ENTERPRISE ARCHITECT

User Guide Series

Modeling Frameworks

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CREATED WITH ENTERPRISE ARCHITECT

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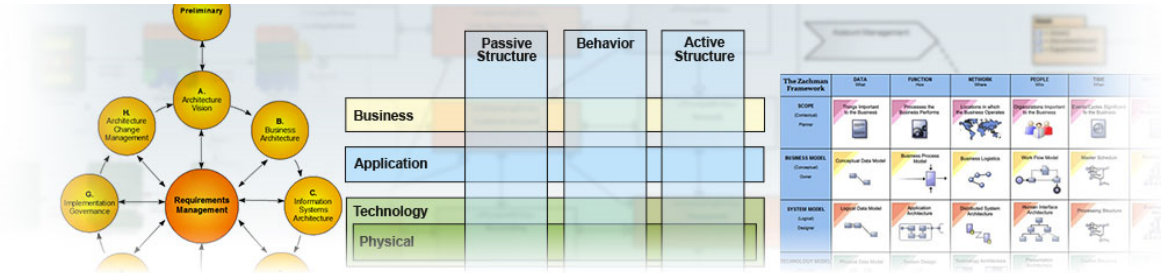


Modeling an enterprise is a significant undertaking, but using a tried and tested industry framework reduces some of the risks and increases the benefits you will gain from the effort and resources used in the creation of the Enterprise Architecture models. Enterprise Architect supports the most popular frameworks, including TOGAF, UPDM, UAF, Zachman Framework, and the Federal Enterprise Architecture Framework. The tool provides many pre-built patterns that, when used, will reduce the modeling effort required and ensure you develop industry-compliant best-practice models, allowing you to concentrate your efforts on the architectural description of your enterprise.

The Zachman Framework	DATA What	FUNCTION How	NETWORK Where	PEOPLE Who	TIME When	MOTIVATION Why
SCOPE (Contextual) Planner	Things Important to the Business	Processes the Business Performs	Locations in which the Business Operates	Organizations Important to the Business	Events/Cycles Significant to the Business	Business Goals/Strategies
BUSINESS MODEL (Conceptual) Owner	Conceptual Data Model	Business Process Model	Business Logistics	Work Flow Model	Master Schedule	Business Plan
SYSTEM MODEL (Logical) Designer	Logical Data Model	Application Architecture	Distributed System Architecture	Human Interface Architecture	Processing Structure	Business Rule Model
TECHNOLOGY MODEL (Physical) Builder	Physical Data Model	System Design	Technology Architecture	Presentation Architecture	Control Structure	Rule Design
DETAILED REPRESENTATIONS Sub-Contractor	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Specification
FUNCTIONING ENTERPRISE	Data	Function	Network	Organization Units	Schedule	Strategy

Zachman Framework Interfaces Diagram showing the cells supported by the Enterprise Architect models.

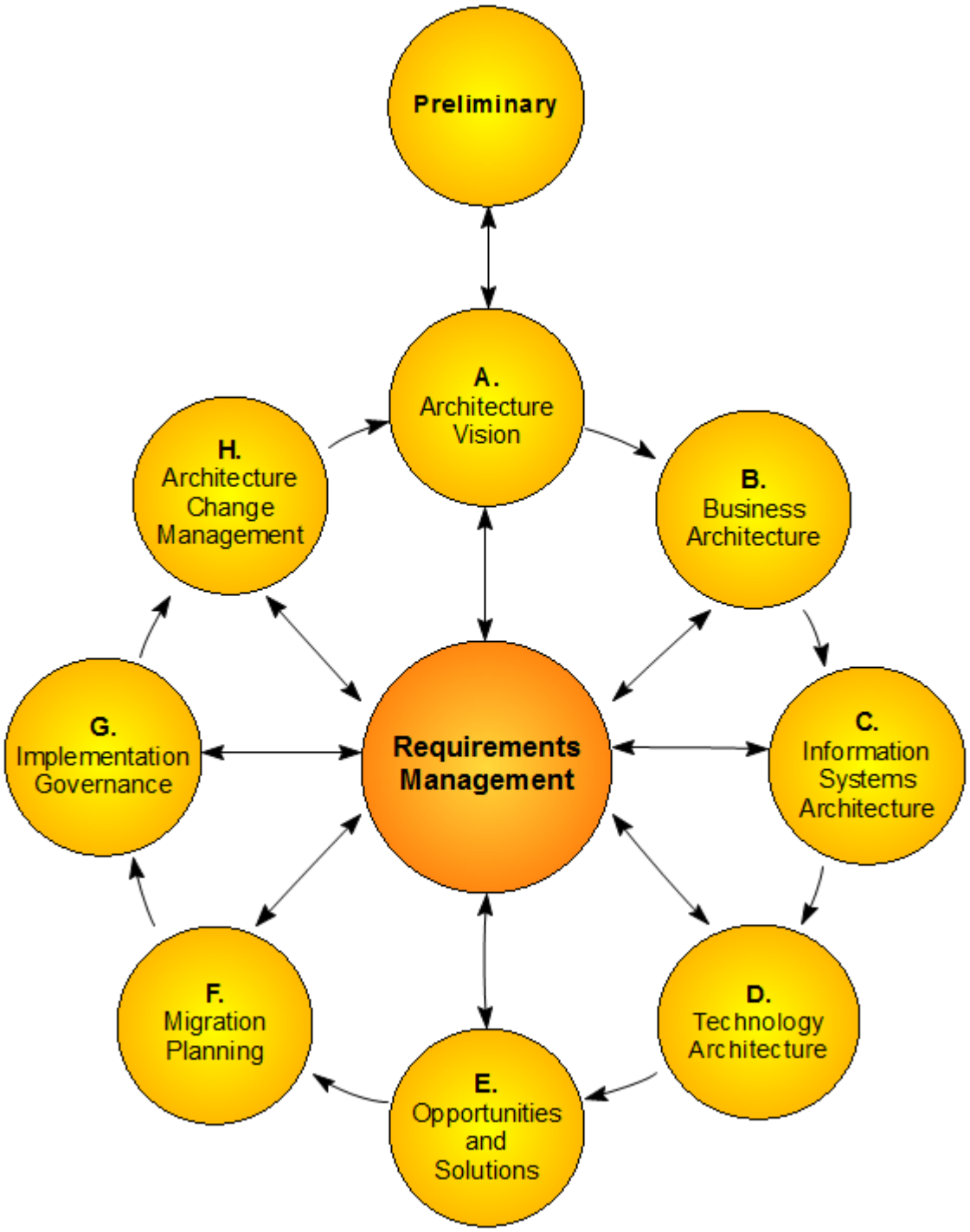
Enterprise Architect allows you to use each framework independently or in combination. For example, you could use TOGAF for your overall Enterprise Architecture governance and description but use Zachman Framework as your content framework to describe and catalog the artifacts in the Architecture Landscape and the Reference Library, Standards, and Governance Log. In this topic, you will learn how to install and use each framework.

Modeling Frameworks

Framework/Language	Description
ArchiMate Framework	ArchiMate is a framework defined by The Open Group that provides a visual modeling language used in the analysis and design of business architectures. The scope for its use is primarily orientated towards enterprise modeling.
TOGAF 	The Open Group Architecture Framework (TOGAF) is one of the most widely accepted methods for developing Enterprise Architecture, providing a practical, definitive and proven step-by-step method for developing and maintaining Enterprise Architecture.
UPDM 	UAF/UPDM tightly integrates with Sparx Systems Enterprise Architect and provides a model-based framework for planning, designing and implementing the Unified Profile for DoDAF and MODAF (UPDM) architectures.
Zachman Framework 	The Zachman Framework is a widely used approach for engineering Enterprise Architecture. The Framework is a simple, logical structure that helps in organizing the content models that describe the Enterprise.
ArcGIS Geodatabases	The ArcGIS framework supports the modeling and design of geodatabase structures for the Esri ArcGIS platform, using a modeling standard based on UML. ArcGIS models can be exported and imported via the ArcGIS XML Workspace document.
Google Cloud Platform (GCP)	Enterprise Architect's Google Cloud Platform modeling provides constructs for creating expressive GCP diagrams used in specifying new Cloud infrastructure and platforms, as well as for documenting existing GCP structures.
Amazon Web Services (AWS)	Enterprise Architect's Amazon Web Services modeling constructs allow you to create detailed diagrams that specify Cloud infrastructure and platforms based on AWS infrastructure. This includes defining IaaS (Infrastructure-as-a-Service) and PaaS (Platform-as-a-Service) environments.
Microsoft Azure	Microsoft Azure provides services to define IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service) and SaaS (Software as a Service) Cloud environments. Enterprise Architect provides modeling constructs that allow you to create expressive Azure diagrams.
MDG Technologies	Using MDG Technologies you can extend the core UML structures to create a modeling framework based on a publicly defined model language or a language of your own definition. As a technology developer, can use Enterprise Architect to develop your own customized modeling languages and solutions.

The Open Group Architecture Framework (TOGAF)

The Open Group Architecture Framework (TOGAF) is one of the most widely accepted methods for developing enterprise architecture. TOGAF is an open framework, providing a practical, definitive and proven step-by-step method for developing and maintaining enterprise architecture.You can use the TOGAF facilities in Enterprise Architect to model an enterprise of any size, and you can create or import any number of Artifacts including Catalogues, Matrices and diagrams, which can all be conveniently stored in the repository that will serve as the Architecture Repository. All Artifacts are stored in compliance with the TOGAF metamodel; additionally Reference Libraries, Standards and governance logs can all be modeled in the tool.

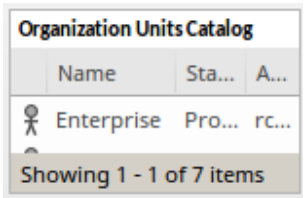


The Open Group's TOGAF Architecture Development Method

Enterprise Architecture is an important discipline, as organizations need to understand the fundamental aspects of their business in order to keep pace with the global market and technology changes in a continually evolving world. Enterprise Architect has built-in support for all the important enterprise architecture frameworks and enterprise modeling languages, allowing you to model an enterprise from the business goals and drivers through to Cloud-based infrastructure services. In this topic you will learn how to model an Enterprise using TOGAF, including working with the ADM and metamodel attributes.

Discussion

The topics described here provide an introduction to, and procedural explanation of, using TOGAF in Enterprise Architect.

Section	Content
Welcome 	This section provides an introduction to TOGAF, and contains the formal documentation defining its use with Enterprise Architect.
Using TOGAF 	Get started with TOGAF, learning about the model structure, templates, diagram types and more.
TOGAF ADM 	The key to TOGAF remains a reliable, practical method - the TOGAF Architecture Development Method (ADM) - for defining business needs and developing an architecture that meets those needs, applying the elements of TOGAF and other architectural assets available to the organization.
The TOGAF Enterprise Continuum 	The TOGAF Enterprise Continuum is a 'virtual repository' of all the architecture assets - models, Patterns, architecture descriptions and other artifacts - that exist both within the enterprise and in the IT industry at large, and that the enterprise considers itself to have available for the development of architectures for the enterprise.
Federal Enterprise Architecture Framework 	TOGAF provides diagrams and Toolbox pages specific to the Federal Enterprise Architecture Framework (FEAF). It also provides 'out-of-the-box' models of the FEAF Performance Reference model and Technical Reference model.
TOGAF Catalogs 	Enterprise Architect helps you to create Model Catalog Artifacts, using the TOGAF-Catalog model Pattern, for: • Actors • Business Services • Organization Units • Principles • Requirements and

	• Roles

Brief Introduction

Welcome to The Open Group Architecture Framework (TOGAF) integrated with Enterprise Architect.

Using this technology, users of Enterprise Architect benefit from TOGAF within a multi-featured modeling environment based on open standards.

About TOGAF

The Open Group Architecture Framework is one of the most widely accepted methods for developing enterprise architectures. TOGAF is an open framework, providing a practical, definitive and proven step-by-step method for developing and maintaining enterprise architectures.

The key to TOGAF remains a reliable, practical method - the TOGAF Architecture Development Method (ADM) - for defining business needs and developing an architecture that meets those needs, applying the elements of TOGAF and other architectural assets available to the organization.

TOGAF embodies the concept of the Enterprise Continuum to reflect different levels of abstraction in an architecture development process. In this way TOGAF facilitates understanding and co-operation between actors at different levels. It provides a context for the use of multiple frameworks, models, and architecture assets in conjunction with the TOGAF ADM. By means of the Enterprise Continuum, architects are encouraged to leverage all other relevant architectural resources and assets, in addition to the TOGAF Foundation Architecture, in developing an organization-specific IT architecture.

For detailed information on TOGAF itself, visit the TOGAF website.

Benefits of TOGAF

- Helps align business processes and IT to the business strategies and goals
- Provides support for all the phases in the ADM
- Provides support for OMG's Business Motivation Model
- Provides support for the Architecture Content Model
- Provides support for visual modeling of As-Is and To-Be architecture
- Provides support for modeling all four architecture domains specific to TOGAF (Business, Application, Data and Technology)
- Provides support for the report generation of TOGAF work products
- Provides the Open Group's TOGAF deliverable templates as Linked Document templates
- Provides out-of-box FEAF reference models

TOGAF Features

- A visual clickable Interface for the Architecture Development Method (ADM)
- Useful starter model to help you become productive quickly
- UML profiles for FEAF Business, Performance, Service and Technical Reference Models
- Efficient relationship management for model artifacts with Enterprise Architect's Relationship Matrix and Hierarchy View
- Links to external files, audit log and report generation features of Enterprise Architect, providing additional capability for maintaining and managing your enterprise architecture
- A TOGAF-specific Glossary for the technology

Getting Started

For instructions on how to start using TOGAF within Enterprise Architect, see the *Using TOGAF* Help topic.

TOGAF System Requirements

TOGAF version 9.x runs under these environments:

Operating Systems

- Windows 10
- Windows 8
- Windows 7
- Windows 2008 Server
- Windows 2003 Server
- Windows XP Service Pack 2

Enterprise Architect Versions

- Enterprise Architect Version 11.1 or later

TOGAF Support

Technical support for modeling through TOGAF in Enterprise Architect is available to registered users of Enterprise Architect in exactly the same way as for Enterprise Architect itself.

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MDG Technology for TOGAF, Enterprise Architect MDG Add-In, Version 3.0.

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Using TOGAF

TOGAF provides a model-based framework for planning, designing and implementing the Architecture for an Enterprise. The starter model provided with TOGAF acts as a base upon which you can build the Enterprise Architecture. You can create the appropriate diagrams from the extended Enterprise Architect UML diagram set, using Toolbox pages that support every phase of the TOGAF Interface Diagram. You can also align models across the phases of the Architecture Development Method (ADM) using the Enterprise Architect Relationship Matrix.

Notes

- TOGAF is integrated with the features of Enterprise Architect
- Enterprise Architect is integrated with other Service Oriented Architecture tools such as SOMF and SoaML, and broader architecture modeling tools such as ArchiMate, SPEM and Business Rule Modeling, all of which you can use in conjunction with the TOGAF to model and develop your Enterprise Architecture

Getting Started With TOGAF

TOGAF is fully integrated with the Unified and Ultimate Editions of Enterprise Architect, in which it is enabled and ready for use.

If you have the Corporate Edition of Enterprise Architect, you can purchase and install an MDG Technology for TOGAF separately; once you have entered the registration key for the MDG Technology for TOGAF, it is automatically available in and integrated with Enterprise Architect, as for the Unified and Ultimate Editions.

You can use the TOGAF profile in the Professional Edition of Enterprise Architect. However, the Gap Analysis Matrix feature is not available for TOGAF in the Professional Edition.

Access TOGAF

1. Create a new Enterprise Architect project file, and click on the top-level Package.
2. Select the 'Design > Package > Model Wizard' option.
3. In the 'Create from Pattern' tab (Model Wizard), select the 'Enterprise Architecture > TOGAF' Perspective and the 'Starter Model' Pattern.
4. Click on the Create Model(s) button.

A new base TOGAF model is created in the Browser window, containing the TOGAF Architecture Development Method (ADM) structures and the Enterprise Continuum asset Packages, and displaying the TOGAF-ADM (Interface) diagram.

TOGAF Model Patterns

TOGAF includes a set of model Patterns that you can use to generate separate models within your TOGAF project. These are available through the Model Wizard (Start Page 'Create from Pattern' tab).

Access

Display the Model Wizard (Start Page 'Create from Pattern' tab), using any of the methods outlined here.

Once in the Model Wizard, select the 'Enterprise Architecture > TOGAF' Perspective.

Select from the TOGAF Patterns:

- Starter Model (includes both ADM and Enterprise Continuum)
- Architecture Development Method (ADM)
- Enterprise Continuum
- Technical Reference Model
- Catalogs

If you require additional diagrams, then while in the Model Wizard, click on the 'Add Diagram' tab and (if necessary) select the 'Enterprise Architecture > TOGAF' Perspective. Then select from the diagram categories:

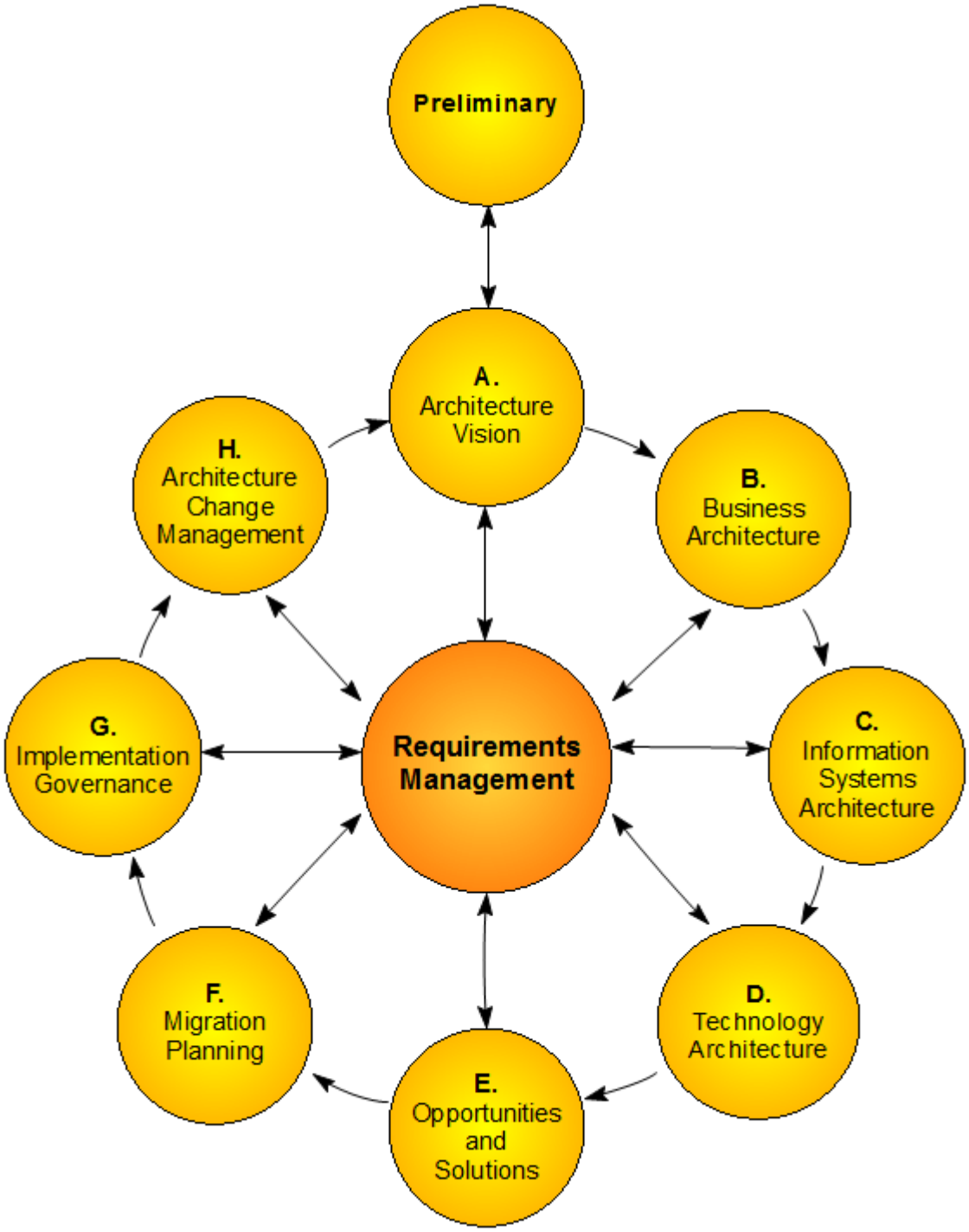
- FEAF Diagrams (Federal Enterprise Architecture Framework)
- TOGAF_BusinessArchitecture
- TOGAF_DataArchitecture
- TOGAF Diagrams

In the 'Diagram Types' panel, select the required diagram type.

Ribbon	Design > Package > Model Wizard
Context Menu	Right-click on Package | Add a Model using Wizard
Keyboard Shortcuts	Ctrl+Shift+M
Other	Browser window Header Bar :  | New Model from Pattern

The TOGAF Interface Diagram

In Enterprise Architect, the TOGAF Framework is presented as a predefined model. The model-level diagram of this model structure is the TOGAF Interface diagram, which serves as a user interface for the development of Enterprise Architecture based on TOGAF.

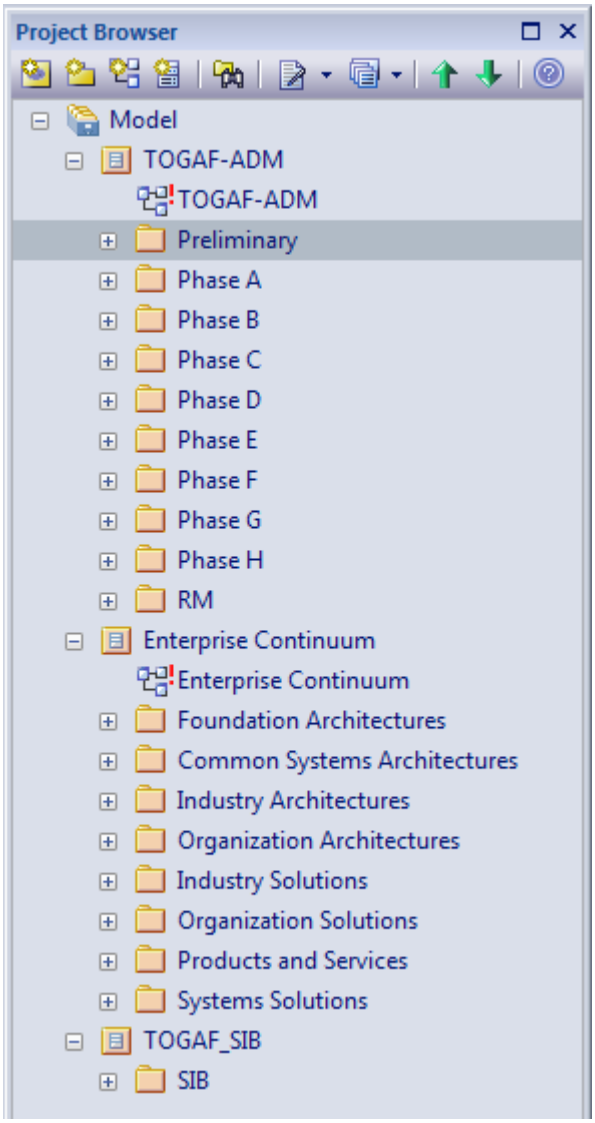


The TOGAF Framework model makes use of UML Packages, which is apparent from the model structure diagram. The Interface diagram itself is a standard UML Package diagram, using custom images.

Double-click on a cell of the Interface diagram to open the model Package and diagram corresponding to that particular ADM phase.

The TOGAF Model Structure

Within the TOGAF Framework model, each ADM phase is modeled as the highest-level Package.



The TOGAF Diagrams

TOGAF provides a number of diagram types to support modeling with TOGAF. These diagrams include:

TOGAF diagrams:

- TOGAF Interface
- Conceptual Framework
- Architecture Content
- Architecture Development Method
- Service Model
- Enterprise Continuum
- Standards Information Base

TOGAF_BusinessArchitecture:

- Benefits
- Business Motivation Model
- Organization Structure
- Business Logistics
- Business Process

TOGAF_DataArchitecture:

- Data Map

FEAF diagrams:

- (FEAF) Business Reference Model
- (FEAF) Service Component Reference Model
- (FEAF) Technical Reference Model
- (FEAF) Performance Reference Model

TOGAF-specific diagrams can be created in the same way as for any other diagram in Enterprise Architect. When you open a TOGAF diagram, Enterprise Architect automatically opens the appropriate Toolbox pages for that diagram.

The TOGAF Toolbox Pages

The MDG Technology For TOGAF Toolbox pages provide elements and relationships for the full range of TOGAF diagrams supported by the Technology.

Access

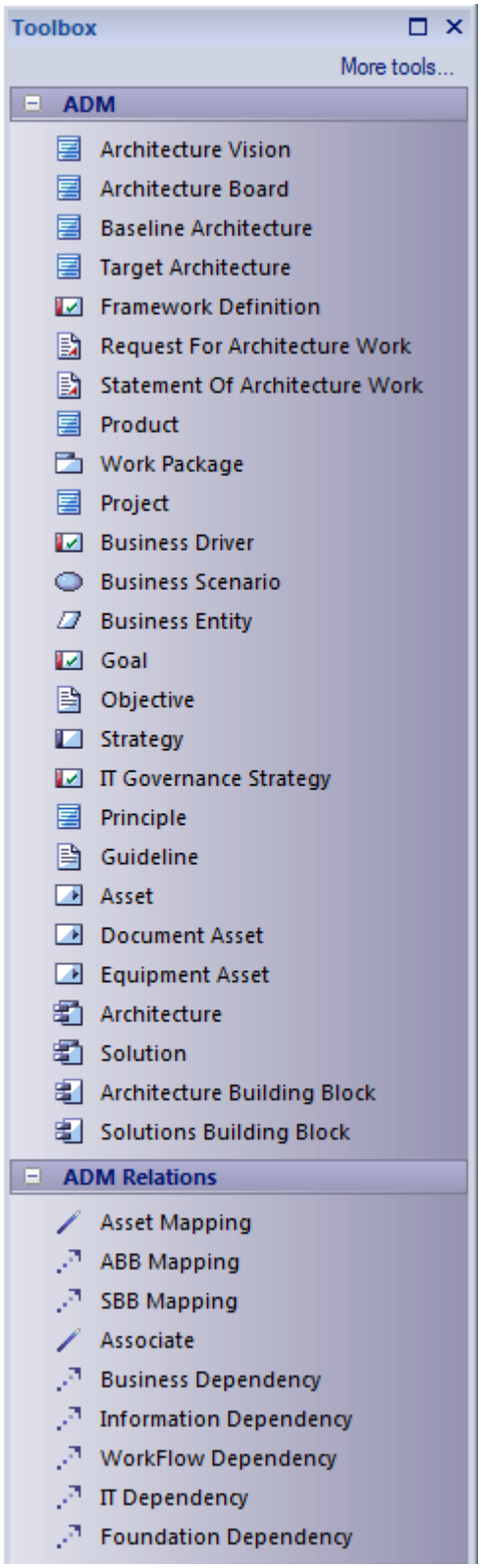
When you open a TOGAF diagram, Enterprise Architect displays the Toolbox pages that are most useful for that particular diagram type. In addition, the 'Common Elements' and 'Common Relationships' pages of UML elements and relationships display, regardless of which diagram is open.

The Diagram Toolbox pages can be docked on either side of the diagram, or free floated on top of the diagram to expose more surface for editing.

Ribbon	Design > Diagram > Toolbox:  > Specify 'TOGAF' in the 'Find Toolbox Item' dialog
Keyboard Shortcuts	Ctrl+Shift+3 :  > Specify 'TOGAF' in the 'Find Toolbox Item' dialog
Other	You can display or hide the Diagram Toolbox by clicking on the  or  icons at the left-hand end of the Caption Bar at the top of the Diagram View.

Architecture Development Method Toolbox Pages

Architecture Development Method (ADM) elements are used to define and model the TOGAF specific primitives in all the phases of ADM. You use them to define the scope of the architecture.



Architecture Development Method Toolbox

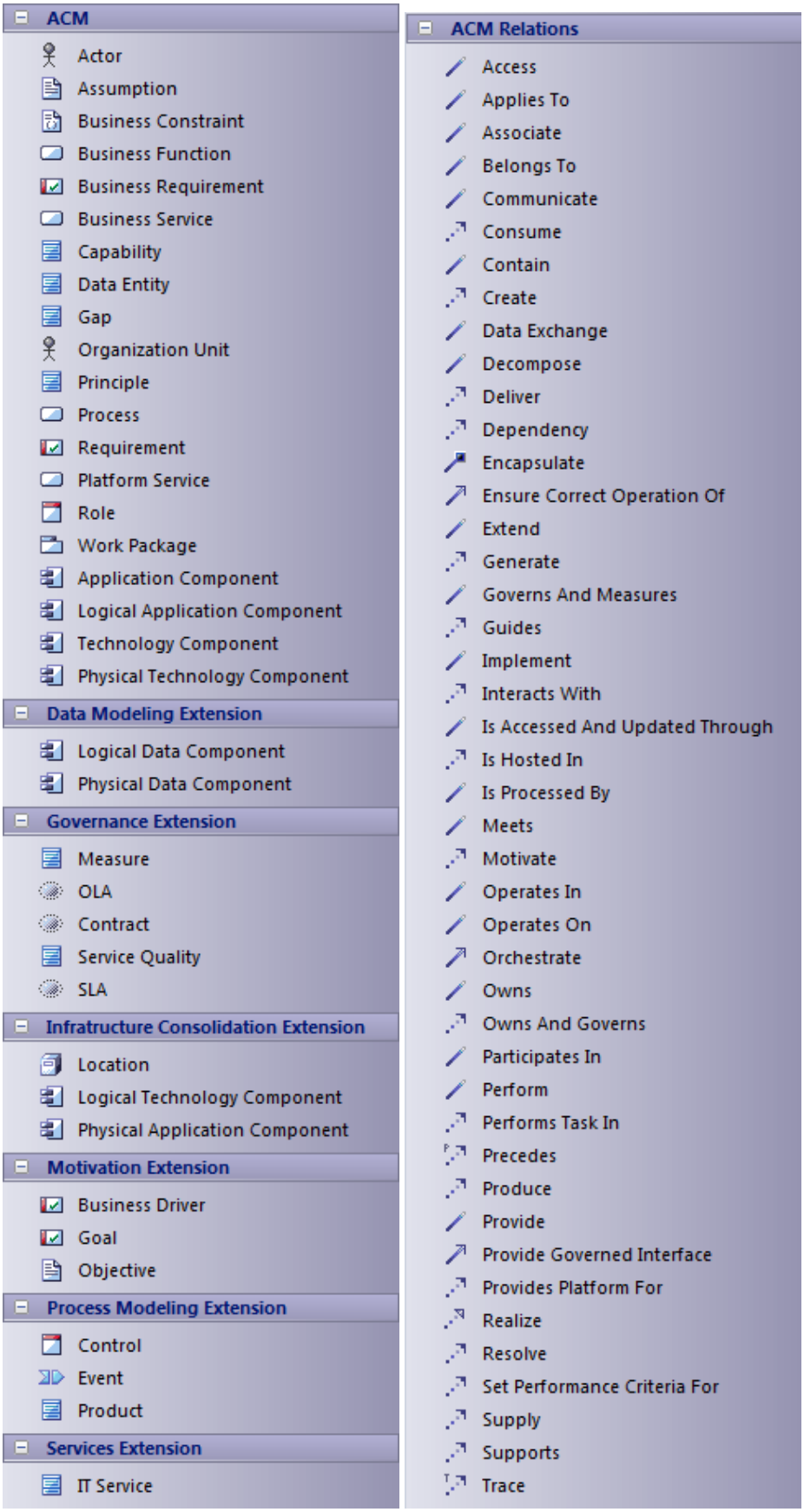
Item	Description
Architecture Vision	Articulates a vision that enables the business goals, responds to the strategic drivers, conforms with the principles, and addresses the stakeholder concerns and objectives. Tagged Values – ID, Scope, Version
Architecture Board	Captures the definition for a cross-organization Architecture Board. This is a key element in a successful architecture governance strategy, to oversee the implementation of the strategy. This body should be representative of all the key stakeholders in the architecture, and typically comprises a group of executives responsible for the review and maintenance of the overall architecture. Tagged Values – ID, Authority Limits, Responsibilities
Baseline Architecture	Captures the very high-level definitions of the Baseline environment from the perspective of business information systems and technology. The scope and level of detail to be defined depends on the extent to which existing architecture elements are likely to be carried over into the Target Architecture. Tagged Values – ID, Type, Version
Target Architecture	Captures the very high-level definitions of the target environment, from the perspective of business information systems and technology. Tagged Values – ID, Type, Version
Framework Definition	Provides a textual description of the Framework. Tagged Values – ID, Version
Request for Architecture Work	Captures the information for the Request for Architecture Work, a major input for the ADM phases. This element is designed as a Document Artifact. On creating a new element of this type, double-click on the element to open the Linked Document and select the 'TOGAF - Request for Architecture Work' template from the list of templates available for the 'Copy Template' option. Tagged Values – ID, Architecturing Organization, Sponsoring Organization
Statement of Architecture Work	Captures the information for the Statement of Architecture Work, a major output for the ADM phases. This element is designed as a Document Artifact. On creating a new element of this type, double-click on the element to open the Linked Document and select the 'TOGAF – Statement of Architecture Work' template from the list of templates available for the 'Copy Template' option. Tagged Values – ID, Version
Product	Captures the information on a product produced by the enterprise. Tagged Value – ID
Work Package	Defines a set of actions that achieve one or more objectives for the business. A work Package can be a part of a project, a complete project, or a program.

	Tagged Values – CapabilityDelivered, WorkPackageCategory, ID, Source, Owner
Project	Captures the information to define a planned endeavor undertaken to create a product or service. Tagged Values – ID, FutureDirections, Introduction, ProjectDevelopment, Process Overview, References, Target Architecture(s) Mapping
Business Driver	Defines the business driver in the 'Name' field. Tagged Values – ID, Version
Business Scenario	Identifies and clarifies business needs, and thereby derives the business requirements that the architecture development has to address. Creating a business scenario involves these steps: 1. Identifying, documenting, and ranking the problem driving the scenario. 2. Identifying the business and technical environment of the scenario and documenting it in scenario models. 3. Identifying and documenting desired objectives. 4. Identifying the human actors (participants) and their place in the business model. 5. Identifying computer actors (computing elements) and their place in the technology model. 6. Identifying and documenting roles, responsibilities, and measures of success per actor; documenting the required scripts per actor, and the results of handling the situation. 7. Checking for 'fitness-for-purpose' and refining only if necessary. A Linked Document template for Business Scenarios is provided by the Technology. To use the template, right-click on the element and select the 'Edit Linked Document' menu option. Select 'TOGAF – Business Scenario/Architecture Vision' for the 'Copy template' option. Tagged Value – ID
Business Entity	A generic element that captures enterprise resources. Tagged Values – ID, Description
Goal	Captures what is to be achieved by the enterprise, with specifications defined by the Tagged Values. Tagged Values – Assumption, Critical Success Factor, Goal Type, ID, Key Performance Indicator, Measure, Unit Responsible, Opportunity, Strength, Threat, Weakness
Objective	Captures the attainable, time-targeted, and measurable target that the enterprise seeks to meet in order to achieve its goals. Tagged Value – ID
Strategy	Captures the strategy statements for the business plan. Tagged Values – Action Plan, Estimated Budget, Estimated Time Period, ID, Measure, Target Value
IT Governance Strategy	Defines the strategy statement for IT governance. Tagged Values – ID, Version
	Defines and guides the organization, for the use of all assets and resources across

Principle	the enterprise. Each Principle should be linked to the relevant business objective and key architecture drivers. Tagged Values – ID, Implications, Rationale, Statement, Type, Version
Guideline	Captures the Guidelines governing the enterprise and its functions, by providing guidance on the optimal ways to carry out design or implementation activities. Tagged Value – ID
Asset	Captures the enterprise resources that could be estimated for value. Tagged Values – ID, AssetValue, Description
Document Asset	A subtype of Asset that captures the important document resources of the enterprise. Tagged Values – ID, AssetValue, Description
Equipment Asset	A subtype of Asset that captures the equipment resources of the enterprise. Tagged Values – ID, AssetValue, Description
Architecture	Captures summary views of the Architecture Landscape (that is, the state of the enterprise) at particular points in time. Tagged Values – ID, Category, Source, Owner, Subject Matter, View Point, Level Of Detail, Level Of Abstraction, Accuracy, Version, Maturity
Solution	Captures the summary views of a solution in place for a specific architecture. Tagged Values – ID, Category, Source, Owner, Subject Matter, Time, Volatility, Version, Maturity
Architecture Building Block	(ABB) Relates to the Architecture Continuum, and is defined or selected as a result of the application of the ADM. Tagged Values – ID, Description, Owning Organization, Rationale, ServicePortfolio
Solutions Building Block	(SBB) Relates to the Solutions Continuum, and can be either procured or developed. Tagged Values – ID, Description, Supplier Organization

Architecture Content Model Toolbox Pages

The Architecture Content framework provides a structural model for architectural content that enables the major work products that an architect creates to be consistently defined, structured, and presented.



The elements in each of the Architecture Content Model Toolbox pages are described in separate topics:

- *ACM Core*

- *Data Modeling Extension*
- *Governance Extension*
- *Infrastructure Consolidation Extension*
- *Motivation Extension*
- *Process Modeling Extension*
- *Services Extension*

For information on Architecture Content Model relationships, see the topic *Architecture Content Metamodel Relationships* in the TOGAF online documentation.

ACM Core

Elements from the ACM page of the Architecture Content Model Toolbox.

ACM Core Toolbox

Item	Description
Actor	Identifies a person, organization or system with a role that initiates or interacts with activities. Actors can be internal or external to an organization. Tagged Values – ID, Category, Source, Owner, #FTEs, ActorGoal, ActorTasks
Assumption	Defines a statement of probable fact that has not been fully validated at this stage, due to external constraints. Tagged Values – ID, Rationale, Statement, Type
Business Constraint	Identifies an external factor that prevents an organization from pursuing particular approaches to meet its goals. Tagged Value – ID
Business Function	Identifies a factor that delivers business capabilities closely aligned to an organization, but not necessarily explicitly governed by the organization. Tagged Value – ID
Business Requirement	Defines a quantitative statement of business need that must be met by a particular architecture or work Package. Tagged Value – ID
Business Service	Identifies a service that supports business capabilities through an explicitly defined interface and is explicitly governed by an organization. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate
Capability	Defines a business-focused outcome that is delivered by the completion of one or more work Packages. Using a capability-based planning approach, change activities can be sequenced and grouped in order to provide continuous and incremental business value. Tagged Values – ID, Category, Source, Owner, Increments, BusinessValue
Data Entity	Defines an encapsulation of data that is recognized by a business domain expert as an entity. Logical data entities can be tied to applications, repositories and services, and can be structured according to implementation considerations. Tagged Values – ID, Category, Source, Owner, PrivacyClassification, RetentionClassification
Gap	Provides a statement of difference between two states. Used in the context of gap analysis, where the difference between the Baseline and Target Architecture is identified. Tagged Values – ID, Category, Source, Owner

Organization Unit	Defines a self-contained unit of resources with line management responsibility, goals, objectives, and measures. Organizations can include external parties and business partner organizations. Tagged Values – ID, PersonIncharge
Principle	Provides a qualitative statement of intent that should be met by the architecture. This has at least a supporting rationale and a measure of importance. Tagged Values – ID, Type, Statement, Rationale, Implications
Process	Represents the flow of control between or within functions and/or services (depending on the granularity of definition). Processes represent a sequence of activities that together achieve a specified outcome, can be decomposed into sub-processes, and can show operation of a function or service (at the next level of detail). Processes can also be used to link or compose organizations, functions, services, and processes. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate, ProcessCriticality, ProcessVolumetrics, ProcessType
Platform Service	Defines a technical capability required to provide enabling infrastructure that supports the delivery of applications. Tagged Values – ID, Category, Source, Owner, StandardClass
Role	Defines the usual or expected function of an Actor, or the part somebody or something plays in a particular action or event. An Actor can have a number of roles. Tagged Values – ID, Category, Source, Owner, Responsibilities
Work Package	Identifies a set of actions to achieve one or more objectives for the business. A work Package can be a part of a project, a complete project or a program. Tagged Values – ID, Category, Source, Owner, CapabilityDelivered
Application Component	Provides an encapsulation of application functionality aligned to implementation structure. See also: 'Logical Application Component' and 'Physical Technology Component'. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate
Logical Application Component	Provides an encapsulation of application functionality that is independent of a particular implementation. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate
Technology Component	Provides an encapsulation of technology infrastructure that represents a class of technology product or specific technology product. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate
Physical Technology	Defines an instance of a specific technology infrastructure product or technology

Component	infrastructure product. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate, ModuleName, ProductName, Vendor, Version

Data Modeling Extension

Elements from the Data Modeling Extension page of the Architecture Content Model Toolbox.

Data Modeling Extensions Toolbox

Item	Description
Logical Data Component	Defines a boundary zone that encapsulates related data entities to form a logical location to be held. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate
Physical Data Component	Defines a boundary zone that encapsulates related data entities to form a physical location to be held. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate

Governance Extension

Elements from the Governance Extension page of the Architecture Content Model Toolbox.

Governance Extension Toolbox

Item	Description
Measure	Identifies an indicator or factor that can be tracked, usually on an ongoing basis, to determine success or alignment with objectives and goals. Tagged Values – ID, Category, Source, Owner
Contract	Defines an agreement between a service consumer and a service provider that establishes functional and non-functional parameters for interaction. Tagged Values – ID, Source, Owner, AvailabilityCharacteristics, BehaviorCharacteristics, CapacityCharacteristics, ConsumingService, ContractControlRequirements, CredibilityCharacteristics, ExtensibilityCharacteristics, Growth, GrowthPeriod, IntegrityCharacteristics, InternationalizationCharacteristics, LocalizationCharacteristics, LocatabilityCharacteristics, ManageabilityCharacteristics, PeakProfileLongTerm, PeakProfileShortTerm, PerformanceCharacteristics, PortabilityCharacteristics, PrivacyCharacteristics, ProvidingService, QualityOfInformationRequired, RecoverabilityCharacteristics, ReliabilityCharacteristics, ResponseRequirements, ResultControlRequirements, ScalabilityCharacteristics, SecurityCharacteristics, ServiceabilityCharacteristics, ServiceQualityCharacteristics, ServiceTimes, Throughput, ThroughputPeriod
OLA	Defines an Operation Level Agreement. Tagged Values – ID, Source, Owner, AvailabilityCharacteristics, BehaviorCharacteristics, CapacityCharacteristics, ConsumingService, ContractControlRequirements, CredibilityCharacteristics, ExtensibilityCharacteristics, Growth, GrowthPeriod, IntegrityCharacteristics, InternationalizationCharacteristics, LocalizationCharacteristics, LocatabilityCharacteristics, ManageabilityCharacteristics, PeakProfileLongTerm, PeakProfileShortTerm, PerformanceCharacteristics, PortabilityCharacteristics, PrivacyCharacteristics, ProvidingService, QualityOfInformationRequired, RecoverabilityCharacteristics, ReliabilityCharacteristics, ResponseRequirements, ResultControlRequirements, ScalabilityCharacteristics, SecurityCharacteristics, ServiceabilityCharacteristics, ServiceQualityCharacteristics, ServiceTimes, Throughput, ThroughputPeriod
SLA	Defines a Service Level Agreement Tagged Values – ID, Source, Owner, AvailabilityCharacteristics, BehaviorCharacteristics, CapacityCharacteristics, ConsumingService, ContractControlRequirements, CredibilityCharacteristics, ExtensibilityCharacteristics, Growth, GrowthPeriod, IntegrityCharacteristics, InternationalizationCharacteristics, LocalizationCharacteristics, LocatabilityCharacteristics, ManageabilityCharacteristics, PeakProfileLongTerm, PeakProfileShortTerm, PerformanceCharacteristics, PortabilityCharacteristics, PrivacyCharacteristics, ProvidingService, QualityOfInformationRequired, RecoverabilityCharacteristics, ReliabilityCharacteristics, ResponseRequirements, ResultControlRequirements, ScalabilityCharacteristics, SecurityCharacteristics, ServiceabilityCharacteristics, ServiceQualityCharacteristics, ServiceTimes,

	Throughput, ThroughputPeriod
Service Quality	Defines a preset configuration of non-functional attributes that can be assigned to a service or service contract. Tagged Values – ID, Category, Source, Owner

Infrastructure Consolidation Extension

Elements from the Infrastructure Consolidation Extension page of the Architecture Content Model Toolbox.

Infrastructure Consolidation Extension Toolbox

Item	Description
Location	Represents a place where business activity takes place and can be hierarchically decomposed. Tagged Values – ID, Category, Source, Owner
Logical Technology Component	Provides an encapsulation of technology infrastructure that is independent of a particular product. A class of technology product. Tagged Values – ID, Category, Source, Owner, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate
Physical Application Component	Identifies an application, application module, application service or other deployable component of functionality. Tagged Values – ID, Source, Owner, AvailabilityCharacteristics, CapacityCharacteristics, CredibilityCharacteristics, ExtensibilityCharacteristics, Growth, GrowthPeriod, IntegrityCharacteristics, InternationalizationCharacteristics, InteroperabilityCharacteristics, LocalizationCharacteristics, LocatabilityCharacteristics, ManageabilityCharacteristics, PeakProfileLongTerm, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetirementDate, PeakProfileShortTerm, PerformanceCharacteristics, PortabilityCharacteristics, PrivacyCharacteristics, RecoverabilityCharacteristics, ReliabilityCharacteristics, ScalabilityCharacteristics, SecurityCharacteristics, ServiceabilityCharacteristics, ServiceTimes, Throughput, ThroughputPeriod, LifeCycleStatus, InitialLiveDate, DateOfLastRelease, DateOfNextRelease, StandardsClass

Motivation Extension

Elements from the Motivation Extension page of the Architecture Content Model Toolbox.

Motivation Extension Toolbox

Item	Description
Business Driver	Defines an external or internal condition that motivates the organization to define its goals. Tagged Values – ID, Version
Goal	Provides a high-level statement of intent or direction for an organization. Typically used to measure success of an organization. Tagged Values – ID, Category, Source, Owner
Objective	Identifies a time-bounded milestone for an organization, to demonstrate progress towards a goal. Tagged Values – ID

Process Modeling Extension

Elements from the Process Modeling Extension page of the Architecture Content Model Toolbox.

Process Modeling Extension Toolbox

Item	Description
Control	Defines a decision-making step with accompanying decision logic, used to determine the execution approach for a process or to ensure that a process complies with governance criteria. Tagged Values – ID, Category, Source, Owner
Event	Defines an organizational state change that triggers processing events; can originate from inside or outside the organization and can be resolved inside or outside the organization. Tagged Values – ID, Category, Source, Owner
Product	Defines the output generated by the business; that is, the business product of the execution of a process. Tagged Values – ID, Category, Source, Owner

Services Extension

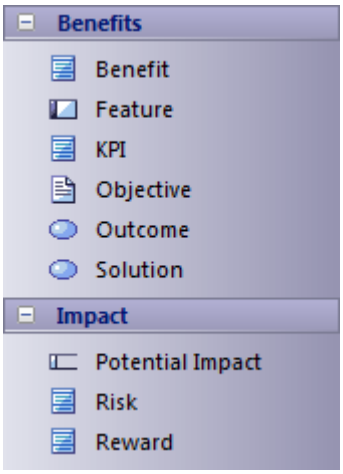
Elements from the Services Extension page of the Architecture Content Model Toolbox.

Services Extension Toolbox

Item	Description
IT Service	Defines the automated elements of a business service. An information system service can deliver or support part or all of one or more business services. Tagged Values – ID, Category, Source, Owner, DefinitionText, ContactPoint, Availability, ChargeToUser, DependentSystems, StandardsClass, StandardCreationDate, LastStandardReviewDate, NextStandardReviewDate, RetireDate

Benefits Toolbox Pages

You use the Benefits Toolbox to create elements that represent and depict the opportunities identified in an architecture definition, classified according to their relative size, benefit, and complexity. The resulting Benefits diagram can be used by stakeholders to make decisions on selection, prioritization and sequencing of the identified opportunities.



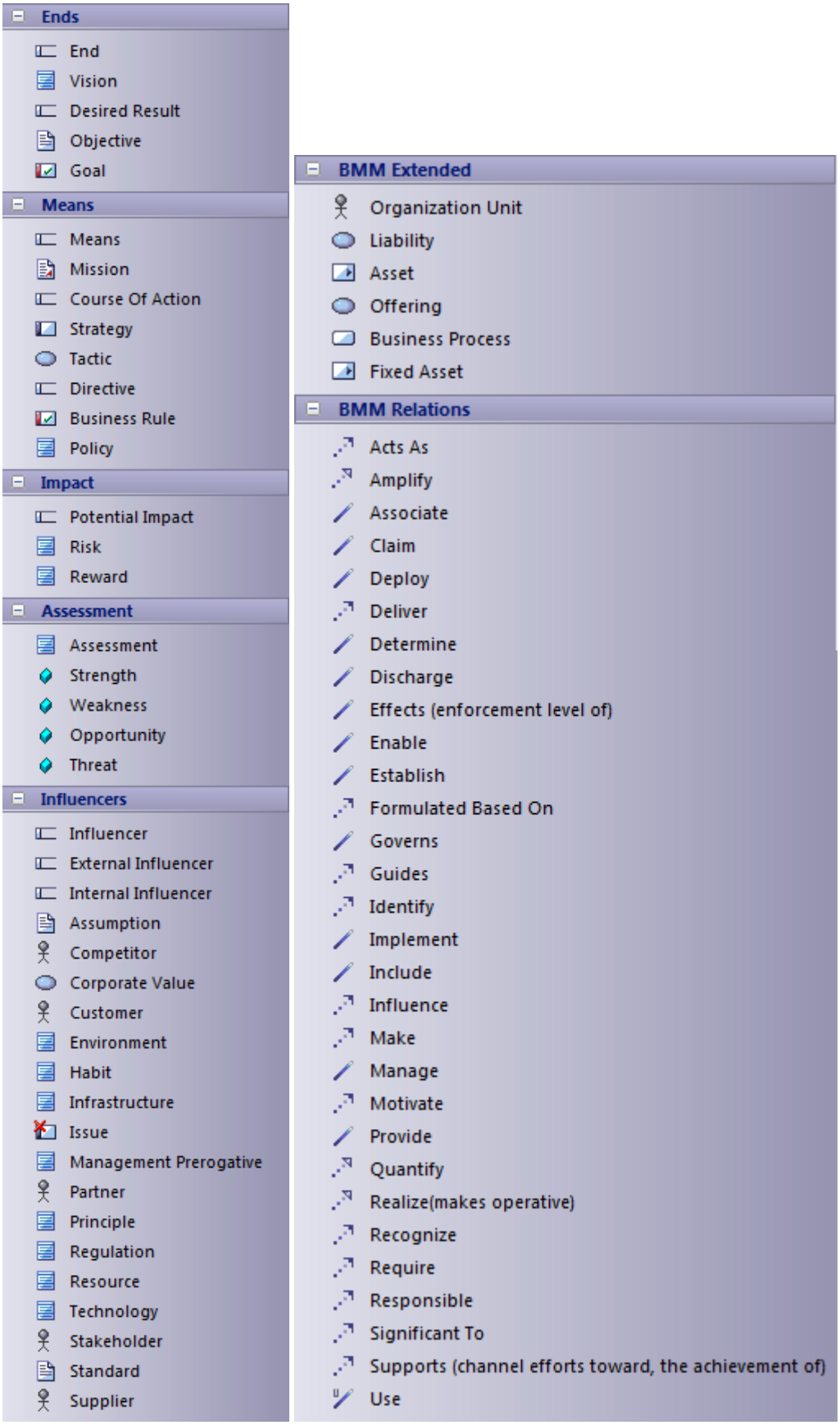
Benefits Toolbox

Item	Description
Benefit	An Artifact to model the benefit of an opportunity identified in the architecture definition. Tagged Values – ID, Owner, Source, Category
Feature	Represents a characteristic of a service or solution Tagged Values – ID, Owner, Source, Category
KPI	(Key Performance Indicator) A metric used to define and measure progress towards achieving goals or critical success factors. Tagged Values – ID, Owner, Source, Category
Objective	A statement of an attainable, time-targeted and measurable target that the enterprise seeks to meet in order to achieve its goals. An Objective quantifies a Goal. Tagged Value – ID
Outcome	The resulting end state of an event, decision or architecture process. Tagged Values – ID, Owner, Source, Category
Solution	A statement of an operation or activity that supports the outcome. Tagged Values – ID, Owner, Source, Category
Potential Impact	See the Help on the 'Impact' Toolbox page for the Business Motivation Model.
Risk	See the Help on the 'Impact' Toolbox page for the Business Motivation Model.

Reward	See the Help on the 'Impact' Toolbox page for the Business Motivation Model.

Business Motivation Model Toolbox Pages

The Business Motivation Model Toolbox pages are based on the OMG specification for the Business Motivation Model (BMM). These elements provide a structure for developing, communicating, and managing business plans in an organized manner.



The elements in each of the Business Motivation Model Toolbox pages are described in separate topics:

- *Ends Page*

- *Means Page*
- *Impact Page*
- *Assessment Page*
- *Influencers Page*
- *BMM Extended Page*

Ends Page

Elements from the 'Ends' page of the Business Motivation Model Toolbox.

Ends Toolbox

Item	Description
End	Groups 'end' concepts (Vision and Desired Result). An End is something the business seeks to accomplish. It does not include any indication of how it is to be achieved. Tagged Values – ID, Category, Source, Owner
Vision	Describes the future state of the enterprise, without regard to how it is to be achieved. A Vision is supported or made operative by Missions, and is amplified by Goals. Tagged Value – ID
Desired Result	Groups 'desired result' concepts (Goal and Objective). A Desired Result is an End that is a state or target that the enterprise intends to maintain or sustain. A Desired Result is supported by Courses of Action. One Desired Result can include other Desired Results and can itself be included in another Desired Result. Tagged Values – ID, Category, Source, Owner
Goal	A statement about a state or condition of the enterprise to be brought about or sustained through appropriate Means. A Goal amplifies a Vision. Tagged Values – Assumption, Critical Success Factor, Goal Type, ID, Key Performance Indicator, Measure, Unit Responsible, Opportunity, Strength, Threat, Weakness
Objective	A statement of an attainable, time-targeted and measurable target that the enterprise seeks to meet in order to achieve its goals. An Objective quantifies a Goal. Tagged Value – ID

Means Page

Elements from the 'Means' page of the Business Motivation Model Toolbox.

Means Toolbox

Item	Description
Means	Groups 'Means' concepts (Mission, Course of Action and Directive). A Means represents any capabilities that can be exploited to achieve the desired Ends. Tagged Values – ID, Category, Source, Owner
Mission	Captures the mission statement, policies and values of the enterprise. A Mission indicates the ongoing operational activity of the enterprise, and makes a Vision operative. Tagged Values – ID, Category, Source, Owner
Course of Action	Groups 'course of action' concepts (Strategy and Tactic). A Course of Action is an approach or plan for configuring some aspect of the enterprise involving things, processes, locations, people, timing or motivation, undertaken to achieve Desired Results. A Course of Action channels efforts towards Desired Results. Courses of Action are governed by Directives. It is also possible for the Courses of Action to be formulated based on Directives. Courses of Action can be realized by Business Processes. One Course of Action can include other Courses of Action, and one Course of Action can be enabled by another Course of Action. Tagged Values – ID, Category
Strategy	Defines the right approach to achieve a set of Goals, given the environmental constraints and risks. A Strategy usually channels efforts towards those Goals. Tagged Values – Action Plan, Estimated Budget, Estimated Time Period, ID, Measure, Target Value
Tactic	A Course of Action that represents part of the detailing of a Strategy. A Tactic implements one or more Strategies. Tagged Values – ID, Category
Directive	Indicates how the Course of Action should, or should not, be carried out. A Directive defines, constrains or liberates some aspect of an enterprise. It is intended to assert business structure or to control or influence the behavior of the business, and is stated in declarative form. Directives govern Courses of Action. A Directive is defined to support the achievement of a Desired Result directly. Tagged Values – ID, Category
Business Rule	A Business Rule element captures the Business Rule statements. Business Rules provide specific, actionable governance or guidance to implement Business Policies. Business Rules guide Business Processes. Tagged Values – ID, Name, Description, Effective_From, Expiry_From, Status, Version, Enforcement_Level
	Captures the policy definitions followed in the enterprise. A Business Policy is a

Policy	non-actionable Directive whose purpose is to govern or guide the enterprise. Business Policies provide the basis for Business Rules. Business Policies also govern Business Processes. One Business Policy can include other Business Policies. Tagged Value – ID

Impact Page

Elements from the 'Impact' page of the Business Motivation Model Toolbox.

Impact Toolbox

Item	Description
Potential Impact	Groups the concepts of 'impacts' (Risk and Reward). Each Potential Impact is an evaluation that quantifies or qualifies some aspect of an Assessment in specific terms, types or dimensions. An Assessment identifies some Potential Impacts. A Potential Impact can be significant to an Assessment. Tagged Values – ID, Category, Source, Owner
Risk	A Potential Impact that indicates the possibility of loss, injury, disadvantage or destruction. Tagged Value – ID
Reward	A Potential Impact that indicates the probability of gain. Tagged Value – ID

Assessment Page

Elements from the 'Assessment' page of the Business Motivation Model Toolbox.

Assessment Toolbox

Item	Description
Assessment	A judgment on an Influencer that affects the organization's ability to employ its Means or achieve its Ends. A Directive is motivated by an Assessment. Assessments can also use other Assessments. An Assessment can support the achievement of Ends. Tagged Values – ID, Source, Owner
Strength	This category of Assessment indicates some advantage or area of excellence within the enterprise that can impact its employment of Means or achievement of Ends. It is modeled as a parameter of the Assessment element. Tagged Value – ID
Weakness	This category of Assessment indicates some area of inadequacy within the enterprise that can impact its employment of Means or achievement of Ends. It is modeled as a parameter of the Assessment element. Tagged Value – ID
Opportunity	This category of Assessment indicates that some Influencer can have a favorable impact on the organization's employment of Means or achievement of Ends. It is modeled as a parameter of the Assessment element. Tagged Value – ID
Threat	This category of Assessment indicates that some Influencer can have an unfavorable impact on the organization's employment of Means or achievement of Ends. It is modeled as a parameter of the Assessment element. Tagged Value – ID

Influencers Page

Elements from the 'Influencers' page of the Business Motivation Model Toolbox.

Influencers Toolbox

Item	Description
Influencer	An Influencer element groups the elements influencing an Assessment. The Influencers are those that can impact the enterprise in its employment of Means or achievement of its Ends. This impact has influence that is judged in Assessments. Tagged Values – ID, Category
External Influencer	An External Influencer element groups the elements having an external influence on an Assessment. External Influencers are those outside an enterprise's organizational boundaries that can impact its employment of Means or achievement of Ends. Tagged Values – ID, Category
Internal Influencer	An Internal Influencer element groups the elements having an internal influence on an Assessment. Internal Influencers are those from within an enterprise that can impact its employment of Means or achievement of Ends. Tagged Values – ID, Category
Assumption	An Assumption element captures the assumptions made in information manipulation; assumptions are items of information taken for granted or without proof. Tagged Values – ID, Rationale, Statement, Type
Competitor	An External Influencer that is an individual or enterprise posing a challenge to the subject enterprise. Tagged Value – ID
Corporate Value	An ideal, custom or institution that an enterprise promotes or agrees with (either positive or negative). Tagged Value – ID
Customer	An External Influencer as an individual or enterprise that has investigated, ordered, received or paid for products or services from the subject enterprise. Tagged Value – ID
Environment	An Environment element is the aggregate of surrounding conditions or Influencers affecting the existence or development of an enterprise. Tagged Value – ID
Habit	A customary practice or use. Tagged Value – ID
Infrastructure	An Internal Influencer forming the basic underlying framework or features of a

	system. Tagged Value – ID
Issue	A point in question or a matter that is in dispute as between contending partners.
Management Prerogative	A right or privilege exercised by virtue of ownership or position in an enterprise. Tagged Value – ID
Partner	An External Influencer as an enterprise that shares risks and profit with the subject enterprise (or is associated with the subject enterprise to share risks and profit) because this is mutually beneficial. Tagged Value – ID
Principle	Defines and guides the organization, for use of all assets and resources across the enterprise. Each Principle should be linked to the relevant business objective and key architecture drivers. Tagged Values – ID, Implications, Rationale, Statement, Type, Version
Regulation	An External Influencer as an order prescribed by an authority such as a government body or the management of an enterprise. Tagged Value – ID
Resource	An internal Influencer as a resource available for carrying out the business of an enterprise, applying its influence especially by way of its quality. Tagged Value – ID
Technology	An External Influencer as the role of technology, including its developments and limitations — there could be prerequisites for use of technology, or an enterprise activity that technology enables or restricts. Tagged Value – ID
Stakeholder	Captures the actors interested and involved in the enterprise. Tagged Value – ID
Standard	Defines the standards followed in the enterprise. Tagged Values – ID, Statement, Type
Supplier	An External Influencer as an individual or enterprise that can furnish or provide products or services to the subject enterprise. Tagged Value – ID

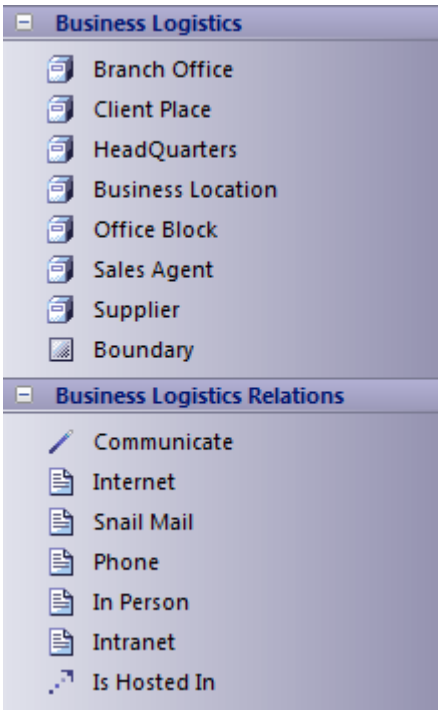
BMM Extended Page

Elements from the 'BMM Extended' page of the Business Motivation Model Toolbox.

BMM Extended Toolbox

Item	Description
Organization Unit	Represents any recognized association of people in the context of the enterprise. In a hierarchical structure, it might be the corporation, a division, a department, a group or a team. Tagged Values – ID, PersonInCharge
Liability	A Liability is a reservation of actual resources (materials, finished goods, people's time, cash) to meet commitments. A Liability can be discharged by Courses of Action, can be the responsibility of Organization Units, and can claim Resources. Tagged Value – ID
Asset	An Asset is something of value owned by the enterprise. Tagged Values – ID, Description, AssetValue
Offering	An Offering is a Fixed Asset that is a specification of a product or service that can be supplied by the enterprise. An Offering can be defined by Courses of Action, can be delivered by Business Processes, can require Resources and can use Fixed Assets. Tagged Value – ID
Business Process	A function or behavior of the Enterprise or part of the Enterprise. A Business Process is the responsibility of an Organization Unit, realizes Courses of Action, is guided by Business Rules, is governed by Business Policies, can deliver Offerings and can manage Assets. Tagged Values – ID, Description, ProcessType
Fixed Asset	A Fixed Asset is an Asset that is maintained over time and reused. A Fixed Asset can be used by Offerings and can provide Resources. Tagged Values – ID, AssetValue

Business Logistics Toolbox Pages



Business Logistics Toolbox

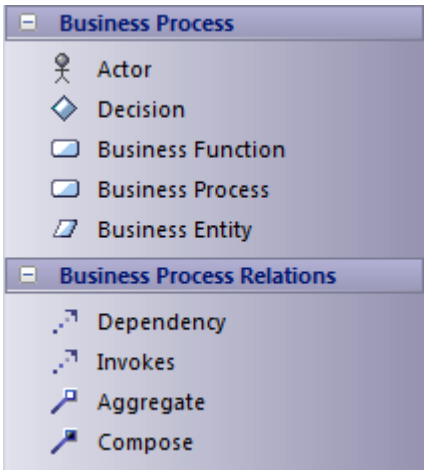
Item	Description
Branch Office	Models a Business Location as a Branch Office.
Client Place	Models a Business Location as a Client Place.
Head Quarters	Models a Business Location as a Head Quarters.
Business Location	Models the location from which the business operates.
Office Block	Models a Business Location as an Office Block.
Sales Agent	Models a Business Location as a Sales Agent.
Supplier	Models a Business Location as a Supplier.
Communicate	Indicates that a business location communicates directly with another business location.
Internet	Indicates that the means of communication is the World Wide Web.
Snail Mail	Indicates that the means of communication is the postal system or courier services.
Phone	Indicates that the means of communication is the telephone.

In Person	Indicates that the means of communication is direct person-to-person.
Intranet	Indicates that the means of communication is the local intranet or WAN.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Business Process Toolbox Pages



Business Process Toolbox

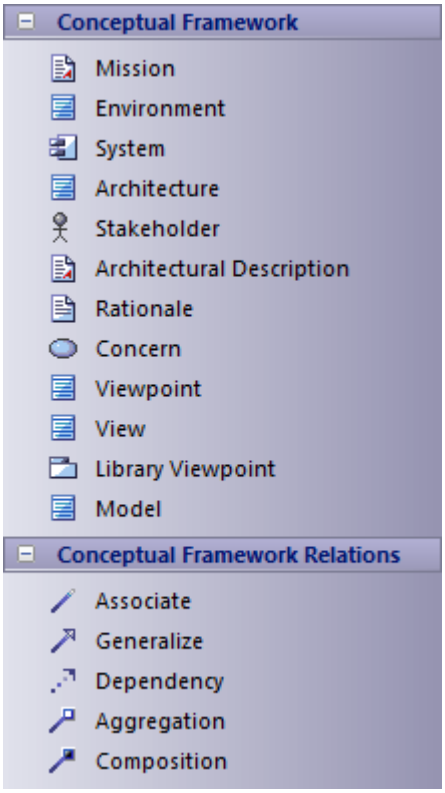
Item	Description
Actor	Models a stakeholder or any other human resource of the Enterprise.
Decision	Indicates point of conditional progression where a business decision is taken.
Business Function	A major function performed by the Enterprise or a part of the Enterprise.
Business Process	A function or behavior of the Enterprise or part of the Enterprise.
Business Entity	A generic element to capture Enterprise resources.
Invokes	A relationship that defines the invocation of a business process.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Conceptual Framework Toolbox Pages

The Conceptual Framework Elements are used to model the architectural descriptions and to establish concepts for architectural thinking. The Toolbox element design is based on IEEE standard 1471 - 2000.



Conceptual Framework Toolbox

Item	Description
Mission	Captures the mission statement, policies and values of the enterprise. Tagged Value – ID
Environment	Defines the developmental, operational and programmatic context of the system for the purpose of Enterprise Engineering work. Tagged Value – ID
System	Captures details of a working component of the enterprise. System includes, for example, application, system, platform, system -of-systems, enterprise and product line. Tagged Value – ID
Architecture	Captures the definition of the Architecture work. Tagged Value – ID
Stakeholder	Captures the actors interested and involved in the enterprise. Tagged Value – ID

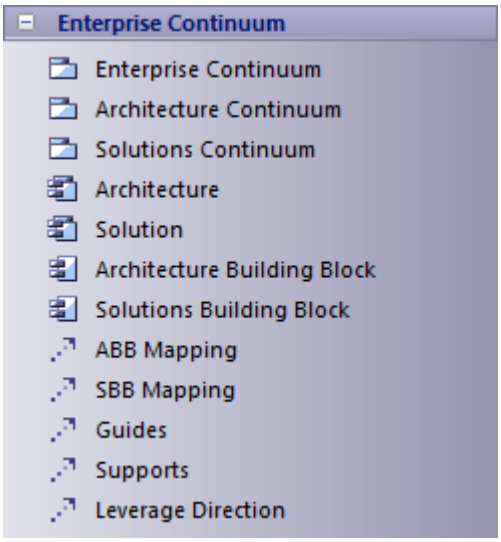
Architectural Description	Captures the architectural descriptions and identifies the system's stakeholders and their concerns. Tagged Value – ID
Rationale	Captures the statement of purpose for the Architectural Description.
Concern	Forms the basis for completeness. An Architectural Description addresses all stakeholders' concerns, and each Concern is addressed by an Architectural View
Viewpoint	A Pattern for constructing Views – Viewpoints define the rules on Views. Each View corresponds to exactly one Viewpoint. Tagged Value – ID
View	A representation of a whole system from the perspective of a set of Concerns. A View can contain one or more architectural models, so the View can use multiple notations.
Library Viewpoint	Captures a collection of categorized Viewpoints. Tagged Value – ID
Model	Defines and represents a model. Tagged Value – ID

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Enterprise Continuum Toolbox Page

Enterprise Continuum elements are used to model the Architecture Continuum and Solutions Continuum of an enterprise. Using these elements you can create Architecture Building Blocks or Solutions Building Blocks by mapping to the appropriate architecture models or solution models (as diagrams, elements and models).



Enterprise Continuum Toolbox

Item	Description
Enterprise Continuum	A Package that models the Enterprise Continuum. Tagged Values – ID, Architecturing Organization, Sponsoring Organization
Architecture Continuum	A Package that models the Architecture Continuum.
Solutions Continuum	A Package that models the Solutions Continuum.
Architecture	Captures summary views of the Architecture Landscape (such as the state of the enterprise) at particular points in time. Tagged Values – ID, Category, Source, Owner, Subject Matter, View Point, Level Of Detail, Level Of Abstraction, Accuracy, Version, Maturity
Solution	Captures the summary views of a solution in place for a specific architecture. Tagged Values – ID, Category, Source, Owner, Subject Matter, Time, Volatility, Version, Maturity
Architecture Building Block	Relates to the Architecture Continuum, and is defined or selected as a result of the application of the ADM. Tagged Values – ID, Description, Owning Organization, Rationale, ServicePortfolio
Solutions Building Block	Relates to the Solutions Continuum, and can be either procured or developed. Tagged Values – ID, Description, Supplier Organization

ABB Mapping	Connector to map the architectural models and artifacts to the Architecture Building Blocks.
SBB Mapping	Connector to map the solution models and artifacts to the Solutions Building Blocks.
Guides	Connector to represent guides relationships. Architecture Building Blocks guide the development of Solutions Building Blocks.
Supports	Connector to represent supports relationships. Solutions Building Blocks support the development of other Solutions Building Blocks.
Leverage Direction	Connector to represent the direction of leveraging of architecture and solution components.

Organization Structure Toolbox Pages

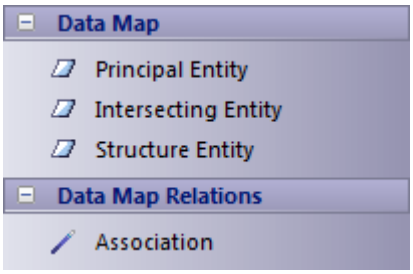
Organization Structure Toolbox

Item	Description
Board of Directors	Captures the details of the board of directors.
StakeHolder	Captures stakeholders of the enterprise.
External Organization	Captures any external business unit that is not under direct control of the enterprise, but has a relationship with the enterprise.
Organization Unit	Captures any business unit that is under direct control of the enterprise.
Personnel	Captures the details of personnel in an enterprise.
In Contract	Captures the contract-based relationships between business units.
Works For	Captures the details of team links; for example, Stakeholder 1 works for Organization Unit 1.
Supervise	Captures process supervision details.
Control	Captures Unit in charge or Person in charge information.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Data Map Toolbox Pages



Data Map Toolbox

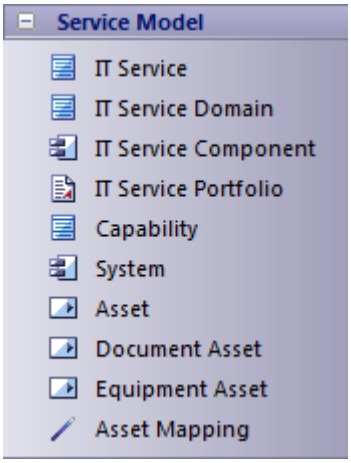
Item	Description
Principal Entity	A business entity that forms a resource of the enterprise.
Intersecting Entity	Normalizes the many-to-many relationship between principal entities.
Structure Entity	Captures potential knowledge base entities.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Service Model Toolbox Page

Service Model elements are used to build a conceptual framework that describes the IT Service infrastructure of the enterprise.



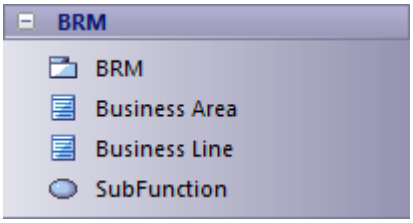
Service Model Toolbox

Item	Description
IT Service	Captures the IT capability offered as a consumable entity that is managed by the enterprise. Tagged Values – ID, DefinitionText, Owner, Availability, Charge_to_User, ContactPoint, Dependent_Systems
IT Service Domain	Categorizes IT services. Tagged Values – ID, Description
IT Service Component	Captures a set of capabilities that might be exposed through the technology interface. Tagged Values – ID, Rationale
IT Service Portfolio	A Document Artifact that captures the information required to describe an IT service portfolio. Tagged Values – ID
Capability	A business-focused outcome that is delivered by the completion of one or more work Packages. Using a capability-based planning approach, change activities can be sequenced and grouped in order to provide continuous and incremental business value. Tagged Values – ID, Category, Increments, Business Value, Source, Owner
System	Captures details of a working component of the enterprise. System includes things such as application, system, platform, system-of-systems, enterprise and product line. Tagged Values – ID

Asset	Captures the enterprise resources that could be estimated for value. Tagged Values – ID, AssetValue, Description
Document Asset	Subtype of Asset that captures the important document resources of the enterprise. Tagged Values – ID, AssetValue, Description
Equipment Asset	Subtype of Asset that captures the equipment resources of the enterprise. Tagged Values – ID, AssetValue, Description

FEAF Business Reference Model Toolbox Page

The FEAF Business Reference Model (BRM) provides a framework facilitating a functional (rather than organizational) view of the enterprise's lines of business (LoBs), including its internal operations and its services.



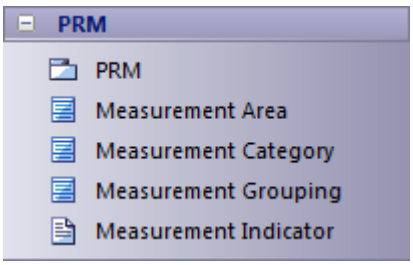
FEAF Business Reference Model Toolbox

Item	Description
BRM	A Package in which to capture the Business Reference Model (BRM). Tagged Values – Version
Business Area	The high-level organizing layer of the BRM, capturing high-level categories relating to the business purpose and objectives. Tagged Values – BusinessAreaID, Definition
Business Line	Captures the lines of business of the enterprise. Tagged Values – BusinessLineID, Definition, Referencing Business Area
SubFunction	Represents the lowest level of granularity in the BRM, grouping functionalities related to each line of business. Tagged Values – SubFunctionID, Definition, Referencing BusinessLine, Referencing Business Area

FEAF Performance Reference Model Toolbox Page

The FEAF Performance Reference Model (PRM) Toolbox page is designed to conform to the specification of the FEAF-PRM framework. The PRM is a framework for performance measurement providing common output measurements throughout the enterprise. It enables agencies to better manage the business at a strategic level, by providing a means for using an agency's Enterprise Architect to measure the success of IT investments and their impact on strategic outcomes.

The FEAF Performance Reference Model (PRM) facilitates resource-allocation decisions based on comparative determinations of which programs and organizations are more efficient and effective.

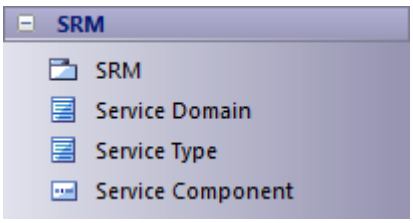


FEAF Performance Reference Model Toolbox

Item	Description
PRM	A Package to capture the Performance Reference Model. Tagged Values – Version
Measurement Area	The high-level organizing layer of the PRM, capturing aspects of performance at the output levels. This layer is directly linked to the performance objectives established at the agency and program levels. Tagged Values – MeasurementAreaID, Definition
Measurement Category	Categorizes the measurement area with respect to the attribute or characteristic to be measured. Tagged Values – MeasurementCategoryID, Definition, Referencing Measurement Area
Measurement Grouping	Further refines Measurement Categories into specific types of Measurement Indicator. Tagged Values – MeasurementGroupingID, Definition, Referencing Measurement Category
Measurement Indicator	Captures the specific measures. Tagged Values – MeasurementIndicatorID, Definition, Referencing Measurement Grouping

FEAF Service Component Reference Model Toolbox Page

The FEAF Service Component Reference Model (SRM) is a business-driven, functional framework classifying Service Components according to how they support business and performance objectives. The model aids in recommending service capabilities to support the reuse of business components and services across the enterprise. The SRM should be structured across horizontal service areas that, independent of the business functions, can provide a leverage-able foundation for reuse of applications, application capabilities, components, and business services.

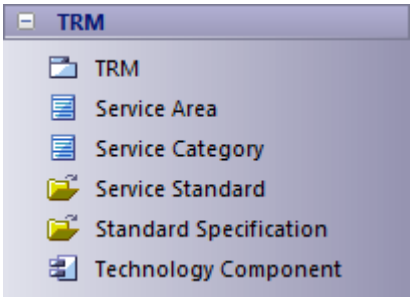


FEAF Service Component Reference Model Toolbox

Item	Description
SRM	A Package to capture the Service Component Reference Model. Tagged Values – Version
Service Domain	Captures a high-level view of the services and capabilities that support enterprise and organizational processes and applications. Tagged Values – ServiceDomainID, Definition
Service Type	Groups similar capabilities in support of the domain, providing an additional layer of categorization that defines the context of a specific capability component within a given domain. Tagged Values – ServiceTypeID, Definition, Referencing Service Domain
Service Component	Captures a set of capabilities that might be exposed through a business or technology interface. Service Components are 'building blocks' to deliver the information management capability to the business. Tagged Values – ServiceComponentID, Definition, Referencing Service Domain, Referencing Service Type

FEAF Technical Reference Model Toolbox Page

The FEAF Technology Reference Model (TRM) is a component-driven, technical framework categorizing the standards and technologies to support and enable the delivery of Service Components and capabilities.



FEAF Technical Reference Model Toolbox

Item	Description
TRM	A Package to capture the Technology Reference Model. Tagged Value – Version
Service Area	Represents a technical tier supporting the secure construction, exchange, and delivery of a Service Component. Tagged Values – ServiceAreaID, Definition
Service Category	Classifies a lower level of technology and standard with respect to the business or technology function it serves. Tagged Values – ServiceCategoryID, Definition, Referencing Service Area
Service Standard	Defines a standard and technology that supports a Service Category. Tagged Values – ServiceStandardID, Definition, Referencing Service Category
Standard Specification	Provides the specification details of the standard. Tagged Value – StandardSpecificationID

Gap Analysis Matrix - TOGAF

The Specification document for TOGAF states:

'Gap analysis is widely used in the TOGAF Architecture Development Method (ADM) to validate an architecture that is being developed. The basic premise is to highlight a shortfall between the Baseline Architecture and the Target Architecture; that is, items that have been deliberately omitted, accidentally left out, or not yet defined.'

TOGAF provides a Gap Analysis Matrix that you can use to:

- Identify gaps between the baseline and target
- Create Gap elements (if any gaps are identified) in the repository, which can later be addressed and assigned as tasks; the Gap elements can then be used to prioritize activities
- Create and manage Gap Analysis Matrix profiles

Notes

- This feature is not available in the Professional Edition of Enterprise Architect

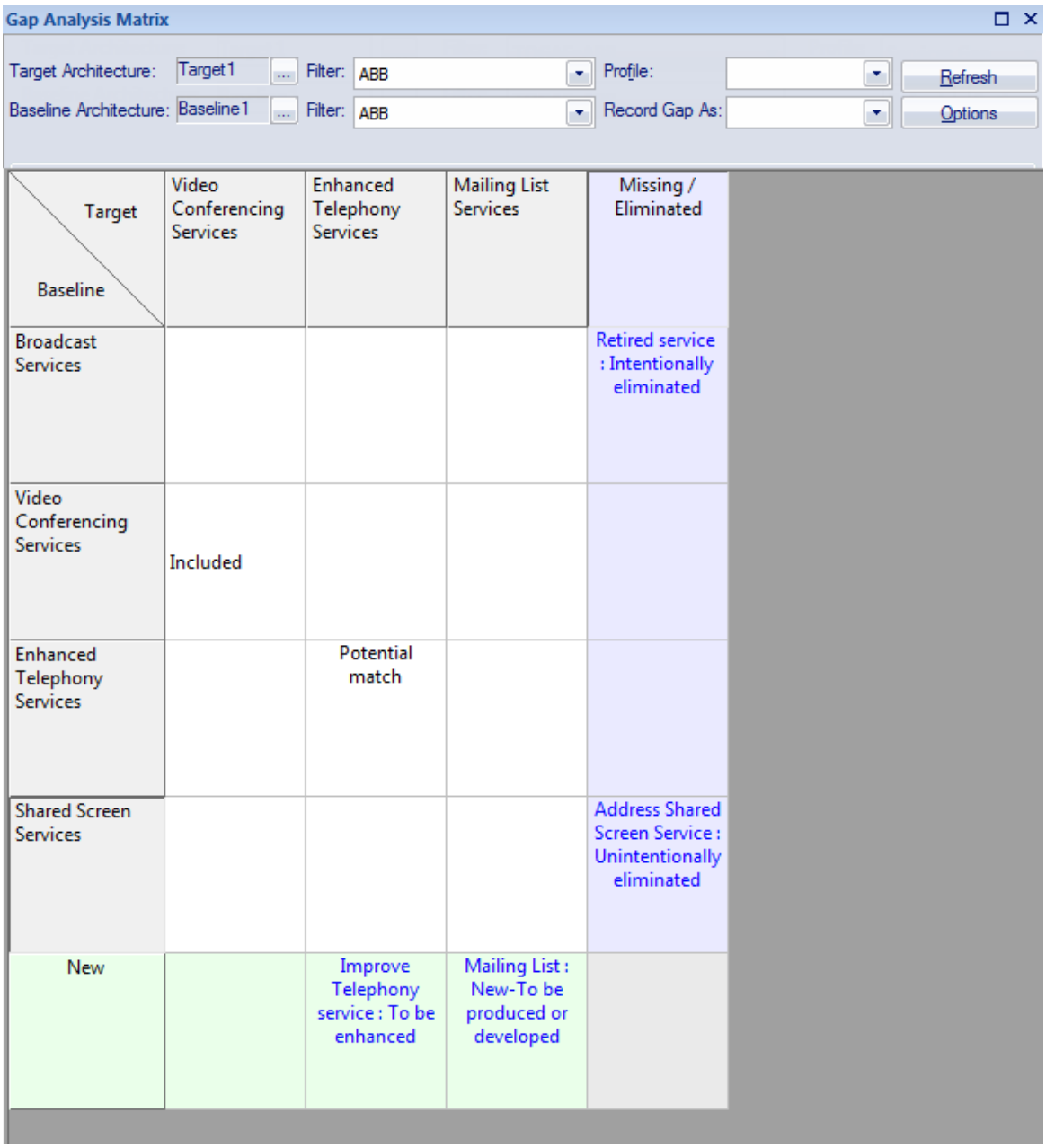
Open the Matrix

Access

Ribbon	Design >Package > Gap Analysis

Example

This Gap Analysis Matrix example is from the TOGAF Specification; it illustrates Gap Analysis for Architecture Building Blocks (ABBs) that are services from the Network Services category.



Using the Gap Analysis Matrix

The 'Filter' fields list all the stereotypes that can be shown in the matrix; use these fields to set a filter for each of the Target and Baseline Architectures.

After setting the filters, click on the  button to the right of the 'Target Architecture' and 'Baseline Architecture' fields, and browse for and select the Target Architecture Package and Baseline Architecture Package.

Click on the Refresh button; the matrix lists the elements having the stereotypes you set in the 'Filter' fields. The Target Architecture elements are listed horizontally as column headings, and the Baseline Architecture elements are listed vertically as row titles. If you double-click on the row or column headers containing the Baseline or Target elements, the corresponding 'Properties' dialog displays.

To locate an object from the Matrix in the Browser window, right-click on it and select the 'Find in Project Browser' option.

In the cells at the intersection of the Target element columns and Baseline element rows, you can create and edit Gap Analysis Notes. To edit the notes double-click on the cell, or right-click and select the 'Edit Gap Note' option.

Any elements that are not in the Target Architecture but are available in the Baseline Architecture must be addressed as Gap elements in the last column, called 'Missing / Eliminated'. Any elements that are in the Target Architecture but not in the Baseline Architecture must be addressed as Gap elements in the last row, called 'New'.

In the example:

- *Broadcast Services* and *Shared Screen Services* are present in the Baseline Architecture but missing from the Target Architecture; therefore, you must create appropriate Gap elements in the 'Missing / Eliminated' column, the last column of the matrix
- Mailing List Services is not in the Baseline Architecture but it is in the Target Architecture, meaning that the service is a new one in the Target Architecture and it must be procured or developed; you must create a corresponding Gap element in the 'New' row, the last row of the matrix

Notes

- Locate the Baseline/Target element in the 'Project' tab of the Browser window with the Traceability window open, and then switch to the 'Details' tab of the Inspector window, to help improve Gap Analysis as it shows all the elements and details such as Tagged Values that are linked to the element; for example, if an Architecture Building Block (ABB) is missing in the Target Architecture, you can see what other processes and tasks depend on this ABB and what processes are impacted, which can also help you to decide whether or not an ABB must be enhanced in the Target Architecture

Create Gap Elements

Create a Gap Element to Model an Identified Gap

1. Right-click on the cell and select the 'Create Gap Element' option. The 'Browse Project' dialog displays.
2. Select the Package in which to create the Gap element and click on the OK button. A Gap element is created in the selected Package and its 'Properties' dialog displays; enter the element name and other required properties.
3. Select the 'Tagged Values' tab of the 'Properties' dialog and set the Tagged Values listed under 'Gap Element Tagged Values'.
4. Click on the OK button. The name and category of the Gap element displays in the selected matrix cell.

Gap Element Tagged Values

If you intend to use a Gap element that is already available in the model, right-click on the appropriate cell in the 'Missing / Eliminated' column or 'New' row and select the 'Link to Existing Gap Element' option. The 'Select Classifier' dialog displays, from which you select the existing Gap element.

Once you have created a Gap element, you can right-click on its cell and select from these context menu options:

- 'Edit Gap Element' to open the 'Properties' dialog of the Gap element and edit its properties
- 'Locate in Project Browser' to find and highlight the Gap element in the Browser window
- 'Remove Gap Element Link' to delete the link to the element in that cell (the element still exists in its parent Package)
- 'Delete Gap Element' to delete the element from the model; this action cannot be undone

Tagged Value	Description
ID	The unique identifier for the architecture object.
Owner	The owner of the architecture object.
Source	The location/source from which the information is collected.
Category	The categorization of the Gap. This can have any one of the values: • Intentionally eliminated • Unintentionally eliminated • New – To be produced or developed • To be enhanced
RefBaseline Architecture	The name of the Baseline Architecture artifact that is linked to the Gap element. If the Gap is to point to a missing element, this tag has the value of the Baseline artifact that is missing.
RefTarget Architecture	The name of the Target Architecture artifact that is linked to the Gap element. If the Gap points to a new artifact that is required for the Target Architecture, this tag has the value of the new Target artifact.

Gap Analysis Matrix Profiles

On the Gap Analysis Matrix, you can create and manage profiles to save commonly-used combinations of target Architectures and stereotypes.

To work on Gap Analysis Matrix profiles, click on the Options button in the top right corner of the matrix. A submenu displays, listing options to:

- Create a profile of the current matrix settings
- Update the currently-selected profile in the 'Profile' field
- Delete the currently-selected profile

The 'Profile' field drop-down list shows all the saved Gap Analysis Matrix profiles.

Tagged Values in TOGAF

TOGAF makes extensive use of Tagged Values for assigning custom properties to the various elements specific to TOGAF. When creating or viewing a TOGAF model, it is recommended that you keep the Properties window docked and visible at all times, with the TOGAF section expanded.

Synchronize Tagged Values

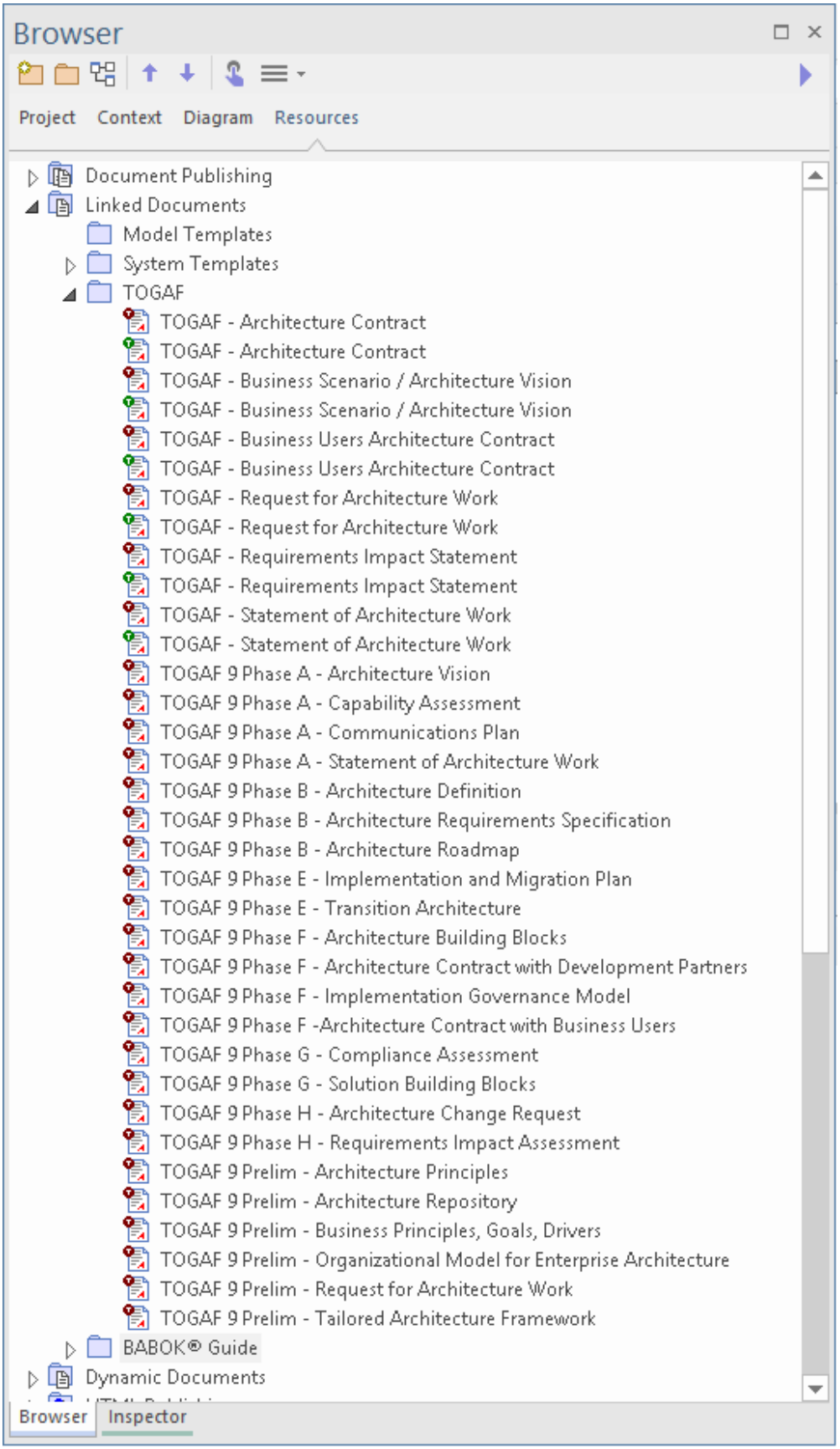
From time to time you might need to add missing Tagged Values to all elements in the model that require them, such as:

- Whenever you create a new element by any means other than directly dropping the element from the TOGAF Toolbox pages
- Before using a new version of the Technology, to update the Tagged Values of elements in existing models to the latest version of the TOGAF profile

You can do this using the 'Synchronize Stereotype' option on the icons in the TOGAF pages of the Diagram Toolbox.

TOGAF Linked Document Templates

Enterprise Architect contains a set of Linked Document templates that are specific to TOGAF.



You can also select these templates from the drop-down list in the 'New Linked Document from Template' dialog; scroll down to the 'Technology Templates' list.

The Linked Document templates are provided by The Open Group, contingent on this text being displayed in any

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The Architecture Development Method (ADM)

The key to TOGAF remains a reliable, practical method - the TOGAF Architecture Development Method (ADM) - for defining business needs and developing an architecture that meets those needs, applying the elements of TOGAF and other architectural assets available to the organization.

TOGAF embodies the concept of the Enterprise Continuum to reflect different levels of abstraction in an architecture development process. In this way TOGAF facilitates understanding and co-operation between actors at different levels. It provides a context for the use of multiple frameworks, models, and architecture assets in conjunction with the TOGAF ADM. By means of the Enterprise Continuum, architects are encouraged to leverage all other relevant architectural resources and assets, in addition to the TOGAF Foundation Architecture, in developing an organization-specific IT architecture.

Key Points About the ADM

The ADM is iterative over the whole process, between phases and within phases; for each iteration of the ADM, a fresh decision must be taken on:

- The breadth of coverage of the enterprise to be defined
- The level of detail to be defined
- The extent of the time horizon aimed at, including the number and extent of any intermediate time horizons
- The architectural assets to be leveraged in the organization's Enterprise Continuum, including:
  - Assets created in previous iterations of the ADM cycle within the enterprise
  - Assets available elsewhere in the industry (such as other frameworks, systems models and vertical industry models)

These decisions must be made on the basis of a practical assessment of resource and competence availability, and the value that can realistically be expected to accrue to the enterprise from the chosen scope of the architecture work.

As a generic method, the ADM is intended to be used by enterprises in a wide range of different geographies and applied in different vertical sectors/industry types. As such it can be - but does not necessarily have to be - tailored to specific needs. For example, it can be used:

- In conjunction with the set of deliverables of another framework, where these are more appropriate for a specific organization; many US federal agencies have developed individual frameworks that define the deliverables specific to their particular departmental needs
- In conjunction with the well-known Zachman Framework, which is an excellent classification scheme but which lacks an openly available, well-defined methodology

ADM Phases

The Architecture Development Method (ADM) has ten Phases, as identified here. The approach and complete description of each Phase are provided in the TOGAF documentation available on The Open Group website, to identify the objectives, inputs, steps and outputs of each phase.

Preliminary Phase: Framework and Principles

The Preliminary Phase is about defining 'where, what, why, who, and how we do architecture' in the enterprise concerned. The main aspects are:

- Defining the enterprise
- Identifying key drivers and elements in the organizational context
- Defining the requirements for architecture work
- Defining the architecture principles that will inform any architecture work
- Defining the framework to be used
- Defining the relationships between management frameworks
- Evaluating the enterprise architecture maturity

Phase A: Architecture Vision

Architecture Vision starts with receipt of a Request for Architecture Work from the sponsoring organization to the architecture organization. During this phase, you define the architecture scope, how to create the vision, and obtain approvals.

Phase B: Business Architecture

Business Architecture is the first architecture activity that must be undertaken, if not catered for already in other organizational processes (such as enterprise planning, strategic business planning or business process re-engineering).

Phase C: Information Systems Architectures

In this phase you develop the Information Systems Architectures, including the Data and Applications Architectures. Detailed steps for Phase C are given separately for each architecture domain:

- Data Architecture
- Applications Architecture

Phase D: Technology Architecture

The steps within the Technology Architecture phase are:

- Select reference models, viewpoints, and tools
- Develop Baseline Technology Architecture Description
- Develop Target Technology Architecture Description

- Perform gap analysis
- Define roadmap components
- Resolve impacts across the Architecture Landscape
- Conduct formal stakeholder review
- Finalize the Technology Architecture
- Create Architecture Definition Document

Phase E: Opportunities and Solutions

In the Opportunities and Solutions phase you identify the parameters of change, the major phases along the way, and the top-level projects to be undertaken in moving from the current environment to the target.

Phase F: Migration Planning

During the Migration Planning phase you sort the various implementation projects into priority order. Activities include assessing the dependencies, costs and benefits of the various migration projects.

Phase G: Implementation Governance

During the Implementation Governance phase you bring together all the information for successful management of the various implementation projects.

Phase H: Architecture Change Management

In the Architecture Change Management phase you establish an architecture change management process for the new enterprise architecture baseline.

ADM Architecture Requirements Management

The ADM is continuously driven by the Architecture Requirements Management process.

The TOGAF Enterprise Continuum

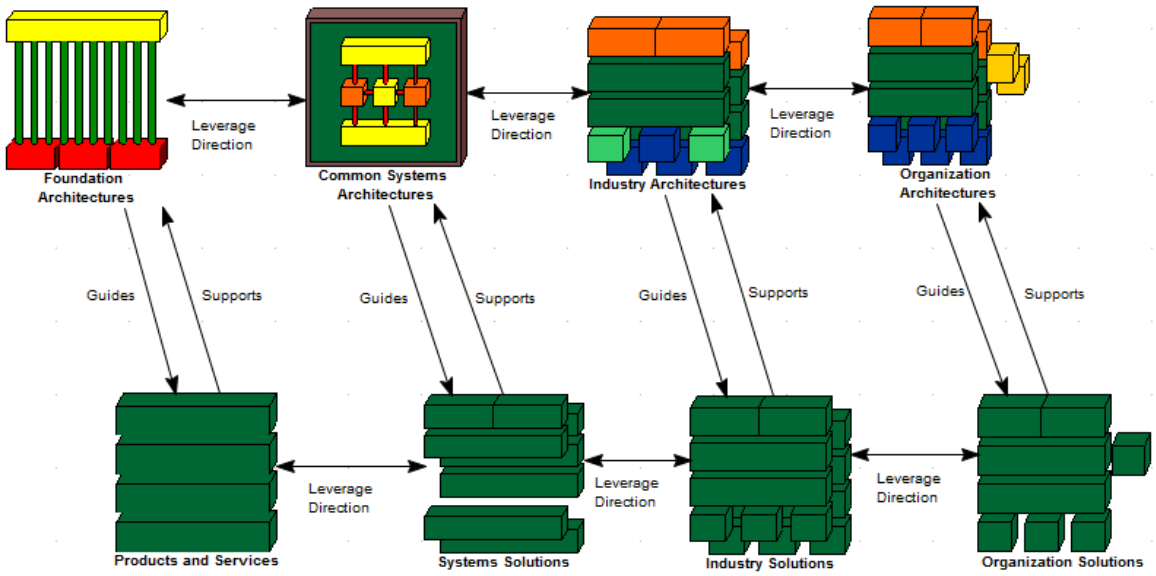
It is simplest to think of the Enterprise Continuum as a 'virtual repository' of all the architecture assets - models, Patterns, architecture descriptions and other artifacts - that exist both within the enterprise and in the IT industry at large, and that the enterprise considers itself to have available for the development of architectures for the enterprise.

Examples of 'assets within the enterprise' are the deliverables of previous architecture work that are available for re-use.

Examples of 'assets in the IT industry at large' are the wide variety of industry reference models and architecture Patterns that exist and that are continually emerging, including those that are:

- Highly generic, such as TOGAF's own Technical Reference Model (TRM)
- Specific to certain aspects of IT, such as a web services architecture, or a generic manageability architecture
- Specific to certain types of information processing, such as e-Commerce or supply chain management
- Specific to certain vertical industries; for example, the models generated by vertical consortia such as TMF (in the Telecommunications sector), ARTS (Retail) or POSC (Petrotechnical)

Enterprise Architect's support for the Enterprise Continuum is provided by the Enterprise Continuum diagram and the corresponding Diagram Toolbox page. The starter model consists of an interface to the TOGAF Enterprise Continuum.



When you double-click on an Architecture Continuum or Solution Continuum element, an Enterprise Continuum diagram displays. The Diagram Toolbox page provides the Architecture Building Block and Solutions Building Block elements and the appropriate relationship connectors.

Support For Federal Enterprise Architecture Framework

TOGAF provides diagrams and Toolbox pages specific to the Federal Enterprise Architecture Framework (FEAF). It also provides 'out-of-the-box' models of the FEAF Performance Reference model and Technical Reference model.

To open the FEAF-PRM and FEAF-TRM models:

1. Create a new Enterprise Architect project file, and click on the top-level Package.
2. Select the 'Design > Package > Model Wizard' option.
3. In the Model Wizard, select the 'Enterprise Architecture > TOGAF' Perspective and the required FEAF Pattern.
4. Click on the Create Model(s) button.

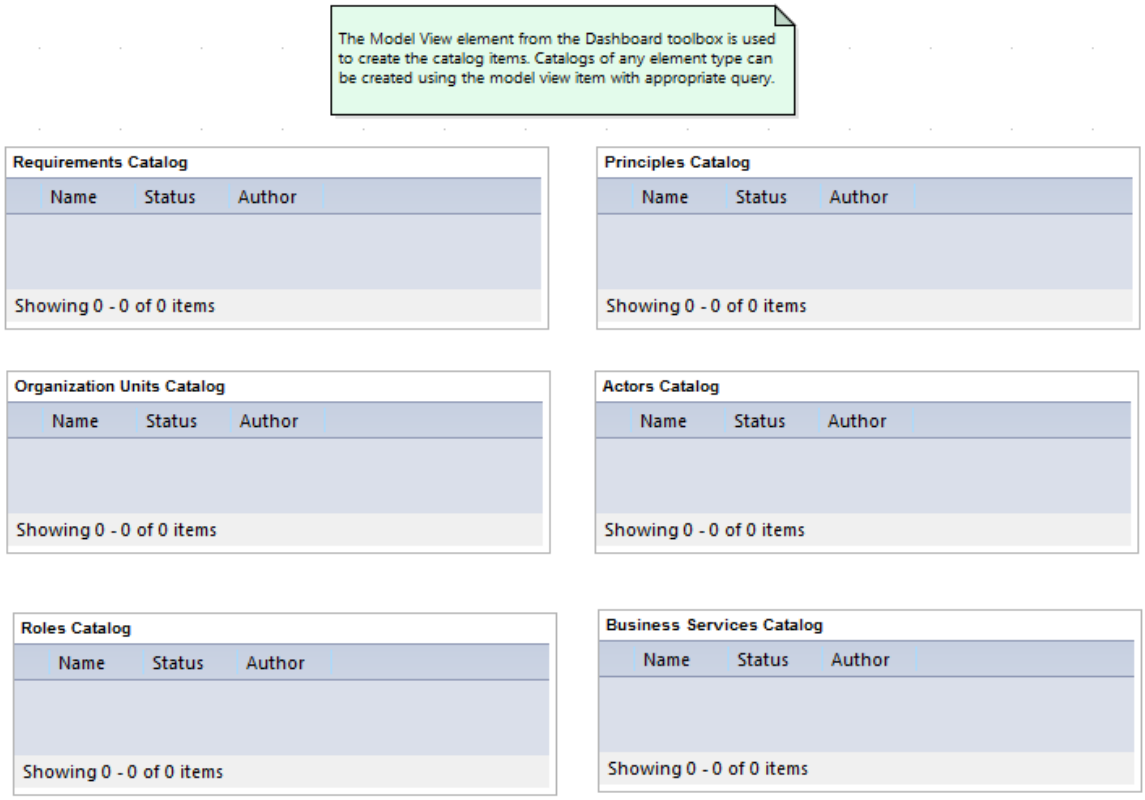
These TOGAF Toolbox pages provide specific support for FEAF:

- FEAF Business Reference Model Toolbox Page
- FEAF Performance Reference Model Toolbox Page
- FEAF Service Component Reference Model Toolbox Page
- FEAF Technical Reference Model Toolbox Page

TOGAF Catalogs

Enterprise Architect helps you to create Model Catalog Artifacts, using the TOGAF-Catalog model Pattern. Choosing this model Pattern in the Model Wizard (Start Page 'Create from Pattern' tab) generates a template model in which you create TOGAF-specific catalogs for:

- Actors
- Business Services
- Organization Units
- Principles
- Requirements and
- Roles



Each Model View will list all objects of the corresponding type in the entire model.

Alternatively, you can create TOGAF Catalogs in a diagram using Model View elements from the 'Dashboard' pages of the Diagram Toolbox.

More Information

Unified Profile for DoDAF/MODAF (UPDM)

UPDM (Unified Profile for DoDAF-MODAF) provides a UML profile that extends the capability of Enterprise Architect to provide a standard approach for modeling systems and Enterprise Architectures in support of DoDAF and MODAF.

DoDAF is the abbreviation of Department of Defense Architecture Framework (USA); MODAF is the abbreviation of Ministry of Defence Architecture Framework (UK).

Discussion

The topics described here provide an introduction to, and procedural explanation of, using UPDM in Enterprise Architect.

Section	Content
Welcome 	This section provides an introduction to UPDM, and explains the support available for the Framework and the system requirements for its use.
Licensing Copyright and Trademarks 	These topics contain the formal documentation defining the use of the MDG Technology for UPDM with Enterprise Architect.
Using UPDM 	Work with UPDM, learning about the model structure, templates, diagram types and more.
Model Validation 	Learn how to develop and configure model validation for UPDM.

Brief Introduction

Welcome to the UPDM 2.0 profile in Sparx Systems Enterprise Architect.

This UML profile extends the capability of Enterprise Architect to support the creation of Unified Profile for DoDAF and MODAF (UPDM) architecture models. DoDAF is the abbreviation of Department of Defense Architecture Framework (USA); MODAF is the abbreviation of Ministry of Defence Architecture Framework (UK).

The UPDM profile provides a standard approach for modeling systems and enterprise architectures in support of DoDAF and MODAF. It improves interoperability of architecture data among architecture modeling tools, enhances reuse of architecture data, and improves communication among DoDAF and MODAF stakeholders.

UPDM is already integrated with the Enterprise Architect Ultimate and Unified Editions; an MDG Technology can be purchased separately to be used with the Enterprise Architect Professional or Corporate Editions.

This technology is based on the Unified Profile for DoDAF-MODAF (UPDM) version 1.0. UPDM 1.0 is based on DoDAF version 1.5 and MODAF version 1.2. Full details of the profile, including the latest specification, can be obtained from the Object Management Group (OMG) website.

Getting Started

For instructions on how to use UPDM, see the topics *Getting Started with UPDM* and *Using UPDM*.

UPDM Support

Technical support for the UPDM profile is available to registered users of Enterprise Architect in exactly the same way as for Enterprise Architect itself.

UPDM System Requirements

The UPDM profile version 2.0 runs under these environments:

Operating Systems

- Windows 10
- Windows 8
- Windows 7
- Windows 2008 Server
- Windows 2003 Server
- Windows XP Service Pack 2

Enterprise Architect Versions

- Enterprise Architect Version 9.0 or later

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Using UPDM

UPDM is the Unified Profile for the Department of Defense Architecture Framework (DoDAF) and Ministry of Defence Architecture Framework (MODAF). UPDM is an Object Management Group (OMG) initiative; the specification is available from the OMG website.

You can perform UPDM modeling within Enterprise Architect, using these facilities:

- The UPDM Profile, which defines the stereotyped UML elements that are used for UPDM modeling
- Custom diagram types for each UPDM view
- Custom Diagram Toolbox pages for each UPDM diagram type, which give easy access to the elements used on diagrams of that type
- Options within the Model Wizard (Start Page 'Create from Pattern' tab) that can be used to import a template Package for each UPDM view and that provide a brief description of the view and what might be expected of the modeler
- Quicklinks for stereotyped elements that guide you towards creating correct relationships between elements
- Model Validation rules that you can apply to check your models for correctness
- Relationship Matrix profiles for showing the relationships between elements
- Model Views that help you navigate your model quickly to find specific diagram more easily
- A Glossary import, with items describing each UPDM stereotype for easy reference
- Tagged Values that you can use to enter metadata specific to UPDM elements
- An Example Model that illustrates a typical UPDM problem and its solution, implemented using Enterprise Architect

Getting Started with UPDM

When you install the Unified or Ultimate Edition of Enterprise Architect, the UPDM profile is fully enabled and ready to use.

If you have the Corporate or Professional Edition of Enterprise Architect, you can purchase and install an MDG Technology for UPDM separately; once you have entered the registration key for the MDG Technology for UPDM, it is automatically available in and integrated with Enterprise Architect, as for the Unified and Ultimate Editions.

Access the MDG Technology

1. Create a new Enterprise Architect project file, and click on the top-level Package.
2. Select the 'Design > Package > Model Wizard' option.
3. In the Start Page 'Create from Pattern' tab (Model Wizard), select the 'Systems Engineering > UPDM' Perspective and the 'UPDM Frameworks' Pattern Group; select either the 'DoDAF Framework' Pattern or the 'MODAF Framework' Pattern.
4. Click on the Create Model(s) button.

A new base DoDAF or MODAF model is created in the Browser window.

Model Wizard in UPDM

You can create UPDM models within your project using templates selected from the Enterprise Architect Model Wizard (Start Page 'Create from Pattern' tab).

Access

Ribbon	Design > Package > Model Wizard
Context Menu	Browser window | Right-click on Package | Add a Model using Wizard > Model Patterns
Keyboard Shortcuts	Ctrl+Shift+M

Notes

- In the Model Wizard, click on the <perspective name> button and select 'System Engineering > UPDM'
- Expand the 'UPDM Frameworks' group or one of the 'DoDAF' or 'MODAF' groups, and click on the required Pattern in that group
- Click on the Create Model(s) button to generate the corresponding UPDM model structures in your project

UPDM Extensions Menu

You can perform various tasks on your UPDM model using the UPDM Technology menu.

Access

Ribbon	Specialize > Technologies > UPDM 2.0
Context Menu	Right-click on Package, diagram or element | Specialize | UPDM 2.0

Options

Option	Action
Synchronize Tagged Values	Add missing Tagged Values to all elements in the model that require them.
Import Glossary	Import UPDM information into the Enterprise Architect Glossary.
Import Images	Import the alternative images (as used in the UPDM Framework diagram) into the current model. You can use these images to decorate your own models (select a diagram object, right-click and select 'Appearance | Select Alternate Image') or you can design your own.
Help	Display this Help topic.
About	Show the version of the MDG Technology for UPDM that you are using. The version number has the format 1.0.001, where 1.0 is the version of the UPDM specification that is supported, and 001 is the incremental build number.

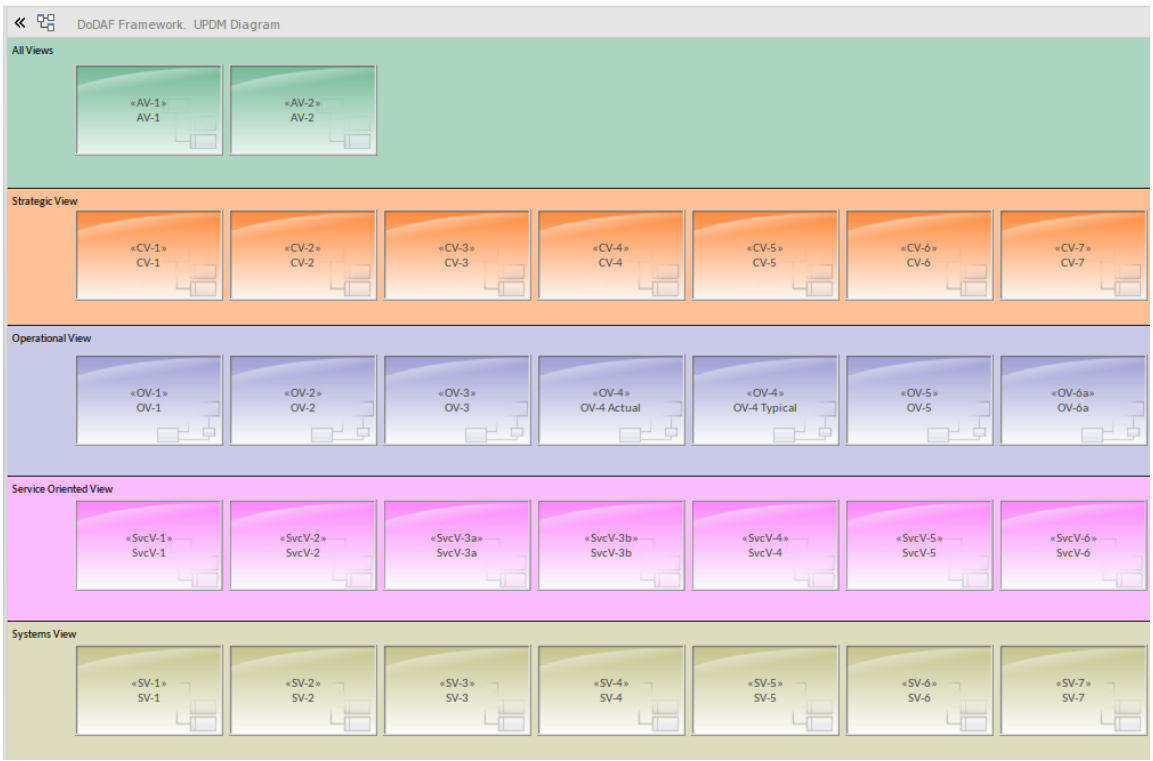
UPDM Framework Diagram

When developing and distributing a model, it is useful to have a single front page diagram that has hyperlinks to all the important information in the model. That is the aim of the two UPDM Framework diagrams (one for DoDAF, one for MODAF), which are created with color-coded swimlanes for each set of views. You can drag and drop on to these diagrams:

- Packages, which act as hyperlinks to the documents that they own
- Document Artifacts
- Any kind of composite element that points to its child diagram
- Hyperlinks pointing to custom SQL queries, Relationship Matrix profiles or external files

Create a UPDM Framework Diagram

1. In the Start Page 'Create from Pattern' tab (Model Wizard), click on the <perspective name> button and select 'System Engineering > UPDM'.
2. Expand the 'UPDM Frameworks' group and click on the required Pattern, either 'DODAF Framework' or 'MODAF Framework'.
3. Click on the Create Model(s) button to generate the corresponding UPDM model structures in your project.



Editing Swimlanes

You can add, remove and modify the swimlanes on the Framework diagram. Select 'Design > Diagram > Manage > Swimlanes'.

To change the width of swimlanes, use the mouse to drag their boundaries.

Changing Appearances

Each Package, document and hyperlink on the Framework diagram has an alternative image. To load these images into your model, select the 'Settings > Reference Data > Images' option.

If you want to apply your own bitmap images to the UPDM elements, you must first import the images into the model, also using the 'Settings > Reference Data > Images' option. Then you can either select the element and press Ctrl+Shift+W to add an alternative image to the element, or you can apply your own stereotype to apply a Shape Script to the element. For example, you might define a stereotype with this Shape Script:

```
shape main
{
	v_align="center";
	h_align="center";
	defSize(90,70);
	image("myBitMap.bmp",0,0,100,100);
	printWrapped("#name#");
}
```

UPDM Diagram Types

UPDM introduces a number of custom diagram types into Enterprise Architect. These are, for the most part, extended UML diagrams. On opening a UPDM diagram, Enterprise Architect automatically opens the appropriate UPDM Diagram Toolbox pages for the diagram type.

You can use the UPDM diagrams that are generated by the Model Wizard (Start Page 'Create from Pattern' tab), or create a new UPDM diagram.

Access

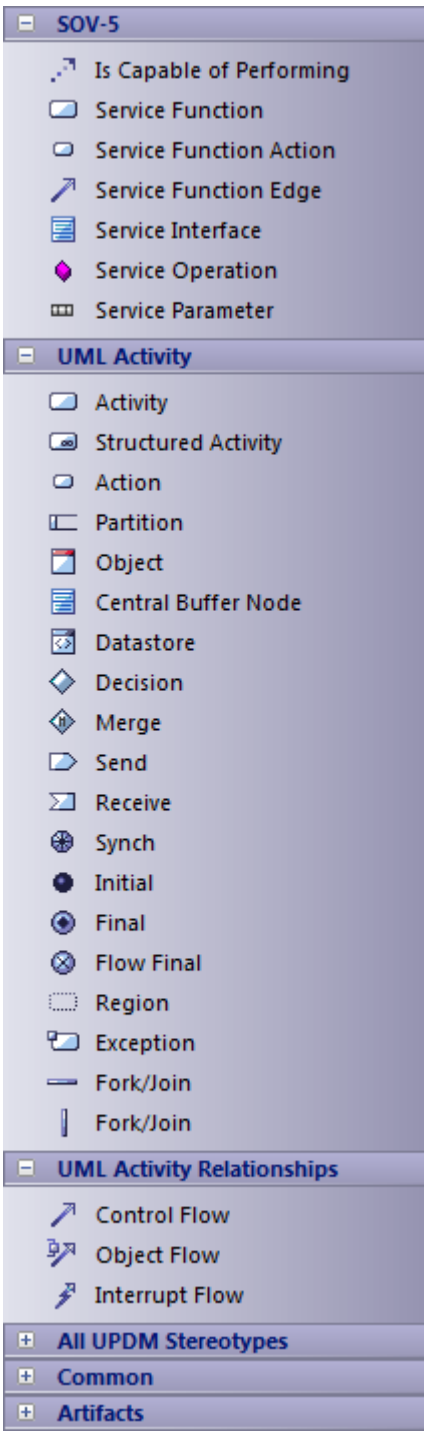
Ribbon	Design > Diagram > Add Diagram
Context Menu	Browser window | Right-click on Package | Add Diagram

Notes

- On the 'New Diagram' dialog, select 'UPDM' in the 'Select From' panel and the appropriate diagram type in the 'Diagram Types' panel
- Click on the OK button to open the Diagram View with the empty diagram displayed

UPDM Toolbox Pages

When you open a diagram, Enterprise Architect opens the Diagram Toolbox pages that are most useful for that particular diagram type. For a UPDM diagram, Enterprise Architect opens the Toolbox pages that contain elements and relationships appropriate to the particular View that the diagram is part of, as well the pages for the diagram type. For example, if you open an SOV-5 Activity diagram, Enterprise Architect opens the 'SOV-5 Elements' page, the 'UML Activity' page and the 'UML Activity Relationships' page.



In addition, the 'Common Elements' and 'Common Relationships' pages and various global task pages of the Diagram Toolbox are always available, regardless of which diagram is open.

If you hide the default Toolbox pages and want to get them back, simply switch to the Start Page and back to the current

diagram, and all the default Toolbox pages for the current diagram type are re-opened.

All UPDM Stereotypes

For your convenience, a Diagram Toolbox page is provided that includes every stereotype in the UPDM profile, listed in alphabetical order. If you cannot remember which context-sensitive Toolbox page a stereotype appears in, just go to the 'All UPDM Stereotypes' Toolbox page instead. To make this page available at all times, either:

- Select the 'Specialize > Technologies > Manage Technology' ribbon option, select 'UPDM Technology' in the table, and click on the Set Active button, or
- Select 'UPDM 2.0' from the list box on the Default Tools toolbar

UPDM Stereotypes

ActualMeasurementSet

A set or collection of measurements; used in AV-3, OV-3, SV-6 and SV-7.

Extensions:

- Object

Constraints:

- Classifier must be a MeasurementSet

Use:

- Press Ctrl and drag a MeasurementSet element from the Browser window to create an instance, or drop an ActualMeasurementSet from the Diagram Toolbox and press Ctrl+L to set the classifier; set the Run State and enter actual values for each of the classifier's attributes

ActualOrganization

An actual specific organization as an instance of an organization Class; used in AcV-1, OV-4, StV-5, TV-1 and TV-2.

Extensions:

- Object

Generalizations:

- ActualOrganizationalResource

Constraints:

- Classifier must be an Organization

Use:

- Press Ctrl and drag an Organization from the Browser window to create an instance, or drop an ActualOrganization from the Diagram Toolbox and press Ctrl+L to set the classifier
- Can have a set of 'ratifiedStandards' (Standard)
- Can be 'responsibleFor' a set of ActualProject
- Can be client and/or supplier of an ActualOrganizationRelationship
- Can be client of an OwnsProcess dependency to an OperationalActivity

ActualOrganizationRelationship

A relationship between two actual organizational resources (organizations or posts); used in OV-4.

Extensions:

- InformationFlow

Constraints:

- Supplier must be an ActualOrganizationalResource (ActualOrganization or ActualPost)
- Client must be an ActualOrganizationalResource (ActualOrganization or ActualPost)
- Realizes a ResourceInteraction

ActualPerson

A named individual that fulfills an ActualPost; used in OV-4.

Extensions:

- Object

Constraints:

- Classifier must be a Person

Use:

- Press Ctrl and drag a Person from the Browser window to create an instance, or drop an ActualPerson from the Diagram Toolbox and press Ctrl+L to set the classifier
- Can be a client of a FillsPost dependency to an ActualPost

ActualPost

An actual, specific post, as an instance of the Post Class; used in AcV-1, OV-4 and StV-5.

Extensions:

- Object

Generalizations:

- ActualOrganizationalResource

Constraints:

- Classifier must be a Post

Use:

- Press Ctrl and drag a Post from the Browser window to create an instance, or drop an ActualPost from the Diagram Toolbox and press Ctrl+L to set the classifier
- Can be responsible for a set of ActualProject
- Can be client and/or supplier of an ActualOrganizationRelationship
- Can be client of an OwnsProcess dependency to an OperationalActivity
- Can be supplier of a FillsPost dependency from an ActualPerson

ActualProject

A time-limited attempt to create a specific set of products or services; used in AcV-1, AcV-2, StV-3, StV-5 and SV-8.

Extensions:

- Object

Constraints:

- Classifier must be a Project

Use:

- Press Ctrl and drag a Project from the Browser window to create an instance, or drop an ActualProject from the Diagram Toolbox and press Ctrl+L to set the classifier
- Can have Aggregations to or from another ActualProject
- Can have a set of 'ownedMilestones' (type ActualProjectMilestone, including IncrementMilestone, OutOfServiceMilestone, NoLongerUsedMilestone and DeployedMilestone)

ActualProjectMilestone

An event in a project by which progress is measured; used in AcV-2, StV-3, StV-5 and SV-8.

See also: IncrementMilestone, OutOfServiceMilestone, NoLongerUsedMilestone and DeployedMilestone.

Extensions:

- Object

Specializations:

- IncrementMilestone
- OutOfServiceMilestone
- NoLongerUsedMilestone
- DeployedMilestone

Constraints:

- Classifier must be a ProjectMilestone

Use:

- Can have a set of associated Resource
- Can be client/supplier of a MilestoneSequence

Alias

A comment used to define an alternative name for an element; used in AV-2.

Extensions:

- Note

Constraints:

- AnnotatedElement must be a UPDMElement

Use:

- Just drag a Quicklink NoteLink from the Alias to the annotated element

Arbitrary Relationship

Represents a visual indication of a connection used in high level operational concept diagrams. The connections are purely visual and cannot be related to any architectural semantics; used in OV-1.

Extensions:

- Dependency

Constraints:

- Client and Supplier must both be stereotyped ConceptRole

Use:

- Drag a Quicklink from a ConceptRole

ArchitecturalDescription

A specification of a system of systems at a technical level, which also provides the business context; used in AV-1.

Extensions:

- Package

Use:

- Can have a DefinesArchitecture Realization to an EnterprisePhase
- Can have an ArchitecturalReference Dependency to another ArchitecturalDescription
- Can be annotated with an ArchitectureMetadata note

ArchitecturalReference

Asserts that one architectural description refers to another; used in AV-1.

Extensions:

- Dependency

Constraints:

- Client and Supplier must both be stereotyped ArchitecturalDescription

Use:

- Drag a Quicklink from an ArchitecturalDescription.

ArchitectureMetadata

Information on architectural description; used in AV-1.

Extensions:

- Note

Generalizations:

- Metadata

Constraints:

- AnnotatedElement must be an ArchitecturalDescription

Use:

- Drag a quicklink from an ArchitecturalDescription

Capability

A high-level specification of the enterprise's ability; used in AV-1, OV-2, SOV-3, StV-1, StV-2, StV-3, StV-4, StV-5, StV-6, SV-1 and SV-9.

Extensions:

- Class

Generalizations:

- SubjectOfForecast

Use:

- Can have a set of associated environment conditions stereotyped Environment
- Capabilities can be composed of Capabilities (Composite aggregation)
- Capabilities can be dependent on Capabilities (Dependency)

- Capabilities can sub-class Capabilities (Generalization)
- Can be supplier or client of a Forecast (both must be same stereotype) (from SubjectOfForecast)

CapabilityConfiguration

A set of physical and human resources (and their interactions) configured to provide a capability; used in OV-1, OV-2, OV-3, StV-3, StV-5, SV-1, SV-3, SV-9, SV-10a, SV-12, TV-1, TV-2 and AcV-2.

Extensions:

- Class

Generalizations:

- Resource
- ConceptItem
- Performer
- ResourceInteractionItem
- SubjectOfResourceConstraint
- SubjectOfForecast
- SystemsElement
- SubjectOfResourceStateMachine
- ResourceInteractionItem

Specializations:

- SystemsNode

Use: Can:

- Have a set of associated deployed milestones, stereotyped DeployedMilestone
- Have an optional associated no longer used milestone, stereotyped NoLongerUsedMilestone
- Have a set of associated increment milestones, stereotyped IncrementMilestone
- Have an optional associated out of service milestone, stereotyped OutOfServiceMilestone
- Be annotated by a StandardConfiguration note
- Be the type of a ConceptRole (from ConceptItem)
- Have a set of associated milestones, stereotyped ActualProjectMilestone (from Resource)
- Be the client of a RealizesCapability Realization to a Capability (from Resource)
- Be the client of a ProvidesCompetence Dependency to a Competence (from Resource)
- Have an attached ResourceConstraint (from Resource, SubjectOfResourceConstraint)
- Be the supplier or client of a Forecast Dependency (both must have same stereotype) (from SubjectOfForecast)
- Own a ServicePoint (from Resource)
- Own a RequestPoint (from Resource)
- Own a ResourcePort (from Resource)
- Be the source and target of a ResourceInteraction (from Resource)
- Own a ServiceOperation (from Resource)
- Be the type of a KnownResource (from Resource)
- Be the type of a ResourceRole (from Resource)
- Have a Performs Dependency to a PerformedActivity (Function or OperationalActivity) (from Performer)

Climate

A type of weather condition, or combination of weather conditions, in which a Performer performs; used in StV-2.

Extensions:

- Class

Generalizations:

- EnvironmentalType

Use:

- Can be the type of an EnvironmentProperty

Commands

Asserts that one OrganizationalResource commands another; used in OV-4, SV-1 and SV-10c.

Extensions:

- InformationFlow

Generalizations:

- ResourceInteraction

Constraints:

- Source must be an OrganizationalResource
- Target must be an OrganizationalResource

Use:

- Conveys a DataElement

CompatibleWith

Relates a node to a location to assert that the operational node must be situated at that location; used in OV-2.

Extensions:

- Dependency

Constraints:

- Client is a Node
- Supplier is a ReferredLocation (Location or PhysicalLocation)

Use:

- Drag a Quicklink from a Node

Competence

A specific set of abilities defined by knowledge, skills and attitude; used in OV-4, SV-1 and SV-9.

Extensions:

- Class

Generalizations:

- SubjectOfForecast

Use: Can be:

- The supplier or client of a Forecast Dependency (both must have same stereotype) (from SubjectOfForecast)
- The supplier of a ProvidesCompetence Dependency
- The supplier of a RequiresCompetence Dependency

ConceptRole

A relationship that asserts that a ConceptItem forms part of the high level operational concept; used in OV-1.

Extensions:

- Part

Constraints:

- Type is a ConceptItem

Use:

- Owned by a HighLevelOperationalConcept
- Can be supplier and client of an ArbitraryRelationship dependency

ConfigurationExchange

CapabilityConfigurations that are exchanged between Nodes; used in OV-2, OV-3 and OV-6c.

Extensions:

- InformationFlow

Generalizations:

- OperationalExchange

Constraints:

- Source is a Node (from OperationalExchange)
- Target is a Node (from OperationalExchange)

Use:

- Conveys a CapabilityConfiguration

Controls

A type of ResourceInteraction where one Resource controls another; used in SV-1 and SV-10c.

Extensions:

- InformationFlow

Generalizations:

- ResourceInteraction

Constraints:

- Source is an OrganizationalResource (Organization or Post)
- Target is a ManufacturedResourceType (ResourceArtifact or Software)

Use:

- Conveys a DataElement

DataElement

A formalized representation of data that is managed by or exchanged between systems; used in OV-4, SV-1, SV-2, SV-4, SV-6, SV-10a, SV-10b and SV-11.

Extensions:

- Class

Generalizations:

- SubjectOfResourceConstraint
- ResourceInteractionItem
- SystemsElement
- SubjectOfResourceStateMachine

Use:

- Can have an attached ResourceConstraint (from SubjectOfResourceConstraint)
- Can have a set of associated defined EntityItems
- Can be conveyed on a Controls or Commands information flow

DataExchange

A DoDAF alias for ResourceInteraction.

Extensions:

- InformationFlow

Generalizations:

- ResourceInteraction
- SystemsElement

Use:

- Conveys ResourceInteractionItem (Energy, Post, Organization, CapabilityConfiguration, Software, ResourceArtifact, or DataElement)

DefinesArchitecture

Establishes a relationship between ArchitecturalDescription and EnterprisePhase; used in AV-1.

Extensions:

- Realization

Constraints:

- Client is an ArchitecturalDescription
- Supplier is an EnterprisePhase

Use:

- Drag a Quicklink from an ArchitecturalDescription

Definition

A definition of an element in the architecture; used in AV-2.

Extensions:

- Note

Constraints:

- Annotated Element is a UPDMElement

Use:

- Drop from toolbox and drag a NoteLink to any UPDM element

DeployedMilestone

Asserts that an ActualOrganizationResource started to use, or is slated to start using, a CapabilityConfiguration from a specific point in time; used in StV-5.

Extensions:

- Object

Generalizations:

- ActualProjectMilestone

Constraints:

- Classifier must be a ProjectMilestone (from ActualProjectMilestone)

Use: Can:

- Have a set of associated (usedBy) ActualOrganizationalResource (ActualOrganization or ActualPost)
- Have a set of associated Resource (from ActualProjectMilestone)
- Be client/supplier of a MilestoneSequence (from ActualProjectMilestone)

EnduringTask

A type of behavior recognized by an enterprise as being essential to achieving its goals - that is, a strategic specification of what the enterprise does; used in StV-1.

Extensions:

- Class

Use:

- Target of association from EnterprisePhase

Energy

Energy to be exchanged between Nodes; used in OV-2, OV-3, OV-5, SV-1, SV-4 and SV-6.

Extensions:

- Class

Generalizations:

- ResourceInteractionItem
- OperationalExchangeItem

Use:

- Conveyed on an EnergyExchange information flow

EnergyExchange

A relationship specifying the need to exchange energy between nodes; used in OV-2, OV-3 and OV-6c.

Extensions:

- InformationFlow

Generalizations:

- OperationalExchange
- OperationalElement

Constraints:

- Source is a Node (from OperationalExchange)
- Target is a Node (from OperationalExchange)

Use:

- Conveys a Class stereotyped Energy

EnterpriseGoal

A specific required objective of the enterprise that the architecture represents; used in StV-1.

Extensions:

- Class

Use:

- Has an association to one EnterprisePhase

EnterprisePhase

A specific, required objective of the enterprise that the architecture represents; used in AV-1, StV-1, StV-2, StV-5 and SV-9.

Extensions:

- Class

Specializations:

- WholeLifeEnterprise

Use:

- Can have a set of associations (statementTasks) to EnduringTask Class
- Can have a set of associations (exhibits) to Capability Class
- Can have a set of associations (inhabits) to Environment Class
- Can have a set of associations (goals) with EnterpriseGoal Class
- Can have a set of associations (visions) with EnterpriseVision Class
- Can be the type of a StructuralPart or TemporalPart
- Fulfills a Mission Use Case

- Can be Supplier of a DefinesArchitecture Realization

EnterpriseVision

The overall aims of an enterprise over a given period of time; used in StV-1.

Extensions:

- Class

Use:

- Has an association to one EnterprisePhase

EntityAttribute

A defined property of an EntityItem; used in OV-7 and SV-11.

Extensions:

- Attribute

Use:

- Is owned by an EntityItem

EntityItem

A definition (type) of an item of interest; used in OV-7 and SV-11.

Extensions:

- Class

Constraints:

- Owned attributes must be stereotyped EntityAttribute

Use: Can:

- Be owned by a DataModel
- Be the end type of an EntityRelationship
- Have a set of associated (definedBy) DataElement
- Have a set of associated (represents) InformationElement
- Be conveyed on a Commands or Controls information flow

EntityRelationship

Asserts that there is a relationship between two EntityItems; used in OV-7 and SV-11.

Extensions:

- Association

Constraints:

- The types of any object at either end must be stereotyped EntityItem

Environment

A definition of the conditions in which the Enterprise exists or functions; used in AV-1 and StV-2.

Extensions:

- Class

Constraints:

- Owned attributes must be EnvironmentProperty

EnvironmentProperty

Asserts that an Environment has one or more properties such as Climate, Location or LightCondition; used in StV-2.

Extensions:

- Attribute

Constraints:

- Type must be an EnvironmentalType (LightCondition, Location, PhysicalLocation or Climate)

Use:

- Owned by an Environment element

Equipment

A physical resource that is used to accomplish a task or function in a system or an environment; used in SV-1.

Extensions:

- Part

Generalizations:

- ResourceRole

Constraints:

- Class must be an OrganizationResource (Organization or Post)
- Type must be a ResourceArtifact

Use:

- Can have a RequiresCompetence dependency to a Competence (from ResourceRole)
- Can have a set of associations (usedFunctions) to Function (from ResourceRole)

ExhibitsCapability

Assertion that a Node is required to have a Capability; used in OV-2.

Extensions:

- Dependency

Constraints:

- Client must be a Node
- Supplier must be a Capability

Expose

Assertion that a service interface exposes a capability.

Extensions:

- Dependency

Constraints:

- Client must be a ServiceInterface
- Supplier must be a Capability

ExternalIndividual

An individual defined by an external ontology; used in AV-2.

Extensions:

- Object

Use:

- Can be the supplier of a SameAs dependency

ExternalNode

Operational node that is external to the architecture; used in OV-2.

Extensions:

- Class

Generalizations:

- Node
- Performer

Use: Can:

- Own a RequestPoint Port (from Node)
- Own a ServicePoint Port (from Node)
- Be client of an ExhibitsCapability dependency to a Capability (from Node)
- Have a Performs dependency to a PerformedActivity (Function or OperationalActivity) (from Performer)
- Have a CompatibleWith dependency to a ReferredLocation (PhysicalLocation or Location) (from Node)

ExternalType

A type defined by an external ontology; used in AV-2.

Extensions:

- Class

Use:

- Can be the Supplier of a SameAs dependency
- Any UPDM element can have a Generalization to an ExternalType

FieldedCapability

A deployed and fully realized instance of a capability; used in SV-2.

Extensions:

- Object

Constraints:

- Its classifier must be a CapabilityConfiguration

FillsPost

Asserts that ActualPerson fills an ActualPost; used in OV-4.

Extensions:

- Dependency

Constraints:

- Client must be an ActualPerson
- Supplier must be an ActualPost

Forecast

The actual or predicted status of a system at a project milestone; used in SV-9.

Extensions:

- Dependency

Specializations:

- TechnologyForecast

Constraints:

- Client and Supplier are both SubjectOfForecast (Standard, Competence, Capability, CapabilityConfiguration, Organization, Post, ResourceArtifact or Software)
- Client and Supplier must be the same specialization of SubjectOfForecast

Function

An activity that is specified in context of the resource that performs it; used in OV-4, SV-1, SV-4, SV-5 and SV-10a.

Extensions:

- Activity

Generalizations:

- PerformedActivity
- SystemsElement
- SubjectOfResourceConstraint

Constraints:

- Owned parameters are FunctionParameter

Use: Can:

- Be Supplier of a Performs dependency (from PerformedActivity)
- Own ServiceOperationAction, FunctionAction and FunctionEdge
- Be Client of an ImplementsOperational dependency to an OperationalActivity (from SystemsElement)
- Have an attached ResourceConstraint (from SubjectOfResourceConstraint)

FunctionAction

A call behavior action that invokes the function that needs to be performed; used in SV-4.

Extensions:

- Action (Call Behavior)

Specializations:

- SystemFunctionAction

Constraints:

- Activity is stereotyped Function

Use:

- Ctrl+L to set the function

FunctionEdge

Models the flow of control/objects through a function; used in SV-4.

Extensions:

- ControlFlow

Generalizations:

- SystemsElement

Specializations:

- SystemFunctionEdge

Constraints:

- Source must be a ServiceOperationAction
- Target must be a ServiceOperationAction

Use:

- Can realize a ResourceInteraction (Right-click | Advanced | Information Flows Realized)

FunctionParameter

Represents inputs and outputs of a Function; used in SV-4.

Extensions:

- ActivityParameter

Constraints:

- Type must be a ResourceInteractionItem (Energy, DataElement, CapabilityConfiguration, Organization, Post, ResourceArtifact or Software)

Use:

- Owned by a Function

HighLevelOperationalConcept

A generalized model for operations; used in OV-1.

Extensions:

- Class

Constraints:

- Owned attributes are ConceptRole

Use:

- Can have a set of described Mission

HostedSoftware

Asserts that software is hosted on a ResourceArtifact; used in SV-1.

Extensions:

- Part

Generalizations:

- ResourceRole

Constraints:

- Owning Class must be a ResourceArtifact
- Type must be a Software

Use: Can:

- Have a RequiresCompetence dependency to a Competence (from ResourceRole)
- Have a set of associations to 'used' Functions (from ResourceRole)

HumanResource

The role of a Post or Organization in a CapabilityConfiguration; used in SV-1.

Extensions:

- Part

Generalizations:

- ResourceRole

Constraints:

- Owning Class must be a CapabilityConfiguration
- Type must be an OrganizationalResource (Organization or Post)

Use: Can:

- Have a RequiresCompetence dependency to a Competence (from ResourceRole)
- Have a set of associations to 'used' Functions (from ResourceRole)

ImplementsOperational

Relationship between a system element and the operational element that it implements; used in SV-5.

Extensions:

- Dependency

Constraints:

- Client must be a SystemsElement (Function)
- Supplier must be an OperationalElement (OperationalActivity)

IncrementMilestone

An ActualProjectMilestone that indicates the point in time at which a project is predicted to deliver or has delivered a Capability; used in AcV-2, StV-3 and SV-8.

Extensions:

- Object

Generalizations:

- ActualProjectMilestone

Constraints:

- Classifier must be a ProjectMilestone (from ActualProjectMilestone)

Use:

- Can be the supplier or client of a MilestoneSequence dependency (from ActualProjectMilestone)
- Can have a set of associated Resource (from ActualProjectMilestone)
- Has a set of associations with CapabilityConfiguration

InformationElement

Information exchanged between nodes; used in OV-2, OV-3, OV-5, OV-6a, OV-6b and OV-7.

Extensions:

- Class

Generalizations:

- OperationalExchangeItem
- SubjectOfOperationalConstraint
- SubjectOfOperationalStateMachine
- OperationalElement

Use: Can:

- Have a set of associations with (represented by) EntityItem Classes
- Be conveyed on an InformationExchange - right-click > Advanced > Information Items Conveyed
- Have an attached OperationalConstraint (from SubjectOfOperationalConstraint)
- Own an OperationalStateMachine (from SubjectOfOperationalStateMachine)

InformationExchange

A relationship specifying the need to exchange information between nodes; used in OV-2, OV-3 and OV-6c.

Extensions:

- InformationFlow

Generalizations:

- OperationalExchange

Constraints:

- Conveys an InformationElement
- Source is a Node (from OperationalExchange)
- Target is a Node (from OperationalExchange)

InternalDataModel

DoDAF alias for PhysicalDataModel; used in SV-11.

Extensions:

- Package

Generalizations:

- PhysicalDataModel
- DataModel

Constraints:

- Owns EntityItem elements (from DataModel)

KnownResource

Asserts that a known resource plays a part in the architecture; used in OV-2.

Extensions:

- Part

Generalizations:

- NodeChild

Constraints:

- Type must be a Resource (Post, Organization, CapabilityConfiguration, SystemsNode, Software or ResourceArtifact)
- Class must be a NodeParent (Node or LogicalArchitecture) (from NodeChild)

LightCondition

A specification of environmental lighting conditions; used in StV-2.

Extensions:

- Class

Generalizations:

- EnvironmentalType

Use:

- Can be the type of an EnvironmentProperty (from EnvironmentalType)

Location

A general specification of the surroundings/scenario in which an operation might take place. Examples include 'desert', 'arctic', 'at sea'; used in OV-1 and OV-2.

Extensions:

- Class

Generalizations:

- ReferredLocation
- ConceptItem
- EnvironmentalType

Use: Can be:

- Supplier to a CompatibleWith dependency from a Node (from ReferredLocation)
- Type of a ConceptRole (from ConceptItem)
- The type of an EnvironmentProperty (from EnvironmentalType)

LogicalArchitecture

A composite structure model whose parts are either NodeRoles, ProblemDomains, or KnownResources; used in OV-2.

Extensions:

- Class

Generalizations:

- NodeParent

Use:

- Can own ProblemDomain properties

LogicalDataModel

A specification of business information requirements as a formal data structure; used in OV-7.

Extensions:

- Package

Generalizations:

- DataModel

Constraints:

- Owns EntityItem elements (from DataModel)

MapsToCapability

Asserts that a StandardOperationalActivity is in some way part of a capability; used in StV-6.

Extensions:

- Dependency

Constraints:

- Client must be a StandardOperationalActivity
- Supplier must be a Capability

MaterielExchange

Materiel that is exchanged between Nodes; used in OV-2, OV-3 and OV-6c.

Extensions:

- InformationFlow

Generalizations:

- OperationalExchange

Constraints:

- Source is a Node (from OperationalExchange)
- Target is a Node (from OperationalExchange)

Use:

- Can convey a ResourceArtifact or Software

Measurement

A category of measures; used in AV-3, OV-2 and SV-7.

Extensions:

- Attribute

Specializations:

- PerformanceParameter

Use:

- Owned by a MeasurementSet Class

MeasurementSet

A set or collection of Measurements; used in AV-3, OV-3 and SV-7.

Extensions:

- Class

Constraints:

- Owned attributes must be Measurement

Use:

- Has a set of associations with (measuredElement) UPDMElement
- Is classifier of ActualMeasurementSet object

Metadata

Annotation that can be applied to any element in the architecture; used in AV-1.

Extensions:

- Note

Specializations:

- ArchitectureMetadata

MilestoneSequence

A relationship between two milestones; used in AcV-2 and SV-8.

Extensions:

- Dependency

Constraints:

- Client must be an ActualProjectMilestone
- Supplier must be an ActualProjectMilestone

Mission

A purpose to which a person, organization, or autonomous system is tasked; used in AV-1, OV-1, OV-6a and OV-6b.

Extensions:

- UseCase

Generalizations:

- SubjectOfOperationalConstraint
- SubjectOfOperationalStateMachine

Use:

- Fulfilled by an EnterprisePhase
- Can have an attached OperationalConstraint (from SubjectOfOperationalConstraint)
- Can own an OperationalStateMachine (from SubjectOfOperationalStateMachine)

MovementOfPeople

MODAF alias for OrganizationalExchange.

Extensions:

- InformationFlow

Generalizations:

- OrganizationalExchange

Use:

- Conveys an OrganizationalResource (Organization or Post)

Needline

Documents the requirement to exchange information between nodes; used in OV-2 and OV-3.

Extensions:

- Association
- Connector

Generalizations:

- OperationalElement

Constraints:

- End Types must be Node
- End Roles must be NodePort
- End Roles must be NodeChild (NodeRole, ProblemDomain, KnownResource)

Use:

- Realizes an OperationalExchange - create a Needline between the same two elements as an OperationalExchange, then right-click on the Needline and select 'Advanced > Information Flows Realized'

NoLongerUsedMilestone

Asserts that an ActualOrganizationResource ceased to use - or is slated to cease using - a CapabilityConfiguration from a specific point in time; used in StV-5.

Extensions:

- Object

Generalizations:

- ActualProjectMilestone

Constraints:

- Classifier must be a ProjectMilestone (from ActualProjectMilestone)

Use:

- Has set of associations to 'noLongerUsedBy' ActualOrganizationalResource (ActualOrganization or ActualPost) objects
- Can have a set of associated Resource (from ActualProjectMilestone)
- Can be client/supplier of a MilestoneSequence (from ActualProjectMilestone)
- Has a set of associations with 'configuration' CapabilityConfiguration Classes

Node

Logical entity that performs operational activities; used in OV-1, OV-2, OV-3, OV-5, OV-6a, OV-6b and OV-6c.

Extensions:

- Class

Generalizations:

- Performer
- ConceptItem
- NodeParent

- SubjectOfOperationalConstraint
- SubjectOfOperationalStateMachine
- OperationalElement

Specializations:

- OperationalNode

Constraints:

- Owned ports must be NodePort, RequestPoint or ServicePoint

Use: Can:

- Have a Performs dependency to a PerformedActivity (Function or OperationalActivity) (from Performer)
- Be the Client of a CompatibleWith dependency to a ReferredLocation (Location or PhysicalLocation)
- Be the type of a ConceptRole (from ConceptItem)
- Own a RequestPoint port
- Own a ServicePoint port
- Be client of an ExhibitsCapability dependency to a Capability
- Own NodeChild (NodeRole, KnownResource, ProblemDomain) (from NodeParent)
- Be source and target of an OperationalExchange (ConfigurationExchange, EnergyExchange, InformationExchange, MaterielExchange or OrganizationalExchange) information flow
- Be the end type of a Needline association
- Have an attached OperationalConstraint (from SubjectOfOperationalConstraint)
- Own an OperationalStateMachine (from SubjectOfOperationalStateMachine)
- Be the type of a NodeRole
- Own ServiceOperations

NodePort

A property of a Node that specifies a distinct interaction point between the node and its environment or between the node and its internal parts.

Extensions:

- Port

Constraints:

- Type must be an OperationalExchangeItem (Post, Organization, ResourceArtifact or System)

Use:

- Owned by a Node
- Can be the ends of a Needline

NodeRole

Used to link a parent Node to its sub-nodes; used in OV-2, OV-3 and OV-6c.

Extensions:

- Part

Generalizations:

- NodeChild

Specializations:

- ProblemDomain

Constraints:

- Class must be a Node
- Type must be a Node

OperationalActivity

A logical process, specified independently of how the process is carried out; used in OV-2, OV-3, OV-4, OV-5, OV-6a, OV-6b and SV-5.

Extensions:

- Activity

Generalizations:

- PerformedActivity
- SubjectOfOperationalConstraint
- OperationalElement
- SubjectOfOperationalStateMachine

Specializations:

- StandardOperationalActivity

Constraints:

- Owned parameters must be OperationalParameter

Use: Can:

- Be Supplier of a Performs dependency (from PerformedActivity)
- Be Supplier of an OwnsProcess dependency
- Be the Activity/Behavior of an OperationalActivityAction
- Be the owner of an OperationalActivityEdge
- Have an attached OperationalConstraint (from SubjectOfOperationalConstraint)
- Be the Supplier of a SupportsOperationalActivity dependency
- Own an OperationalStateMachine (from SubjectOfOperationalStateMachine)

OperationalActivityAction

A call behavior action that invokes the activity to be performed; used in OV-5.

Extensions:

- CallBehaviorAction

Constraints:

- Activity/Behavior must be an OperationalActivity

Use:

- Can be the Source or Target of an OperationalActivityEdge

OperationalActivityEdge

Models the flow of control/objects through an OperationalActivity; used in OV-5.

Extensions:

- ControlFlow

Generalizations:

- OperationalElement

Constraints:

- Must be owned by an OperationalActivity
- Source must be an OperationalActivityAction
- Target must be an OperationalActivityAction

Use: Can:

- Have a set of OperationalExchange (ConfigurationExchange, EnergyExchange, InformationExchange, MaterielExchange or OrganizationalExchange) information flows that it realizes
- Carry a set of OperationalExchangeItem (Post, Organization, ResourceArtifact or System)

OperationalConstraint

A rule governing an operational behavior or property; used in OV-6a.

Extensions:

- Constraint

Specializations:

- OperationalRule

Constraints:

- Constrained element must be a SubjectOfOperationalConstraint (OperationalActivity, Node, InformationElement or Mission)

OperationalMessage

Message for use in an Operational Event Trace, which carries any of the subtypes of OperationalExchange; used in OV-6c.

Extensions:

- Message

Generalizations:

- OperationalElement

Use:

- Can have a set of OperationalExchange (ConfigurationExchange, EnergyExchange, InformationExchange, MaterialExchange or OrganizationalExchange) information flows that it realizes

OperationalNode

An element of the operational architecture that produces, consumes, or processes information.

Extensions:

- Class

Generalizations:

- Node

Constraints:

- Owned ports must be NodePort, RequestPoint or ServicePoint

Use: Can:

- Have a Performs dependency to a PerformedActivity (Function, OperationalActivity) (from Performer)
- Be the Client of a CompatibleWith dependency to a ReferredLocation (Location or PhysicalLocation)
- Be the type of a ConceptRole (from ConceptItem)
- Own a RequestPoint port
- Own a ServicePoint port
- Be client of an ExhibitsCapability dependency to a Capability
- Own NodeChild (NodeRole, KnownResource, ProblemDomain) (from NodeParent)
- Be source and target of an OperationalExchange (ConfigurationExchange, EnergyExchange, InformationExchange, MaterielExchange or OrganizationalExchange) information flow
- Be the end type of a Needline association
- Have an attached OperationalConstraint (from SubjectOfOperationalConstraint)
- Own an OperationalStateMachine (from SubjectOfOperationalStateMachine)
- Be type of a NodeRole
- Own ServiceOperations

OperationalParameter

Represents inputs and outputs of an operational activity; used in OV-5.

Extensions:

- ActivityParameter

Constraints:

- Type must be an OperationalExchangeItem (Post, Organization, ResourceArtifact or System)

Use:

- Can be owned by an OperationalActivity

OperationalRule

A DoDAF alias for OperationalConstraint.

Extensions:

- Constraint

Generalizations:

- OperationalConstraint

Constraints:

- Constrained element must be a SubjectOfOperationalConstraint (OperationalActivity, Node, InformationElement or Mission) (from OperationalConstraint)

OperationalStateMachine

A StateMachine describing an operational behavior or property; used in OV-6b.

Extensions:

- StateMachine

Constraints:

- Owner is SubjectOfOperationalStateMachine (Mission, InformationElement or Node)

Organization

A group of persons, associated for a particular purpose; used in OV-4, SV-1, SV-3, SV-9, SV-10a and SV-12.

Extensions:

- Class

Generalizations:

- OrganizationalResource
- Resource, Performer
- SubjectOfForecast
- SubjectOfResourceConstraint

Use: Can:

- Be classifier to an ActualOrganization
- Be source or target of a Commands information flow (from OrganizationalResource)
- Be the owning Class of a PostRole
- Be the Class or type of a SubOrganization
- Be the Class of an Equipment (from OrganizationalResource)
- Be conveyed by an OrganizationalExchange (from OrganizationalResource)
- Be the type of a HumanResource (from OrganizationalResource)
- Be the source of a Controls information flow (from OrganizationalResource)
- Have a set of associated milestones, stereotyped ActualProjectMilestone (from Resource)
- Be the client of a RealizesCapability realization to a Capability (from Resource)
- Be the client of a ProvidesCompetence dependency to a Competence (from Resource)
- Have an attached ResourceConstraint (from Resource, SubjectOfResourceConstraint)
- Be supplier or client of a Forecast dependency (both must have same stereotype) (from SubjectOfForecast)
- Own a ServicePoint (from Resource)
- Own a RequestPoint (from Resource)
- Own a ResourcePort (from Resource)
- Be source and target of a ResourceInteraction (from Resource)
- Own a ServiceOperation (from Resource)
- Be type of a KnownResource (from Resource)
- Be type of a ResourceRole (from Resource)
- Have a Performs dependency to a PerformedActivity (Function or OperationalActivity) (from Performer)

OrganizationalExchange

A relationship specifying flow of people across organizations; used in OV-2, OV-3 and OV-6c.

Extensions:

- InformationFlow

Generalizations:

- OperationalExchange

Specializations:

- MovementOfPeople

Constraints:

- Conveyed element must be an OrganizationalResource (Organization or Post)
- Source is a Node (from OperationalExchange)
- Target is a Node (from OperationalExchange)

OutOfServiceMilestone

A project milestone that indicates a project's deliverable is to go out of service; used in AcV-2, StV-3 and SV-8.

Extensions:

- Object

Generalizations:

- ActualProjectMilestone

Constraints:

- Classifier must be a ProjectMilestone

Use:

- Has a set of association ('configuration') with CapabilityConfiguration
- Can have a set of associated Resource (from ActualProjectMilestone)
- Can be client/supplier of a MilestoneSequence (from ActualProjectMilestone)

OwnsProcess

A relationship that asserts that an ActualOrganizationalResource has responsibility for an OperationalActivity; used in OV-4.

Extensions:

- Dependency

Constraints:

- Client must be an ActualOrganizationalResource (ActualPost or ActualOrganization)
- Supplier must be an OperationalActivity

Part

Use of a ResourceArtifact as a part of another ResourceArtifact; used in SV-1.

Extensions:

- Part

Generalizations:

- ResourceRole

Specializations:

- SubSystemPart

Constraints:

- Class must be a ResourceArtifact
- Type must be a ResourceArtifact

Use: Can have:

- A RequiresCompetence dependency to a Competence (from ResourceRole)
- A set of associations to 'used' Functions (from ResourceRole)

PerformanceParameter

A category of quality measures that address how well a Performer meets Capability needs.

Extensions:

- Attribute

Generalizations:

- Measurement

Use:

- Owned by a MeasurementSet class

Performs

Links a Performer to the behavior that it can perform; used in OV-2, OV-3, OV-4, OV-5, SV-1 and SV-4.

Extensions:

- Dependency

Constraints:

- Client must be a Performer (Node, ExternalNode, OperationalNode, Post, Organization, CapabilityConfiguration, SystemsNode, Software or ResourceArtifact)
- Supplier must be a PerformedActivity (OperationalActivity or Function)

Person

A type of human being; used in OV-4.

Extensions:

- Class

Use:

- Can be Classifier of an ActualPerson

PhysicalDataModel

An implementable specification of a data structure; used in SV-11.

Extensions:

- Package

Generalizations:

- DataModel

Specializations:

- InternalDataModel

Constraints:

- Owns EntityItem elements (from DataModel)

PhysicalLocation

Anywhere that can be specified; used in OV-1 and OV-2.

Extensions:

- Class

Generalizations:

- ReferredLocation
- ConceptItem
- EnvironmentalType

Use: Can be:

- Supplier to a CompatibleWith dependency from a Node (from ReferredLocation)
- Type of a ConceptRole (from ConceptItem)
- The type of an EnvironmentProperty (from EnvironmentalType)

Platform

Use of an artifact as a platform in a particular ResourceConfiguration; used in SV-1.

Extensions:

- Part

Generalizations:

- ResourceComponent
- ResourceRole

Constraints:

- Class must be a CapabilityConfiguration
- Type must be a ResourceArtifact

Use:

- Can have a RequiresCompetence dependency to a Competence (from ResourceRole)
- Can have a set of associations to 'used' Functions (from ResourceRole)

Post

A type of point of contact or responsible person; used in OV-4, SV-1, SV-3, SV-9, SV-10a and SV-12.

Extensions:

- Class

Generalizations:

- OrganizationalResource
- Resource
- Performer
- SubjectOfForecast
- SubjectOfResourceConstraint

Use: Can:

- Be Classifier of an ActualPost
- Be the Type of a PostRole
- Be source or target of a Commands information flow (from OrganizationalResource)
- Be the Class of an Equipment (from OrganizationalResource)
- Be conveyed by an OrganizationalExchange (from OrganizationalResource)
- Be the type of a HumanResource (from OrganizationalResource)
- Be the source of a Controls information flow (from OrganizationalResource)
- Have a set of associated milestones, stereotyped ActualProjectMilestone (from Resource)
- Be client of a RealizesCapability realization to a Capability (from Resource)
- Be client of a ProvidesCompetence dependency to a Competence (from Resource)
- Have an attached ResourceConstraint (from Resource, SubjectOfResourceConstraint)
- Be supplier or client of a Forecast dependency (both must have same stereotype) (from SubjectOfForecast)
- Own a ServicePoint (from Resource)
- Own a RequestPoint (from Resource)
- Own a ResourcePort (from Resource)
- Be source and target of a ResourceInteraction (from Resource)
- Own a ServiceOperation (from Resource)
- Be type of a KnownResource (from Resource)
- Be type of a ResourceRole (from Resource)
- Have a Performs dependency to a PerformedActivity (Function, OperationalActivity) (from Performer)

PostRole

Asserts that a post exists in an organization; used in OV-4 and SV-1.

Extensions:

- Part

Generalizations:

- OrganizationRole
- ResourceRole

Constraints:

- Class must be an Organization
- Type must be a Post

Use: Can have a:

- RequiresCompetence dependency to a Competence (from ResourceRole)
- Set of associations to 'used' Functions (from ResourceRole)

ProblemDomain

The boundary containing those Nodes that can be realized by functional resources; used in OV-2.

Extensions:

- Part

Generalizations:

- NodeRole
- NodeChild

Constraints:

- Class must be a LogicalArchitecture
- Type must be a Node (from NodeRole)

Project

Used to define a category of project; used in AcV-1.

Extensions:

- Class

Use: Can:

- Be classifier of an ActualProject
- Have an association to a ProjectMilestone Class

ProjectMilestone

A type of project milestone; used in AcV-2.

Extensions:

- Class

Constraints:

- Owned attributes must be ProjectTheme

Use: Can:

- Be classifier of an ActualProjectMilestone
- Have an association from a Project Class

ProjectSequence

Asserts that one ActualProject follows on from another; used in AcV-2.

Extensions:

- Dependency

Constraints:

- Client must be an ActualProject
- Supplier must be an ActualProject

ProjectTheme

An aspect by which the progress of various projects can be measured; used in AcV-2.

Extensions:

- Attribute

Constraints:

- Type must be a ProjectThemeStatus

Use:

- Owned by ProjectMilestone

ProjectThemeStatus

Specifies a status for a ProjectTheme.

Extensions:

- Class

Use:

- The type of a ProjectTheme

Protocol

A standard for communication; used in SV-2, TV-1 and TV-2.

Extensions:

- Class

Generalizations:

- Standard
- SubjectOfForecast

Use: Can:

- Have a set of associations with ('ratifiedBy') ActualOrganization objects (from Standard)
- Have ProtocolLayers
- Be the type of ProtocolLayers
- Be the client and supplier of a Forecast dependency

ProtocolLayer

Asserts that a protocol uses another protocol; used in TV-1 and TV-2.

Extensions:

- Attribute

Constraints:

- Owning Class must be a Protocol
- Type must be a Protocol

ProvidesCompetence

Asserts that a resource provides a competence; used in OV-4.

Extensions:

- Dependency

Constraints:

- Client must be a Resource (Post, Organization, CapabilityConfiguration, SystemsNode, Software or ResourceArtifact)
- Supplier must be a Competence

RealizesCapability

Asserts that a resource provides a capability; used in SOV-3, StV-3, StV-5 and SV-1.

Extensions:

- Realization

Constraints:

- Client must be a Resource or a ServiceInterface
- Supplier must be a Capability

RequestPoint

The mechanism by which a Service communicates; used in OV-2 and SV-1.

Extensions:

- Port

Constraints:

- Type must be a ServiceInterface

Use:

- Can be owned by a Node or a Resource

RequiresCompetence

Asserts that a role requires a competence; used in SV-1.

Extensions:

- Dependency

Constraints:

- Client must be a ResourceRole
- Supplier must be a Competence

ResourceArtifact

A type of man-made object; used in OV-2, OV-3, OV-5, SV-1, SV-3, SV-9, SV-10a and SV-12.

Extensions:

- Class

Generalizations:

- OperationalExchangeItem
- ManfacturedResourceType
- Resource
- SubjectOfForecast
- ResourceInteractionItem
- Performer
- SubjectOfResourceConstraint

Specializations:

- System

Use: Can:

- Be conveyed by a MaterielExchange
- Be the type of an OperationalParameter (from OperationalExchangeItem)
- Own HostedSoftware
- Be the Class and type of a Part
- Be the type of a ResourceComponent
- Be the type of an Equipment
- Be the target of a Controls flow (from ManfacturedResourceType)
- Have a set of associated milestones, stereotyped ActualProjectMilestone (from Resource)
- Be client of a RealizesCapability realization to a Capability (from Resource)
- Be client of a ProvidesCompetence dependency to a Competence (from Resource)
- Have an attached ResourceConstraint (from Resource, SubjectOfResourceConstraint)
- Be supplier or client of a Forecast dependency (both must have same stereotype) (from SubjectOfForecast)
- Own a ServicePoint (from Resource)
- Own a RequestPoint (from Resource)
- Own a ResourcePort (from Resource)
- Be source and target of a ResourceInteraction (from Resource)
- Own a ServiceOperation (from Resource)
- Be type of a KnownResource (from Resource)
- Be type of a ResourceRole (from Resource)
- Have a Performs dependency to a PerformedActivity (Function or OperationalActivity) (from Performer)

ResourceComponent

A well-defined resource that is used by a CapabilityConfiguration to accomplish a capability; used in SV-1.

Extensions:

- Part

Generalizations:

- ResourceRole

Specializations:

- Platform

Constraints:

- Type must be a ResourceArtifact
- Owning Class must be a CapabilityConfiguration

Use: Can have a:

- RequiresCompetence dependency to a Competence (from ResourceRole)
- Set of associations to 'used' Functions (from ResourceRole)

ResourceConnector

A physical connection between two resources that implements protocols through which the source resource can transmit items to the destination resource; used in SV-2.

Extensions:

- Connector

Generalizations:

- ProtocolImplementation

Constraints:

- End roles must be ResourcePort

Use: Can:

- Have a set of ResourceInterface that it realizes
- Realize a ResourceInteraction

ResourceConstraint

Specifies the set of rules that govern the structural or functional aspects of the system; used in SV-10a.

Extensions:

- Constraint

Constraints:

- Constrained element must be a SubjectOfResourceConstraint (DataElement, Function, SystemFunction, CapabilityConfiguration, SystemsNode, Software, ResourceArtifact, System, Post or Organization)

ResourceInteraction

Represents data that is exchanged between resources; used in OV-4, SOV-4c, SV-1, SV-2, SV-3, SV-4, SV-6 and SV-10c.

Extensions:

- InformationFlow

Generalizations:

- SystemsElement
- ProtocolImplementation

Specializations:

- Controls
- Commands
- DataExchange

Constraints:

- Realizing connector is a ResourceInterface
- Realizing activity edge is a FunctionEdge
- Conveyed elements must be ResourceInteractionItem (DataElement, Energy, Post, Organization, CapabilityConfiguration, SystemsNode, Software, ResourceArtifact or System)
- Source must be a Resource (Post, Organization, CapabilityConfiguration, SystemsNode, Software, ResourceArtifact or System)
- Target must be a Resource (Post, Organization, CapabilityConfiguration, SystemsNode, Software, ResourceArtifact or System)

Use:

- Can realize an OperationalExchange (OrganizationalExchange, InformationExchange, EnergyExchange or MaterielExchange)
- Can realize an ActualOrganizationRelationship
- Has an association to ('implements') a Protocol (from ProtocolImplementation)

ResourceInterface

A contractual agreement between two resources that implement protocols; used in OV-4, SV-1, SV-2, SV-3 and SV-6.

Extensions:

- Association
- Connector

Generalizations:

- SystemsElement

Specializations:

- SystemConnector

Constraints:

- End roles must be ResourceRole
- End types must be Resource

Use:

- Can realize a ResourceInteraction

ResourceMessage

Message for use in a Resource event trace, implements a ResourceInteraction; used in SV-10c.

Extensions:

- Message

Generalizations:

- SystemsElement

Use:

- Can have a set of ResourceInteraction that it carries

ResourcePort

An interaction point for a resource through which it can interact with the outside environment; used in SV-2.

Extensions:

- Port

Generalizations:

- ProtocolImplementation

Constraints:

- Type must be a ResourceInteractionItem (Energy, Post, Organization, CapabilityConfiguration, Software, ResourceArtifact or DataElement)

Use:

- Can be owned by a Resource
- Has an association to a Protocol Class that it 'implements' (from ProtocolImplementation)
- Can be the end role of a ResourceConnector

ResourceStateMachine

UPDM artifact that extends a UML StateMachine applied to Resources; used in SV-10b.

Extensions:

- StateMachine

Generalizations:

- SystemsElement

Constraints:

- Owner must be SubjectOfResourceStateMachine (Post, Organization, CapabilityConfiguration, SystemsNode, Software, ResourceArtifact, System or DataElement)

SameAs

Asserts that two elements refer to the same real-world thing; used in AV-2.

Extensions:

- Dependency

Constraints:

- Client must be a UPDMElement
- Supplier must be an ExternalIndividual or ExternalType

ServiceAttribute

A property of a ServiceInterface that allows performance, reliability and cost values to be captured; used in SOV-1.

Extensions:

- Attribute

Use:

- Owned by a ServiceInterface

ServiceFunction

Describes the abstract behavior of ServiceOperations, regardless of the actual implementation; used in SOV-5.

Extensions:

- Activity

Use: Can:

- Be the behavior of a ServiceFunctionAction
- Be the activity of a ServiceOperationAction
- Own ServicePoint ports

ServiceFunctionAction

A call behavior action that invokes the ServiceFunction to be performed; used in SOV-5.

Extensions:

- CallBehaviorAction

Constraints:

- Behavior must be a ServiceFunction

ServiceInteraction

Interaction for a service interface; used in SOV-4c.

Extensions:

- Interaction

ServiceInterface

A contractual agreement between two resources that implement protocols through which the source service interacts with the destination resource; used in SOV-1, SOV-2, SOV-3, SOV-4a, SOV-4b, SOV-4c and SOV-5.

Extensions:

- Class

Constraints:

- Owned attributes must be ServiceAttribute
- Owned operations must be ServiceOperation

Use: Can:

- Be client of a SupportsOperationalActivity dependency to an OperationalActivity
- Be client of a RealizesCapability realization to a Capability
- Own ServicePolicy
- Have one association to a ServiceStateMachine
- Have one association to a ServiceInteraction
- Be type of a RequestPoint or ServicePoint port
- Be dependent on another ServiceInterface
- Be client of an Expose dependency to a Capability

ServiceMessage

Message for use in a service interaction specification, implements a resource interaction; used in SOV-4c.

Extensions:

- Message

Use:

- Can carry a set of ResourceInteractions

ServiceOperation

Provides the access point for invoking the behavior of a provided service; used in SOV-2 and SOV-5.

Extensions:

- Operation

Constraints:

- Owner must be a Resource (Post, Organization, CapabilityConfiguration, SystemsNode, Software, ResourceArtifact or System)
- Owner must be a Node

Use: Can:

- Have an association to a (concreteBehavior) Function
- Be owned by a ServiceInterface
- Be the operation of a ServiceOperationAction
- Have an association to an (abstractBehavior) ServiceFunction

ServiceOperationAction

A call action that represents a Resource or ServiceFunction invoking a ServiceOperation; used in SOV-5.

Extensions:

- CallOperationAction

Constraints:

- Activity must be a ServiceFunction
- Activity must be a Function
- Operation must be a ServiceOperation

Use:

- Can be the Source and Target of a FunctionEdge control flow

ServicePoint

The mechanism by which a service communicates; used in OV-2, SV-1 and SV-12.

Extensions:

- Port

Constraints:

- Type must be a ServiceInterface
- Owned behavior is a ServiceFunction

Use:

- Can be owned by a Node or a Resource (Post, Organization, CapabilityConfiguration, SystemsNode, Software, ResourceArtifact or System)

ServicePolicy

A constraint governing the consumers and providers of services; used in SOV-4a.

Extensions:

- Constraint

Use:

- Rule can be owned by a ServiceInterface

ServiceStateMachine

UPDM artifact that extends UML StateMachine; used in SOV-4b.

Extensions:

- StateMachine

Software

Software needed for the functioning of the system; used in OV-2, OV-3, SV-1, SV-3, SV-9, SV-10a and SV-12.

Extensions:

- Class

Generalizations:

- ManufacturedResourceType

- Resource
- SubjectOfForecast
- ResourceInteractionItem
- Performer
- SubjectOfResourceConstraint

Use: Can:

- Be conveyed on a MaterielExchange information flow
- Be type of HostedSoftware
- Be the target of a Controls flow (from ManfacturedResourceType)
- Have a set of associated milestones, stereotyped ActualProjectMilestone (from Resource)
- Be client of a RealizesCapability realization to a Capability (from Resource)
- Be client of a ProvidesCompetence dependency to a Competence (from Resource)
- Have an attached ResourceConstraint (from Resource, SubjectOfResourceConstraint)
- Be supplier or client of a Forecast dependency (both must have same stereotype) (from SubjectOfForecast)
- Own a ServicePoint (from Resource)
- Own a RequestPoint (from Resource)
- Own a ResourcePort (from Resource)
- Be source and target of a ResourceInteraction (from Resource)
- Own a ServiceOperation (from Resource)
- Be a type of a KnownResource (from Resource)
- Be a type of a ResourceRole (from Resource)
- Have a Performs dependency to a PerformedActivity (Function or OperationalActivity) (from Performer)

Standard

A ratified set of rules that are used to guide and/or constrain any UPDM element; used in SV-9, TV-1 and TV-2.

Extensions:

- Class

Generalizations:

- SubjectOfForecast

Specializations:

- Protocol

Use:

- Any UPDMElement can have a 'conformsTo' association to a Standard
- Can have an association (ratifiedBy) with an ActualOrganization
- Can be supplier or client of a Forecast (both must be same stereotype) (from SubjectOfForecast)

StandardConfiguration

A comment, attached to a CapabilityConfiguration, indicating that the annotated CapabilityConfiguration is a standard Pattern for re-use in the architecture; used in TV1 and TV-2.

Extensions:

- Note

Constraints:

- The annotated element must be a CapabilityConfiguration

StandardOperationalActivity

An OperationalActivity that is a standard procedure and that is doctrinal; used in OV-5 and StV-6.

Extensions:

- Activity

Generalizations:

- OperationalActivity
- PerformedActivity
- SubjectOfOperationalConstraint
- OperationalElement
- SubjectOfOperationalStateMachine

Constraints:

- Owned parameters must be OperationalParameter (from OperationalActivity)

Use: Can:

- Be Client of a MapsToCapability dependency to a Capability Class
- Be Supplier of a Performs dependency (from PerformedActivity)
- Be Supplier of an OwnsProcess dependency (from OperationalActivity)
- Be the Activity/Behavior of an OperationalActivityAction (from OperationalActivity)
- Be the owner of an OperationalActivityEdge (from OperationalActivity)
- Have an attached OperationalConstraint (from SubjectOfOperationalConstraint)
- Be the Supplier of a SupportsOperationalActivity dependency (from OperationalActivity)
- Own an OperationalStateMachine (from SubjectOfOperationalStateMachine)

StereotypeExtension

Defines an additional stereotype used in the architecture that is not defined in this metamodel; used in AV-2.

Extensions:

- Note

Constraints:

- Annotated element must be a UPDMElement

Use:

- Can have a set of associations (ontologyReference) to ExternalType

StructuralPart

Describes a structural part of an EnterprisePhase; used in AV-1.

Extensions:

- Part

Constraints:

- Type must be an EnterprisePhase
- Class must be an EnterprisePhase

SubOrganization

Asserts that one type of organization is typically the parent of another; used in OV-4 and SV-1.

Extensions:

- Part

Generalizations:

- OrganizationRole
- ResourceRole

Constraints:

- Type must be an Organization
- Class must be an Organization

Use: Can:

- Have a RequiresCompetence dependency to a Competence (from ResourceRole)
- Have a set of associations to 'used' Functions (from ResourceRole)

SubSystemPart

Indicates that a subsystem is part of another system; used in SV-1.

Extensions:

- Part

Generalizations:

- Part
- ResourceRole

Constraints:

- Class must be a ResourceArtifact (from Part)
- Type must be a ResourceArtifact (from Part)

Use: Can:

- Have a RequiresCompetence dependency to a Competence (from ResourceRole)
- Have a set of associations to 'used' Functions (from ResourceRole)

SupportsOperationalActivity

An assertion that a Service in some way contributes or assists in the execution of an OperationalActivity.

Extensions:

- Dependency

Constraints:

- Client must be a ServiceInterface
- Supplier must be an OperationalActivity

System

Any organized assembly of resources and procedures united and regulated by interaction of interdependence to accomplish a set of specific functions.

Extensions:

- Class

Generalizations:

- ResourceArtifact
- OperationalExchangeItem
- ManfacturedResourceType
- Resource
- SubjectOfForecast
- ResourceInteractionItem
- Performer
- SubjectOfResourceConstraint

Use: Can:

- Be conveyed by a MaterielExchange (from ResourceArtifact)
- Be the type of an OperationalParameter (from OperationalExchangeItem)
- Own HostedSoftware (from ResourceArtifact)
- Be the Class and type of a Part (from ResourceArtifact)
- Be the type of a ResourceComponent (from ResourceArtifact)
- Be the type of an Equipment (from ResourceArtifact)
- Be the target of a Controls flow (from ManfacturedResourceType)
- Have a set of associated milestones, stereotyped ActualProjectMilestone (from Resource)
- Be client of a RealizesCapability realization to a Capability (from Resource)
- Be client of a ProvidesCompetence dependency to a Competence (from Resource)
- Have an attached ResourceConstraint (from Resource, SubjectOfResourceConstraint)
- Be supplier or client of a Forecast dependency (both must have same stereotype) (from SubjectOfForecast)
- Own a ServicePoint (from Resource)
- Own a RequestPoint (from Resource)
- Own a ResourcePort (from Resource)
- Be source and target of a ResourceInteraction (from Resource)
- Own a ServiceOperation (from Resource)
- Be type of a KnownResource (from Resource)
- Be type of a ResourceRole (from Resource)
- Have a Performs dependency to a PerformedActivity (Function or OperationalActivity) (from Performer)

SystemConnector

A link between two systems.

Extensions:

- Association
- Connector

Generalizations:

- ResourceInterface
- SystemsElement

Specializations:

- SystemConnector

Constraints:

- End roles must be ResourceRole (from ResourceInterface)
- End types must be Resource (from ResourceInterface)

Use:

- Can realize a ResourceInteraction (from ResourceInterface)

SystemFunction

A DoDAF alias for Function.

Extensions:

- Activity

Generalizations:

- Function
- PerformedActivity
- SystemsElement
- SubjectOfResourceConstraint

Constraints:

- Owned parameters are FunctionParameter (from Function)

Use: Can:

- Be Supplier of a Performs dependency (from PerformedActivity)
- Own ServiceOperationAction, FunctionAction or FunctionEdge (from Function)
- Be Client of an ImplementsOperational dependency to an OperationalActivity (from SystemsElement)
- Have an attached ResourceConstraint (from SubjectOfResourceConstraint)

SystemFunctionAction

A DoDAF alias for FunctionAction.

Extensions:

- CallBehaviorAction

Generalizations:

- FunctionAction

Constraints:

- Activity is stereotyped Function (from FunctionAction)

Use:

- Press Ctrl+L to set the function (from FunctionAction)

SystemFunctionEdge

An alias for FunctionEdge.

Extensions:

- A DoDAF ControlFlow

Generalizations:

- FunctionEdge
- SystemsElement

Constraints:

- Source must be a ServiceOperationAction (from FunctionEdge)
- Target must be a ServiceOperationAction (from FunctionEdge)

Use:

- Can realize a ResourceInteraction (right-click, Advanced > Information Flows Realized) (from FunctionEdge)

SystemsNode

A DoDAF alias for CapabilityConfiguration.

Extensions:

- Class

Generalizations:

- CapabilityConfiguration
- Resource, ConceptItem
- Performer
- ResourceInteractionItem
- SubjectOfResourceConstraint
- SubjectOfForecast
- SystemsElement
- SubjectOfResourceStateMachine
- ResourceInteractionItem

Use: Can:

- Have a set of associated deployed milestones, stereotyped DeployedMilestone (from CapabilityConfiguration)
- Have an optional associated no longer used milestone, stereotyped NoLongerUsedMilestone (from CapabilityConfiguration)
- Have a set of associated increment milestones, stereotyped IncrementMilestone (from CapabilityConfiguration)
- Have an optional associated out of service milestone, stereotyped OutOfServiceMilestone (from CapabilityConfiguration)
- Be annotated by a StandardConfiguration note (from CapabilityConfiguration)
- Be the type of a ConceptRole (from ConceptItem)

- Have a set of associated milestones, stereotyped ActualProjectMilestone (from Resource)
- Be client of a RealizesCapability realization to a Capability (from Resource)
- Be client of a ProvidesCompetence dependency to a Competence (from Resource)
- Have an attached ResourceConstraint (from Resource, SubjectOfResourceConstraint)
- Be supplier or client of a Forecast dependency (both must have same stereotype) (from SubjectOfForecast)
- Own a ServicePoint (from Resource)
- Own a RequestPoint (from Resource)
- Own a ResourcePort (from Resource)
- Be source and target of a ResourceInteraction (from Resource)
- Own a ServiceOperation (from Resource)
- Be the type of a KnownResource (from Resource)
- Be the type of a ResourceRole (from Resource)
- Have a Performs dependency to a PerformedActivity (Function, OperationalActivity) (from Performer)

TechnologyForecast

A statement about the future state of one or more types of standard.

Extensions:

- Forecast
- Dependency

Constraints:

- Client and Supplier are both SubjectOfForecast (Standard, Competence, Capability, CapabilityConfiguration, Organization, Post, ResourceArtifact or Software) (from Forecast)
- Client and Supplier must be the same specialization of SubjectOfForecast (from Forecast)

TemporalPart

EnterprisePhase elements that have a time-based nature; used in AV-1.

Extensions:

- Part

Constraints:

- Type must be an EnterprisePhase
- Class must be an EnterprisePhase

UsedConfiguration

The use of a CapabilityConfiguration in another CapabilityConfiguration; used in SV-1.

Extensions:

- Part

Generalizations:

- ResourceRole

Constraints:

- Type must be a CapabilityConfiguration
- Class must be a CapabilityConfiguration

Use: Can:

- Have a RequiresCompetence Dependency to a Competence (from ResourceRole)
- Have a set of Associations (usedFunctions) to Function (from ResourceRole)

VisionStatement

A high-level textual description of an EnterpriseVision.

Extensions:

- Note

WholeLifeEnterprise

A purposeful endeavor of any size involving people, organizations and supporting systems; used in AV-1 and StV-1.

Extensions:

- Class

Generalizations:

- EnterprisePhase

Use: Can:

- Have a set of Associations (statementTasks) to EnduringTask Class (from EnterprisePhase)
- Have a set of Associations (exhibits) to Capability Class (from EnterprisePhase)
- Have a set of Associations (inhabits) to Environment Class (from EnterprisePhase)
- Have a set of Associations (goals) with EnterpriseGoal Class (from EnterprisePhase)
- Have a set of Associations (visions) with EnterpriseVision Class (from EnterprisePhase)
- Be the type of a StructuralPart or TemporalPart (from EnterprisePhase)
- Fulfill a Mission Use Case (from EnterprisePhase)
- Be Supplier of a DefinesArchitecture Realization (from EnterprisePhase)

Abstract Stereotypes

Stereotype Specializations

Stereotype	Description
ActualOrganizationalResource	An actual organization or post. Specializations: • ActualOrganization • ActualPost
ConceptItem	An item that might feature in a high level operational concept. Specializations: • CapabilityConfiguration • Node • ReferredLocation • Resource
DataModel	A structured specification of data, showing classifications of data elements and the relationships between them. Specializations: • LogicalDataModel • PhysicalDataModel
EnvironmentalType	A type of environment. Specializations: • LightCondition • Location • PhysicalLocation • Climate
ManufacturedResourceType	A resource artifact or software. Generalizations: • Resource Specializations: • ResourceArtifact • Software
NodeChild	An abstract element used for supporting the composite structuring of operational elements such as Nodes and LogicalArchitectures. Specializations: • NodeRole • ProblemDomain • KnownResource

NodeParent	Represents the owners/context of composite structure at the operational level. Specializations: • Node • ExternalNode • OperationalNode • LogicalArchitecture
OperationalElement	Elements relating to operational models. Specializations: • OperationalActivity • StandardOperationalActivity • OperationalMessage • Node • ExternalNode • OperationalNode • Needline • OperationalExchange • InformationElement • OperationalActivityEdge
OperationalExchange	Describes the characteristics of an exchanged item, such as the content, format (voice, imagery, text and message format), throughput requirements, security or classification level, timeliness requirement, and the degree of interoperability. Generalizations: • OperationalElement Specializations: • ConfigurationExchange • EnergyExchange • InformationExchange • MaterielExchange • OrganizationalExchange
OperationalExchangeItem	An item that participates in an operational exchange. Specializations: • Post • Organization • ResourceArtifact • System
OrganizationalResource	Either an organization or a post. Generalizations: • Resource • OperationalExchangeItem Specializations: • Post • Organization

OrganizationRole	Represents properties in an organization that are typed by another organization or a post. Generalizations: • ResourceRole Specializations: • SubOrganization • PostRole
PerformedActivity	A behavior that can be performed by a Performer. Specializations: • OperationalActivity • Function
Performer	A structural element that can perform behaviors (such as PerformedActivity) Specializations: • Node • Resource
ProtocolImplementation	An element that implements a specific protocol. Specializations: • ResourcePort • ResourceInteraction • Controls • Commands • DataExchange • ResourceConnector
ReferredLocation	Either an actual location or a type of location (that is, environment) at/in which operations can be conducted. Generalizations: • ConceptItem • EnvironmentalType Specializations: • Location • PhysicalLocation
Resource	A physical asset, organizational resource or functional resource that can contribute towards fulfilling a capability. Generalizations: • SystemsElement • SubjectOfResourceStateMachine • ResourceInteractionItem • Performer • SubjectOfResourceConstraint • ConceptItem • SubjectOfForecast

	Specializations: • Post • Organization • CapabilityConfiguration • SystemsNode • Software • ResourceArtifact • System
ResourceInteractionItem	Represents the items exchanged between resources through a resource interaction. Specializations: • Energy • Resource • DataElement
ResourceRole	Defines the usage of any resource in the system. Specializations: • UsedConfiguration • Equipment • SubOrganization • PostRole • Part • SubSystemPart • HumanResource • ResourceComponent • Platform • HostedSoftware
SubjectOfForecast	Any element that can be subject to a forecast. Specializations: • Standard • Protocol • Capability • Competence • Post • Organization • CapabilityConfiguration • SystemsNode • Software • ResourceArtifact • System
SubjectOfOperationalConstraint	An element of the architecture that can be subject to an OperationalConstraint or OperationalStateDescription. Specializations: • OperationalActivity

	• InformationElement • Node • Mission
SubjectOfOperationalStateMachine	The element being described by the StateMachine. Specializations: • OperationalActivity • InformationElement • Node • Mission
SubjectOfResourceConstraint	Anything that can be constrained by a ResourceConstraint. Specializations: • Post • Organization • CapabilityConfiguration • SystemsNode • Software • ResourceArtifact • System • DataElement • Function
SubjectOfResourceStateMachine	The element being described by the StateMachine. Specializations: • Post • Organization • CapabilityConfiguration • SystemsNode • Software • ResourceArtifact • System • DataElement
SystemsElement	Elements relating to system models. Specializations: • Resource • ResourceInteraction • ResourceMessage • ResourceInteraction • DataElement • ResourceStateMachine • FunctionEdge • Function
UPDMElement	A super type for all UPDM elements, providing a means of extending UPDM

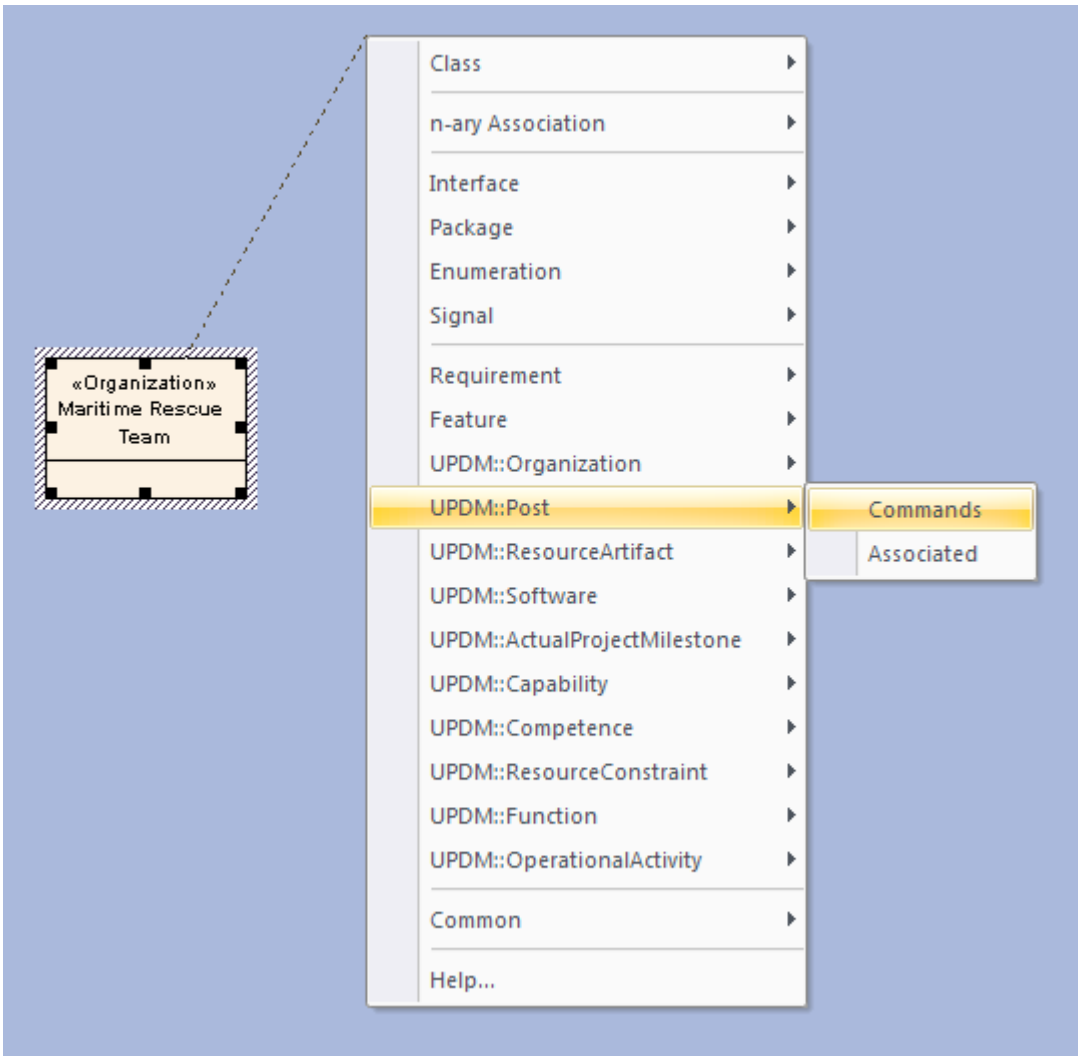
	elements in a common way. Specializations: • All UPDM stereotypes

Quicklinks

The UPDM profile makes use of Enterprise Architect's 'Quicklink' feature to make it quicker and easier to create correct and consistent UPDM models.

When you select an element, the Quicklink arrow displays next to the top-right corner of the element.

Drag the arrow away from the element and release it over empty diagram space. The Quicklink context menu displays, listing all the UPDM elements that could commonly be attached to the element, as shown.



Selecting the 'UPDM::Post | Commands' option in the context menu creates a new Post element connected to the Organization element by a Commands relationship.

Tagged Values for UPDM

UPDM is an extension of UML, which is extended by applying stereotypes to elements. The stereotypes in turn apply Tagged Values that provide additional information to that normally associated with a UML element. Since UPDM makes frequent use of Tagged Values, it is recommended to keep the Properties window docked and visible at all times, with the 'UPDM' section expanded.

Synchronize Tagged Values

The list of Tagged Values owned by an element can get out of date. A new version of the UML Profile might define new or modified Tagged Values for an element type, or as user might delete some. Also, you might apply the stereotype using the stereotype combo box, which doesn't add Tagged Values. If you want to refresh the list of Tagged Values for a single element, you can drag and drop the stereotype from the Diagram Toolbox onto the element and select the 'Apply' option. This only works for single diagram objects, and not for connectors.

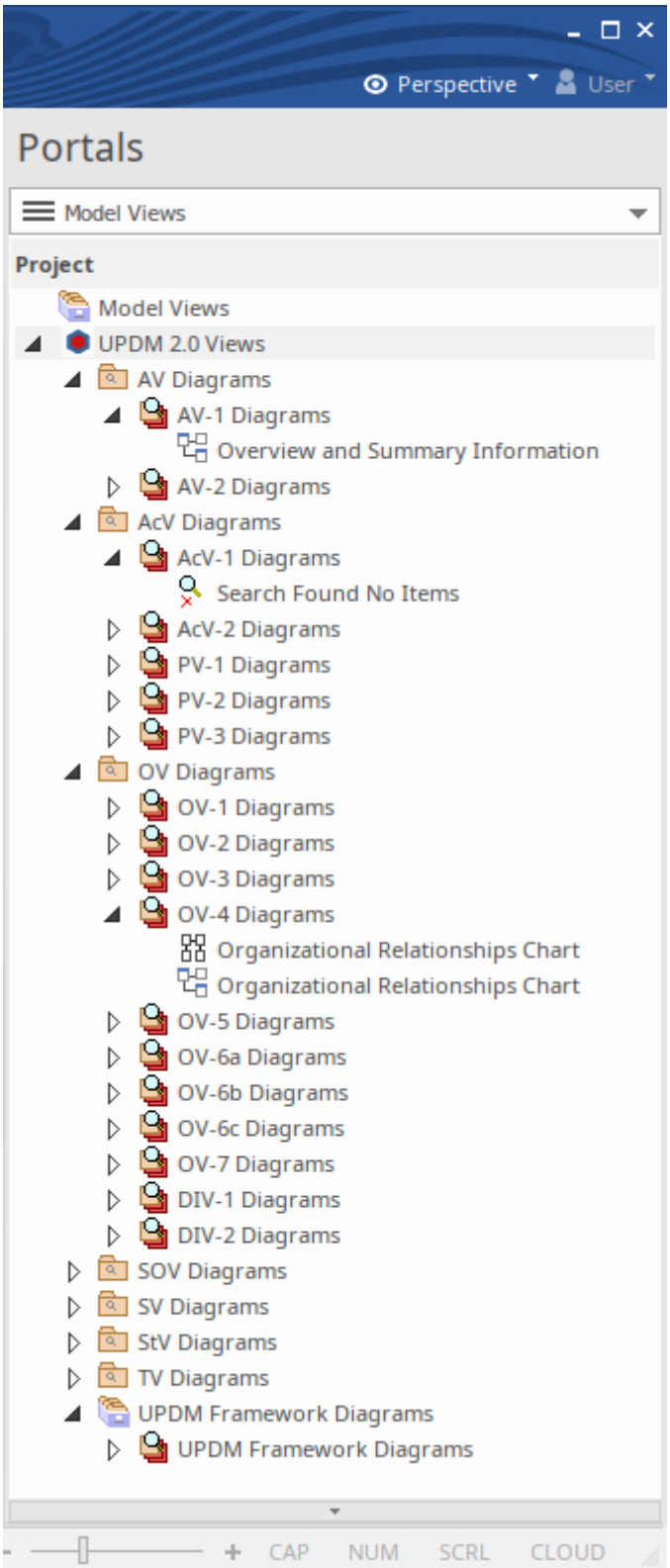
If you want to refresh the list of Tagged Values for every element in your model, select the 'Specialize > Technologies > UPDM > Synchronize Tagged Values' menu option.

The URL/URI Tagged Value

In the UPDM Profile Specification the stereotype «UPDMElement» - from which all profile elements are derived - provides a Tagged Value URL/URI. In Enterprise Architect, this Tagged Value has been omitted and you must use the standard Enterprise Architect functionality to achieve the same result: that is, open the 'Properties' dialog for the element, select the 'Files' tab or page, and type in a web location.

Model Views in UPDM

The 'Model Views' tab of the Focus window displays a variety of different views on the model data, providing an alternative to the Browser window. You can use this tab as a quick and easy method of locating all of your UPDM diagrams in the current model.



To open the 'Model Views' tab, select 'Start > All Windows > Design > Focus > Model Views'. Expand the appropriate

folders and double-click on the required diagram to open it.

Glossary

UPDM provides the ability to import descriptions of all UPDM stereotypes into the Enterprise Architect Glossary. This gives you a quick reference to the meaning of each stereotype, lists the views that the stereotype might appear in and, for abstract stereotypes, lists the concrete stereotypes that inherit from the abstract stereotype.

Import Glossary

You import the Glossary definitions into each model individually. To do this, select the 'Publish > Technologies > Import > Other Tools/Formats' ribbon option.

View the Glossary

To view the Glossary, select one of:

- 'Design > Dictionary > Glossary > Glossary View to display the Project Glossary view
- 'Design > Dictionary > Glossary > Edit' to open the 'Glossary' dialog
- In any dialog 'Notes' field, a Glossary hyperlink (underlined and colored blue)

Using Enterprise Architect Elements

Creating an instance from a Class

UPDM has Classifier/Instance pairs where the classifier describes a class of elements and the instance represents a single member of that Class. The Classifier/Instance pairs in UPDM are:

- MeasurementSet/ActualMeasurementSet
- Organization/ActualOrganization
- Person/ActualPerson
- Post/ActualPost
- Project/ActualProject
- ProjectMilestoneType/ActualProjectMilestone
- CapabilityConfiguration/FieldedCapability

If you have an element that is the classifier part of one of these Classifier/Instance pairs, you can choose between two main approaches for creating the instance:

1. Set the classifier of an existing instance - Click on the instance element in a diagram and then either press Ctrl+L or right-click and select 'Advanced | Instance Classifier'; the same command sets the type of a Port or Part.
2. Create an instance from an existing classifier - Press Ctrl while dragging the classifier element from the Browser window onto a diagram. The 'Paste Element' dialog displays; select the 'Paste as Instance of Element' option. An anonymous instance is created with the appropriate stereotype; select the instance, press F2 and give it a name.

Set the run state of an object

Where a classifier can own a set of attributes, an instance of that classifier can own a Slot for each attribute. The set of assigned values for these Slots is known as the run state. To set the run state of an object on a diagram, right-click on it and select 'Features | Set Run State' or press Ctrl+Shift+R.

Some stereotypes are defined by UPDM as extending the Slot metaclass. Each run state attribute represents a Slot, but it is not possible to stereotype Slots in Enterprise Architect, so UPDM's slot-extending stereotypes are not available in Enterprise Architect's implementation. UPDM stereotypes that extend Slot are:

- ActualMeasurement (ActualMeasurementSet)
- ActualOrganizationRole (ActualOrganization)
- MeasureOfPerformance (ActualMeasurementSet)
- ProjectStatus (ActualProjectMilestone)

Properties

Some stereotypes in UPDM are defined as extending the UML Property metaclass. This gives you the choice of a number of different representations for these elements in your model. If you drag one of the properties from the Toolbox onto a classifier element on a diagram, you are prompted to select to create an attribute, a Part, or a Port. These are all different representation of the UML Property metaclass; which one you choose depends on what rendering of the Property you want to see in your model.

Another representation of the UML Property metaclass is the Association End; to apply one of UPDM's Property stereotypes to an Association End:

1. Double-click on the element to display the 'Properties' dialog.
2. Select the 'Roles' tab.

3. Click on the  button next to the appropriate 'Stereotype' field.
4. On the 'Stereotype for Association' dialog, select 'UPDM' from the 'Profile' field.
5. Select every stereotype that applies.

Stereotypes that extend Property are:

- ConceptRole
- EntityAttribute
- EnvironmentProperty
- Equipment
- HostedSoftware
- HumanResource
- KnownResource
- Measurement
- NodeRole
- Part
- PerformanceParameter
- Platform
- PostRole
- ProblemDomain
- ProjectTheme
- ProtocolLayer
- ResourceComponent
- ServiceAttribute
- StructuralPart
- SubOrganization
- SubSystemPart
- TemporalPart
- UsedConfiguration

Model Validation in UPDM

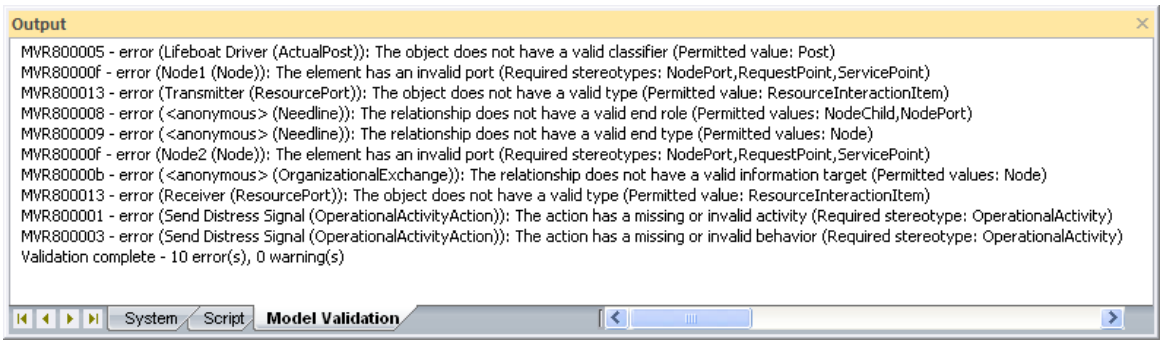
Enterprise Architect supports model validation of UPDM models, validating and reporting errors against more than 160 different rules.

Configure Model Validation

Before being able to validate a model, you first have to select the rules to validate against. Select 'Design >Package > Manage > Validate > Configure Validation Rules' and deselect the checkbox against all validation rules except for the UPDM set.

Perform Model Validation

Open a diagram or select either a Package or a number of elements in the Browser window, then select the 'Design > Package > Manage > Validate > Validate Current Package' ribbon option (or press Ctrl+Alt+V). Validation results are displayed in the System Output window, which is opened if it isn't already displayed. To go to the element that caused a validation error, double-click on the error message in the System Output window.



Model Validation Rules

Errors are indicated by an error code of the format MVRxxnnnn where:

- xx is 80 by default (if the MDG Technology for UPDM is the only Add-In that you have installed) but could be some other number, and
- nnnn is a hexadecimal number from 0001 to 0013 as described here

MVRxx0001 - activity

Error Message: The action has a missing or invalid activity (Required stereotype: <stereotypeList>)

The validation rule checks that stereotyped Action elements are owned by an Activity with the required stereotype.

Solution: Locate the Action in the Browser window, locate an Activity with one of the named stereotypes (or their specializations) or create a new one, and drag the Action to the Activity.

Action Stereotypes	Activity Stereotypes
FunctionAction	Function
OperationalActivityAction	OperationalActivity
ServiceOperationAction	Function
ServiceOperationAction	ServiceFunction

MVRxx0002 - annotatedElement

Error Message: The note has an invalid annotated element (Required stereotype: <stereotype>)

This validation rule checks that stereotyped Note elements are attached (by a NoteLink connector) to an element with the required stereotype.

Solution: Attach the Note to an element with the named stereotype (or one of its specializations). You can do this by either dragging the opposite end of the NoteLink connector, or deleting the NoteLink connector and creating a new one with the Quick Linker.

Note Stereotypes	Annotated Element Stereotypes
Alias	UPDMElement
ArchitectureMetadata	ArchitecturalDescription
Definition	UPDMElement
StandardConfiguration	CapabilityConfiguration
StereotypeExtension	UPDMElement

MVRxx0003 - behavior

Error Message: The action has a missing or invalid behavior (Required stereotype: <stereotype>)

This validation rule checks that stereotyped CallBehaviorAction elements call a Behavior with the required stereotype.

Solution: Right-click on the Action and select Advanced | Set Behavioral Classifier, or press Ctrl+L, and select a behavior element with the named stereotype (or one of its specializations).

Action Stereotypes	Behavior Stereotypes
OperationalActivityAction	OperationalActivity
ServiceFunctionAction	ServiceFunction

MVRxx0004 - class

Error Message: The object does not have a valid owning Class (Permitted values: <stereotypeList>)

This validation rule checks that stereotyped Property elements (Parts or attributes) are owned by a Class with the required stereotype.

Solution: Locate the property in the Browser window, locate a Class with one of the named stereotypes (or their specializations) or create a new one, and drag the property to the Class.

Property Stereotypes	Class Stereotypes
Equipment	OrganizationalResource
HostedSoftware	ResourceArtifact
HumanResource	CapabilityConfiguration
NodeChild	NodeParent
NodeRole	Node
Part	ResourceArtifact
PostRole	Organization
ProblemDomain	LogicalArchitecture
ProtocolLayer	Protocol
ResourceComponent	CapabilityConfiguration
ResourceRole	Resource
StructuralPart	EnterprisePhase
SubOrganization	Organization

TemporalPart	EnterprisePhase
UsedConfiguration	CapabilityConfiguration

MVRxx0005 - classifier

Error Message: The object does not have a valid classifier (Permitted value: <stereotype>)

This validation rule checks that stereotyped instance elements (objects) are classified by elements with the required stereotypes.

Solution: Select the object, right-click it and select Advanced | Instance Classifier, or press Ctrl+L, and select a classifier element with the named stereotype (or one of its specializations).

Object Stereotypes	Classifier Stereotypes
ActualMeasurementSet	MeasurementSet
ActualOrganization	Organization
ActualPerson	Person
ActualPost	Post
ActualProject	Project
ActualProjectMilestone	ProjectMilestoneType
FieldedCapability	CapabilityConfiguration

MVRxx0006 - client

Error Message: The relationship does not have a valid client (Permitted values: <stereotypeList>)

This validation rule checks that, for stereotyped Dependency or Realization relationships, their client (source) elements have the required stereotypes.

Solution: Drag the end of the relationship without the arrowhead to an element with the named stereotype (or one of its specializations).

Relationship Stereotypes	Client Element Stereotypes
ArbitraryRelationship	HighLevelOperationalConcept
ArchitecturalReference	ArchitecturalDescription
CompatibleWith	Node
DefinesArchitecture	ArchitecturalDescription
ExhibitsCapability	Node

Expose	ServiceInterface
FillsPost	ActualPerson
Forecast	SubjectOfForecast
ImplementsOperational	SystemsElement
MapsToCapability	StandardOperationalActivity
MilestoneSequence	ActualProjectMilestone
OwnsProcess	ActualOrganizationalResource
Performs	Performer
ProjectSequence	ActualProject
ProvidesCompetence	Resource
RealizesCapability	Resource
RealizesCapability	ServiceInterface
RequiresCompetence	ResourceRole
SameAs	UPDMElement
SupportsOperationalActivity	ServiceInterface

MVRxx0007 - constrainedElement

Error Message: The constraint has an invalid constrained element (Required stereotype: %s)

This validation rule checks that stereotyped Constraint elements are attached (by a NoteLink) to elements with the required stereotypes.

Solution: Attach the constraint to an element with the named stereotype (or one of its specializations). You can do this by either dragging the opposite end of the NoteLink connector, or by deleting the NoteLink connector and creating a new one using the Quick Linker.

Constraint Stereotypes	Constrained Element Stereotypes
OperationalConstraint	SubjectOfOperationalConstraint
ResourceConstraint	SubjectOfResourceConstraint

MVRxx0008 - endRoles

Error Message: The relationship does not have a valid end role (Permitted values: <stereotypeList>)

This validation rule checks that, for stereotyped Association or Connector relationships, the elements at both ends of the relationship have the required stereotypes.

Solution: Drag one or both ends of the relationship to elements with the named stereotype (or one of its specializations).

Relationship Stereotypes	End Element Stereotypes
Needline	NodeChild
Needline	NodePort
ResourceConnector	ResourcePort
ResourceInterface	ResourceRole

MVRxx0009 - endType

Error Message: The relationship does not have a valid end type (Permitted values: <stereotypeList>)

This validation rule checks that, for stereotyped connectors, the elements (Objects or Parts) at both ends of the relationship are typed by the required stereotypes.

Solution: Drag one or both ends of the relationship to elements that have types with the named stereotype (or one of its specializations).

Connector Stereotypes	End Type Stereotypes
EntityRelationship	EntityItem
Needline	Node
ResourceInterface	Resource

MVRxx000a - informationSource

Error Message: The relationship does not have a valid information source (Permitted values: <stereotypeList>)

This validation rule checks that stereotyped InformationFlow relationship source elements have the required stereotypes.

Solution: Drag the end of the information flow without the arrowhead to an element with the named stereotype (or one of its specializations).

InformationFlow Stereotypes	Source Element Stereotypes
ActualOrganizationRelationship	ActualOrganizationalResource
Commands	OrganizationalResource

Controls	OrganizationalResource
OperationalExchange	Node
ResourceInteraction	Resource

MVRxx000b - informationTarget

Error Message: The relationship does not have a valid information target (Permitted values: <stereotypeList>)

This validation rule checks that stereotyped InformationFlow relationship target elements have the required stereotypes.

Solution: Drag the end of the information flow with the arrowhead to an element with the named stereotype (or one of its specializations).

InformationFlow Stereotypes	Target Element Stereotypes
ActualOrganizationRelationship	ActualOrganizationalResource
Commands	OrganizationalResource
Controls	OrganizationalResource
OperationalExchange	Node
ResourceInteraction	Resource

MVRxx000c - ownedAttribute

Error Message: The element has an invalid attribute (Required stereotype: <stereotype>)

This validation rule checks that, for stereotyped Class elements, any attributes that they own have the required stereotypes.

Solution: Replace the attribute with one with the named stereotype (or one of its specializations).

Class Stereotypes	Attribute Stereotypes
EntityItem	EntityAttribute
Environment	EnvironmentProperty
HighLevelOperationalConcept	ConceptRole
MeasurementSet	Measurement
ProjectMilestoneType	ProjectTheme

ServiceInterface	ServiceAttribute

MVRxx000d - ownedOperation

Error Message: The element has an invalid operation (Required stereotype: %s)

This validation rule checks that, for stereotyped Class elements, any operations that they own have the required stereotypes.

Solution: Replace the operation with one with the named stereotype (or one of its specializations).

Class Stereotype	Operation Stereotype
ServiceInterface	ServiceOperation

MVRxx000e - ownedParameter

Error Message: The element has an invalid activity parameter (Required stereotype: %s)

This validation rule checks that, for stereotyped Activity elements, any ActivityParameter elements that they own have the required stereotypes.

Solution: Locate the ActivityParameter in the Browser window and drag and drop it onto an element with the appropriate stereotype, and/or replace the ActivityParameter in its current owner with an ActivityParameter with the named stereotype.

Activity Stereotypes	ActivityParameter Stereotypes
Function	FunctionParameter
OperationalActivity	OperationalParameter

MVRxx000f - ownedPort

Error Message: The element has an invalid Port (Required stereotypes: <stereotypeList>)

This validation rule checks that, for stereotyped Class elements, any Ports that they own have the required stereotypes.

Solution: Locate the Port in the Browser window and drag and drop it onto an element with the appropriate stereotype, and/or replace the Port in its current owner with a Port with one of the named stereotypes.

Class Stereotypes	Port Stereotypes
Node	NodePort
Node	RequestPoint
Node	ServicePoint
Resource	RequestPoint

Resource	ResourcePort
Resource	ServicePoint

MVRxx0010 - source

Error Message: The relationship does not have a valid source (Permitted values: <stereotypeList>)

This validation rule checks that stereotyped ActivityEdge connector source elements have the required stereotypes.

Solution: Drag the end of the relationship without the arrowhead to an element with the named stereotype (or one of its specializations).

ActivityEdge Stereotypes	Source Element Stereotypes
FunctionEdge	ServiceOperationAction
OperationalActivityEdge	OperationalActivityAction

MVRxx0011 - supplier

Error Message: The relationship does not have a valid supplier (Permitted values: <stereotypeList>)

This validation rule checks that stereotyped Dependency or Realization relationship supplier (target) elements have the required stereotypes.

Solution: Drag the end of the relationship with the arrowhead to an element with the named stereotype (or one of its specializations).

Relationship Stereotypes	Supplier Element Stereotypes
ArbitraryRelationship	HighLevelOperationalConcept
ArchitecturalReference	ArchitecturalDescription
CompatibleWith	ReferredLocation
DefinesArchitecture	EnterprisePhase
ExhibitsCapability	Capability
Expose	Capability
FillsPost	ActualPost
Forecast	SubjectOfForecast
ImplementsOperational	OperationalElement
MapsToCapability	Capability

MilestoneSequence	ActualProjectMilestone
OwnsProcess	OperationalActivity
Performs	PerformedActivity
ProjectSequence	ActualProject
ProvidesCompetence	Competence
RealizesCapability	Capability
RealizesCapability	Competence
RequiresCompetence	ExternalIndividual
SameAs	ExternalType
SupportsOperationalActivity	OperationalActivity

MVRxx0012 - target

Error Message: The relationship does not have a valid target (Permitted values: <stereotypeList>)

This validation rule checks that stereotyped ActivityEdge connector target elements have the required stereotypes.

Solution: Drag the end of the relationship with the arrowhead to an element with the named stereotype (or one of its specializations).

ActivityEdge Stereotypes	Target Element Stereotypes
FunctionEdge	ServiceOperationAction
OperationalActivityEdge	OperationalActivityAction

MVRxx0013 - type

Error Message: The object does not have a valid type (Permitted value: <stereotype>)

This validation rule checks that stereotyped Property elements (Parts or attributes) have type elements with the required stereotypes.

Solution: For Parts, right-click on the Part and select 'Advanced | Set Property Type', or press Ctrl+L, and select a type element with the named stereotype (or one of its specializations). For attributes, open the Features window for the attribute and select a type element with the named stereotype (or one of its specializations) in the 'Type' field.

Property Stereotypes	Type Element Stereotypes
ConceptRole	ConceptItem

EnvironmentProperty	EnvironmentalType
Equipment	ResourceArtifact
FunctionParameter	ResourceInteractionItem
HostedSoftware	Software
HumanResource	OrganizationalResource
KnownResource	Resource
NodePort	OperationalExchangeItem
NodeRole	Node
OperationalParameter	OperationalExchangeItem
Part	ResourceArtifact
PostRole	Post
ProjectTheme	ProjectThemeStatus
ProtocolLayer	Protocol
RequestPoint	ServiceInterface
ResourceComponent	ResourceArtifact
ResourcePort	ResourceInteractionItem
ServicePoint	ServiceInterface
StructuralPart	EnterprisePhase
SubOrganization	Organization
TemporalPart	EnterprisePhase
UsedConfiguration	CapabilityConfiguration

The ArchiMate Framework

ArchiMate is both a language and a framework, making it a profoundly useful paradigm for both descriptive and prescriptive representations of the architecture of an enterprise or its divisions. Combining language and framework allows enterprise architects and others to create an articulated model that unites the business, application, and technology architectures. These layers are, in turn, subdivided into aspects that cut across the language grammar from active and passive structure to behavior and motivation. The models can be embellished or supplemented with other framework content such as reusable content libraries, standards, governance logs, and more.

The Archimate Framework is expressed in a metamodel that defines these layers and concepts. The core framework defines three layers and three aspects and these are extended in the Full Framework with two additional layers and a and one more aspect. This allows the architect to model motivation, strategy, implementation and migration artifacts.

Enterprise Architect supports both the ArchiMate language and the Core Framework storing elements and their relationships in a robust and flexible repository that can be devised, visualized, queried, and viewed with a formidable suite of tools. Industry best practice models, diagrams, and viewpoints are available in a set of model patterns that you can use to inject pre-built content into your architectures. Descriptive text accompanies each pattern and details how to use the pattern, including tools, ideas, and next steps.

ArchiMate Core Framework

The reference structure used to classify elements of the ArchiMate core language is implemented in Enterprise Architecture in its core internal metamodel. It consists of three layers and three aspects (including the physical) and the extended framework contains a number of extra layers and aspects as extensions. These core and extended language elements are visible in the tool in the form of the Diagram list and Toolbox pages corresponding to the layers, and in the element representations with their various forms including the icon format. This diagram has been created in Enterprise Architect to demonstrate the structure of the language.

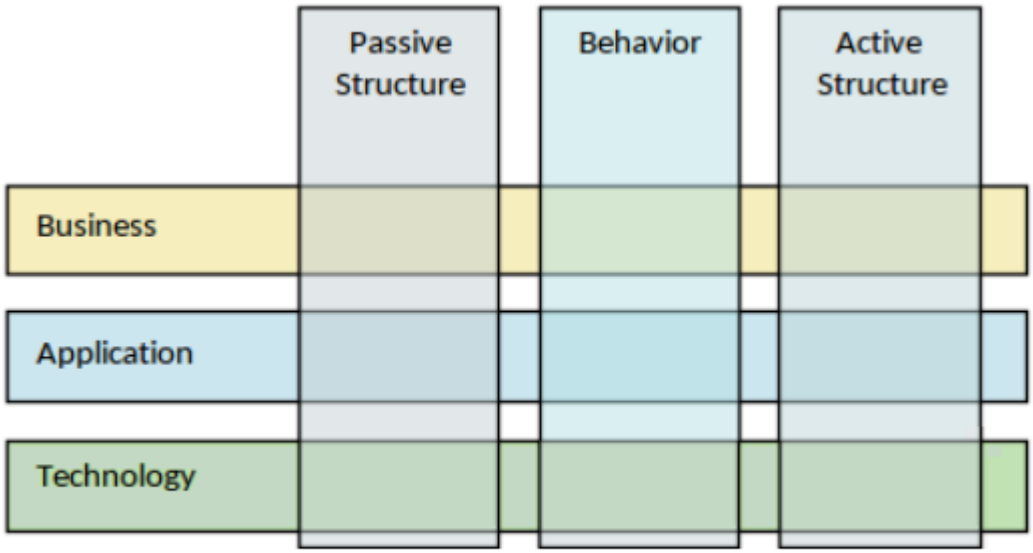


Figure: Showing the layers and aspects of the core framework

Aspects

The Active Structure aspect defines structural concepts that can exhibit behavior directly. Elements such as Business Actors in the Business Layer and the Application Component in the Application layer are examples. These are like the subjects in our natural languages.

The Behavior aspect defines behaviors allocated to structural elements and includes elements such as services, functions, processes, and more. The structural elements define the element that exhibits the behavior. These are like the verbs in our natural languages.

The Passive structure aspect defines elements that are the recipients of behavior. These elements are typically information, data, and physical objects. These are like the objects (or predicates) in our natural languages.

Layers

ArchiMate defines a layered and service-oriented paradigm for architectural models. The higher layers utilize services provided by the lower layers. The layers are abstract concepts, and an architectural practice or team is free to organize their models according to any structure. The layers provide a continuum from the stakeholders and users defined in the business layer to the virtual or physical technology elements that provide the platform for the middle technology layer..

The Full Framework

The ArchiMate core framework has been extended to allow architects to model a range of additional concepts including a cross-cutting motivation aspect that spans all layers and two new layers to model strategy and Implementation and Migration. Another layer is included which is contained in the technology layer that the architect uses to model physical items such as machines and devices.

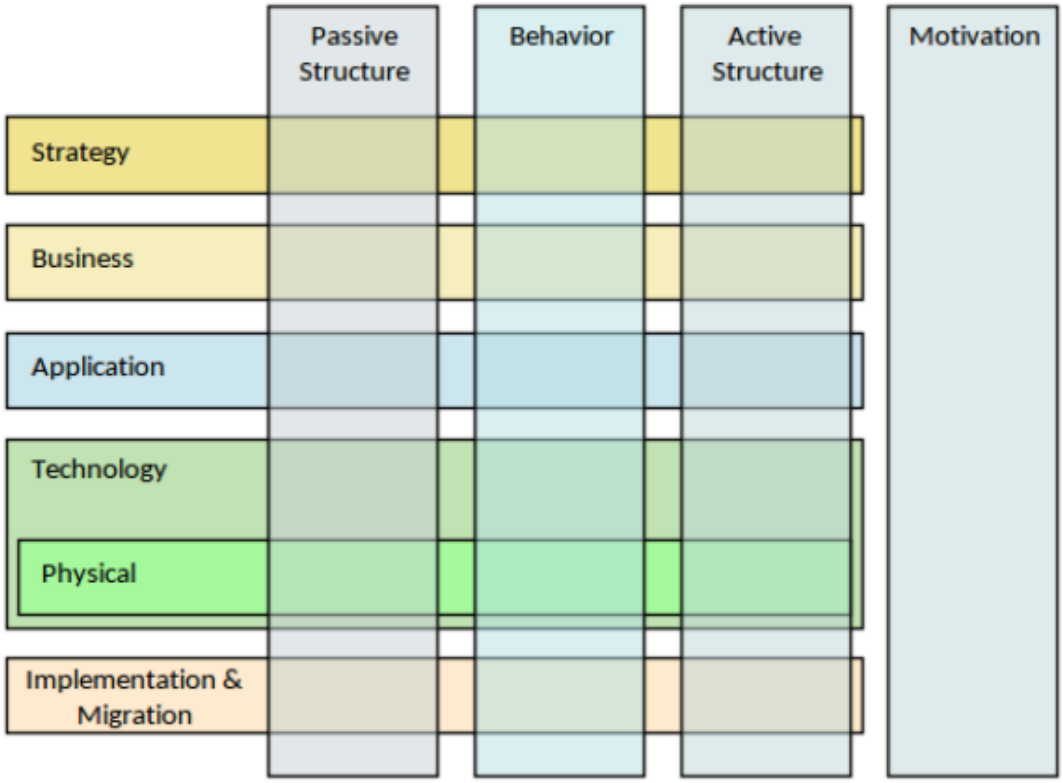


Figure: Showing the layers and aspects of the full framework

The Zachman Framework

The Zachman Framework is a widely used approach for engineering Enterprise Architecture. The Framework is a simple, logical structure that helps in organizing the information infrastructure of the Enterprise and provides many benefits in helping align technology with business needs.

Discussion

The topics described here provide an introduction to, and procedural explanation of, using the Zachman Framework in Enterprise Architect.

Section	Content
Welcome 	This section provides an introduction to the Zachman Framework, and contains the formal documentation defining its use with Enterprise Architect.
Using the Zachman Framework 	Get started with the Zachman Framework, learning about the model structure, templates, diagram types and more.
Model Validation 	Learn how to develop and configure model validation for the Zachman Framework.

Brief Introduction

Welcome to the Zachman Framework in Enterprise Architect.

Using this technology with Enterprise Architect, you can employ the Zachman Framework with the associated benefits of a multi-featured, open-standard modeling system. The Zachman Framework is already integrated with the Ultimate and Unified Editions; it can be purchased separately to be used with the Enterprise Architect Professional or Corporate Editions.

About the Zachman Framework

The Zachman Framework is a widely used approach for engineering Enterprise Architecture. The Framework is a simple, logical structure that helps in organizing the information infrastructure of the Enterprise.

While conceptually simple, the Zachman Framework provides many benefits in helping align technology with business needs. It has become a popular approach in defining Enterprise Architecture because it:

- Is platform neutral
- Is a versatile planning device
- Is both comprehensive and readily understood by non-technical people
- Assists in problem solving
- Helps in documenting enterprise-wide information system architecture

Under the Zachman Framework, an Enterprise is modeled by answering six questions: What? How? Where? Who? When? and Why? with respect to six role perspectives: the Planner, Owner, Designer, Builder, Subcontractor and Functioning Enterprise.

For further information, visit the Zachman Framework website.

Getting Started

For instructions on how to use the Zachman Framework, see the topics:

- *Getting Started with the Zachman Framework* and
- *Using the Zachman Framework*

Support for the Zachman Framework

Technical support for the Zachman Framework is available to registered users of Enterprise Architect through the same channels as for Enterprise Architect itself.

Zachman Framework System Requirements

Zachman Framework version 1.1.4 runs under the environments identified here.

Microsoft® Operating Systems Supported

- Windows 10
- Windows 8
- Windows 7
- Windows 2008 Server
- Windows 2003 Server
- Windows XP Service Pack 2

Enterprise Architect Versions Supported

- Enterprise Architect Version 7.1 or later

Notes

- 32 bit and 64 bit operating systems supported

Getting Started with Zachman

When you install the Unified or Ultimate Edition of Enterprise Architect, the Zachman Framework is fully enabled and ready to use.

If you have the Corporate or Professional Edition of Enterprise Architect, you can purchase and install the MDG Technology for Zachman Framework separately; once you have entered the registration key for the MDG Technology for Zachman Framework, it is automatically available in and integrated with Enterprise Architect, as for the Unified and Ultimate Editions.

Access the MDG Technology For Zachman Framework

1. Create a new Enterprise Architect project file, and click on the top-level Package.
2. Select the 'Design > Package > Model Wizard' option.
3. In the 'Create from Pattern' tab (Model Wizard), select the 'Enterprise Architecture > Zachman' Perspective and the 'Zachman Framework' Pattern.
4. Click on the Create Model(s) button.

A new base Zachman model is created in the Browser window, containing the Zachman Framework diagram and the Planner, Owner, Designer, Builder, Subcontractor and Functioning Enterprise Packages.

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MDG Technology for Zachman Framework Software Product License Agreement

This Software Product License Agreement relates to the separately-purchased MDG Technology for Zachman Framework for use with the Professional and Corporate Editions of Sparx Systems Enterprise Architect. The MDG Technology integrated with the Unified and Ultimate Editions of Enterprise Architect is subject to the Sparx Systems Enterprise Architect Modelling Tool.

MDG Technology for Zachman Framework - Enterprise Architect MDG Add-In, Version 1.1

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This agreement shall be construed in accordance with the laws of the Commonwealth of AUSTRALIA, in the state of Victoria.

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- OMG ™
- UML ™
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Using the Zachman Framework

The Zachman Framework provides a model-based framework for planning, designing and implementing the Architecture for an Enterprise. The starter model provided with the Technology acts as a base upon which you can build the Enterprise Architecture. You can create the appropriate diagrams from the extended Enterprise Architect UML diagram set, using Toolbox pages that support every cell of the Zachman classification framework.

The Technology also provides model validation and reporting capabilities for strategic project plans.

Within Enterprise Architect you can choose between Diagram View and Element List View. Element List View can be used in cells where you prefer to define only the model artifacts.

You can also align cells across the framework (horizontally and vertically) through the Enterprise Architect Relationship Matrix.

You can view a demonstration video of the MDG Technology For Zachman Framework in use, on the Sparx Systems website.

The Zachman Framework Help topics provide a detailed exploration of the Zachman Framework tools and features, such as.

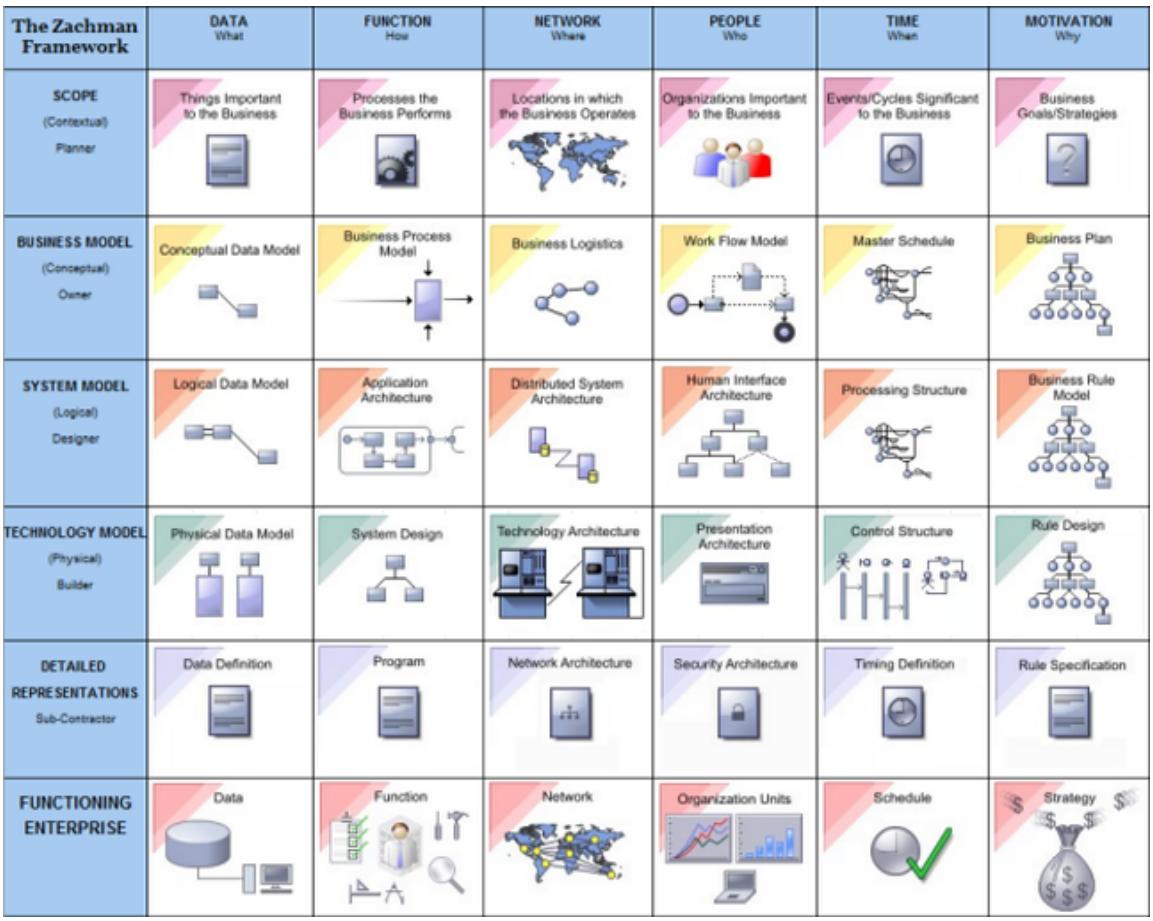
- The example Enterprise Architect model for the Zachman Framework
- UML profiles (Toolbox pages) for use within specific Zachman Framework cells
- A diagram interface for the Zachman Framework
- New diagram types specific to the Zachman Framework
- A flexible model starter-structure
- Report generation capabilities for strategic project plans

The MDG Technology For Zachman Framework is integrated with the features of Enterprise Architect.

The Zachman Framework Interface Diagram

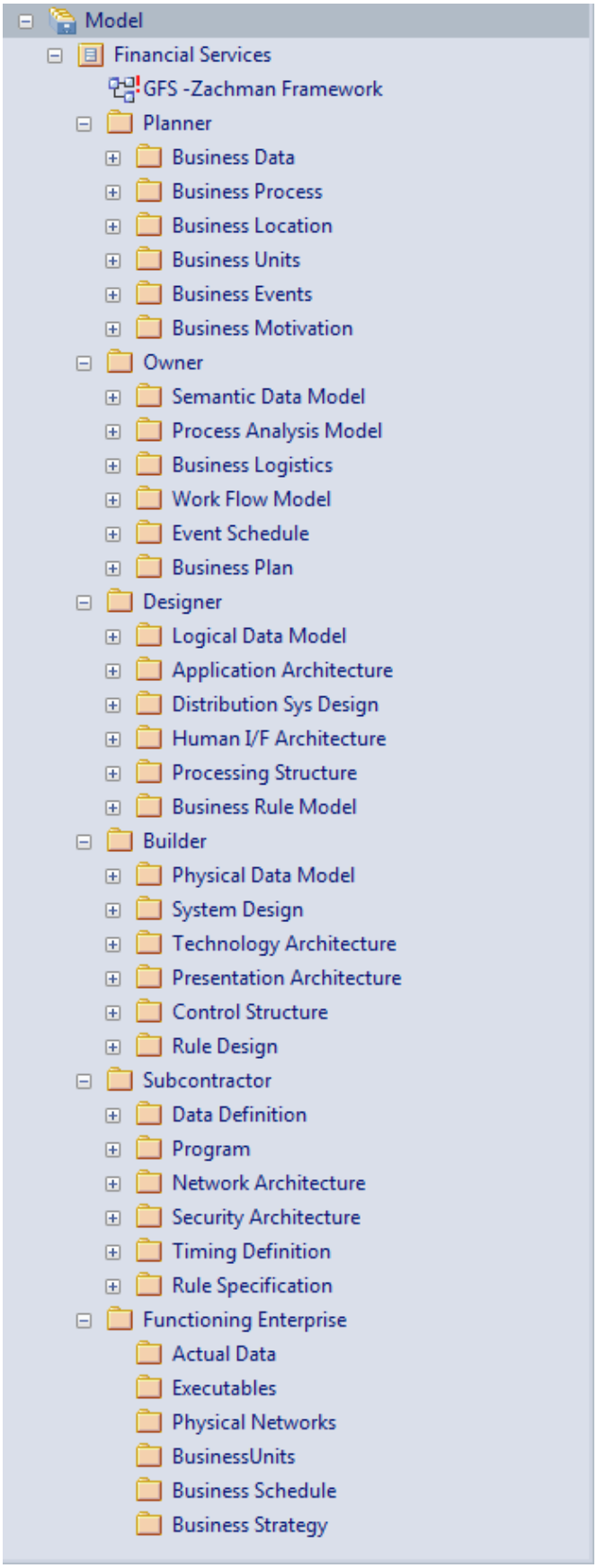
The Zachman Framework is a predefined model in Enterprise Architect. The model-level diagram of the model structure is the Zachman Framework Interface diagram, which serves as a template for the development of Enterprise Architecture based on the Zachman classification framework.

Each cell links to the relevant Zachman Framework diagram in the child Packages in the base model.



Zachman Framework Model Structure

The Zachman Framework provides a Framework model template, in which each Zachman Perspective (or row) is modeled as the highest-level Package inside the model. Cells belonging to the Perspectives are modeled as child Packages of the appropriate row Package.


Model
Financial Services
GFS -Zachman Framework
Planner
Business Data
Business Process
Business Location
Business Units
Business Events
Business Motivation
Owner
Semantic Data Model
Process Analysis Model
Business Logistics
Work Flow Model
Event Schedule
Business Plan
Designer
Logical Data Model
Application Architecture
Distribution Sys Design
Human I/F Architecture
Processing Structure
Business Rule Model
Builder
Physical Data Model
System Design
Technology Architecture
Presentation Architecture
Control Structure
Rule Design
Subcontractor
Data Definition
Program
Network Architecture
Security Architecture
Timing Definition
Rule Specification
Functioning Enterprise
Actual Data
Executables
Physical Networks
BusinessUnits
Business Schedule
Business Strategy

The Zachman Framework Model Template

The Zachman Framework Model Template provides the model skeleton from which you can develop your Enterprise definition.

Add a new Zachman Framework model to the project

1. Right-click on the root node and select 'Add a Model using Wizard'. The 'Create from Pattern' tab (Model Wizard) displays.
2. On the 'Create from Pattern' tab, click on the <name> Perspective button and select 'Enterprise Architecture > Zachman' from the list.
3. Select the 'Zachman Framework' pattern.
4. Click on the Create Model(s) button.

Zachman Framework Diagrams

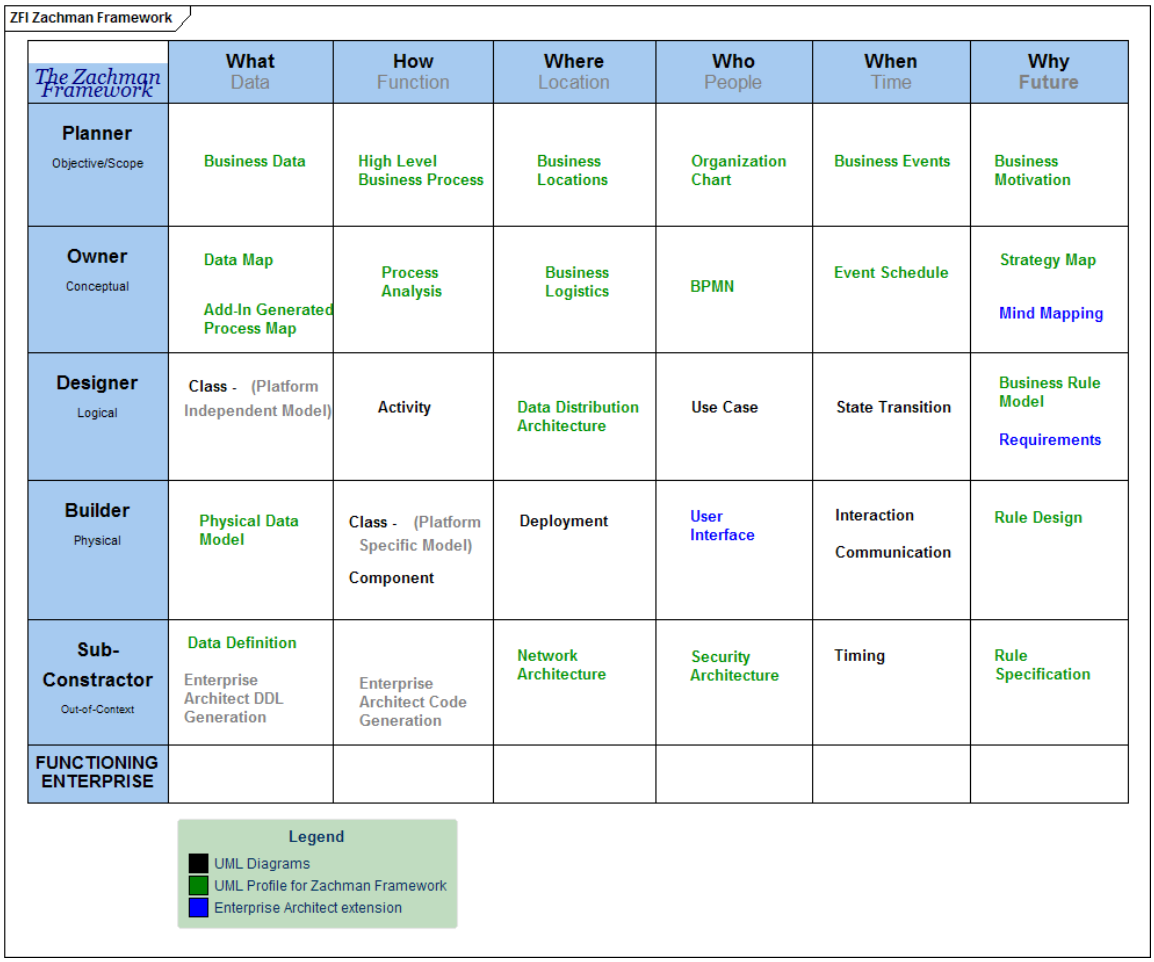
The Zachman Framework introduces new diagram types that support modeling of the Zachman Classification Framework. A Zachman Framework diagram is created in the same way as any other diagram in Enterprise Architect.

The Technology provides access to these categories of diagram through the 'New Diagram' dialog:

- Planner
- Owner
- Designer
- Builder
- Subcontractor
- Zachman Framework Interface

Zachman Framework Diagram Types

The Zachman Framework further extends the Enterprise Architect diagram set to support the Framework, with diagram types appropriate to each cell of the Zachman Framework.



The Zachman Framework Toolbox

The Zachman Framework pages of the Diagram Toolbox provide elements and relationships for all the Zachman Framework diagrams that the MDG Technology supports. The Zachman Framework Toolbox pages can be accessed by clicking on  and specifying 'Zachman' in the 'Find Toolbox Item' dialog. The Diagram Toolbox can be docked on either side of the diagram, or free floated on top of the diagram to expose more surface for editing.

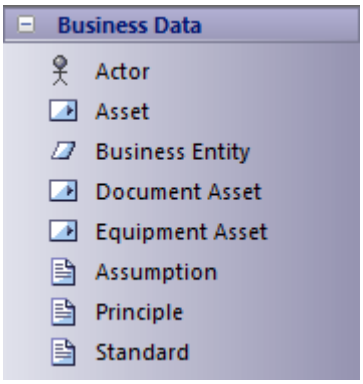
Diagrams for Toolboxes

This table shows, for each Zachman Framework cell, the diagram that could be used.

Zachman Cell	Diagram
Planner - Data	Business Data
Planner - Function	Business Process
Planner - Location	Business Locations
Planner - People	Organization Chart
Planner - Timing	Business Events
Planner - Motivation	Business Motivation
Owner - Data	Data Map and Process Map (Generated by Add-In)
Owner - Function	Process Analysis
Owner - Location	Business Logistics
Owner - People	BPMN
Owner - Timing	Event Schedule
Owner - Motivation	Enterprise Architect Mind Mapping diagram and Strategy Map
Designer - Data	Class
Designer – Function	Activity
Designer - Location	Data Distribution Architecture
Designer - People	Use Case
Designer - Timing	State Transition

Designer - Motivation	Business Rule Model
Builder - Data	Physical Data Model
Builder - Function	Class and Component
Builder - Location	Deployment
Builder - People	User Interface
Builder - Timing	Communication and Interaction
Builder - Motivation	Rule Design
Subcontractor - Data	Data Definition; default toolbox for the diagram is Custom.
Subcontractor – Function	No diagram defined – Code generation is done in this cell.
Subcontractor - Location	Network Architecture
Subcontractor - People	Security Architecture
Subcontractor - Timing	Timing
Subcontractor - Motivation	Rule Specification

Business Data Page



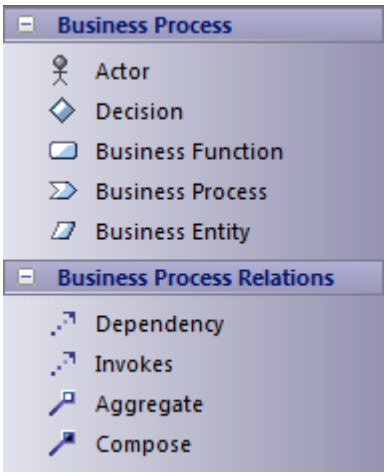
Business Data Toolbox

Item	Description
Actor	Models a stakeholder or any other human resource of the enterprise.
Asset	Represents the enterprise resources that could be estimated for value.
Business Entity	Represents generic enterprise resources.
Document Asset	A subtype of Asset that captures the important documents of the enterprise.
Equipment Asset	A subtype of Asset that captures the equipment resources of the enterprise.
Assumption	Captures the assumptions made in information manipulation. Applies the Tagged Value Type = Enterprise / Business / System / Application / Technology / Data.
Principle	Defines the Principles framed and followed in the enterprise. Applies the Tagged Value Type = Enterprise / Business / System / Application / Technology / Data.
Standard	Defines the standards followed in the Enterprise. Applies the Tagged Value Type = Enterprise / Business / System / Application / Technology / Data.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Business Process Pages



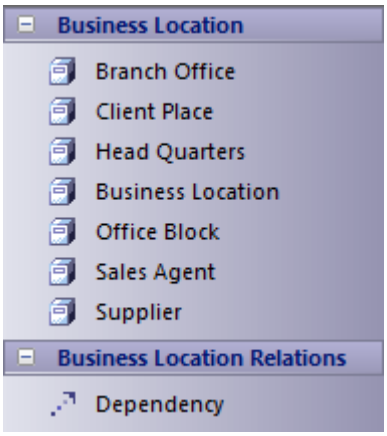
Business Process Toolbox

Item	Description
Actor	Models a stakeholder or any other human resource of the Enterprise.
Decision	Indicates the point of conditional progression where a business decision is taken.
Business Function	Represents a major function performed by the enterprise or a part of the enterprise.
Business Process	Represents a function or behavior of the enterprise or part of the enterprise.
Business Entity	Represents generic enterprise resources.
Invokes	A relationship that defines the invocation of a business process.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Business Location Page



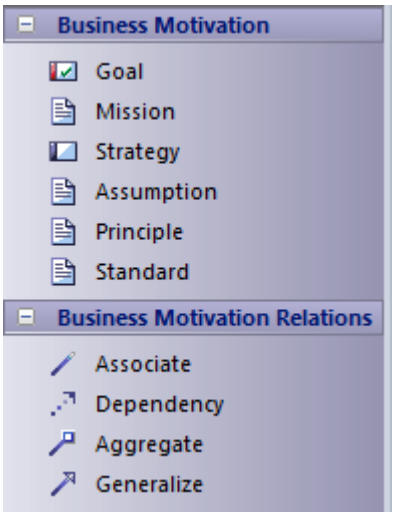
Business Location Toolbox

Item	Description
Branch Office	Models a Business Location as a Branch Office.
Client Place	Models a Business Location as a Client Place.
Head Quarters	Models a Business Location as a Head Quarters.
Business Location	Models the location from which the business operates.
Office Block	Models a Business Location as an Office Block.
Sales Agent	Models a Business Location as a Sales Agent.
Supplier	Models a Business Location as a Supplier.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Business Motivation Pages



Business Motivation Toolbox

Item	Description
Goal	Models what is to be achieved by the enterprise, with specifications defined by the Tagged Values.
Mission	Models the mission statement, policies and values of the enterprise.
Strategy	Models the strategy statements for the business plan.
Assumption	Models the assumptions made in information manipulation. Tagged Value Type = Enterprise / Business / System / Application / Technology / Data.
Principle	Defines the Principles framed and followed in the enterprise. Tagged Value Type = Enterprise / Business / System / Application / Technology / Data.
Standard	Defines the standards followed in the enterprise. Tagged Value Type = Enterprise / Business / System / Application / Technology / Data.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Organization Chart Pages

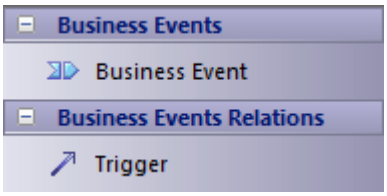
Organization Chart Toolbox

Item	Description
Board of Directors	Captures the details of the board of directors.
StakeHolder	Defines a stakeholder of the enterprise.
External Organization	Defines any external business unit that is not under direct control of the enterprise, but has a relationship with the enterprise.
Organization Unit	Defines any business unit that is under direct control of the enterprise.
Personnel	Captures the details of personnel in an enterprise.
In Contract	A connector that represents the contract-based relationships between business units.
Works For	A connector that captures the details of team links; for example, Stakeholder 1 works for Organization Unit 1.
Supervise	A connector that captures process supervision details.
Control	A connector that captures Unit in charge or Person in charge information.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

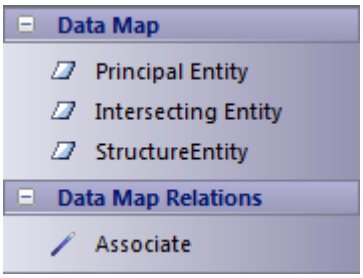
Business Events Pages



Business Event Toolbox

Item	Description
Business Event	Captures major business events of the enterprise.
Trigger	Indicates that a Business Event triggers another event or a business process.

Data Map Pages



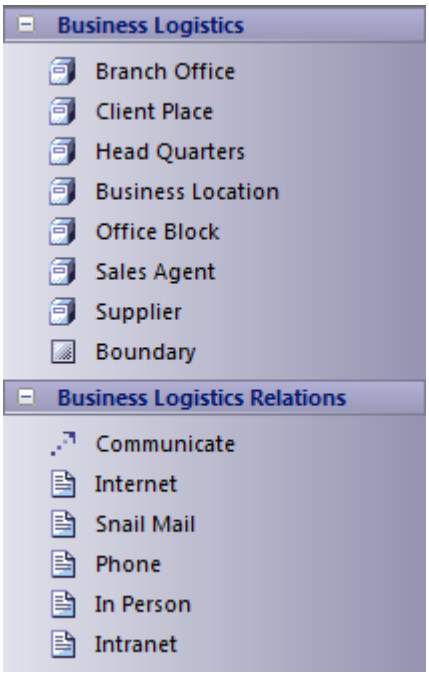
Data Map Toolbox

Item	Description
Principal Entity	Represents a business entity that forms a resource of the enterprise.
Intersecting Entity	Normalizes the many-to-many relationship between principal entities.
Structure Entity	Captures potential knowledge-based entities.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Business Logistics Pages



Business Logistics Items and Relations

Item	Description
Branch Office	Models a Business Location as a Branch Office.
Client Place	Models a Business Location as a Client location
Head Quarters	Models a Business Location as Head Quarters.
Business Location	Models the location from which the business operates.
Office Block	Models a Business Location as an Office Block.
Sales Agent	Models a Business Location as a Sales Agent.
Supplier	Models a Business Location as a Supplier.
Communicate	Indicates that a business location communicates directly with another business location.
Internet	Indicates that the means of communication is the World Wide Web.
Snail Mail	Indicates that the means of communication is the postal system or courier services.
Phone	Indicates that the means of communication is the telephone.

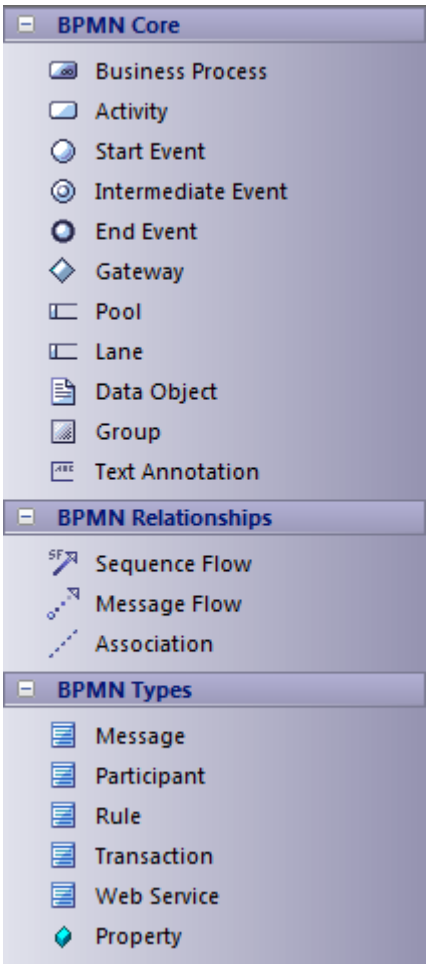
In Person	Indicates that the means of communication is direct person-to-person.
Intranet	Indicates that the means of communication is the local intranet or WAN.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

BPMN Pages

The BPMN Toolbox pages provide the graphical (Core) and non-graphical (Types) Business Process Model and Notation (BPMN) elements for use on Business Process diagrams through the Zachman Framework Technology. Specifications of these elements and relationships are defined by Tagged Values.



BPMN Toolbox

Item	Description
Business Process	Defines a business process; an extension of a composite Activity.
Activity	Defines an activity within a business process.
Start Event	Defines the initiating event in a process.
Intermediate Event	Defines an intermediate event in a process.
End Event	Defines the terminating event in a process.
Gateway	Defines a decision point in a business process. If a condition is true, then processing continues one way; if not, then another.

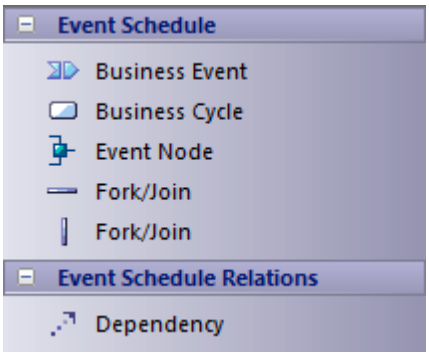
Pool	Logically organizes an Activity; an extension of a Partition element.
Lane	Subdivides a Pool; an extension of a Partition element.
Data Object	Defines a physical piece of information used or produced by a system; an extension of an Artifact element.
Group	Groups a number of other elements; an extension of a Boundary element.
Text Annotation	A comment.
Sequence Flow	Defines the flow of an activity; an extension of a Control Flow relationship.
Message Flow	Defines the flow of communications in a process; an extension of a Control Flow relationship.
Association	Associates information and artifacts with flow objects.
Message	Defines a message; an extension of a Class element.
Participant	Defines a participant in an activity; an extension of a Class element.
Rule	Defines business rule statements; an extension of a Class element.
Transaction	Defines a transaction in an activity; an extension of a Class element.
Web Service	Defines a web service; an extension of a Class element.
Property	Assigns a property to an element; an extension of an attribute.

Notes

- Enterprise Architect is delivered with the BPMN Technologies (for BPMN 1.0. 1.1 and 2.0) automatically installed, providing BPMN profiles and Toolboxes separate from this Zachman version; to make even further use of BPMN facilities, download the BPMN Add-In from:

  https://sparxsystems.com/products/mdg_bpmn.html

Event Schedule Pages



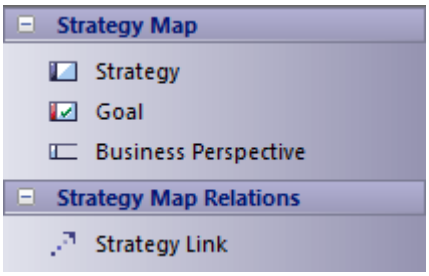
Event Schedule Toolbox

Item	Description
Business Event	Captures major business events of the enterprise.
Business Cycle	Captures major business cycles of the enterprise.
Event Node	Captures the event points in a business cycle.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

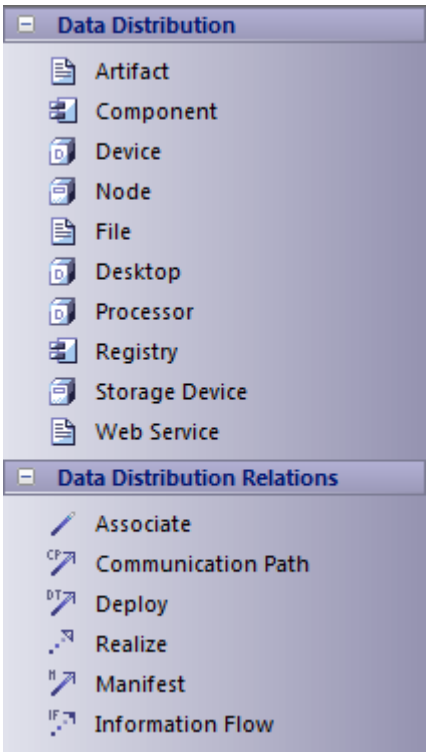
Strategy Map Pages



Strategy Map Toolbox

Item	Description
Strategy	Captures the strategy statements for the business plan.
Goal	Captures what is to be achieved by the enterprise, with specifications defined by the Tagged Values.
Business Perspective	Relates the strategies to a specific category.
Strategy Link	Indicates that a strategy is linked to another strategy or goal.

Data Distribution Architecture Pages



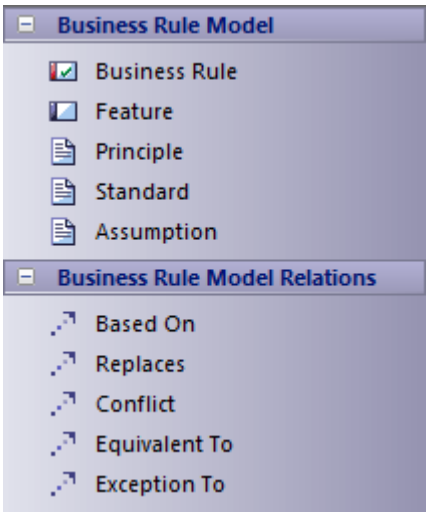
Data Distribution Architecture Toolbox

Item	Description
File	Represents a file.
Desktop	Represents a desktop.
Processor	Represents a processor.
Registry	Represents a registry.
Storage Device	Represents a storage device.
Web Service	Represents a web service.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Business Rule Model Pages



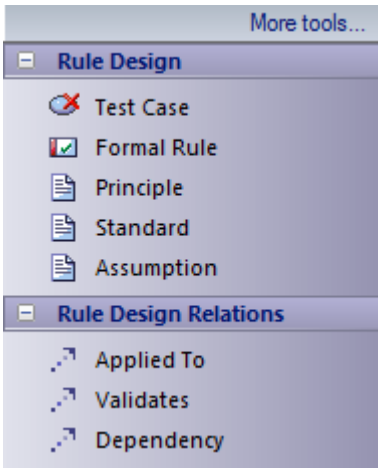
Business Rule Model Toolbox

Item	Description
Business Rule	Captures the Business Rule statements.
Principle	Defines the Principles framed and followed in the Enterprise. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Standard	Defines the standards followed in the Enterprise. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Assumption	Captures the assumptions made in information manipulation. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Based On	Indicates that a rule is based on another model element, which forms the rationale for the rule.
Replaces	Indicates that a new rule replaces another rule.
Conflict	Indicates that a rule conflicts with another defined rule.
Equivalent To	Indicates that a rule is equivalent to another rule.
Exception To	Indicates exceptions for a rule.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Rule Design Pages



Rule Design Toolbox

Item	Description
Formal Rule	Represents a business rule transformed to a technology-specific logical rule or constraint statement.
Principle	Defines the Principles framed and followed in the Enterprise. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Standard	Used to define the Standards followed in the Enterprise. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Assumption	Used to capture the assumptions made in information manipulation. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Applied To	Indicates that a Formal Rule is applied to other model artifacts such as Scenarios or Activities.
Validates	Indicates that a model artifact validates a Formal Rule.

Notes

- Elements and connectors common to Enterprise Architect UML and Extended diagrams are documented in the Object Toolbox section

Network Architecture Pages

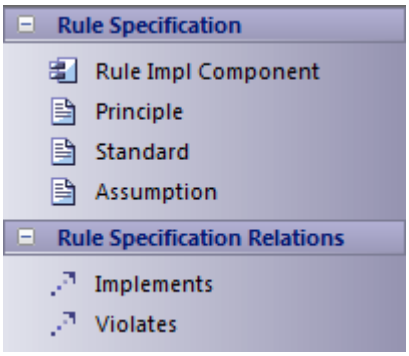
Network Architecture Toolbox

Item	Description
Artifact	Generic graphical element used to capture information.
Document Artifact	Generic graphical element used to capture detailed information such as network configuration details.

Notes

- For a full description of Artifact elements, see the Artifact topic

Rule Specification Pages



Rule Specification Toolbox

Item	Description
Rule Impl Component	Captures the component implementing a rule.
Principle	Defines the Principles framed and followed in the enterprise. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Standard	Defines the Standards followed in the enterprise. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Assumption	Captures the assumptions made in information manipulation. Tag Value Type = Enterprise / Business / System / Application / Technology / Data.
Implements	Indicates that a Rule Impl Component implements a rule.
Violates	Indicates that the rule is violated by the connecting model element.

Tagged Values for Zachman Framework

The Zachman Framework makes extensive use of Tagged Values to assign custom properties to the various Zachman Framework elements. When creating or viewing a Zachman Framework model, it is recommended that you keep the Properties window docked and visible at all times, with the 'ZF' section expanded.

Access

Ribbon	Start > All Windows > Properties > General > Tagged Values Explore > Portals > Windows > Properties > Tagged Values
Keyboard Shortcuts	Ctrl+2

Synchronize Tagged Values

From time to time you might need to add missing Tagged Values to all elements in the model that require them, such as:

- Whenever you create a new element by any means other than directly dropping the element from the Zachman Framework Toolbox pages
- Before using a new version of the Technology, to update the Tagged Values of elements in existing models to the latest version of the Zachman Framework profile

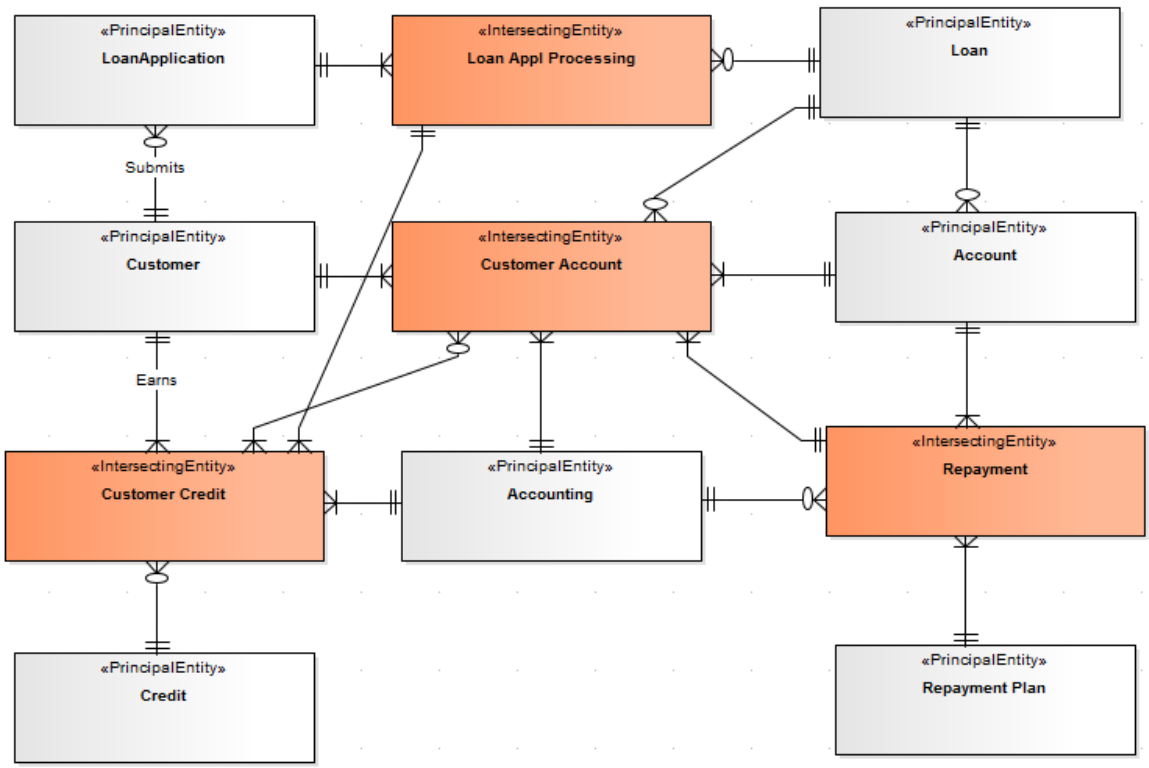
You can do this using the 'Synchronize Stereotype' option on the icons in the Zachman Framework pages of the Diagram Toolbox.

Data Map Analysis

A valid Data Map diagram is basically an Entity Relationship diagram constructed using Principal Entity, Structure Entity and Intersecting Entity elements. The relationships between them are defined by the business rules.

- Principal Entities are identified from the Business Entities in scope
- Intersecting Entities are used to break a many-to-many association between Principal Entities, which form potential business processes
- Structure Entities represent the existence of a potential knowledge base

This is an example of a valid Data Map diagram:



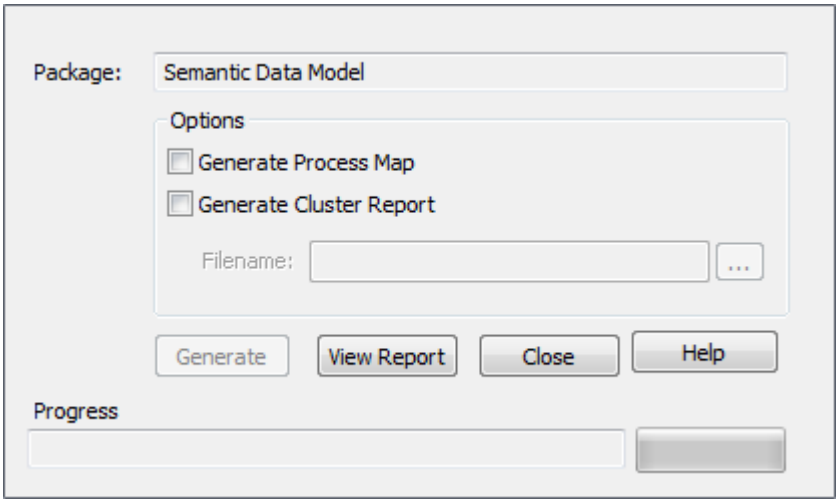
Cluster Reports and Process Maps are deliverables of a valid Data Map diagram analysis.

Perform a Data Map diagram analysis

With the Data Map diagram to be analyzed open and active, either:

- Select the 'Specialize > Add-Ins > Zachman Framework > Do Data-Map Analysis' ribbon option, or
- Right-click on the Data Map diagram in the Browser window, and select the 'Specialize | Zachman Framework | Do Data-Map Analysis' context menu option

The 'Data Map Analysis' dialog displays.



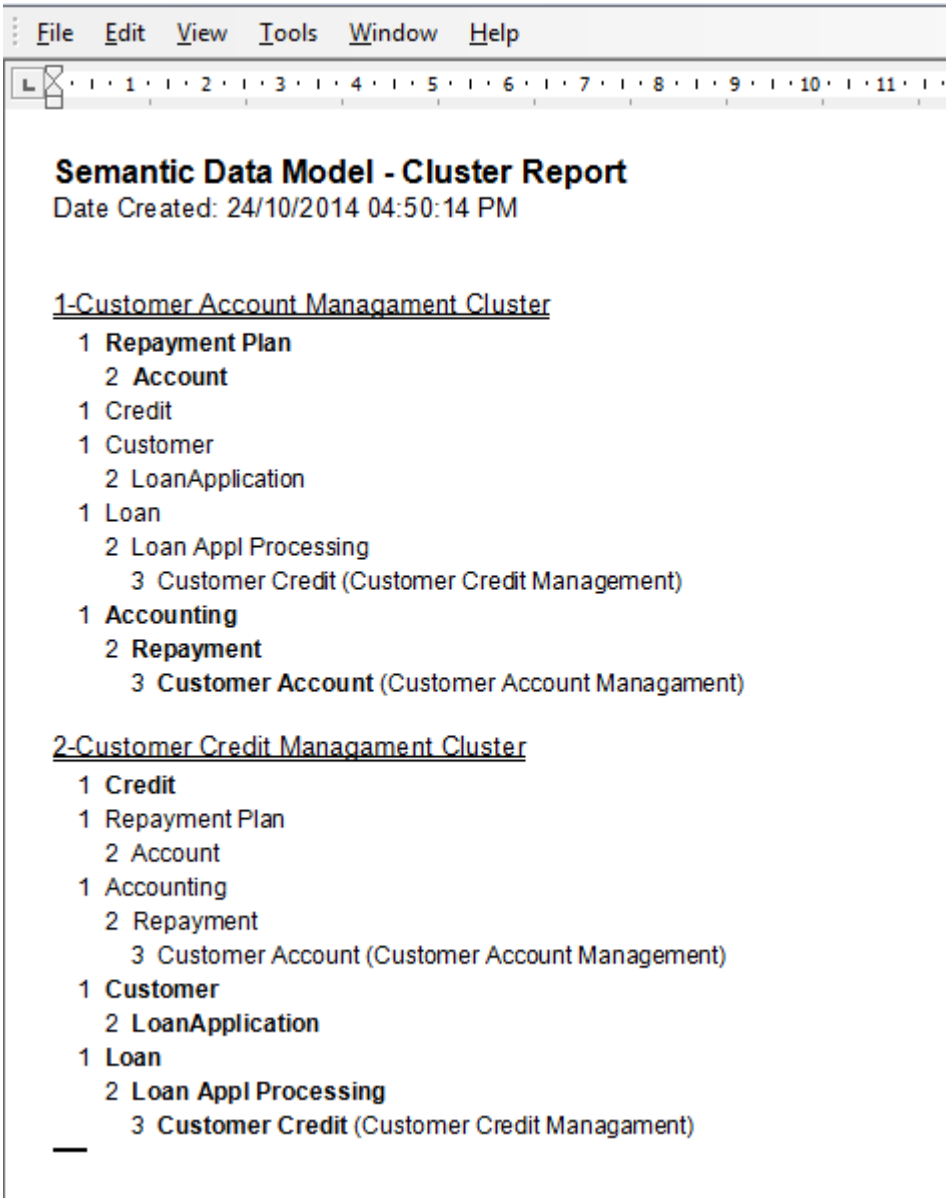
Click on the checkbox against each deliverable required. If you have selected 'Generate Cluster Report', also enter the file pathname under which to save the report.

Click on the Generate button.

Cluster Report

A cluster is a logically related group of processes arranged in a sequence, this being the plan of the order of the execution of processes.

This Cluster Report was generated for the sample Data Map diagram, in .rtf format.


File Edit View Tools Window Help

Semantic Data Model - Cluster Report

Date Created: 24/10/2014 04:50:14 PM

1-Customer Account Managament Cluster

1 **Repayment Plan**
2 **Account**
1 Credit
1 Customer
2 LoanApplication
1 Loan
2 Loan Appl Processing
3 Customer Credit (Customer Credit Management)
1 **Accounting**
2 **Repayment**
3 **Customer Account** (Customer Account Managament)

2-Customer Credit Managament Cluster

1 **Credit**
1 Repayment Plan
2 Account
1 Accounting
2 Repayment
3 Customer Account (Customer Account Management)
1 **Customer**
2 **LoanApplication**
1 **Loan**
2 **Loan Appl Processing**
3 **Customer Credit** (Customer Credit Managament)

The report shows how each cluster is a logical group of processes or tasks forming a major business process.

The number preceding each entity name is the phase number for the entity. Phase 1 against an entity means that the entity forms a potential resource/element that must be procured/framed before proceeding with the business process.

Entities with phase numbers greater than 1 are potential processes, with their sequence of execution set after procuring/framing the phase 1 entities in the cluster.

After successful completion of Data Map analysis, the phase property of each entity in the Data Map diagram is set accordingly.

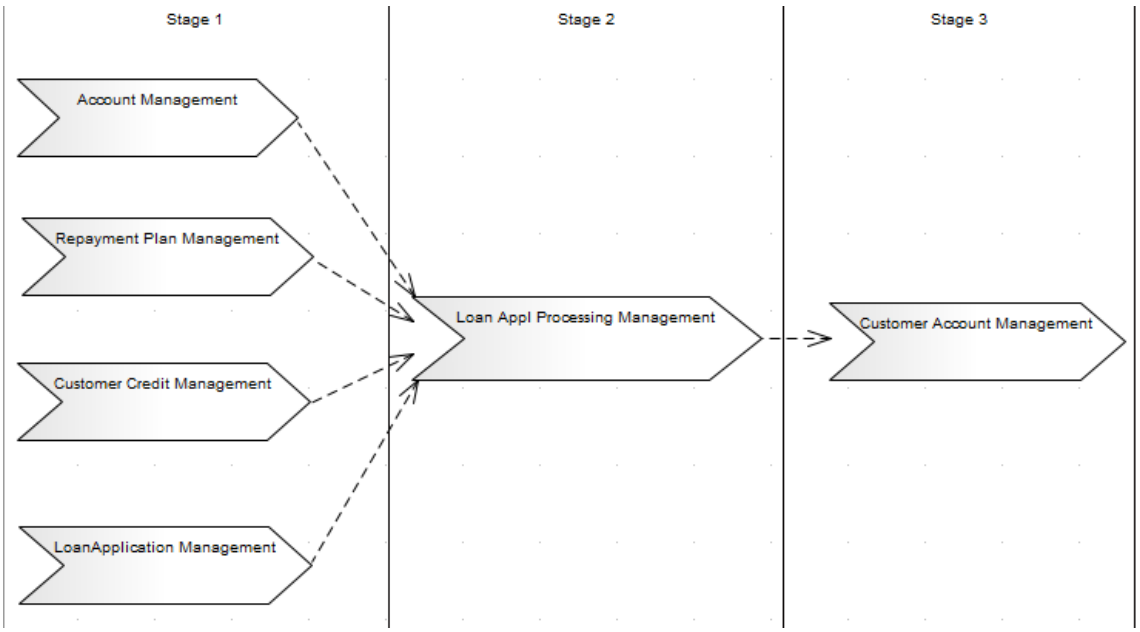
Acknowledgement

The algorithm for Cluster Report generation is derived from the book *Enterprise Architecture for Integration: Rapid Delivery Methods and Technologies* (Clive Finkelstein; April 2006).

Process Map

A Process Map is the visual model of the Cluster Report; however, the Phase 1 entities in the Cluster Report are not shown. The Process Map groups the identified Business Processes into the stages of the project, arranged as a guide for the project.

This is the Process Map generated for the sample Data Map diagram.



Business Scorecard Report Template

To aid your strategic management methods, the Zachman Framework provides a report template for creating Business Scorecards.

Generate a Business Scorecard

Step	Action
1	In the Browser window, click on the Package containing your Business Perspectives and Strategies (an Owner | Business Plan | Strategic Plan Package). The Business Perspectives must own the respective strategies.
2	Either: • Press F8, or • Select the 'Publish > Model Reports > Report Builder > Generate Documentation' menu option The 'Generate Documentation' dialog displays.
3	In the 'Use Template' field, click on the drop-down arrow and select 'Balanced Score Card'.
4	Click on the Generate button.

Model Validation

The Zachman Framework registers with Enterprise Architect to receive model validation requests from users.

Configure Model Validation

To configure Enterprise Architect to perform Zachman Framework model validation, select:

- 'Design > Package > Manage > Validate > Configure Validation Rules'

The 'Model Validation Configuration' dialog displays.

To perform validation on Zachman Framework models only, click on the Select None button and then click on the checkbox for 'Zachman Framework (ZF) Rules'. Click on the OK button.

Validate Zachman Framework Model

You can validate, against the Zachman Framework rules:

- An element and any connectors attached to it
- A diagram and all its elements, or
- A Package and all its diagrams and elements

To do this, click on the element, diagram or Package and then select:

- 'Design > Package > Manage > Validate > Validate Current Package'

The 'Model Validation status' dialog displays, showing the progress of the validation.

Validation Messages for Elements

These error messages can be output by the validation of a Zachman Framework element.

Messages

Element	Diagram and Message
Event Node	Event Schedule Message: Event Nodes must be used only with Business Cycles Meaning: An Event Node has been used with elements other than Business Cycle.
Event Node	Event Schedule Message: Message triggered Event Node must have a message defined Meaning: An Event Node with the 'Trigger' Tagged Value set to 'Message' does not have the 'MessageDetail' Tagged Value set.
Event Node	Event Schedule Message: Rule triggered Event Node must have Rule defined Meaning: An Event Node with the 'Trigger' Tagged Value set to 'Rule' does not have the 'Rule' Tagged Value set.
Event Node	Event Schedule Message: Error triggered Event Node must have the Error defined Meaning: An Event Node with the 'Trigger' Tagged Value set to 'ErrorDetail' does not have the 'Error' Tagged Value set.
Event Node	Event Schedule Message: Multiple triggered Event Node must have a defined list of Triggers Meaning: An Event Node with the 'Trigger' Tagged Value set to 'Multiple' does not have the 'Trigger' Tagged Value set.
Business Cycle	Event Schedule Message: Business Cycles must have Event Nodes defined Meaning: A Business Cycle element does not have any Event Nodes defined.
Goal	Business Motivation/ Strategy Map Message: Goal not realized Meaning: A Goal has no relationship defined with other model artifacts.
Strategy	Business Motivation/ Strategy Map Message: Strategy not realized Meaning: A Strategy has no relationship defined with other model artifacts.

Validation Messages for Connectors

These error messages can be output by the validation of a Zachman Framework connector.

Messages

Connector	Diagram and Message
Association	Data Map Message: DataMap Association must have a valid source element Meaning: An Association has a source element other than Principal Entity, Structure Entity or Intersecting Entity.
Association	Data Map Message: DataMap Association must have a valid target element Meaning: An Association has a target element other than Principal Entity, Structure Entity or Intersecting Entity.
Association	Data Map Message: Possibility of an Intersecting entity < name> which might represent a Potential Business Process exists – This is a warning message. Meaning: An Association has a many-to-many relationship, informing that the relationship could be normalized.
Strategy Link	Strategy Map Message: Strategy Map Association must have a valid source element Meaning: A Strategy Link has a source element other than Strategy and Goal.
Strategy Link	Strategy Map Message: StrategyMap Association must have a valid target element Meaning: A Strategy Link has a target element other than Strategy and Goal.

Validation Messages for Diagrams

These error message can be output by the validation of a Zachman Framework diagram.

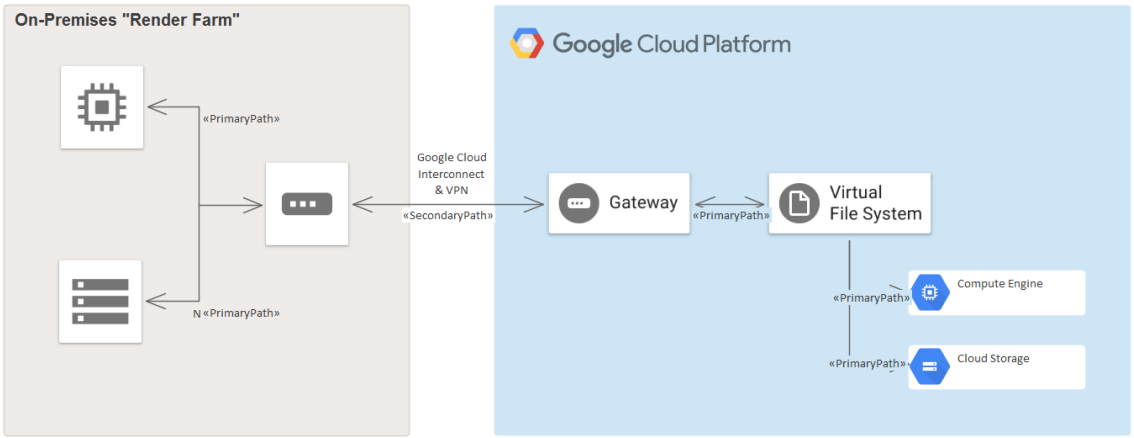
Messages

Diagram	Message
Data Map	Entities must have relations in DataMap Meaning: In the Data Map diagram there are entities with no relationships defined.

Google Cloud Platform (GCP) Icons

Create Google Cloud Platform Diagrams that Specify and Document GCP Virtual Infrastructure

Google Cloud Platform (GCP) provides a suite of Cloud computing services, following their initial Google App offering. Alongside a set of management tools, it provides a series of modular Cloud services including computing, data storage, data analytics and machine learning. Google Cloud Platform provides infrastructure as a service IaaS, platform as a service PaaS, and server-less computing environments. Enterprise Architect provides modeling constructs that allow you to create expressive GPC diagrams that specify new Cloud infrastructure and platforms or document existing ones. You can also model other Cloud Infrastructure and platform providers such as Amazon's AWS and Microsoft's Azure.



GPC diagram showing an On-Premise Render Farm

While Google offers tools for creating diagrams, the power of Enterprise Architect is that you can create visualizations that show the relationship to on-premise platforms, and the elements and services can be related to other system life-cycle artifacts such as Strategy, Business Rules, Requirements, Constraints, Applications XML and Database Schemas, just to mention a few.

The Google Cloud Platform (GCP) UML Profile provides all of the graphics (icons and images) necessary to model GCP architecture diagrams. The icons and images are provided by a Model Wizard (Start Page 'Create from Pattern' tab) framework pattern, which must be imported into your model before you can start creating GCP architecture diagrams. The Google Web Images pattern contains over 250 Image Assets that can be dragged-and-dropped onto diagrams.

Getting Started

In this topic you will learn how to work with the features that support Google Cloud Platform diagramming outlined in each section.

Selecting the Perspective

Enterprise Architect partitions the tool's extensive features into Perspectives, which ensures that you can focus on a specific task and work with the tools you need without the distraction of other features. To work with the Google Cloud Platform features you first need to select this Perspective:


<perspective name> > Analysis > Google Cloud Platform

Setting the Perspective ensures that the Google Cloud Platform diagrams, their tool boxes and other features of the Perspective will be available by default.

Example Diagram

An example diagram provides a visual introduction to the topic and allows you to see some of the important elements and connectors that are created in specifying or describing the way a Cloud Architecture is defined including: Availability Zones, VPC's, Subnets, EC2, RDS and more.

Import Google Cloud Platform Patterns

Before you can start creating GCP diagrams to specify or document your cloud services you will need first to import the graphics from a pattern. This will inject all the GCP icons as components into the selected location in the Browser window.

Create Google Cloud Platform Diagrams

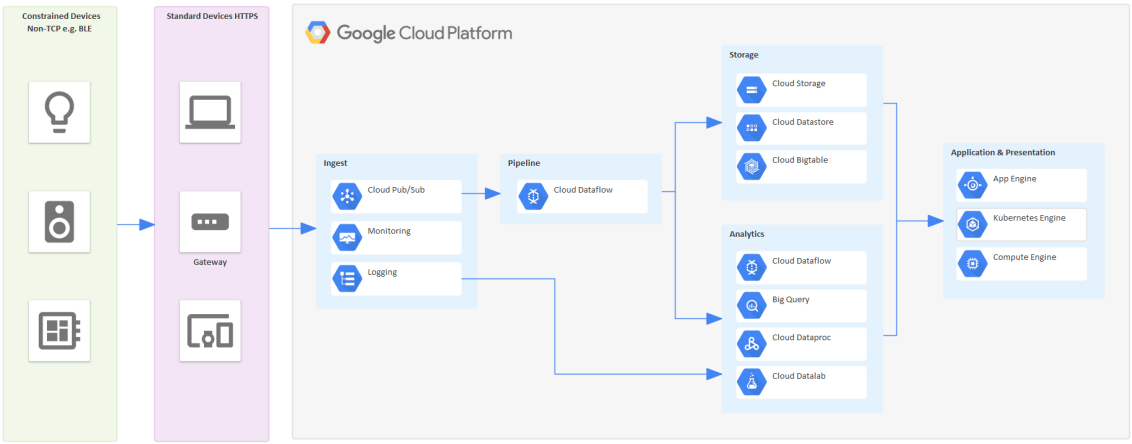
Once the GCP images have been imported creating GCP diagrams is straight forward as all the icons including App Engines, Compute Engine, Virtual File System and Gateways available from the Browser window and Toolbox. You will simply create a diagram and then drag-and-drop elements from the GCP Browser Packages or the Toolbox.

More Information

This section provides useful links to other topics and resources that you might find useful when working with the Google Cloud Platform tool features.

Example Diagram

Using GCP diagrams you can model cloud architectures. You can add new elements to the diagram from the Imported GCP Icons, the GCP toolbox or existing elements dragged from the Browser. This example is the Sensor Stream Ingest and Processing diagram.



GCP diagram showing Sensor Stream Ingest and Processing

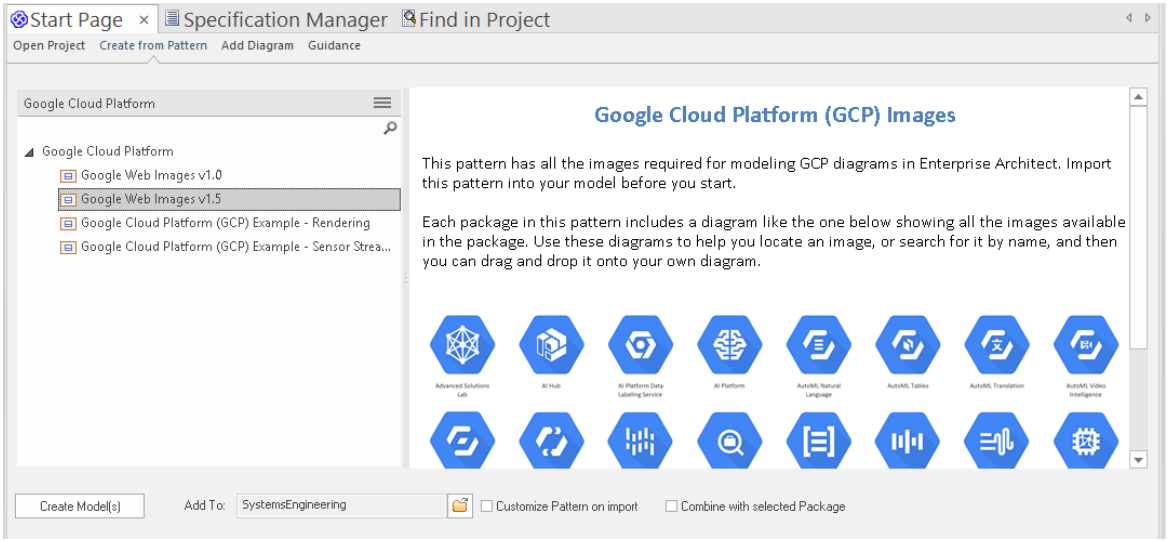
Import Google Cloud Platform Patterns

Before you import the 'Google Web Images' pattern into your model, click on the icon and select the 'Analysis > Google Cloud Platform' Perspective.

This automatically opens the Model Wizard (Start Page 'Create from Pattern' tab) at the 'Google Cloud Platform' page.

Click on the target Package in the Browser window, then on the 'Google Web Images' pattern and click on the Create Model(s) button.

Note: When you have the Web Images packet in your model, do not copy it to another location in the model or save it as XMI; always use the Model Wizard to import the pattern into a new model. The reason for this is that the provided Diagram Toolbox patterns, described here, refer to the Image Assets by their GUIDs. Copying the Image Assets will give them new GUIDs and the Diagram Toolbox patterns will not work.



In the Model Wizard there are example patterns that show typical use of the images in diagrams, reproduced from the 'Google Cloud Platform' Powerpoint.

Create Google Cloud Platform Diagrams

You can create a diagram by right-clicking on its parent Package and selecting the 'Add Diagram' menu option to display the 'New Diagram' dialog.

If you do not have the Google Cloud Platform Perspective selected, click on the drop-down arrow in the 'Type' field and select 'Analysis > Google Cloud Platform'.

In the 'Diagram' field type an appropriate name for the diagram, in the 'Select From panel' click on 'Google Cloud Platform', and in the 'Diagram Types' panel click on 'Google', and then click on the OK button. The 'Google Cloud Platform' pages of the Diagram Toolbox open, including:

- Zones
- Open Source
- AI & Machine Learning
- API Management
- Compute
- Data Analytics
- Databases
- Developer tools
- General Cards
- Hybrid and Multi Cloud
- Internet of Things
- Management Tools
- Migration
- Networking
- Serverless Computing Product Cards (Expanded)
- Security
- Serverless Computing
- Storage
- Paths

Note that the GCP diagrams are automatically set to Custom Style, and when you right-click on an element in the diagram you can make use of the Custom Style icons on the Format Toolbar.

Each Package in the Google Web Images Model Wizard pattern has a diagram that shows every image that is included in the Package.

To add one of these images to your diagram, locate it in the Browser window by either:

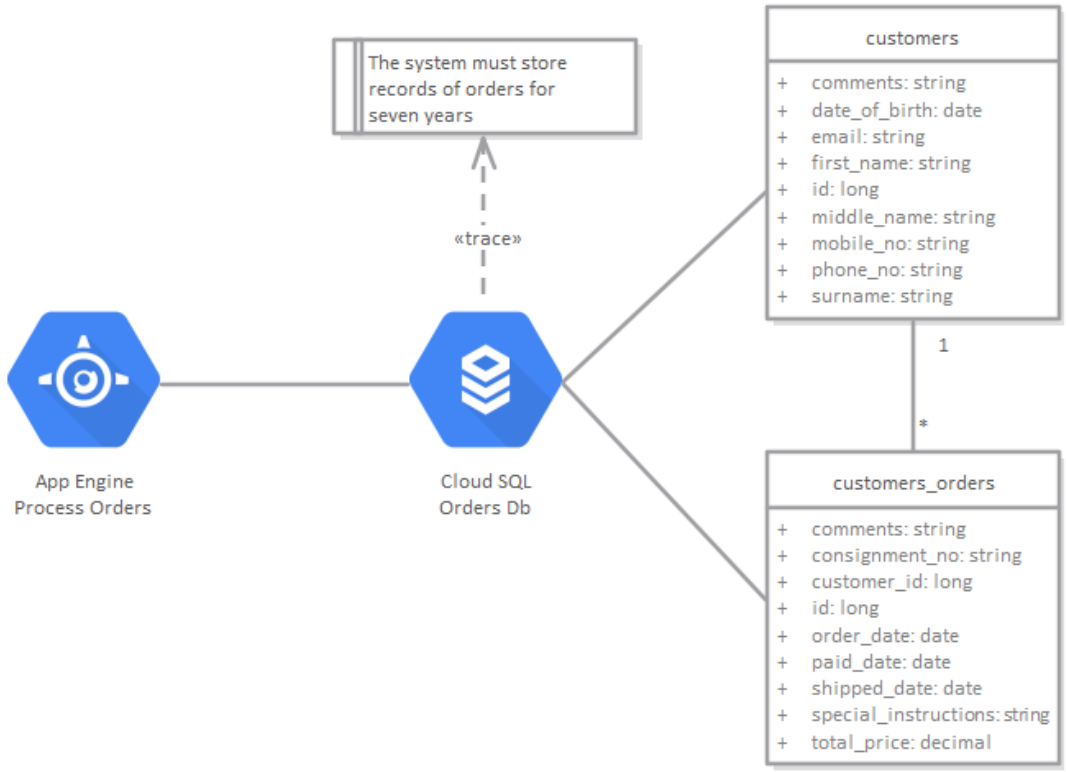
- Searching for it by name or
- Opening the diagram for the Package that you believe it should be in, finding it in the diagram and pressing Alt+G to highlight the Image Asset in the Browser window

Now drag-and-drop the Image Asset onto your diagram. You can choose to:

- Add it as an element with an icon
- Add it as an element with an image, or
- (If you have made an element from the icon already) Add as link

Traces to Project Artifacts

You can create expressive diagrams that can show how the GCP elements relate to other artifacts in your projects. This is achieved by placing any GCP element into a diagram and creating a Trace, Dependency, Association or other relationship between the AWS elements and other elements such as Requirements, User Stories, Conceptual, Logical and Physical database tables.



GCP diagram showing traces to a requirement and two database tables.

More Information

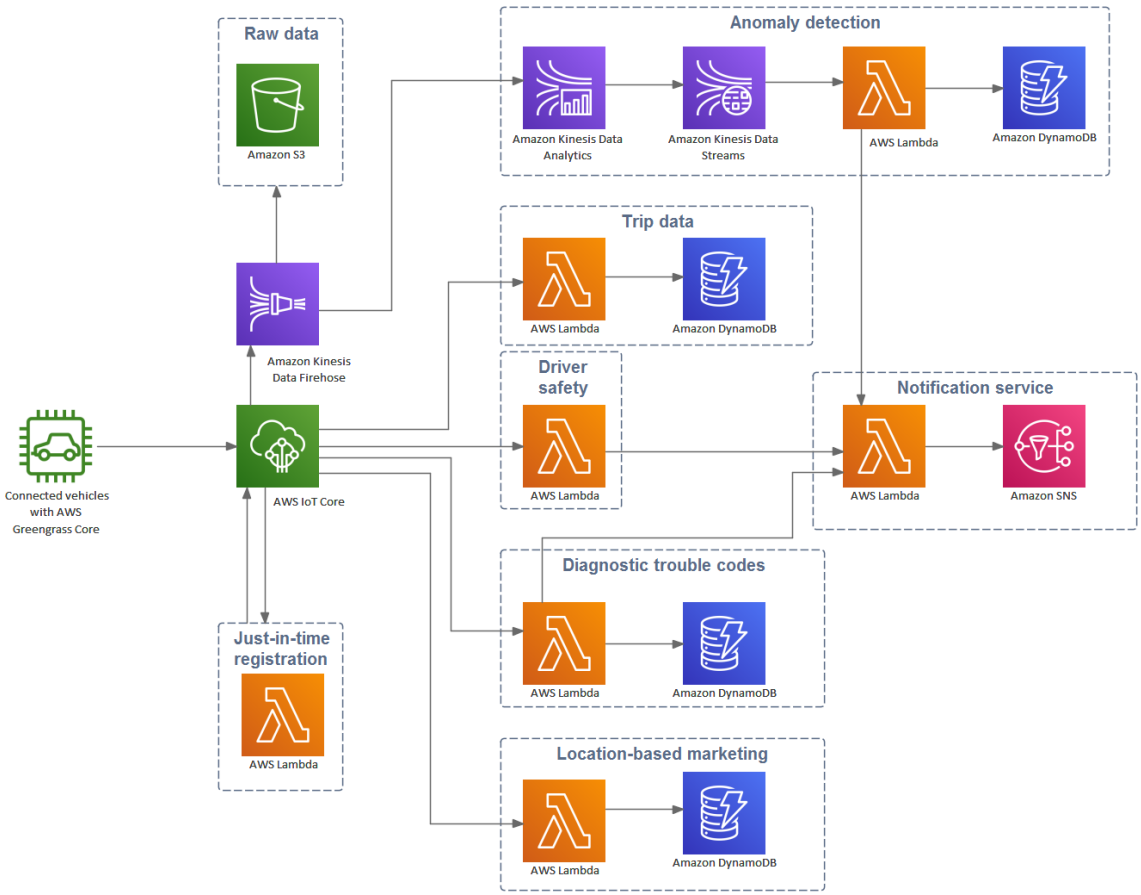
Edition Information

This feature is available in the Corporate, Unified and Ultimate Editions of Enterprise Architect, from Release 15.0. Enterprise Architect Release 15.2 supports Version 1.5 of the GCP graphics file.

Amazon Web Services (AWS)

Creates Amazon Web Services Diagrams that Specify and Document AWS Virtual Infrastructure

Amazon Web Services (AWS) is one of the market leaders of services to define IaaS (Infrastructure-as-a-Service) and PaaS (Platform-as-a-Service) in Cloud environments. The services can be used in isolation, but more typically are used in combination to create scalable Cloud applications and services, reducing any of the delays and issues associated with infrastructure provisioning and device management such as Compute, Storage and Network devices. Enterprise Architect provides modeling constructs that allow you to create expressive AWS diagrams that specify new Cloud infrastructure and platforms or document existing ones. You can also model other Cloud Infrastructure and platform providers such as Google Cloud Platform and Microsoft's Azure.



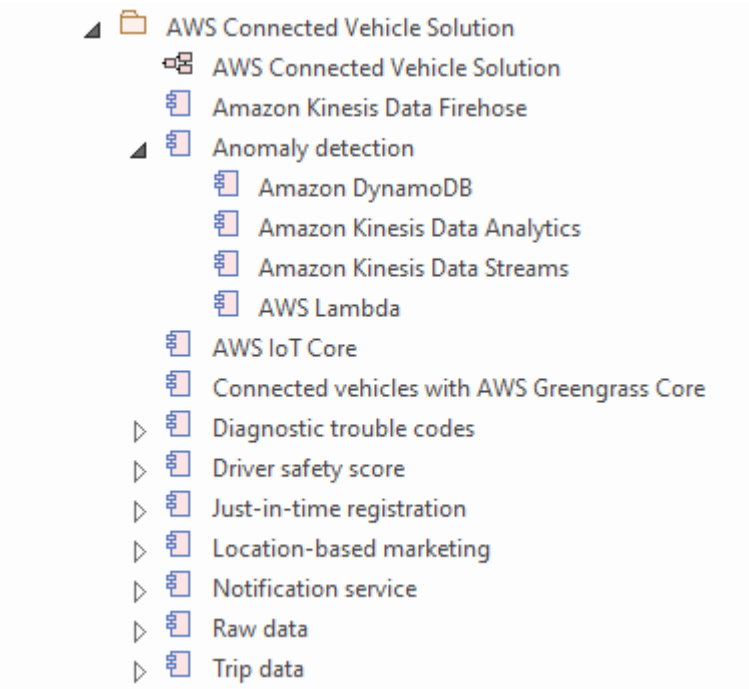
AWS Diagram of a Connected Vehicle Solution

While AWS has tools for doing this, the power of Enterprise Architect is that you can create visualizations that show the relationship to on-premise platforms, and the elements and services can be related to other system life-cycle artifacts such as Strategy, Business Rules, Requirements, Constraints, XML and Database Schemas, just to mention a few.

Getting Started

Creating AWS platform diagrams is straight forward - all the AWS service constructs are available from the Toolbox or from the Browser in the AWS Packages. This allows you to create expressive diagrams containing element items such as EC2 compute and RDS databases, as well as container items such as VPCs and Subnets.

Amazon Web Services (AWS) Architecture provides all of the graphics (icons and images) required to build AWS architecture diagrams. The icons and images are provided by a Model Wizard framework pattern, which must be imported into your model before you can start creating AWS architecture diagrams. The Amazon AWS Web Images pattern contains over 350 Image Assets that can be dragged-and-dropped onto diagrams.



Working with AWS diagrams is straight forward; this topic will guide you through setting up AWS modeling in Enterprise Architect, creating diagrams and tracing to other project Artifacts.

Selecting the Perspective

Enterprise Architect partitions the tool's extensive features into Perspectives; this ensures that you can focus on a specific task and work with the tools you need without the distraction of other features. To work with the Amazon Web Services (AWS) features you first need to select the AWS Architecture Perspective:

 <perspective name> > > Analysis > AWS Architecture

Setting the Perspective ensures that the Amazon Web Services diagrams, their tool boxes and other features of the Perspective are available by default.

Example Diagram

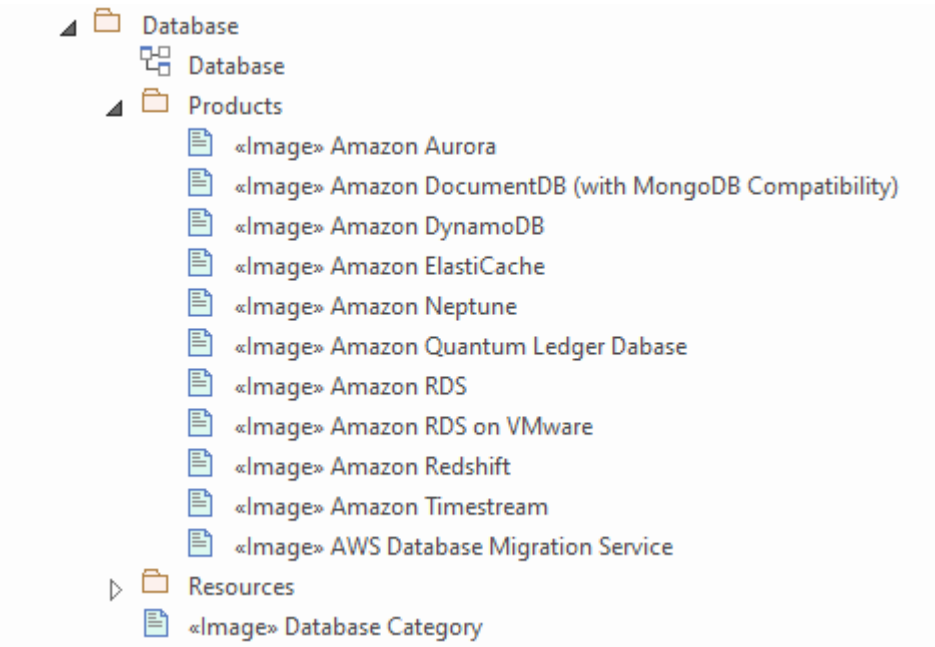
An example diagram provides a visual introduction to the topic and allows you to see some of the important elements and connectors that are created in specifying or describing the way a Cloud Architecture is defined including: Availability Zones, VPC's, Subnets, EC2, RDS and more.

Import Amazon Web Services Patterns

Before you can start creating AWS diagrams to specify or document your Cloud services you must first import the graphics from a pattern. This will inject all the AWS icons as components into the selected location in the Browser window.

Create an Amazon Web Services Diagram

Once the AWS images have been imported creating AWS diagrams is straight forward as all the icons including Products and Resources such as EC2 and RDS and Containers such as VPCs and Availability Zones are available from the Browser window and Toolbox respectively. You will simply create a diagram and then drag-and-drop elements from the AWS Browser Packages or the Toolbox.



The Browser window showing AWS database Product Images.

Tracing to Project Artifacts

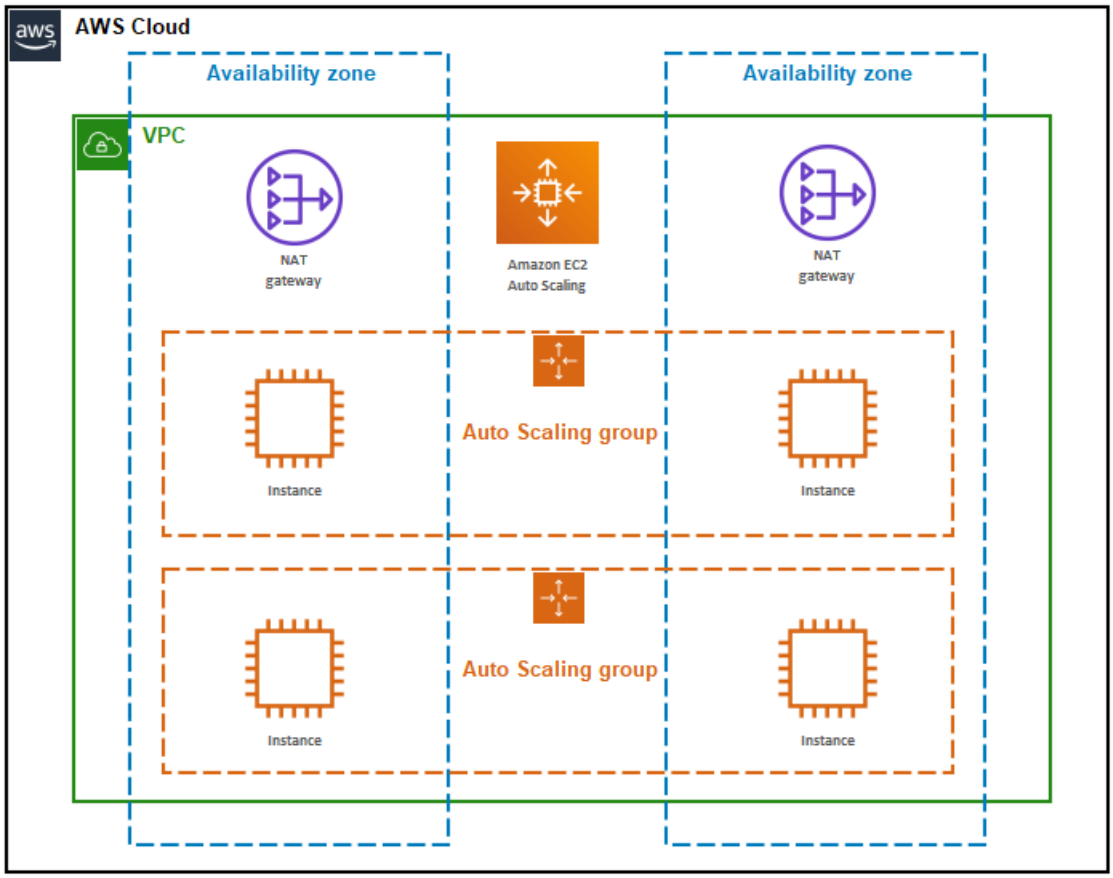
Enterprise Architect is a collaboration platform for all disciplines and one of the great advantages of modeling Amazon web Services is that parts of the cloud based infrastructure can be related to other domains in your projects. You can trace elements in the AWS diagrams to a wide range of other artifacts including: Requirements, Business Rules, Database Schemas, On-Premise Infrastructure and more.

More Information

This section provides useful links to other topics and resources that you might find useful when working with the Amazon Web Services tool features.

Example Diagram

Using AWS diagrams you can model cloud architectures. You can add new elements to the diagram from the Imported AWS Icons, the AWS toolbox or existing elements dragged from the Browser. This example is the Instances on AWS example that contains two availability zones and auto-scaling groups.



AWS diagram showing two availability zones and auto scaling groups.

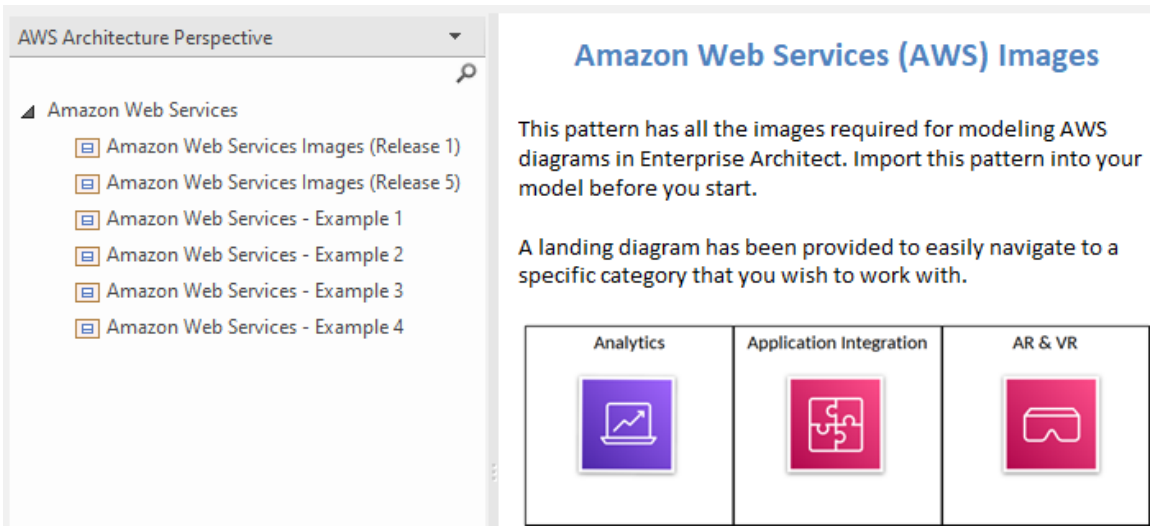
Import Amazon Web Services Patterns

Before you import the 'Amazon/AWS Web Images' pattern into your model, click on the icon and select the 'Analysis > AWS Architecture' Perspective.

This automatically opens the Model Wizard (Start Page 'Create from Pattern' tab) at the AWS Architecture Perspective page.

Click on the target Package in the Browser window, then on the 'Amazon/AWS Web Images' pattern and click on the Create Model(s) button.

In the Model Wizard there are three example patterns that show typical use of the images in diagrams, reproduced from the 'AWS Architecture Icons' Powerpoint.



Patterns window showing AWS pattern for Import.

Note: When you have the Web Images packet in your model, do not copy it to another location in the model or save it as XMI; always use the Model Wizard to import the pattern into a new model. The reason for this is that the provided Diagram Toolbox patterns, described here, refer to the Image Assets by their GUIDs. Copying the Image Assets will give them new GUIDs and the Diagram Toolbox patterns will not work.

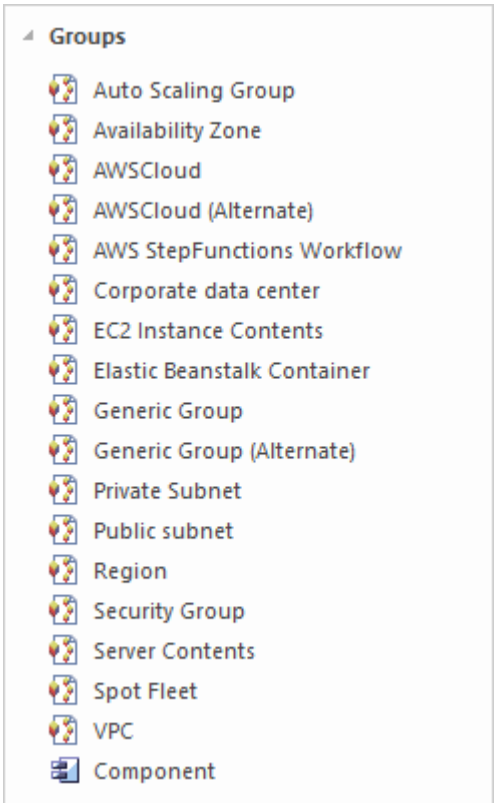
Create an Amazon Web Services Diagram

You can create a diagram by right-clicking on its parent Package and selecting the 'Add Diagram' menu option to display the 'New Diagram' dialog.

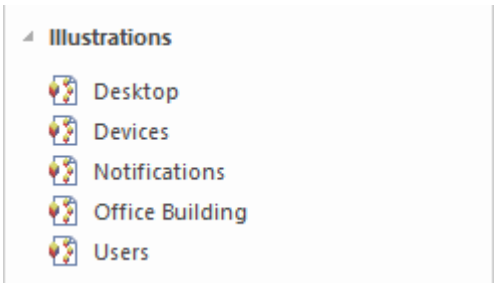
If you do not have the AWS Architecture Perspective selected, click on the drop-down arrow in the Type field and select 'Analysis > AWS Architecture'.

In the 'Diagram' field type an appropriate name for the diagram, in the 'Select From' panel click on 'AWS', in the 'Diagram Types' panel click on 'AWS', and then click on the OK button. The AWS pages of the Diagram Toolbox open, including:

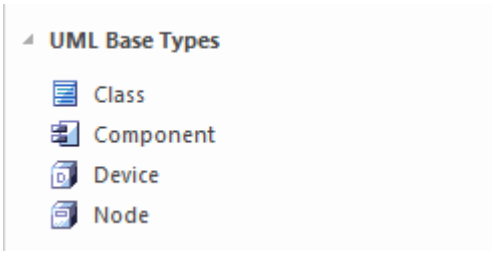
- AWS Groups - This page provides a number of patterns that will create a Group with an icon (from an Image Asset) in the top left corner and the name left-justified at the top; the exceptions are Auto Scaling Group and Elastic Load Balancing, which have their icons centered at the top, and Generic Group and Highlight which don't have an icon



- AWS Illustrations - This page provides five illustrative patterns, containing images for Users, Notification, Devices, Desktop and Office building



- UML Base Types - This page provides a small number of UML elements that you can use within the AWS diagrams



Note that the AWS diagrams are automatically set to Custom Style, and when you right-click on an element in the diagram you can make use of the Custom Style icons on the Custom Style Toolbar.

All the icons in the Diagram Toolbox generate Image Assets as listed in the _General Package of the AWS Model Wizard pattern. The other 22 Packages in the AWS Model Wizard pattern contain all the other images. Each Package has a diagram that shows every image that is included in the Package, and two sub-Packages 'Products' and 'Resources' containing Image Assets for the images. 'Product' images are white on dark gray, and 'Resource' images are dark gray on white.

To add one of these images to your diagram, locate it in the Browser window by either:

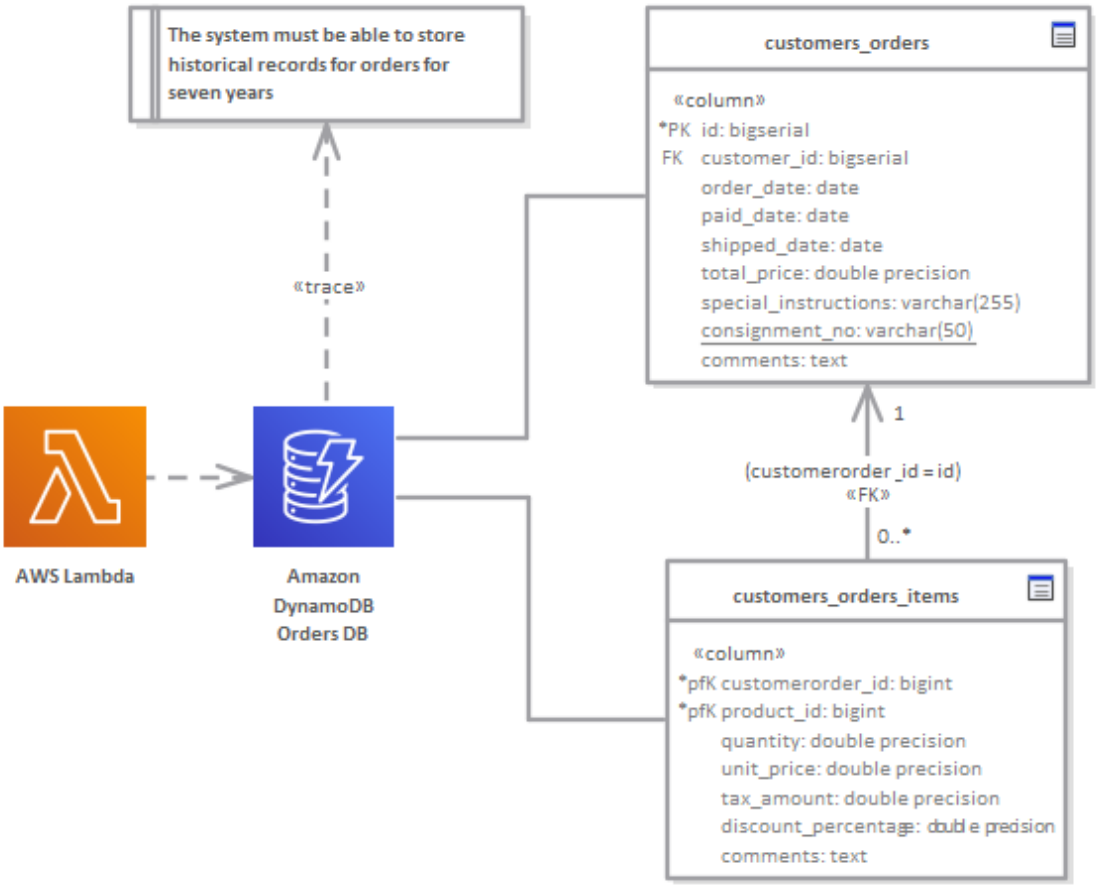
- Searching for it by name or
- Opening the diagram for the Package that you believe it should be in, finding it in the diagram and pressing Alt+G to highlight the Image Asset in the Browser window

Now drag-and-drop the Image Asset onto your diagram. You can choose to:

- Add it as an element with an icon
- Add it as an element with an image, or
- (If you have made an element from the icon already) Add as link

Traces to Project Artifacts

You can create expressive diagrams that can show how the AWS elements relate to other artifacts in your projects. This is achieved by placing any AWS element into a diagram and creating a Trace, Dependency, Association or other relationship between the AWS elements and other elements such as Requirements, User Stories, Conceptual, Logical and Physical database tables.



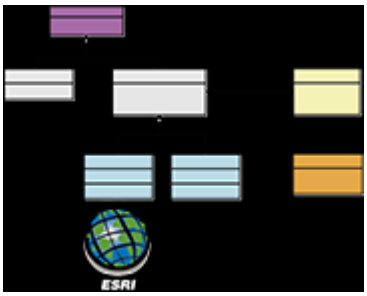
AWS diagram showing traces to a requirement and two database tables.

More Information

Edition Information

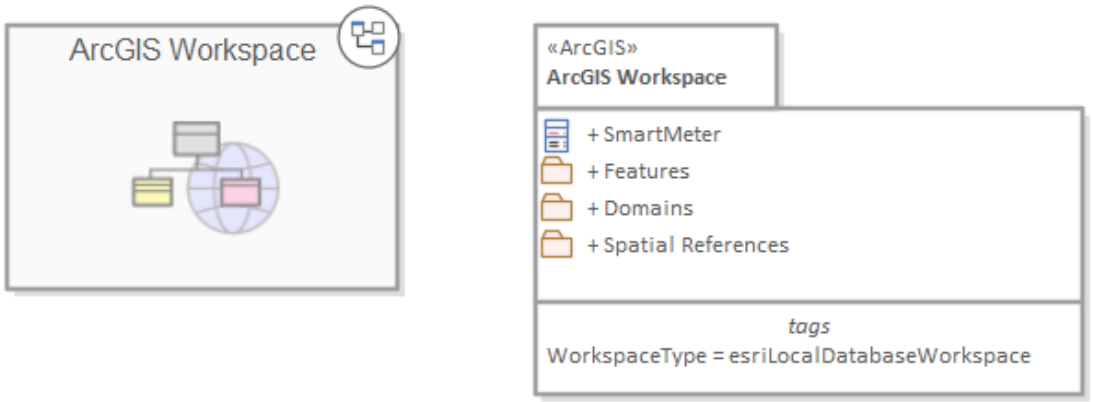
This feature is available in the Corporate, Unified and Ultimate Editions of Enterprise Architect, from Release 15.0. Enterprise Architect Release 15.2.1559 supports Release 7 of the AWS Architecture graphics file.

ArcGIS Geodatabases



Exchange, Model and Visualize ArcGIS Geodatabases

Enterprise Architect supports the import and export of ArcGIS geodatabases, allowing you to visualize Features and Domains within this multi-featured collaboration platform. In the recent past there has been a separation of the disciplines between system software development and geospatial development. In this age of social architecture and digital disruption almost every project and endeavor requires some aspect of location information, from simple delivery services to agricultural, mining, exploration, weather, real estate and disaster recovery systems.

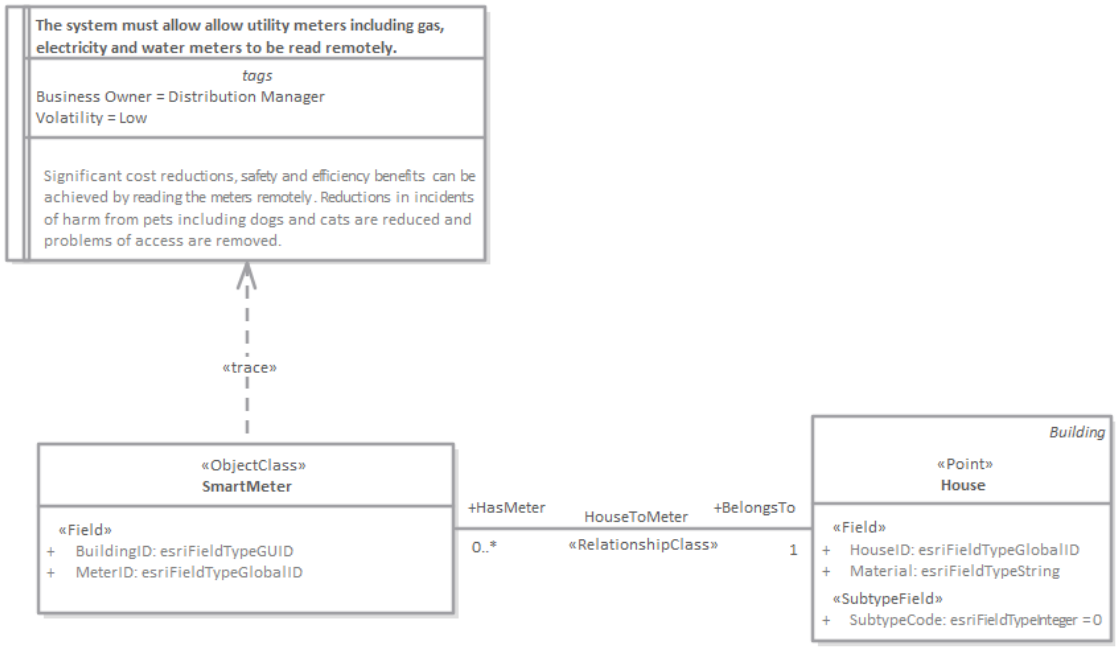


Package diagram showing a Navigation Cell and a Package containing Features Domains and a Geospatial Reference

The ArcGIS system, developed by Esri, supports the development and management of geodatabases. As it is for other databases, it is useful to model the design of a geodatabase using a standard notation such as UML. You can perform such modeling in Enterprise Architect, using the UML profile for ArcGIS. Once you have modeled an ArcGIS schema in Enterprise Architect, you can export the model to ArcGIS as an XML Workspace document. You can also visualize an existing ArcGIS geodatabase schema, by importing the ArcGIS XML Workspace document into Enterprise Architect.

Getting Started

Using the ArcGIS features in Enterprise Architect you can visualize geodatabases inside this system and collaboration platform. This allows you to unify teams working in traditional software-centric and engineering systems with your geospatial teams defining features and domains. Teams defining the strategy business rules and requirements for a system or the components that deliver the system functionality can share models with the geospatial teams creating an integrated model that will help with integration and risk reduction. The multidisciplinary teams can communicate and collaborate using the collaboration features including chat, discussion and reviews, ensuring that the geospatial components are well-considered during the strategy, specification, analysis, design, implementation and support of the overall system.



ArcGIS diagram showing a trace between a Smart Meter and a formal system requirement.

In this topic you will learn how to work with the features that support ArcGIS geodatabases outlined, in the sections.

Selecting the Perspective

Enterprise Architect partitions the tool's extensive features into Perspectives, which ensures that you can focus on a specific task and work with the tools you need without the distraction of other features. To work with the ArcGIS Geodatabases features you first need to select this Perspective:

<perspective name> > Database Engineering > ArcGIS

Setting the Perspective ensures that the ArcGIS diagrams, their tool boxes and other features of the Perspective will be available by default.

Example Diagram

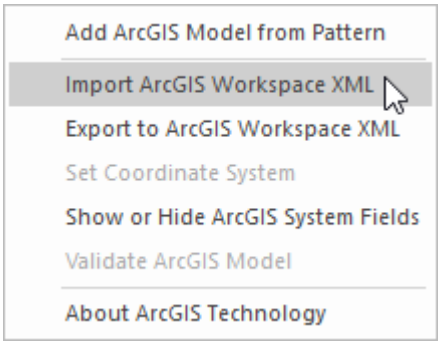
An example diagram provides a visual introduction to the topic and allows you to see some of the important elements and connectors that are created in specifying or describing an ArcGIS geodatabase schema including Features and Domains. Diagrams in other topics will show how Spatial References, Geometric Network and Topology can be modeled in the tool.

Modeling with ArcGIS

This topic introduces the ArcGIS profile, which provides the diagrams, Toolbox pages and elements that you will wor,k with including connectivity rules and topologies. You are able to select the ArcGIS perspective from the Geospatial group, which will set the tool up for modeling geodabases.

Importing ArcGIS XML Workspaces

This functionality allows you to import an ArcGIS workspace which is an XML document that contains the geodatabase schema. Any number of schemas can be imported and then layout tools can be used to show or hide features, including the ability to show or hide ArcGIS System features.



AcrGIS menu options on the Specialize ribbon to Import an ArcGIS Workspace.

Exporting ArcGIS XML Workspaces

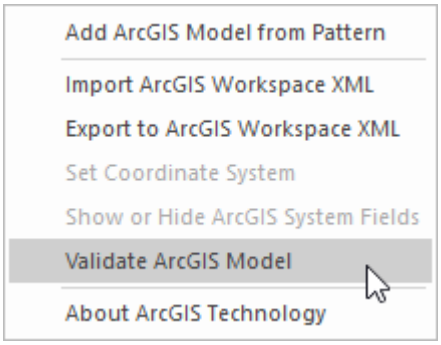
You can model ArcGIS geodatabse schemas in Enterprise Architect and when you are happy that they have been elaborated correctly, including adding Features and Coded Value and Range domains, they can be exported to an XML document which in turn can be imported into the Esri tool.

Export Modular ArcGIS Schemas

In Enterprise Architect, you can export discreet parts of schemas. This is useful if you have a large geodatabase schema, for example a schema defined as part of an industry reference model. Individual Features (elements) can be exported using this facility allowing you to incrementally build up a geodatabase

Validate ArcGIS Workspaces

Enterprise Architect provides a validation services that allows you to check whether the models that you develop are compliant with a set of inbuilt system rules for well-formed models.



AcrGIS menu options on the Specialize ribbon to Validate an ArcGIS model.

More Information

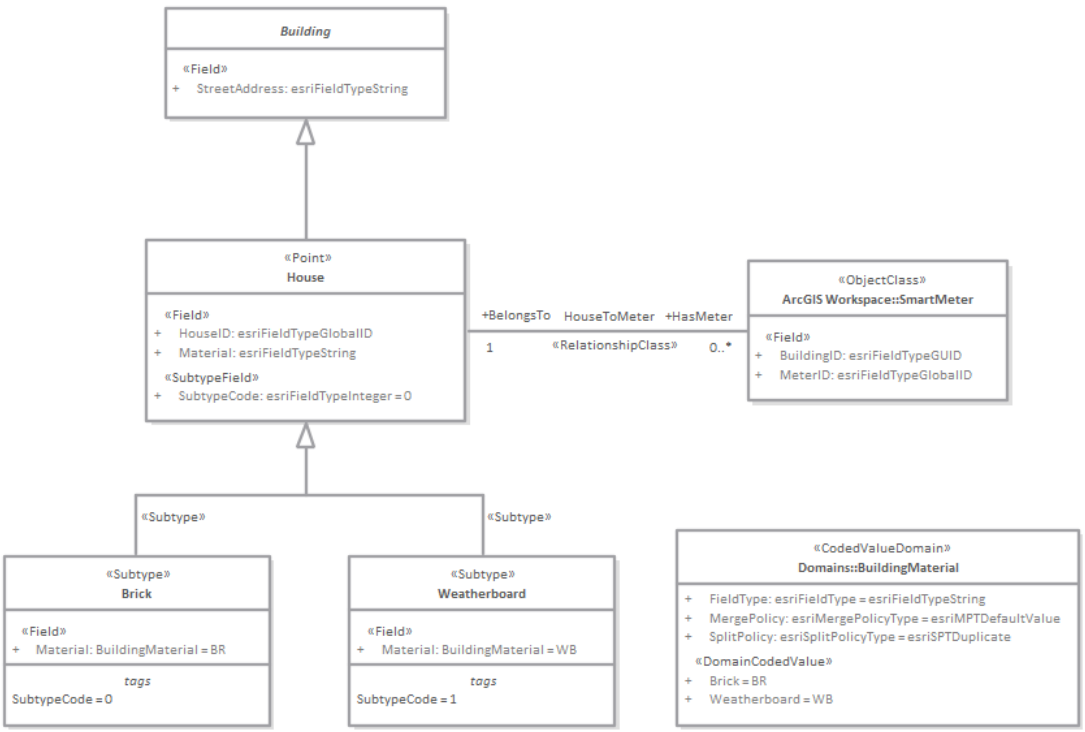
This section provides useful links to other topics and resources that you might find useful when working with the ArcGIS Geodatabase tool features.

Example Diagram

ArcGIS diagrams allow you to visualize the geographic features, domains and other elements that make up a geodatabase schema. In this example a Building has been sub-typed as a house, the house in turn is sub-typed based on the material type. The subtypes of the House references a Coded Value Domain also presented in the diagram with two Domain Code Values:

- Brick
- WeatherBoard

A Smart Meter is associated with the house. The House is a type of Building and the Building contains the property of Street Address



Modeling with ArcGIS

Integration with ArcGIS is built in to the Enterprise Architect installer. A key component of the technology is the UML Profile for ArcGIS.

Access

Ribbon	Specialize > Technologies > ArcGIS
Context Menu	Right-click on Package | Specialize | ArcGIS

Features

Feature	Detail
Profile Support	ArcGIS provides: • ArcGIS Toolbox pages that map ArcGIS concepts to appropriately stereotyped UML elements • A Model Pattern that helps you to start designing geodatabases quickly and to use the required Package structure in Enterprise Architect • Datatypes that are specific to the ArcGIS platform • Quick Linker capabilities that help you make valid connections between elements
ArcGIS Toolbox Pages	The ArcGIS Toolbox contains five core pages: • Domains - for coded value and range domains • Features and Tables - for custom feature types and tables • Network Features - for geometric network and topology Packages • Raster - for raster datasets • Workspace - for ArcGIS workspace and spatial reference information Two additional Toolboxes group the objects used specifically in creating Geometric Network and Topology diagrams.
Spatial References	Enterprise Architect helps you to model Spatial Reference information for your ArcGIS schema, including the selection of predefined coordinate systems and associated values.
Show/Hide System Attribute Fields	The ArcGIS elements provided through the Toolbox pages contain a number of system-assigned attributes that define the «AttributeIndex», «SpatialIndex» and «RequiredField» stereotypes. When you drag an element onto a diagram from the Toolbox, these attributes are not visible in the newly-created structure. If you want to show these system attributes, right-click on the element(s) and select the 'Specialize > Technologies > ArcGIS > Show or Hide ArcGIS System Fields' ribbon option. Similarly, if you have exposed the attributes and want to hide them, select the elements and select the menu option again.

	This option does not operate on attributes or stereotypes you have added to the selected elements, nor on elements that you have not selected. If you do not select any elements, the option is grayed out.

Notes

- ArcGIS is available in the Professional, Corporate, Unified and Ultimate Editions of Enterprise Architect

ArcGIS Toolbox Pages

The ArcGIS Toolbox pages provide elements and connectors that you can use to model ArcGIS geodatabase concepts and relationships. The ArcGIS Toolbox consists of five Core pages:

- Domains - for coded value and range domains
- Features and Tables - for custom feature types and tables
- Network Features - to identify geometric network and topology Packages
- Raster - for raster datasets
- Workspace - for ArcGIS workspace and spatial reference information

Two additional Toolboxes group the objects used specifically in creating Geometric Network and Topology diagrams.

Access

On the Diagram Toolbox, click on  to display the 'Find Toolbox Item' dialog and specify 'ArcGIS:

- Core'
- Geometric Network' or
- Topology'

Ribbon	Design > Diagram > Toolbox
Keyboard Shortcuts	Ctrl+Shift+3

ArcGIS Toolbox Pages

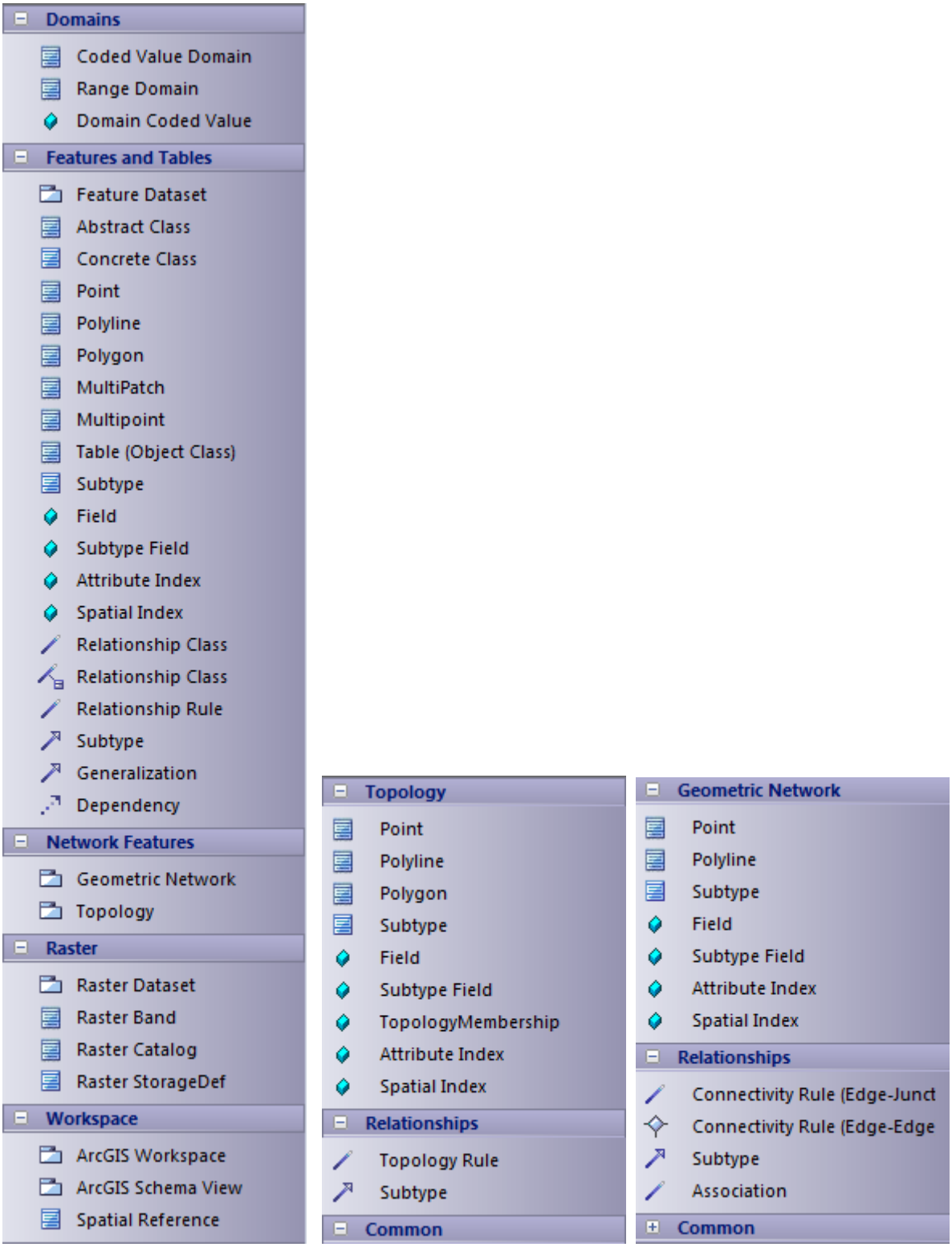


Diagram toolbox icons

Toolbox Icon	Description
Packages	

ArcGIS Workspace	The geodatabase workspace Package, which holds all the ArcGIS modeling elements. Export the contents of this Package to produce the Geodatabase XML Workspace Document, which can be imported to Esri ArcCatalog.
ArcGIS Schema View	A stereotyped Package that represents a subset of the geodatabase schema defined within the ArcGIS Workspace Package. ArcGIS Schema View Packages are useful if you need to create partial or modular schemas based on your complete geodatabase design. You can create any number of ArcGIS Schema View Packages under your ArcGIS Workspace Package. Add this element to a diagram under your workspace, then create a UML Dependency connector from it to each Package to include in the generated XML Workspace Document. For example, you could include only a subset of your Feature Datasets and Domains, by drawing UML Dependency connectors to the appropriate Packages. To export your ArcGIS Schema View for use with ArcCatalog, right-click on it and select the 'Specialize | ArcGIS | Export to ArcGIS Workspace XML' option. The system generates a Workspace XML document containing only the elements associated with the ArcGIS Schema View Package. See the *Export Modular ArcGIS Schemas* topic.
Feature Dataset	A stereotyped Package that holds or organizes Point, Polyline, Polygon or Multipatch elements with the same spatial reference, geometry type and attribute fields (that is, Feature Classes). The Feature Dataset is only created under the ArcGIS Workspace Package; it can not be created under another Feature Dataset Package. Feature Dataset Packages can contain other types of sub-Package, however, which can be useful for organizing large Feature Datasets. When exported to an XML Workspace document, elements of any subPackages are included while the subPackages themselves are ignored, resulting in a 'flattened' model hierarchy. Although ArcGIS prevents Tables (ObjectClasses) being defined under Feature Datasets, Enterprise Architect lets you model Tables under Feature Datasets for convenience. On export, Tables are placed at the root level to create a valid schema.
Geometric Network	An extended UML Package that represents the logical relationships between features in a network system – implemented in ArcGIS as a geometric network.
Raster Dataset	A stereotyped Package that holds or organizes the raster data (as Raster Band elements).
Topology	An extended UML Package that represents the shared geometry of a set of Feature Classes from a Feature Dataset.
Elements (in alphabetical order)	
Abstract Class	A standard UML Abstract Class, representing a concept and set of fields, that can be shared by multiple Feature Classes. Feature Classes that connect to an Abstract Class via an Inheritance relationship gain all of its fields. Since the geodatabase does not directly support Abstract Classes, inherited fields are exported into the definition of each child Feature Class when generating a schema from the model.
Coded Value Domain	An extended UML Class, representing a set of valid values that might apply to any type of attribute.

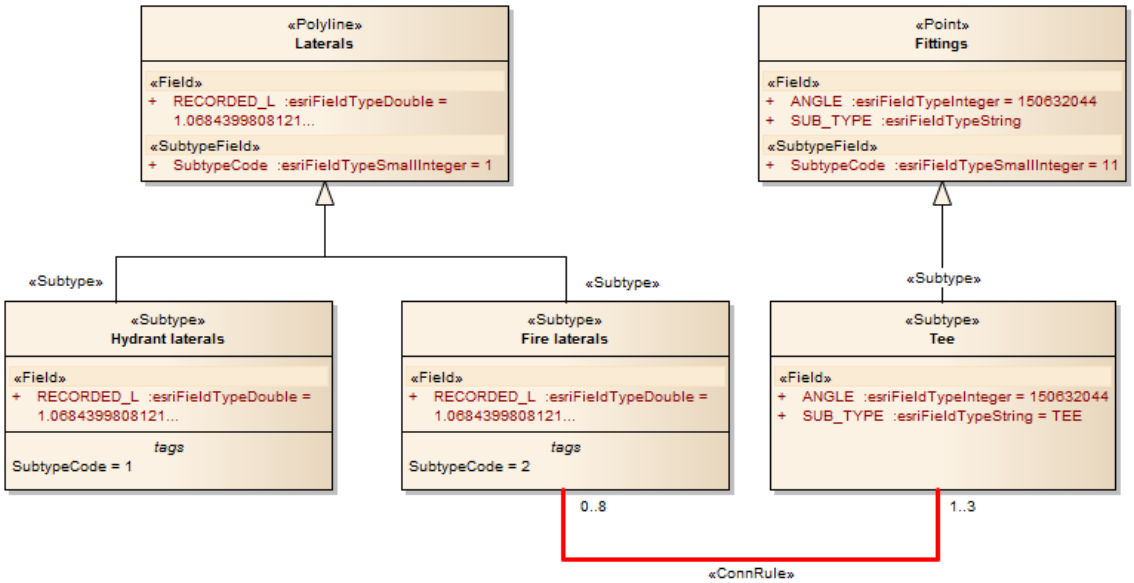
Concrete Class	A standard UML Class that can represent a Feature Class or a Table in ArcGIS, depending on the stereotype setting of its parent Class. If the element has no stereotyped parent Class, it is treated as an ArcGIS Table (Object Class) by default.
MultiPatch	An extended UML Class, representing the ArcGIS MultiPatch.
Multipoint	An extended UML Class, representing the ArcGIS Multipoint.
Point	An extended UML Class, representing the ArcGIS Point.
Polygon	An extended UML Class, representing the ArcGIS Polygon.
Polyline	An extended UML Class, representing the ArcGIS Polyline.
Range Domain	An extended UML Class, representing a valid range of numeric values that might apply to a numeric type of attribute.
Raster Band	An extended UML Class, representing one layer of a matrix of cell values. Every Raster Dataset contains one or more Raster Bands.
Raster Catalog	An extended UML Class, representing a collection of Raster Datasets in the geodatabase.
Raster StorageDef	An extended UML Class, representing the storage properties for a Raster value in the geodatabase; this information is required when a Raster Dataset Package element is created.
Spatial Reference	An extended UML Class that defines the spatial reference information of your schema, such as a coordinate system and XYTolerance. You can define one or more Spatial Reference elements, which you link to other ArcGIS elements via their Spatial Reference Tagged Value.
Subtype	An extended UML Class, holding a subset of the attributes of an element in the Feature Dataset.
Table (Object Class)	An extended UML Class, representing a collection of nonspatial data of the same type or Class.
Relationships (in alphabetical order)	
Association	A normal UML Association connector.
Connectivity Rule (Edge-Edge)	An extended UML N-ary Association that models the valid relationships between edge elements in a Geometric Network. For an example, see *Connectivity Rule Examples*.
Connectivity Rule (Edge-Junction)	An extended UML Association that models the valid relationships between edge and junction elements in a Geometric Network. For an example, see *Connectivity Rule Examples*.
Dependency	A normal UML Dependency connector.

Generalization	Indicates inheritance from the specific classifier to a general classifier.
Relationship Class	An extended UML Association, providing the relationship between: • Two elements in the Feature Dataset, or • An element in the Feature Dataset and an Object Class element
Relationship Class	An extended UML Association Class, providing the attributed relationship between: • Two elements in the Feature Dataset, or • An element in the Feature Dataset and an Object Class element
Relationship Rule	An extended UML Association that determines which subtypes can be related in the geodatabase.
Subtype	An extended UML Association, providing the relationship between a Feature Class element and a Subtype element.
Topology Rule	An extended UML Association that connects Feature Class and Subtype elements in the geodatabase.
Attributes (in alphabetical order)	
Attribute Index	An extended UML attribute that represents the ArcGIS Attribute Index.
Domain Coded Value	An extended UML attribute that specifies the value of an ArcGIS Coded Value Domain.
Field	An extended UML attribute that represents an ArcGIS field of the geodatabase, in a Table or Feature Class.
Spatial Index	An extended UML attribute that represents the ArcGIS Spatial Index.
Subtype Field	An extended UML attribute that represents the 'subtype' field of an ArcGIS Table or Feature Class.
TopologyMembership	An extended UML attribute that represents the accuracy ranks of a Feature Class.

Connectivity Rule Examples

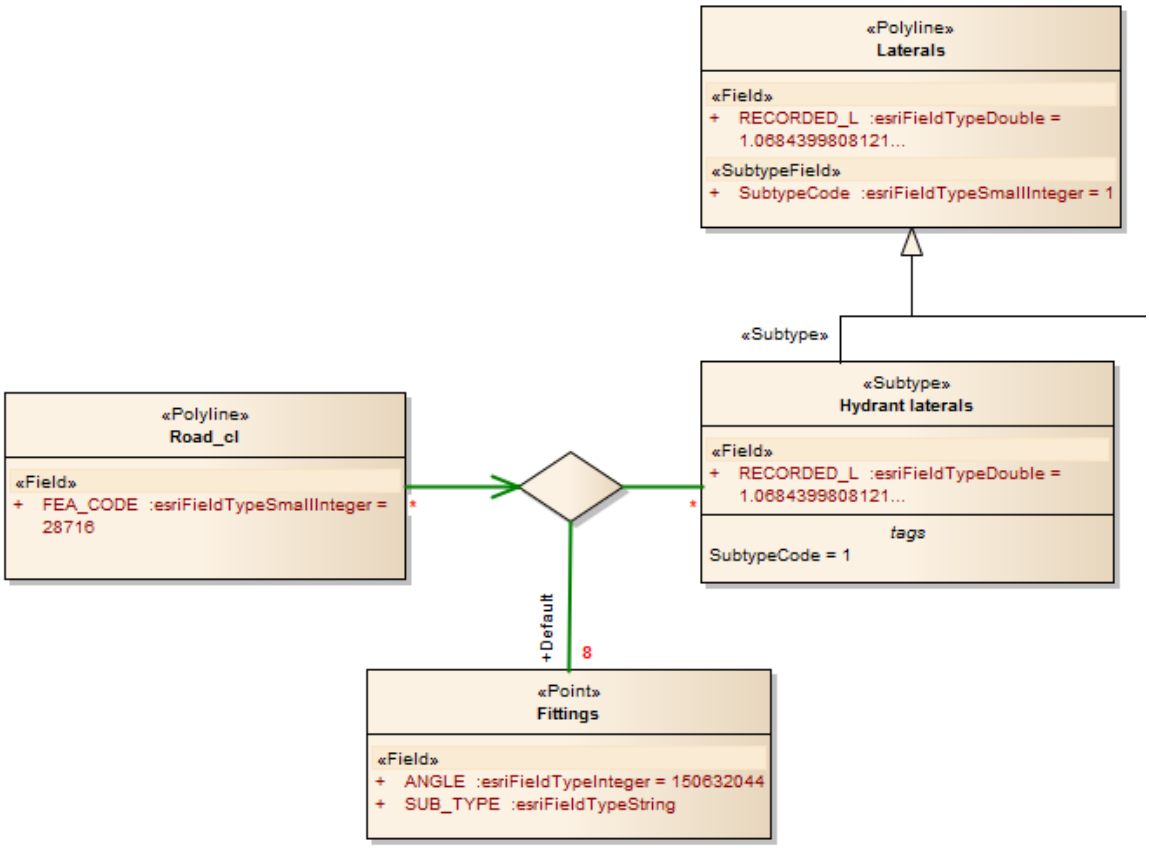
In an ArcGIS Geometric Network diagram, you can use one or other of the two Connectivity Rule relationships - Edge-Junction or Edge-Edge. These examples illustrate the use of each type.

Edge-Junction Connectivity Rule



- The Connectivity-Rule (Edge-Junction) connector is a UML binary Association connector
- The connection includes one edge element («Point», or «Subtype» with «Point» as parent) and one junction element («Polyline», or «Subtype» with «Polyline» as parent)
- Cardinality can be set from the source and target 'Multiplicity' fields on the connector 'Properties' dialog
- You can set the 'Source Role' or 'Target Role' fields to 'Default' on the connector 'Properties' dialog
- All the elements within this Edge-Junction rule must be held in the «GeometricNetwork» Package

Edge-Edge Connectivity Rule



- The Connectivity-Rule (Edge-Edge) connector is a UML N-ary Association connector
- The connection should include two edge elements («Polyline», or «Subtype» with «Polyline» as parent) and any number of junction elements («Point», or «Subtype» with «Point» as parent)
- It is recommended that you use a Direct Association connector, drawn from one of the edge elements to the N-ary element, to indicate the 'from' Class - in the diagram, Road_cl is the edge element that is set as the 'from' Class; for the rest of connection, you can use Association connectors to connect the edge or junction element and the N-ary element, drawn either from the edge or junction elements to the N-ary element, or from the N-ary element to the edge or junction elements
- Cardinality can be set from the source or target element 'Multiplicity' fields on the connector 'Properties' dialog; you only need to set the multiplicity of one end of the connector - if both ends are set, only the multiplicity of the target end is used
- You must mark one of the Junction-N-ary connections as Default, using the 'Source Role' or 'Target Role' field on the connector 'Properties' dialog
- All the elements within this Edge-Edge rule must be held in the «GeometricNetwork» Package

Topology Example

In geodatabases, topology defines the spatial relationship between geographic features; that is, how Point, Polyline, and Polygon features share coincident geometry. Topology is fundamental to data integrity in a GIS database. In the Enterprise Architect ArcGIS profile, you use a «Topology» Package to model data integrity among the Feature Classes.

Modeling topology in the Enterprise Architect ArcGIS model is simple:

1. Select a «FeatureDataset» Package in which to create topology relationships.
2. Open the diagram under the «FeatureDataset» Package.
3. From the Diagram Toolbox ArcGIS Network Features page, drag and drop a «Topology» Package icon onto the diagram; this creates a Package that will contain all the elements and relationships that are required for topology definition.

A Topology defined in Enterprise Architect has these characteristics:

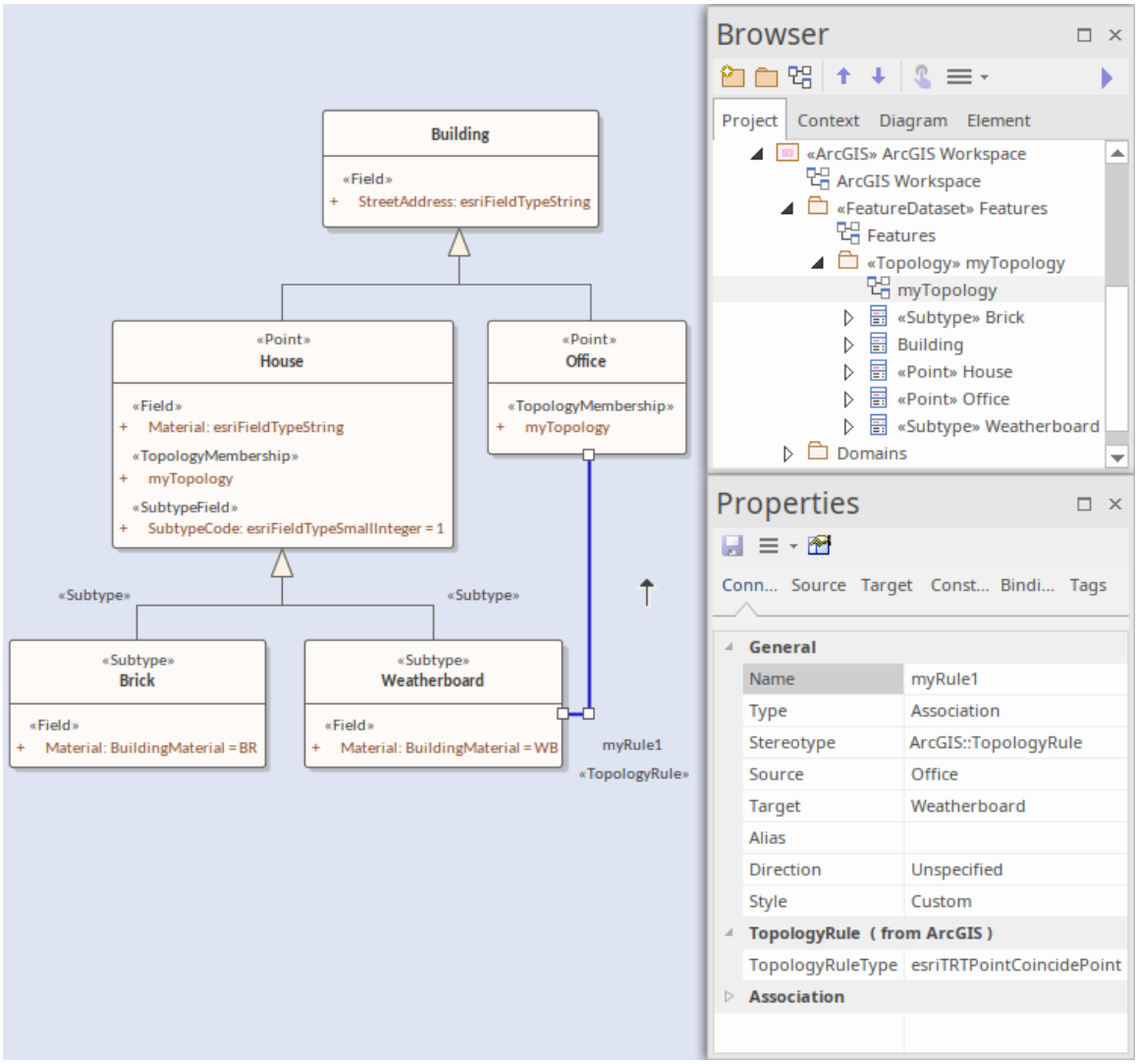
- The «Topology» Package cannot be created outside a « FeatureDataset» Package
- Within one «FeatureDataset» Package, multiple «Topology» Packages can be created
- A Feature Class (Point, Polyline or Polygon) can only participate in one «Topology» Package
- A Feature Class cannot participate in both a «Topology» Package and a «GeometricNetwork» Package

Elements of Topology

Element	Description
Name	You can define the name for the Topology as the «Topology» Package name.
List of Feature Classes	Either: • Create new Feature Classes from the Diagram Toolbox or • Drag existing Feature Classes from the Browser window into the «Topology» Package
X,Y Cluster Tolerance and Z Cluster Tolerance	You define the cluster tolerance values using the ClusterTolerance and ZClusterTolerance Tagged Values of the «Topology» Package.
Accuracy ranks	Accuracy ranks are defined using the Tagged Values of the TopologyMembership attribute, which you can create using the 'TopologyMembership' icon on the 'Topology' page of the Diagram Toolbox. Add this stereotyped attribute to each Feature Class element and then set a value for each rank. • The name of the attribute should be the name of the «Topology» Package • You do not need to set the type of the attribute Each Feature Class only has one TopologyMembership attribute. If you do not add a TopologyMembership attribute to a Feature Class, the ArcGIS exporter will generate a set of default ranking values for you. The values for XYRank and ZRank are between 1 and 50.
Topology Rules	Topology Rules are represented by a UML Association connector that has the «TopologyRule» stereotype. You can create the connector using the 'Topology Rule' icon on the 'Topology' page of the Diagram Toolbox.

	Use this connector to link: • Two Feature Class («Point», «Polyline» or «Polygon») elements • Two «Subtype» elements • A Feature Class («Point», «Polyline» or «Polygon») element to a «Subtype» element • A Feature Class («Point», «Polyline» or «Polygon») itself, or • A «Subtype» element itself The TopologyRuleType tag is used to define the type of Topology Rule.

Example Topology Rule connection



Relationship Rule Example

In ArcGIS modeling, you can use relationship rules to refine the cardinality of a «RelationshipClass» connector between a source Feature Class or Table and a destination Feature Class or Table; a Relationship Class connector only defines the initial cardinality, such as one-to-many or many-to-many.

A relationship rule in Enterprise Architect is represented by a «RelationshipRule» connector, a stereotyped UML Association connector, which you can create using the Relationship Rule icon on the 'ArcGIS Core' page of the Diagram Toolbox. You set the cardinality from the source and target 'Multiplicity' fields on the connector 'Properties' dialog.

When creating a «RelationshipRule» connector between two objects, you must have:

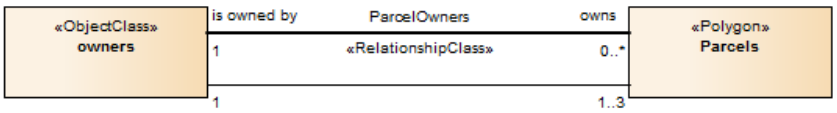
- An existing «RelationshipClass» connector between the two objects that you want to define the relationship rule for; if there is no connector, the «RelationshipRule» you create is ignored during ArcGIS schema generation
- A cardinality range at each end that is compatible with the cardinality of the parent «RelationshipClass»; for example, if you define a cardinality of 1-M in a «RelationshipClass» connector, the source end of the «RelationshipRule» connector must be 1, while you can set the target end of the «RelationshipRule» to a specific number such as 3 (see the example diagrams in this topic)

Relationship rules can also restrict the type of object in the source Feature Class or Table that can be related to a certain kind of object in the destination Feature Class or Table. For example, if the source Class has no subtype elements, the relationship rule applies to all features. If the source Class has subtype elements and the «RelationshipRule» is linked to one of the subtype elements, this means only the associated subtype element is related to the «RelationshipRule». The same restriction is also applied to the destination Feature Class or Table.

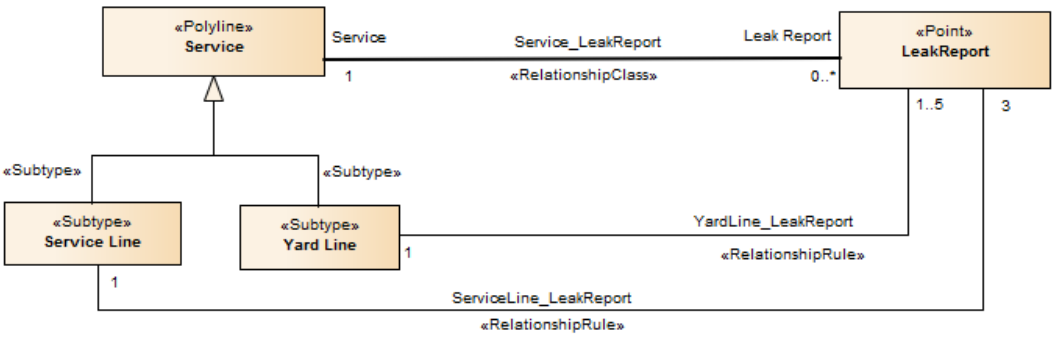
Examples

This diagram provides three examples of possible «RelationshipRule» connections in an ArcGIS model. A custom Line Thickness has been applied to highlight the Relationship Class connectors, and the «RelationshipRule» stereotype label has been hidden where appropriate:

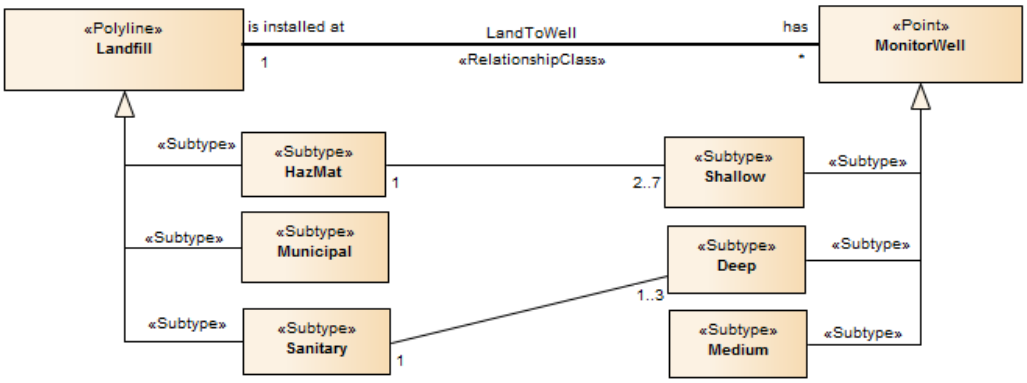
1) Relationship Rule Links feature class and object class/table.



2) Relationship Rule links feature class and subtype.



3) Relationship Rule links subtype and subtype.



Setting ArcGIS Coordinate Systems

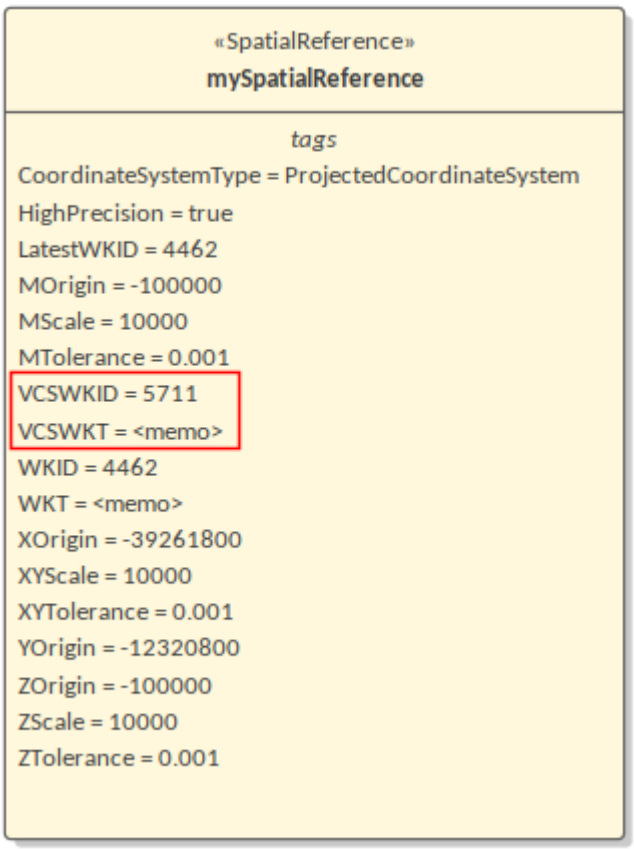
ArcGIS Feature Classes and Feature Datasets use spatial references, which consist of a coordinate system and associated values such as XY resolution and various tolerance values.

You can capture spatial reference properties using a Class stereotyped as «SpatialReference», which is available from the ArcGIS Toolbox pages. The ArcGIS model Pattern includes a Package named Spatial References, as a placeholder for creating such elements.

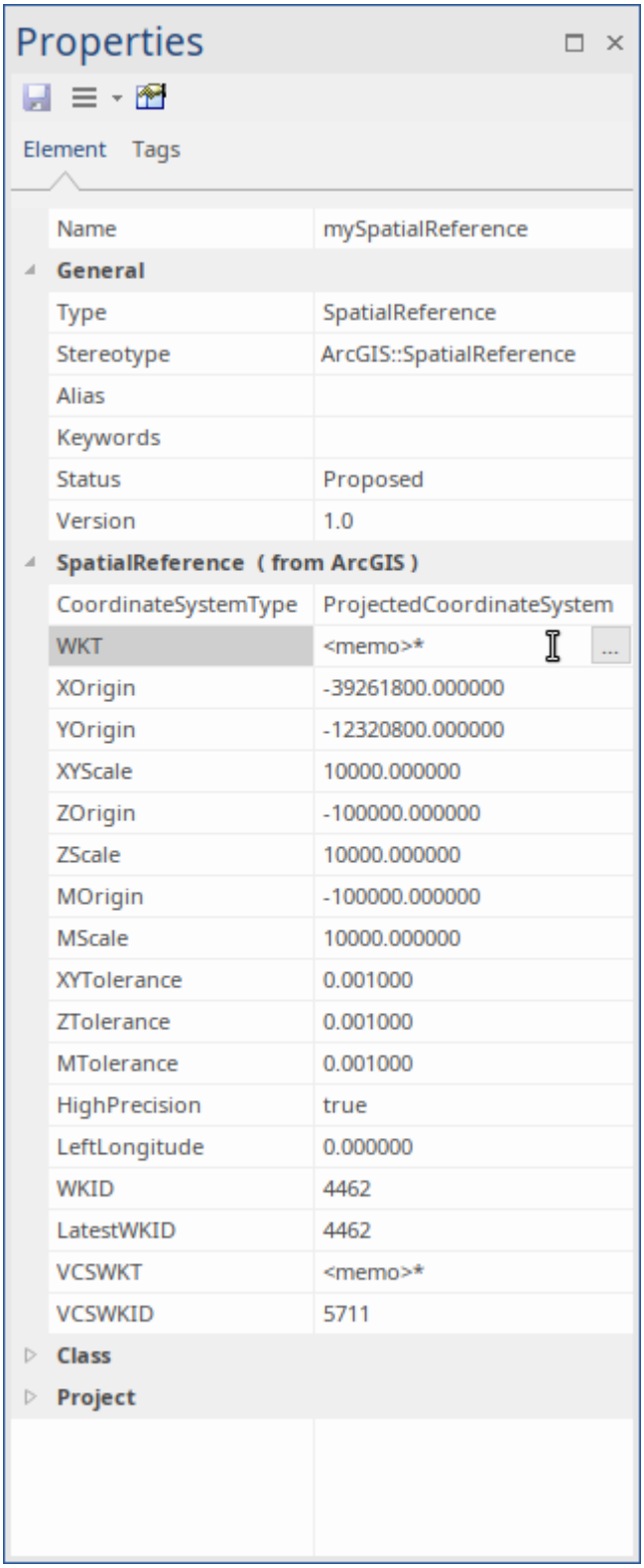
To help you model spatial reference properties, Enterprise Architect provides a dialog for selecting one of the predefined coordinate systems supported by ArcGIS. When you select a Geographic or Projected coordinate system, Enterprise Architect automatically inserts default values for the associated properties, such as Well Known Text (WKT), resolution, precision or tolerances. These values are held as Tagged Values on the «SpatialReference» element.

You can also add vertical coordinates to a selected Geographic or Projected coordinate system; the vertical coordinate is loaded to the VCSWKT and VCSWKID Tagged Values on the «SpatialReference» element.

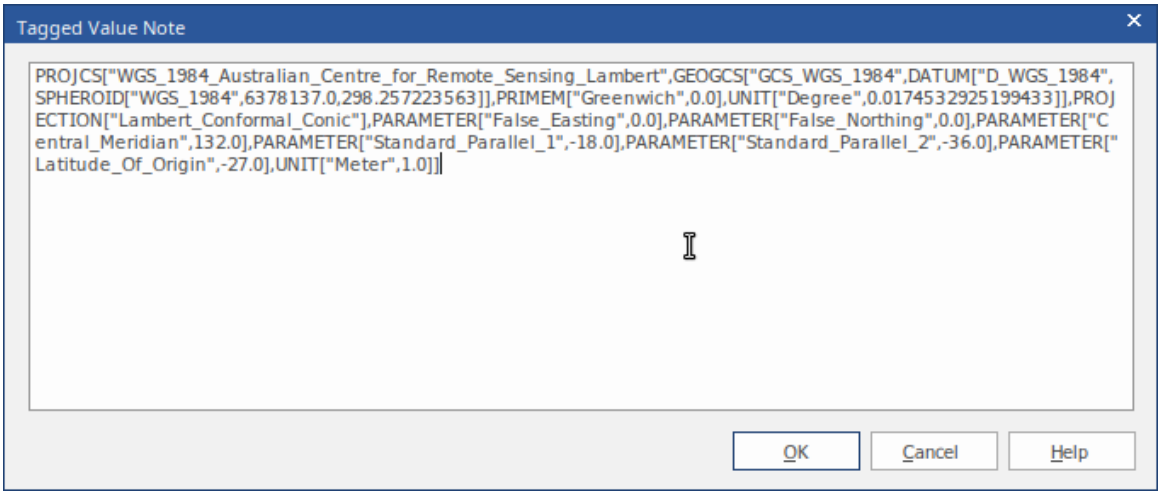
This is an example «SpatialReference» element:



Looking at the WKT Tagged Value in the Tags' tab of the Properties window for this element, you can see that the 'WGS 1984 Australian Centre for Remote Sensing Lambert Projected Coordinate' system has been selected.



You can expand the information held in this Tagged Value by viewing its Tagged Value Note.



Define a Spatial Reference element

Step	Action
1	Open the diagram under the Spatial References Package of your ArcGIS model. (You can actually use any ArcGIS diagram in your model to define Spatial Reference elements; however, this diagram is a convenient placeholder created by Enterprise Architect's model Pattern for ArcGIS.)
2	Drag a Spatial Reference element from the 'Workspace' page of the ArcGIS Core Toolbox onto the diagram.
3	Right-click on the Spatial Reference element, and select the 'Specialize | ArcGIS | Set Coordinate System' menu option. The 'Set Coordinate System' dialog displays.
4	Expand the Geographic or Projected Coordinate Systems hierarchy as appropriate and click on the required coordinate system in the list.
5	If you want to also apply a vertical coordinate system, click on the ... button at the right of the 'Vertical Coordinate' field. The 'Set Vertical Coordinate System' dialog displays, containing a hierarchy that you again expand and from which you select a listed vertical coordinate system. Click on the OK button to return to the 'Set Coordinate System' dialog; the 'Vertical Coordinate' field now displays the system you selected.
6	Click on the OK button to close the dialog and return to the diagram. The Tagged Values for the Spatial Reference element are updated with the Coordinate System information you have selected.

Notes

- You can refer to a «SpatialReference» Class from any other Feature Dataset or Feature Class in your model, using the SpatialReference Tagged Value; the «SpatialReference» Class thus provides a single point of control, should you

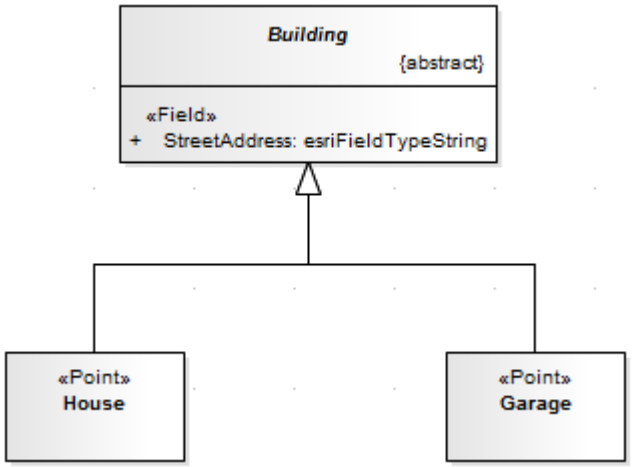
need to change the Spatial Reference information later

- If a Feature Class element references a «SpatialReference» Class that contains a vertical coordinate, set the HasZ Tagged Value on that Feature Class element to true if you want this Feature Class element to store three-dimensional data
- If you do not refer to a «SpatialReference» Class from any Feature Dataset or Feature Class in your ArcGIS model, the system will generate an XML schema with the Unknown Spatial Reference type for these elements

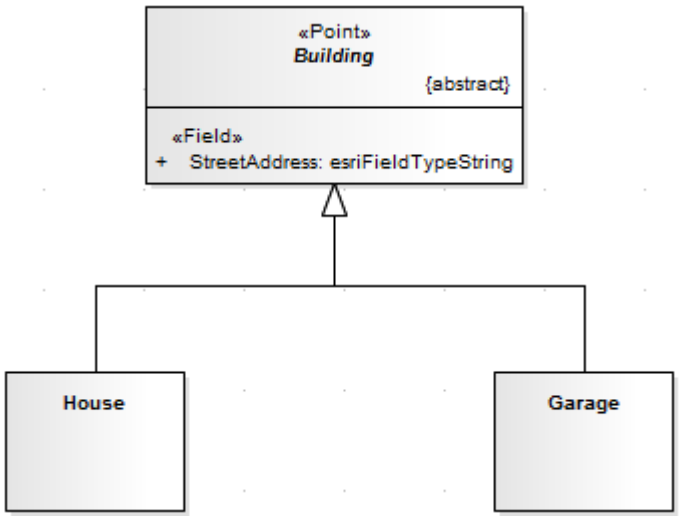
Applying ArcGIS Stereotypes to Abstract Classes

Using the Enterprise Architect UML Profile for ArcGIS, you can specify a geometry stereotype on the Feature Classes in your geodatabase schema. Geometry stereotypes include «Point», «Polyline», «Polygon» and «Multipoint», among others. The ArcGIS Toolbox provides convenient icons for each geometry so that you can drag and drop stereotyped Classes into your geodatabase design model that are immediately ready to export. These Classes are referred to as concrete Classes; since their UML property, IsAbstract, has a value of False, they will be implemented directly in the geodatabase schema.

However, sometimes it is useful to specify the geometry stereotype on an abstract UML Class so that multiple concrete Classes can inherit the geometry, as well as Tagged Values and any fields defined in the abstract Class. This example models houses and garages as Point Feature Classes. Both the 'House' and 'Garage' Classes inherit the 'StreetAddress' field from the abstract Class named 'Building'.



You can create an equivalent model by specifying the stereotype on the abstract Class and using unstereotyped concrete Classes for 'House' and 'Garage', as shown:



The advantages of stereotyping the abstract Class rather than each concrete Class (especially when you have many such derived Feature Classes) include:

- It is easier to change the geometry during design time; you make only one change to the abstract Class stereotype, which then automatically applies to each concrete Class
- It is quicker to create the model in the first place, because you have to edit only one set of Tagged Values associated with the stereotype; the concrete Class might not have to replicate (or override) any of the Tagged Values associated

with its inherited geometry stereotype

- For the same reason, the overall model is smaller and simpler

Create an abstract Class with geometry in the model

A Class is considered to be abstract when its UML property 'Abstract' is set to True. When you create a Class using the 'Abstract Class' icon from the ArcGIS toolbox, the 'Abstract' property is set to True automatically. You can also set the property manually for any Class, on the 'Details' tab of the Class 'Properties' dialog.

Step	Action
1	Open the relevant diagram in your model.
2	Select the 'Core' page of the ArcGIS Toolbox (click on  to display the 'Find Toolbox Item' dialog and specify 'ArcGIS Core') and drag the 'Abstract Class' icon onto the diagram to create the element.
3	If the 'Properties' dialog does not automatically display, double-click on the Abstract Class element.
4	On the 'General' page of the 'Properties' dialog, click on the 'Stereotype' field  button and, on the 'Stereotype for Class' dialog, set the 'Profile' to 'ArcGIS' and click on the checkbox against the required geometry stereotype.

Create a concrete Class that inherits an abstract Class's geometry stereotype

When you export your model as a geodatabase schema, the system applies the geometry stereotype from the abstract Class to any of its derived concrete Classes. Furthermore, the exporter will add any missing 'system level' fields. For example, a Class need not specify, nor inherit, a field named 'OBJECTID'. Similarly for the 'Shape', 'Shape_Length' and 'Shape_Area' fields. Although the exporter will use these fields if they are modeled somewhere in the inheritance hierarchy, it will automatically generate valid instances of them as required.

Step	Action
1	Open the diagram that contains the abstract Class.
2	Select the 'Core' page of the ArcGIS Toolbox (click on  to display the 'Find Toolbox Item' dialog and specify 'ArcGIS Core') and drag the 'Concrete Class' icon onto the diagram to create the element.
3	Click on the Generalization icon in the Toolbox and then click and drag the cursor from the concrete Class to the abstract Class.
4	Save your diagram.

Notes

- Any concrete Class that does not have a stereotype, and does not inherit one, is exported as a Table (ObjectClass); its OBJECTID field is also inserted if it is not defined in the model
- Concrete Classes can only inherit geometry stereotypes or the «ObjectClass» stereotype from an abstract ancestor

Class; currently, Enterprise Architect does not support stereotype inheritance from other concrete Classes

- In addition to inheriting the stereotype, concrete Classes also inherit fields from ancestor abstract Classes
- You can inherit the stereotype from an abstract Class at any level in inheritance hierarchy; for example, the abstract Class that specifies the geometry can be the grandparent of the concrete Class, rather than the parent Class
- Multiple shapes for a single Feature Class are not supported by ArcGIS, nor by Enterprise Architect's ArcGIS profile; therefore, it would be a modeling error if a concrete Class inherited from more than one geometry-stereotyped abstract Class
- If you specify a given tag on a concrete Class that is already present in one of its parent abstract Classes, the concrete Class has precedence and its Tagged Value will be exported to the schema
- Enterprise Architect does not require you to show the Object and Feature Esri Classes on a diagram, nor even include them in your model, because the system implicitly applies their characteristics when you apply a geometry or ObjectClass stereotype to a Class
- It is not, however, an error to include the Object and Feature Esri Classes and model Generalization links to them, even though they are typically not marked as abstract

Importing ArcGIS XML Workspaces

If you have a Geodatabase Workspace XML Document (containing the ArcGIS schema) you can import it into your Enterprise Architect project as a UML model.

Before running the import, deselect the 'Sort Features Alphabetically' checkbox on the 'Objects' page of the Preferences window (Start > Appearance > Preferences > Preferences). This ensures that the fields are imported and organized in Enterprise Architect in the same order as in the source.

Access

Click on the target Package in the Browser window.

Ribbon	Publish > Technologies > Publish > ArcGIS > Import ArcGIS Workspace XML or Publish > Model Exchange > Import Package > Import Package from Native/XMI File : Other XML Formats > ArcGIS
Context Menu	Right-click on Package | Specialize | ArcGIS | Import ArcGIS Workspace XML
Keyboard Shortcuts	Ctrl+Alt+I : Other XML Formats | ArcGIS

Import a Geodatabase Workspace XML document

Option	Action
Filename	Type in or browse for the name of the ArcGIS XML file to import.
Create Diagrams	Select the checkbox to create Class diagrams under the imported Packages.
Hide System-Level ArcGIS Fields on Diagrams	Select the checkbox to hide these stereotyped attributes: • RequiredField • AttributeIndex • SpatialIndex on these stereotyped Classes: • Point • Polyline • Polygon • MultiPatch The 'RequiredField' and 'AttributeIndex' attributes are also hidden for the Table (Object Class) Class. This option is enabled only when the 'Create Diagrams' checkbox is selected.
Strip GUIDs	The 'Strip GUIDs' feature is currently mandatory for ArcGIS imports, which means that elements are created 'as new' each time an ArcGIS schema is imported.

Write Log File	Select the checkbox to write a log of import activity (recommended). The log file is saved in the directory from which the file is being imported, with the same name as the imported file plus the suffix _import.log.
View XML	Click on this button to view the XML before import.
Import	Click on this button to import the ArcGIS XML file.
Close	Click on this button to close this dialog.
Help	Click on this button to display this Help page.
Import Progress	This field indicates the progress of the import.

Notes

- ArcGIS is available in the Professional, Corporate, Unified and Ultimate Editions of Enterprise Architect

Exporting ArcGIS XML Workspaces

When you have modeled your Geodatabase Workspace XML Document (containing the ArcGIS schema), you can export it to an external directory (using the Publish Model Package facility), from which you can then import it to the Esri ArcCatalog.

Access

Click on an ArcGIS stereotyped Package (your ArcGIS Workspace Package) in the Browser window.

Ribbon	Specialize > Technologies > ArcGIS > Export to ArcGIS Workspace XML or Publish > Model Exchange > Publish As...
Context Menu	Right-click on Package | Specialize | ArcGIS | Export to ArcGIS Workspace XML
Keyboard Shortcuts	Ctrl+Alt+E : Publish

Export the Workspace

Option	Action
Root Package	Display the name of the selected ArcGIS Workspace Package.
Filename	Type in or browse for the file path into which the XML file is to be generated.
XML Type	Select 'ArcGIS' as the XML/XMI version to export the Package to.
Format XML Output	Format the output into readable XML (this takes a few more seconds at the end of the run).
Write Log File	Write a log of the export activity (recommended). The log file is saved to the directory into which the XML file is exported.
View XML	Click on this button to view the exported XML file.
Export	Click on this button to initiate the XML export.
Close	Click on this button to close this dialog.
Progress	Observe the progress of the XML export.

Notes

- ArcGIS is available in the Professional, Corporate, Unified and Ultimate Editions of Enterprise Architect

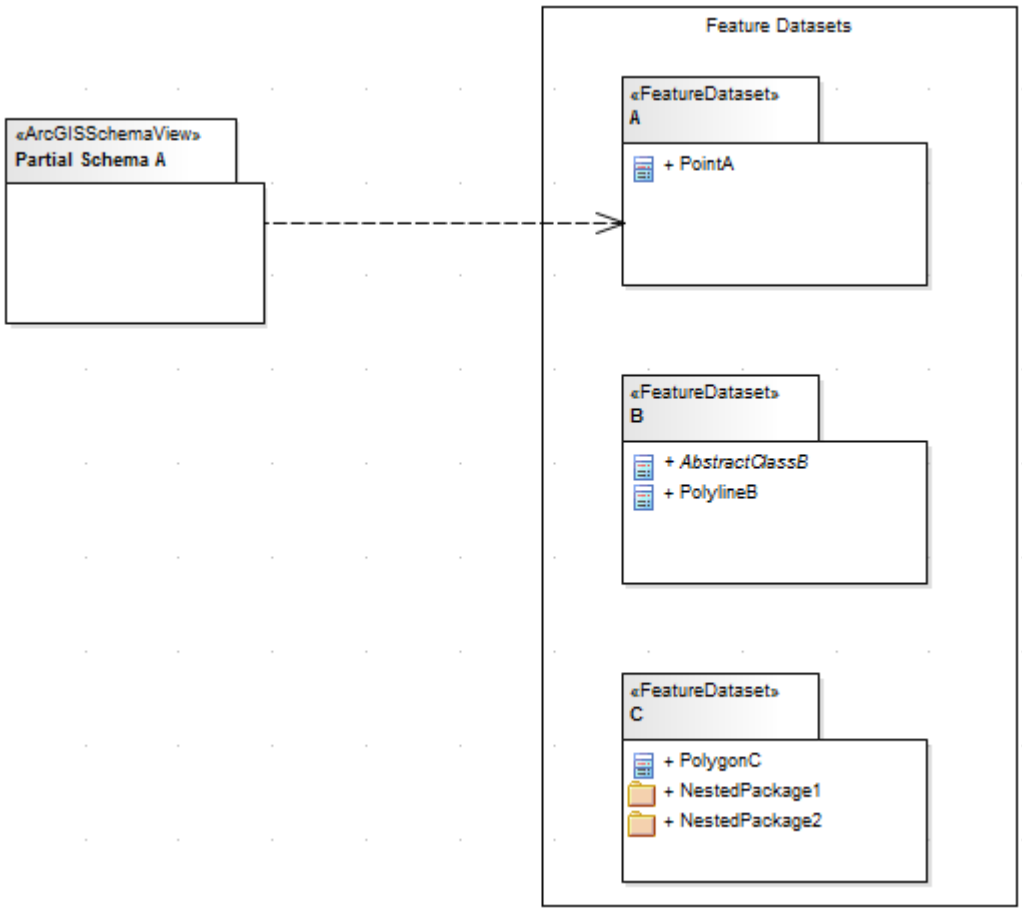
- In the Corporate, Unified and Ultimate Editions of Enterprise Architect, if security is enabled you must have 'Export XMI' permission to export to XML
- Before exporting your model to an ArcGIS schema, you must define at least one Spatial Reference element; Spatial Reference elements are referred to by other schema elements via a dynamically linked Tagged Value, named SpatialReference
- The DefaultSpatialReference tag on an ArcGIS Package is used to specify a Spatial Reference that can be applied to all Feature Datasets and Feature Classes in the workspace; therefore, you do not need to apply a Spatial Reference element to each Feature Dataset or Feature Class
- If you do not reference a Spatial Reference Class from any Feature Dataset or Feature Class in your ArcGIS model, Enterprise Architect by default will generate an XML schema with Unknown type of Spatial Reference for these elements

Export Modular ArcGIS Schemas

In Enterprise Architect, in addition to exporting your entire ArcGIS workspace, you can also export partial schemas. This is useful if you have a large geodatabase schema, as might be defined in an industry reference model. You might require the entire schema in some situations, but only require small parts of it for particular spatial applications, such as field data collection. In such a scenario, you would want to export a schema that contains only the Feature Classes, Tables and Domains that your field data application uses, without duplicating parts of your original schema model. You use the «ArcGISSchemaView» stereotyped Package for this purpose.

An «ArcGISSchemaView» Package is modeled as a subPackage of an ArcGIS Workspace Package. You can define any number of «ArcGISSchemaView» Packages - each representing a different subset of the geodatabase schema. You specify which parts of the schema are included by drawing a UML Dependency connector from the «ArcGISSchemaView» Package to each included Package. When you export the «ArcGISSchemaView» Package, the system includes any other Packages that your included Packages depend on (via Dependency connectors).

This figure shows a partial schema that includes only one of the three Feature Datasets from the complete schema.



Create an ArcGISSchema Package

Step	Action
1	Create or open an ArcGIS diagram within your ArcGIS Workspace.
2	Drag the ArcGIS Schema View icon from the Core Diagram Toolbox onto your diagram. A prompt displays to enter the Package name.

3	Type in a meaningful Package name and click on the OK button.
4	Drag onto the diagram any other Packages that you want to include in the exported schema. (You could achieve the same result using the child diagram of the «ArcGISSchema View» Package to draw the included Packages).
5	Draw a Dependency connector from the «ArcGISSchema View» Package to each of the other Packages.

Notes

- Defining the Dependency relationships on a diagram is convenient, but not necessary; as long as the dependencies are defined in the model – irrespective of whether they exist on a diagram – the ArcGIS schema exporter will use them
- You can arrange your dependency diagrams in whatever part of the ArcGIS Workspace seems appropriate – the diagrams can reside under the «ArcGISSchema View » Package itself or under any other element within the ArcGIS Workspace

Export an ArcGIS Schema View for use with ArcCatalog

Step	Action
1	Select the ArcGIS Schema View Package in a diagram or in the Browser window.
2	Right-click and select the 'Specialize | ArcGIS | Export to ArcGIS Workspace XML' menu option.
3	Identify the target file and click on the Export button. The system generates a Workspace XML document containing only the elements associated with the ArcGIS Schema View Package.

Which related elements are included when you export an ArcGIS Schema View Package?

These rules apply when you export an ArcGIS Schema View Package:

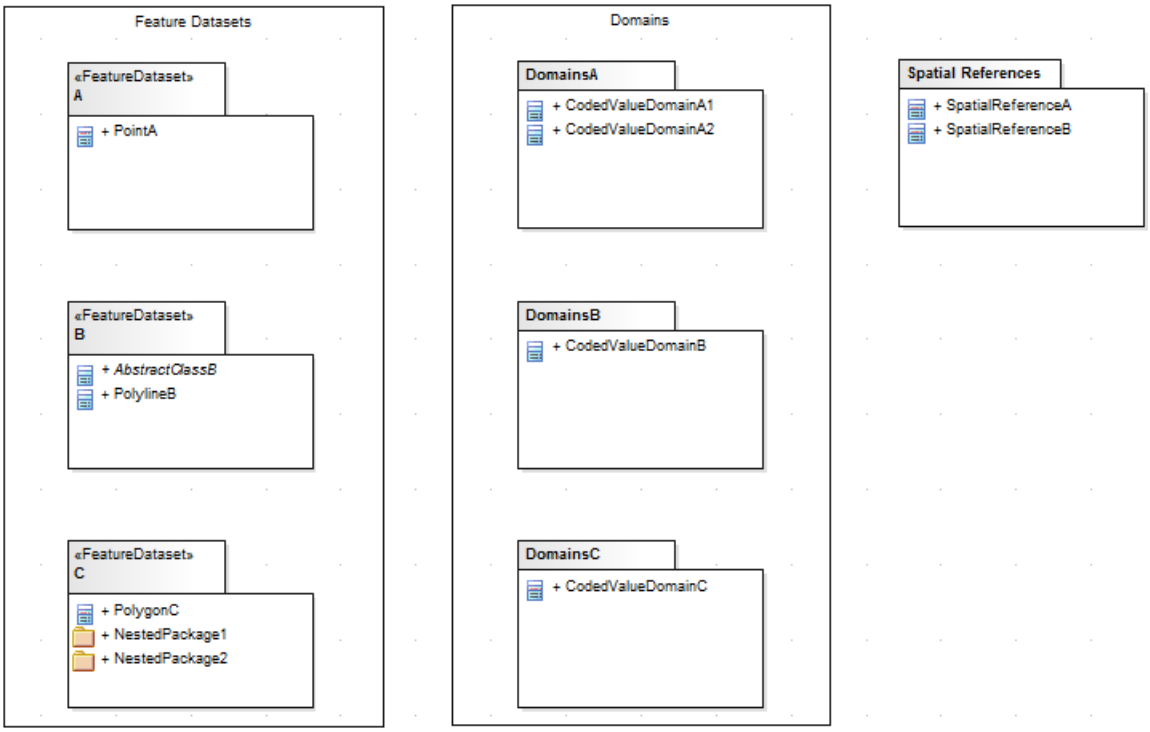
- Dependencies are modeled using the UML Dependency connector
- All elements of a Package that the ArcGIS Schema View depends on (directly or indirectly) are included in the generated schema
- All fields inherited from Abstract Classes by included elements are exported, regardless of the Package in which the Abstract Classes reside
- All Coded Value Domain elements to which included elements refer are exported, regardless of the Package in which the Coded Value Domain elements reside
- If an ArcGIS Schema View Package depends on one or more subPackages of a Feature Dataset Package, the Feature Dataset is exported with only those elements contained in the linked subPackages - no Feature Classes, Domains and Tables that are directly contained in the FeatureDataset Package are exported, because of the Dependency to one of its subPackages; therefore, if you want to export the entire Feature Dataset you must use a Dependency to the

Feature Dataset Package itself

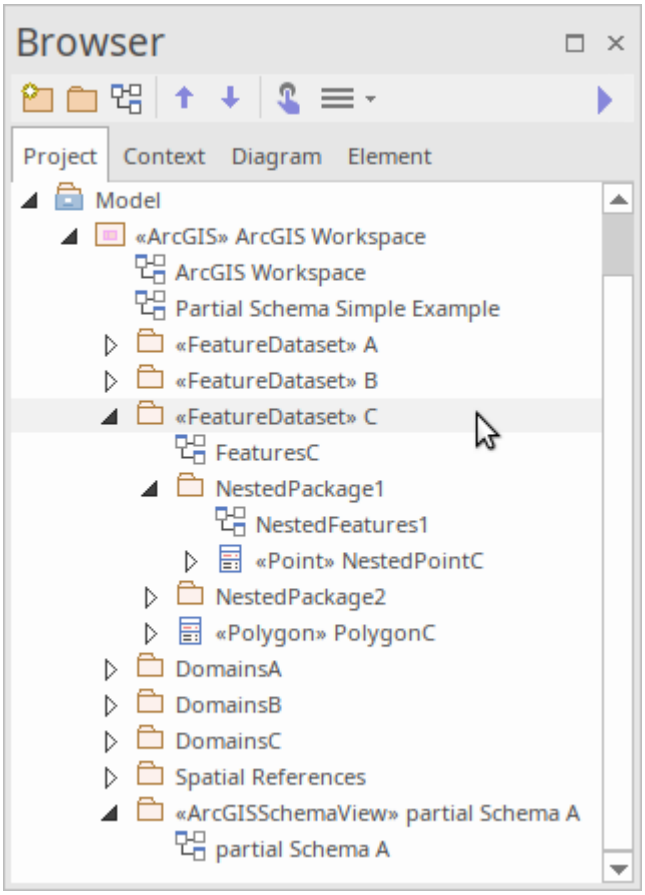
- If a field of an included element refers to a Coded Value Domain element, that Coded Value Domain element is exported, irrespective of whether the ArcGIS Schema View Package has an explicit dependency on the Coded Value Domain element's Package
- If an included element has a Relationship Class connector to another element X AND element X is not already included by the ArcGIS Schema View, neither element X nor the Relationship Class connector are exported; the log file will hold a list of names of the Relationship Class connectors that, for this reason, are not exported

Examples of modeling partial schemas

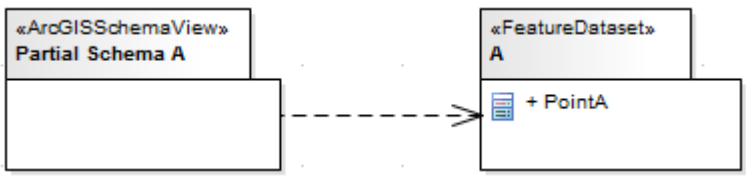
Consider this complete Workspace, which includes three Feature Datasets named A, B and C, and three Packages of Coded Value Domains named DomainsA, DomainsB and DomainsC:



The corresponding model hierarchy in the Browser window resembles this:

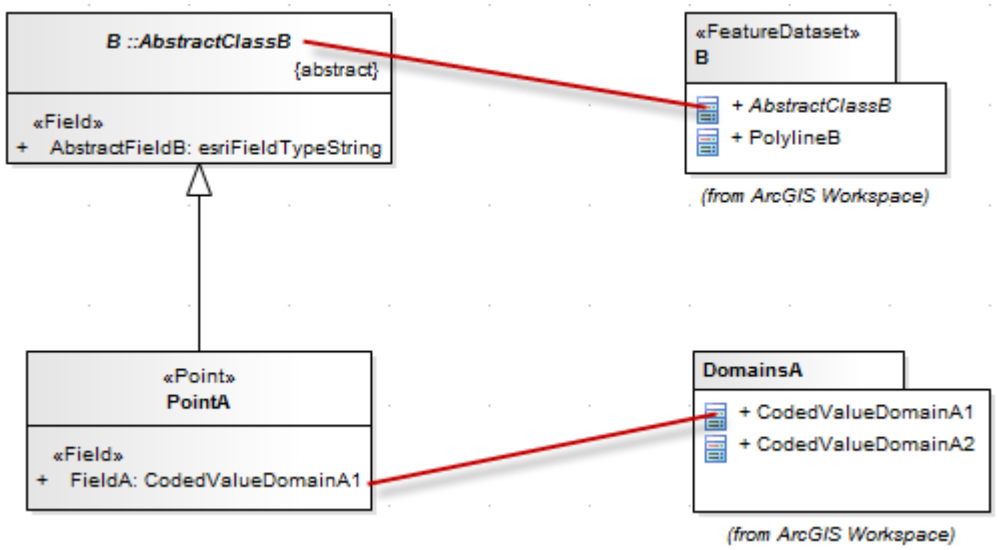


If you want to export only Feature Dataset A and its required elements, you can model the Schema as a partial schema that includes a single Feature Dataset, as shown:

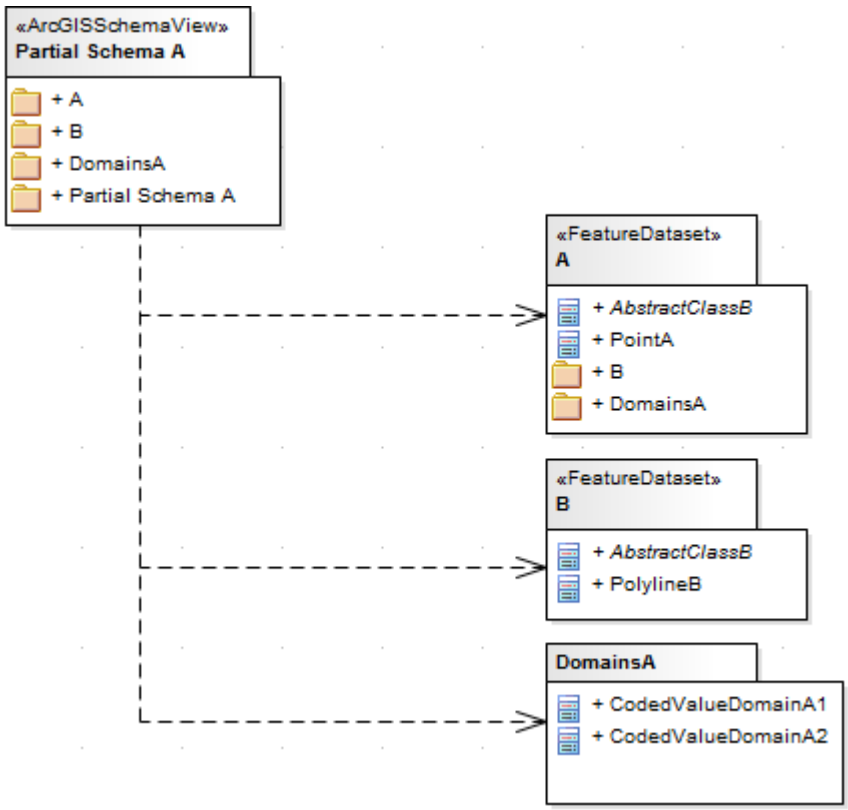


(This diagram is equivalent to the first diagram provided at the start of the topic.) Assuming that Point A depends on no other elements, the resulting schema would include only FeatureDataset A with its Feature Class, Point A.

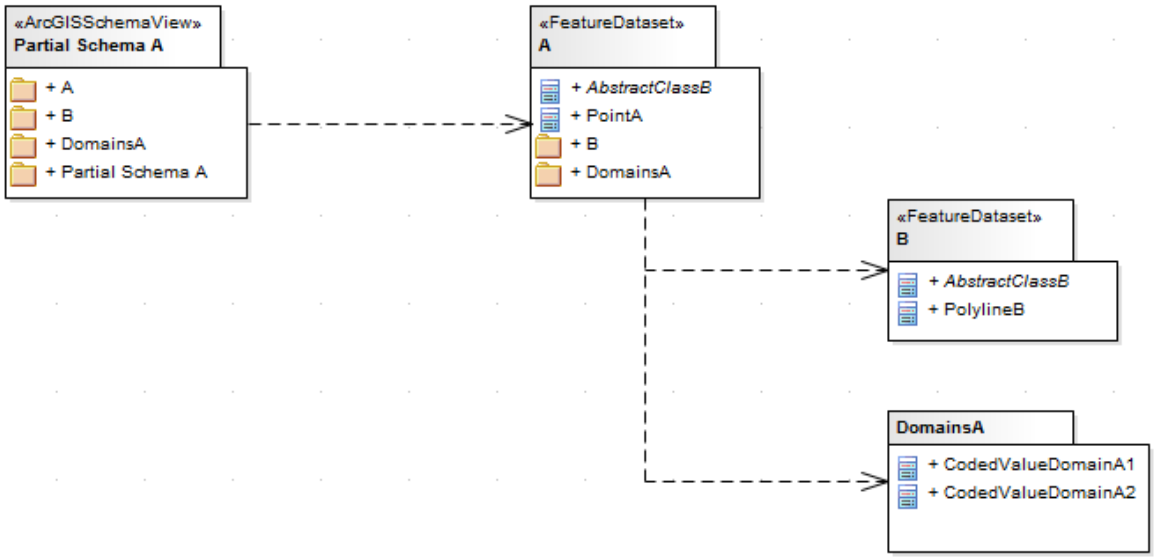
Now assume that Point A inherits from the Abstract Class AbstractClassB (defined in FeatureDataset Package B) and that one of A's fields has type CodedValueDomainA1 defined in the DomainsA Package (as in the next model diagram). Now, the same Partial Schema model would result in an exported schema that included the fields of AbstractClassB and CodedValueDomainA1, even though Partial Schema A does not explicitly depend on Package B or Package DomainsA, because partial schemas automatically include elements that are related by inheritance or are referred to by field types. The exporter thus helps you to generate valid ArcGIS schemas by including such required elements.



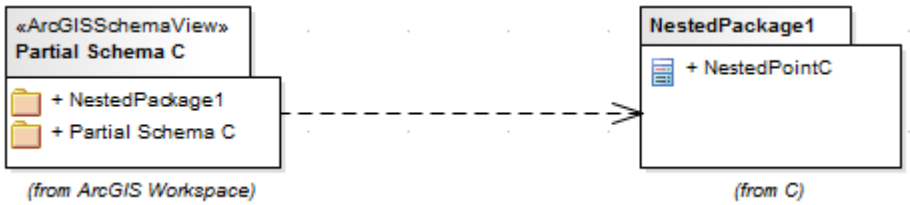
If you wanted to include all CodedValueDomains in DomainsA and all Feature Classes in FeatureDataset B (including any domains they depended on), you could model this situation to include entire Packages of elements in a partial schema via direct and indirect UML Dependency connectors, as shown.



You can also include Packages via indirect Dependency connectors. For example, you can achieve the same result as in the previous example by linking Packages to, say, Feature Dataset A instead of linking them directly to the ArcGIS Schema View.



Finally, if you want to create a partial schema that includes only the elements in, say, NestedPackage1, you can model the scenario as a partial schema Package that refers to nested Packages within a Feature Dataset.



The resulting schema would include a Feature Dataset named C that contained all elements within NestedPackage1. The elements in NestedPackage2 would be excluded, as would PolygonC (assuming no explicit relationships existed with the elements of NestedPackage1).

Validate ArcGIS Workspaces

When you have developed or imported an ArcGIS model, you can validate it against a set of rules in a system-provided ArcGIS validation table.

Access

Ribbon	Specialize > Technologies > ArcGIS > Validate ArcGIS Model
Context Menu	Browser window | Right-click «ArcGIS» Workspace Package | Specialize | ArcGIS | Validate ArcGIS Model

Process

The option launches a validation script on the workspace. While running, the script logs information to the 'ArcGIS Model Validation' tab of the System Output window. Check the script output for errors and warnings.

There are two ways to investigate the errors reported by the model validation script:

- Expand the System Output window and review the errors and warnings directly; you can double-click on a warning or error line to highlight the element or attribute the message relates to, in the Browser window
  or
- Copy all of the output to a text file and open the file using your preferred text editor; this is likely to provide cleaner formatting of the script's output

More Information

Edition Information

- ArcGIS is available in the Professional, Corporate, Unified and Ultimate Editions of Enterprise Architect

Notice of Acknowledgement:

Support for modeling ArcGIS databases in Enterprise Architect was developed in collaboration with the Commonwealth Scientific and Industrial Research Organization (CSIRO), who defined mappings between UML 2 and ArcGIS concepts, and prototyped an automated import and export capability for ArcGIS geodatabase schemas represented in UML.

Microsoft Azure

Create Microsoft Azure Diagrams that Specify and Document Azure Virtual Infrastructure

Microsoft Azure (or simply Azure) is one of the market leaders in public Cloud computing platforms and provides services to define IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service) and SaaS (Software as a Service) Cloud environments. Azure entered the market in 2010 and has steadily grown in importance as a corporate Cloud solution. The platform is used for building, testing, deploying, and managing applications and services through Microsoft-managed data centers and supports many programming languages, tools, and frameworks, including both Microsoft-specific and third-party software and systems.

Enterprise Architect provides modeling constructs that allow you to create expressive Azure diagrams that specify new Cloud infrastructure and platforms or document existing ones. You can also model other Cloud Infrastructure and platform providers such as Amazon Web Services (AWS) and Google Cloud Platform (GPC).

The Microsoft Azure UML profile provides a new image library of graphics (icons and images) required to model Microsoft Azure deployments. The icons and images are provided by a Model Wizard framework pattern, which must be imported into your model before you can start creating diagrams that describe Microsoft Azure deployments. The Azure pattern contains over 350 Image Assets that can be dragged-and-dropped onto diagrams.

Getting Started

Creating Microsoft Azure diagrams is straight forward; all the AWS service constructs are available from the Toolbox pages or from the Browser in the MS Azure Packages. This allows you to create expressive diagrams containing element items such as Virtual Machines, MS SQL databases, Cycle Cloud for big computer clusters, DevOps for code collaboration, Blob Storage and Managed Disks for data storage, and Load Balancers and Traffic Managers for networking.

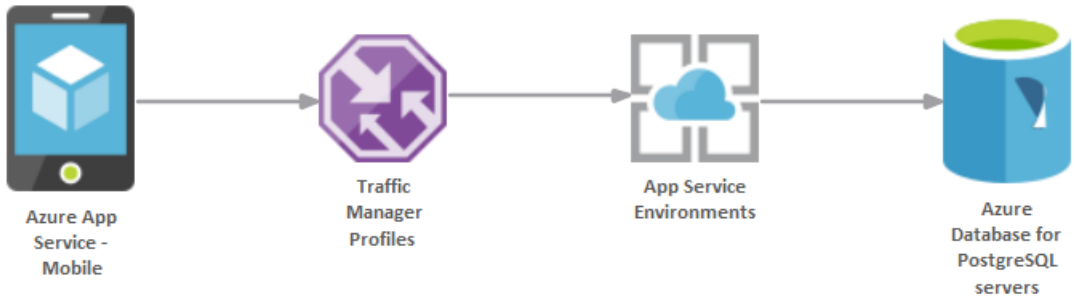


Diagram showing a mobile application using a Smart Phone Traffic Manager and PostgreSQL Database

In this topic you will learn how to work with the features that support MS Azure diagramming, outlined in the topic sections.

Selecting the Perspective

Enterprise Architect partitions the tool's extensive features into Perspectives, which ensures that you can focus on a specific task and work with the tools you need without the distraction of other features. To work with the Microsoft Azure features you first need to select this Perspective:


<perspective name> > Analysis > Microsoft Azure

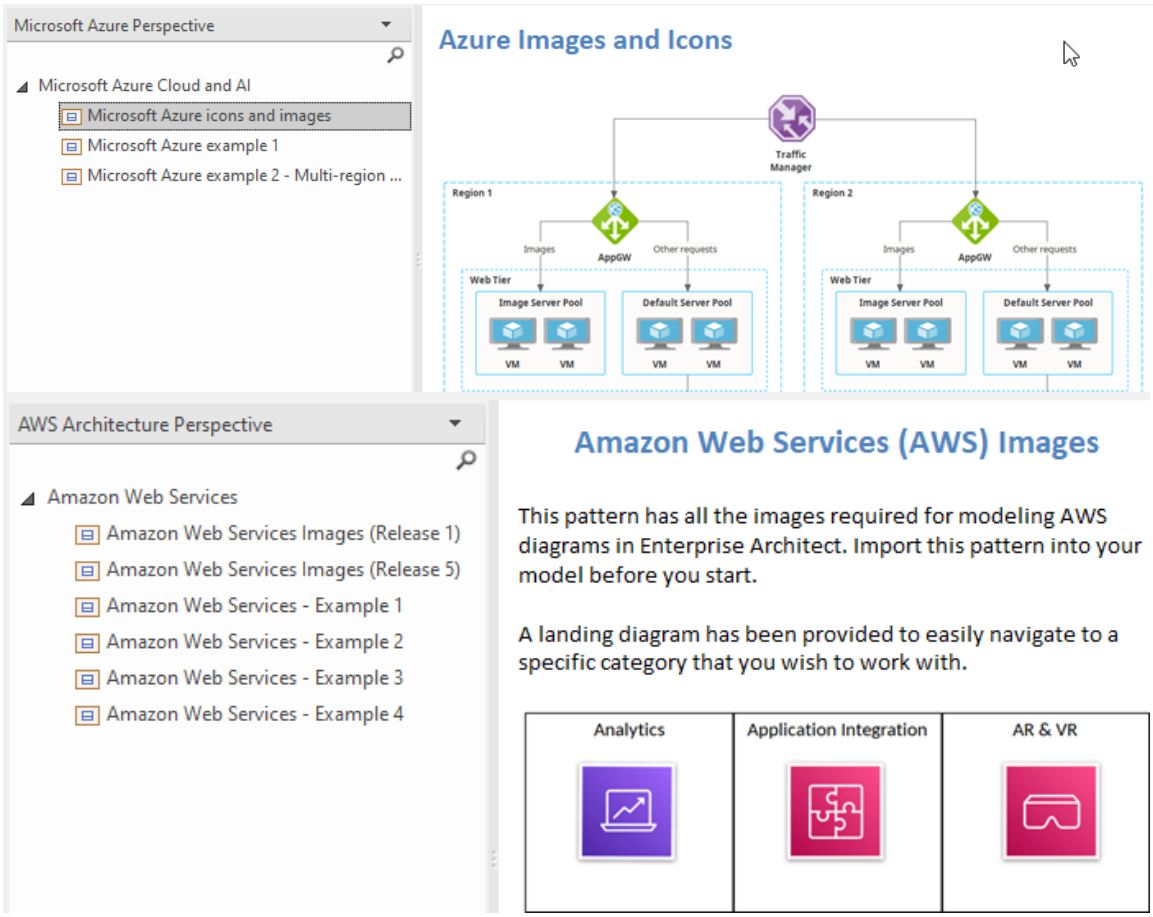
Setting the Perspective ensures that the Microsoft Azure diagrams, their tool boxes and other features of the Perspective will be available by default.

Example Diagram

An example diagram provides a visual introduction to the topic and allows you to see some of the important elements and connectors used when specifying or describing AWS cloud infrastructure.

Import the Microsoft Azure Patterns

Before you can start creating Microsoft Azure diagrams to specify or document your cloud services you will need first to import the graphics from a pattern. This will inject all the Azure icons as components into the selected location in the Browser window.



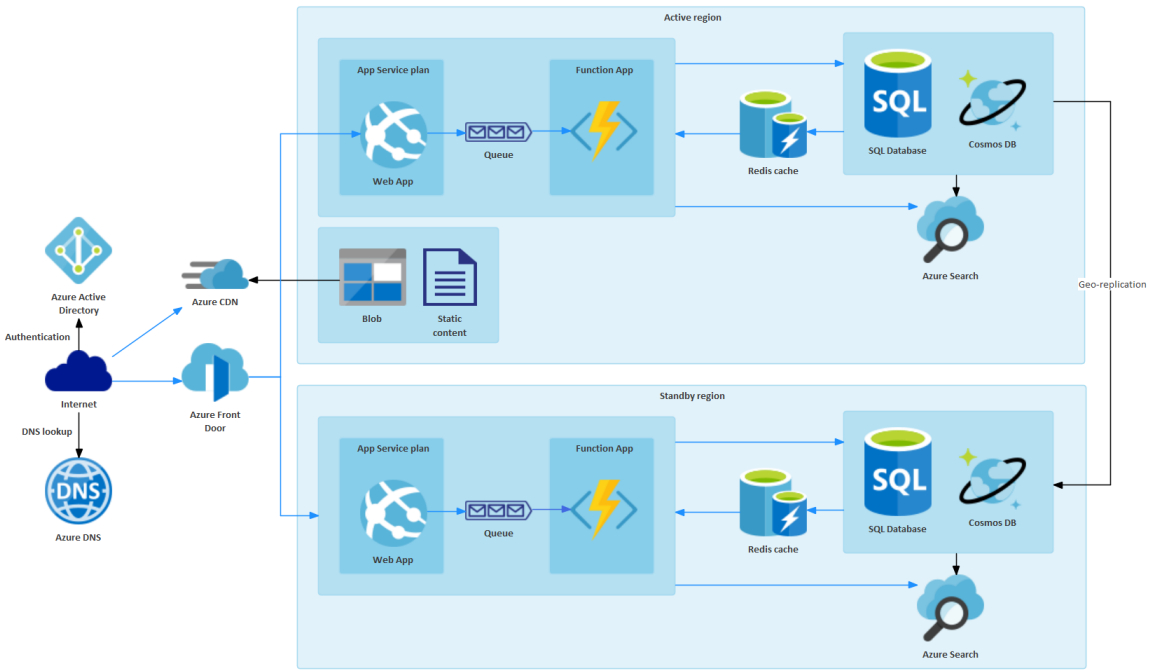
Patterns window showing Azure pattern for Import.

Create Azure Diagrams

More Information

This section provides useful links to other topics and resources that you might find useful when working with the Microsoft Azure tool features.

Example Diagram



Import the Microsoft Azure Patterns

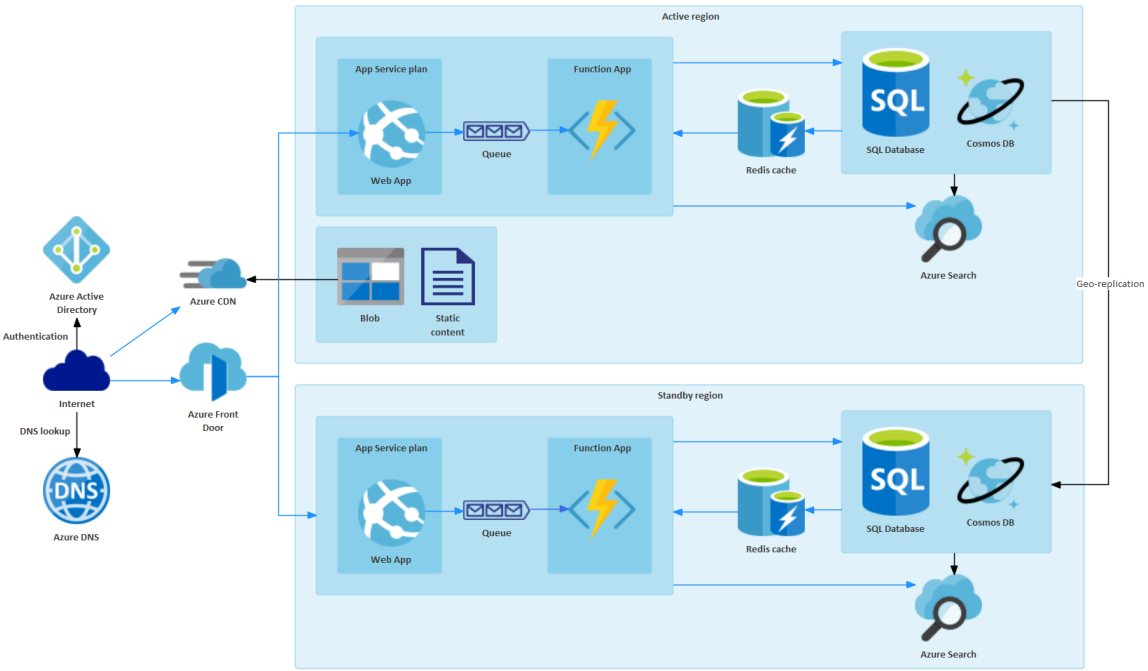
Before you import the 'Microsoft Azure icons and images' pattern into your model, click on the  icon and select the 'Analysis > Microsoft Azure' Perspective.

This automatically opens the Model Wizard on the 'Model Patterns' tab at the 'Microsoft Azure Perspective' page.

Click on the target Package in the Browser window, then on the 'Microsoft Azure icons and images' pattern and click on the Create Model(s) button.

Note: When you have the Images packet in your model, do not copy it to another location in the model or save it as XMI; always use the Model Wizard to import the pattern into a new model. The reason for this is copying the Image Assets will give them new GUIDs, which you do not want to do.

In the Model Wizard there are two example patterns that show typical use of the images in diagrams. This example is the Azure Multi-region Web App.

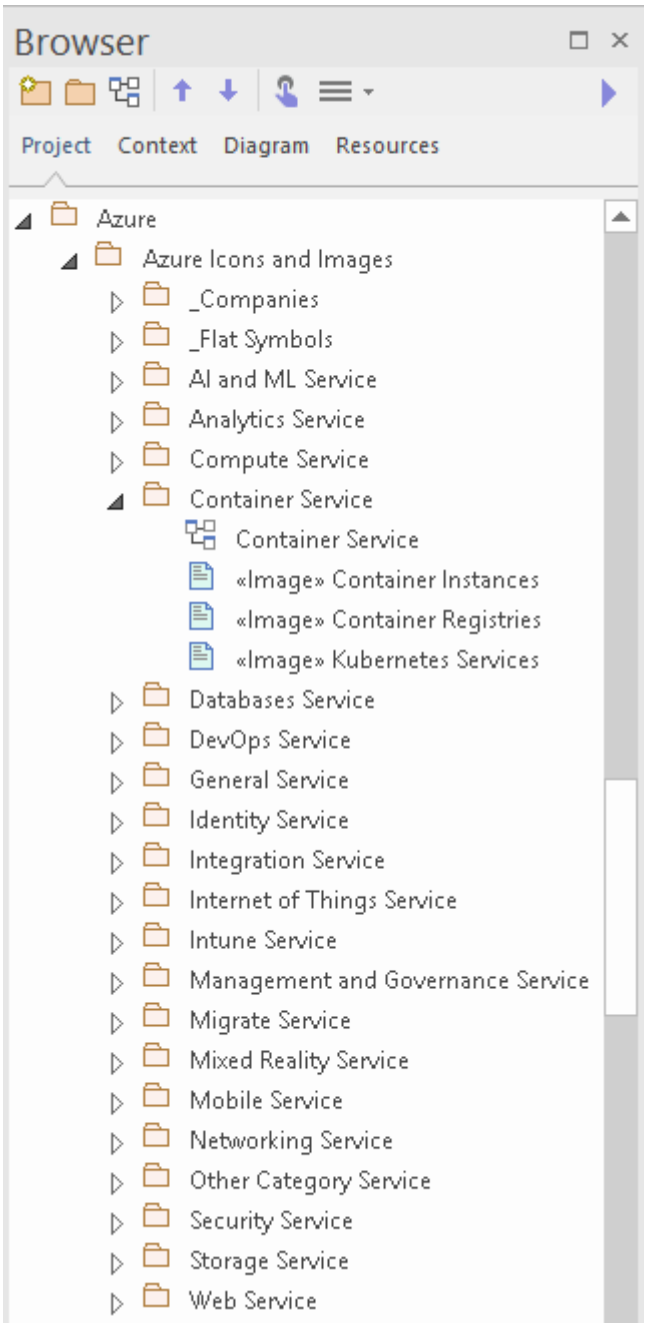


Create Azure Diagrams

You can create a diagram by right-clicking on its parent Package and selecting the 'Add Diagram' menu option to display the 'New Diagram' dialog.

If you do not have the Microsoft Azure Perspective selected, click on the drop-down arrow in the Type field and select 'Analysis > Microsoft Azure'.

In the 'Diagram' field type an appropriate name for the diagram, in the 'Select From panel' click on 'Microsoft Azure', and in the 'Diagram Types' panel click on 'Azure', and then click on the OK button. The 'Azure' page of the Diagram Toolbox opens, showing a small number of UML base element types for Azure. However, you create your diagrams using the images dragged onto the diagram from the Azure Library Packages that you imported, illustrated here:



Note that the Azure diagrams are automatically set to Custom Style, and when you right-click on an element in the diagram you can make use of the Custom Style icons on the Custom Styles Toolbar.

Each Package in the downloaded 'Microsoft Azure icons and images' pattern has a diagram that shows every image that

is included in the Package.

To add one of these images to your diagram, locate it in the Browser window by either:

- Searching for it by name or
- Opening the diagram for the Package that you believe it should be in, finding it in the diagram and pressing Alt+G to highlight the Image Asset in the Browser window

Now drag-and-drop the Image Asset onto your diagram. You can choose to:

- Add it as an element with an icon
- Add it as an element with an image, or
- (If you have made an element from the icon already) Add as link

More Information

Edition Information

This feature is available in the Corporate, Unified and Ultimate Editions of Enterprise Architect, from Release 15.2.

MDG Technologies

An MDG Technology is a vehicle for providing access to the resources of either a commercially-available technology or a technology that you have created yourself. Such resources include a wide range of facilities and tools, such as UML Profiles, code modules, scripts, Patterns, images, Tagged Value Types, report templates, Linked Document templates and Toolbox pages.

Using Enterprise Architect, you can develop models based on the standard UML specifications, and you can extend the core UML structures using UML-supported mechanisms such as Tagged Values, Stereotypes, Profiles and Design Patterns. These facilities are within the Enterprise Architect core technologies, and you can activate and use further Model Driven Generation (MDG) Technologies that are either integrated with the system or available from external locations.

If your systems or work domain require further specialization you, as a Technology Developer, can use Enterprise Architect to develop your own customized modeling languages and solutions.

Obtain and use Technologies

Source of Technology
Core technologies - Enterprise Architect itself contains a: • Basic UML 2 technology as an implementation of UML 2.5 structural and behavioral modeling, and • Core Extensions technology that applies profiles and stereotypes to provide extended modeling of aspects such as Requirements, User interface and Data Modeling
Additional technologies are included in the Enterprise Architect Install directory, MDGTechnologies subfolder.
You can import technologies from external sources into the APPDATA folder (%APPDATA%\Sparx Systems\EA\MDGTechnologies) for your own use, or into the 'Resources' tab of the Browser window for other project users to access.
You can transfer technologies into the MDGTechnologies subfolder; these technologies are available when you restart Enterprise Architect (on Vista/Windows 7 systems you might have to increase your access permissions to do this).
You can access and activate MDG Technologies in remote system folders or web sites, from Enterprise Architect.
Technology Developers can create new MDG Technologies and deploy them to the project team either through the MDGTechnologies subfolder or from a remote folder or website.
To see which technologies are available within Enterprise Architect, and activate the ones you require, use the 'MDG Technologies' dialog ('Specialize > Technologies > Manage Technology' ribbon option). Having made the MDG Technologies available, you can manage their availability to users and you can work with them.

You also have the facility to turn off or disable the Enterprise Architect 'Basic UML 2' and 'Core Extensions' technologies and facilities, so that you can apply the Enterprise Architect facilities and features exclusively to one or more selected MDG Technologies.

Specify Required MDG Technologies

When you have a model that must make use of certain MDG Technologies, a model Administrator can configure the system to check that those Technologies are available and active during the loading process, before the model actually opens. You identify the Technologies in the 'MDG Technologies' section of the 'Manage Model Options' dialog. If a Technology is:

- Required and not installed on a user's machine, that user will be unable to open the model
- Required and available, but not enabled, the system can be configured to automatically enable that Technology
- Specifically not to be used in this model, but is available and enabled, the system can be configured to automatically disable that Technology

The model Administrator can thus ensure that the correct operating environment is in place to work in the model, so that all users have the same view and are using the same facilities (or, at least, are not using the wrong tools and creating structures that other users cannot work with).

You could have a 'relaxed' model where some Technologies are required but others can be used at the user's discretion, or a 'restricted' model where certain Technologies are required and all others are blocked.

Access

Ribbon	Settings > Model > Options > MDG Technologies

Select Required Technologies

Option	Action
Technology	Review the MDG Technologies currently accessible to you, listed in alphabetical order. These technologies might be built-in to Enterprise Architect, provided by an Add-In or from an imported directory or URL.
Required	For a model Administrator, select this checkbox against each Technology that must be available before the model can be opened. Next time a user tries to open the model, Enterprise Architect will check that the selected Technologies are available on the user's system before allowing access to the model. If a required Technology is not installed, Enterprise Architect will not open the model. Additionally, if a Technology flagged as Required is available but not enabled, the system will automatically enable it for this model; the Technology will still be disabled in any other models the user might access.
Disabled	All checkboxes default to unselected, allowing the Technologies to be used. Select the checkbox against each Technology that specifically must not be used in the model. If the Technology is available and enabled, the system automatically disables it within the model. It will still be enabled in other models that the user might access.
All	Click on this button to select the 'Required' checkbox of every Technology in the list.

None	Click on this button to clear all selected 'Required' checkboxes in the list.

Notes

- In the Corporate, Unified and Ultimate Editions of Enterprise Architect, if security is enabled you must have 'Configure Project Requisites' permission to select or clear the 'Required' and 'Disabled' checkboxes against the Technologies

Work with MDG Technologies

Any MDG Technology listed on the 'MDG Technologies' dialog can be enabled, which makes their interface profiles and Toolbox pages available for your use.

When you enable an MDG Technology, any Technology-specific diagram types are added to the 'New Diagram' dialog lists, and the Technology's Diagram Toolbox pages are added to those available through the search facilities of the Toolbox.

If you set an MDG Technology to 'Active', it becomes the main technology for the model. Only one Technology can be active at a time. The Technology's validation configuration is set, and whilst common Toolbox pages are visible at all times, the Technology's Toolbox pages override any parallel Enterprise Architect Toolbox pages; for example, the ICONIX 'Class' pages would override the Enterprise Architect 'Class' pages.

You create Technology-specific diagrams and populate them with elements and connectors in the same way as for standard Enterprise Architect diagrams.

Manage MDG Technologies

You use the 'Manage MDG Technologies' dialog to manage the MDG Technologies accessible to the project and available to project users. The dialog lists the technologies held in a number of locations accessed by the project, such as the APPDATA folder and the Enterprise Architect Install directory. You can set these technologies to being available for use or disabled, as you require. MDG Technologies are deployed as .xml files.

Access

Ribbon	Specialize > Technologies > Manage Technology

Configure availability of Technologies

Option	Action
Technology	Lists all MDG Technologies currently accessible to the project, in alphabetical order. If you click on a Technology name, the upper right panel of the dialog displays the technology: • Name • Version number • Logo (if defined), and • Location of the deployed XML file, which can be: - Internal to Enterprise Architect - An extension - In the Install directory (just the file name) - In the APPDATA folder (filename followed by (in APPDATA)) - In the model The lower right panel displays a description of the Technology, in many cases providing the manufacturer's web site address and a support contact.
Enabled	Select this checkbox against each Technology that you want to be available for use in the project. When an MDG Technology is enabled: • The Technology is added to the list of available options in the 'Profile' field of the Default Tools toolbar, so that you can apply the interface profiles of the MDG Technology • At least one set of Toolbox pages for the MDG Technology is automatically added to the Diagram Toolbox; you can access the added Toolbox pages through the 'Find Toolbox Item' dialog • Any MDG Technology-specific diagram templates are added to the 'New Diagram' dialog for selection; when selected, these display the diagram-specific Toolbox pages Clear the checkbox against a Technology to make it unavailable to the project users. If you disable an MDG Technology that was in use, its Toolbox pages, diagram types and quick-links are omitted from the Diagram Toolbox, Default Tools

	toolbar, diagrams and 'New Diagram' dialog in the user interface.
All	Click on this button to select the 'Enabled' checkbox of every Technology listed on the dialog.
None	Click on this button to clear the 'Enabled' checkbox of every Technology listed on the dialog. If you click on this button, scroll to the top of the list and select the 'Basic UML 2 Technology' and 'Core Extensions' checkboxes to re-enable the 'UML' and 'Extended' Toolbox pages and diagram types.
Set Active	Setting a Technology to Active makes that Technology your default interface to Enterprise Architect, and can: • Override various Toolbox pages (including those from other Technologies) with pages specific to the active Technology • Redefine a stereotype in another profile, adding new tags and removing or modifying existing tags, while the stereotype behaves in all other ways as if it is the original stereotype If your preferred Technology does not use overrides and redefinitions, it is not necessary to set it to Active. Select and highlight your preferred Technology, then click on the Set Active button. This displays an asterisk against the Technology name in the 'Technology' panel, and selects the Technology in the 'Profile' field of the Default Tools toolbar. If the MDG Technology has not yet been enabled, this button also enables it.
Advanced	Click on this button to add MDG Technologies in folders and websites remote from Enterprise Architect.
Remove	(Enabled only for Technologies imported directly into the model.) Click on this button to remove the selected Technology from the list, from the 'Resources' tab of the Browser window and from the model.
OK	Click on this button to close the dialog, save your changes and put them into effect.
Cancel	Click on this button to close the dialog and abort the changes you have made.

Notes

- If you change the 'Enabled' setting of an MDG Technology, or if you change the list of external paths, click on the OK button to reload all enabled technologies; you do not need to restart Enterprise Architect for the changes to take effect
- To work exclusively in a selected MDG Technology, or a small number of Technologies, you can enable just those Technologies (and perhaps set one of them to Active) and then deselect the 'Basic UML 2 Technology' checkbox (and, if necessary, the 'Core Extensions' checkbox)
- For updates on a Profile where new Tagged Values have been added and the stereotype name is consistent, then these new or altered Tagged Values can be synchronized; for more details see the *Synchronize Tagged Values and Constraints* Help topic

Access Remote MDG Technologies

When you are working on your model, you can use MDG Technologies local to your system, or you can access Technologies you have identified in folders and websites remote from the system. You essentially 'bookmark' these remote Technologies for continued use, and then delete the link when you do not want to use them any more.

Access

Ribbon	Specialize > Technologies > Manage Technology : Advanced

Notes

- To remove an MDG Technology listed in the 'MDG Technologies - Advanced' dialog, click on the folder path or URL and click on the Remove button; the path or URL is deleted

Specify the location of a remote MDG Technology

Step	Action
1	On the 'MDG Technologies - Advanced' dialog, click on the Add button. A short context menu displays, offering the options: • 'Add Path' • 'Add URL'
2	To specify an MDG Technology in a directory folder, select the 'Add Path' option. The 'Browse for Folder' dialog displays. Browse for the MDG Technology folder, click on it, and click on the OK button; go to step 4.
3	To specify an MDG Technology on a web site, select the 'Add URL' option. The 'Input' dialog displays. In the 'Enter Value' field, type or copy-and-paste the MDG Technology URL and click on the OK button.
4	The folder path or URL for the MDG Technology displays in the Path panel. The Technology is available

Import MDG Technologies to Model

If you locate or create an MDG Technology that is of use to your project, you can import it into the project either:

- For only your own use; that is, import the technology into the %APPDATA%\Sparx Systems\EA\MDGTechnologies folder on your workstation, or
- To be available to all users of the model, through the 'Resources' tab of the Browser window for the model

To import an MDG Technology you must have a suitable MDG Technology XML file. If the MDG Technology includes references to any metafiles, they should be in the same directory as the MDG Technology XML file.

The Model Patterns provided with the MDG Technology must each have the relevant Pattern XML file, and an RTF file with the same file name containing a description of the Pattern, in the ModelPatterns directory within the Enterprise Architect install directory.

On start up, Enterprise Architect scans both the APPDATA folder and the Enterprise Architect Install directory MDGTechnologies subfolder for technology files, to make them available through the 'MDG Technologies' dialog and, for model Technologies, the 'Resources' tab of the Browser window. Technologies imported to the APPDATA folder are indicated by the text 'Location: Technology.xml'. The Model Patterns have to be imported into the ModelPatterns directory on the user's system separately.

Access

Ribbon	Specialize > Technologies > Publish Technology > Import MDG Technology
Context Menu	In the 'Resources' tab of the Browser window | Right-click MDG Technologies folder | Import Technology

Import a technology

Step	Action
1	On the 'Import MDG Technology' dialog, in the 'Filename' field, type the path and filename of the MDG Technology file to import, or browse for it using the ... button. When you enter the filename, the MDG Technology name and version display in the 'Technology' and 'Version' fields, and any notes display in the 'Notes' field.
2	Select the appropriate radio button for the type of import you want to perform: • Import to Model • Import to User
3	Click on the OK button. • (If you selected the 'Import to User' option) If the APPDATA folder does not yet exist, Enterprise Architect creates it • If the MDG Technology already exists, Enterprise Architect displays a prompt to overwrite the existing version and import the new one Once the import to APPDATA is complete, you must restart Enterprise Architect; the MDG Technology is then listed in the 'MDG Technologies' dialog.

Notes

- To remove an MDG Technology that has been added to APPDATA, locate the appropriate XML file in the %APPDATA%\Sparx Systems\EA\MDGTechnologies folder and delete it
- Consider the fact that some MDG Technologies can be large and might impose some delays on the workstation as they load each time a user connects to the model
- To remove an MDG Technology from the 'Resources' tab of the Browser window and the model, either:
  - Right-click on the Technology name and select the 'Remove Technology' menu option, or
  - Click on the Technology name in the 'Manage MDG Technologies' dialog and click on the Remove button

Extensions - MDG Technologies

Enterprise Architect is the core for a range of Model Driven Generation (MDG) extensions to its modeling capabilities, using more specialized, niche frameworks and profiles.

Extension Facilities

Extensions
A number of technologies are already integrated with the Enterprise Architect installer, including: • ArchiMate • BPEL • BPMN • Data Flow diagrams • Eriksson-Penker Extensions • ICONIX • Mind Mapping • SoaML • SOMF 2.1 • Strategic Modeling • Systems Modeling Language (SysML) • MDG Link For Eclipse • MDG Link For Visual Studio.NET
Enterprise Architect provides support for: • Downloading MDG Technologies from external system files or websites, or • Creating your own easily with the Enterprise Architect MDG Technology Wizard
Sparx Systems also market a number of MDG products: MDG Technology For: • Zachman Framework • The Open Group Architecture Framework (TOGAF) • Unified Architecture Framework (UAF), formerly Unified Profile for DoDAF and MODAF (UPDM) • Data Distribution Service (DDS) • Python (Enterprise Architect versions 4.5 to 5.0; integrated in later versions) (* free product! *) • CORBA (* free product! *) • Java Beans (* free product! *) • Testing (* free product! *) MDG Integration For: • Eclipse 3.3 • Visual Studio 2005, 2008 & 2012 MDG Link For • Microsoft Visio (* free product! *) • IBM Rational Software Architect (formerly Telelogic) DOORS

Over time, this list is being extended to include further products.
Sparx Systems provide extended editions of Enterprise Architect to give greater support for systems engineering and business engineering. These editions incorporate several of the listed MDG Technologies and other Add-Ins.
For the latest list of available Add-Ins and an introduction to each product, including details of pricing, purchasing and download options, see the Sparx Systems website. When you purchase one of the Add-Ins, you receive one or more license keys and instructions on obtaining, installing and registering the product.

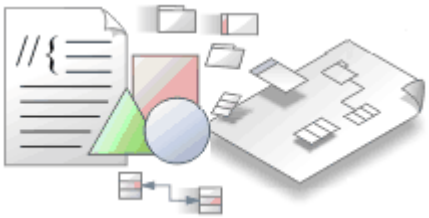
MDG Technology SDK

Enterprise Architect is a multi-featured tool with hundreds of built in features and support for a wide range of modeling standards ready to use out of the box. It also provides a range of helpful extension mechanisms. The Enterprise Architect Software Development Kit (SDK) contains the mechanisms for extending the core UML to support the modeling of a particular domain, platform or method. Enterprise Architect and other partner organizations provide commercially available Model Driven Generation (MDG) Technologies, but anyone is free to use the SDK to create a new Profile and to distribute it as an MDG Technology. For example, you might work in the field of safety engineering and use specific constructs to model your domain and the methods that are used. You could, for example, use Enterprise Architect to create new elements to represent a failure event, a failure mode and any other domain specific entities. Once the profile is complete it could be bundled into an MDG Technology and then used locally within your organization or distributed to the entire industry.

Notes

- In developing your technologies, you need to be familiar with the modeling structures and concepts of the core system and extension mechanisms as they impact and are used by the people you are designing the technology for; that is, the system as described in the modeling sections of this User Guide

Defining a Modeling Language



If you want to perform more specialized modeling, you can extend the base UML modeling elements and their use to develop your own modeling language or solution. A simple method of doing this is to develop and deploy an MDG Technology, which can contain a number of specialized Profiles and a range of other mechanisms to provide the broadest scope for your customized solution.

Extension Facilities

Facility	Description
MDG Technologies	An MDG Technology is a vehicle for providing access to the resources of a commercially-available technology or one that you have created yourself. Such resources include a wide range of facilities and tools, such as UML Profiles, code modules, scripts, Patterns, images, Tagged Value Types, report templates, Linked Document templates and Toolbox pages.
Profiles	Profiles are a means of extending UML; you use them to build models in particular domains. A Profile is a collection of additional stereotypes and Tagged Values that extend or are applied to elements, attributes, methods and connectors, which together describe some particular modeling problem and facilitate modeling constructs in that domain.
Stereotypes	Stereotypes are an inbuilt mechanism for logically extending or altering the meaning, display and syntax of a model element. Different model elements have different standard stereotypes associated with them. The same principles apply when you customize your own stereotypes, either through the 'UML Types' dialog to qualify an element of an existing type, or as elements that extend a specific metaclass to define a new element type.
Design Patterns	Patterns are groups of collaborating Objects/Classes that can be abstracted from a general set of modeling scenarios (that is, parameterized collaborations). They generally describe how to solve an abstract problem, and are an excellent means of achieving re-use and building in robustness.
Shape Scripts	A Shape Script is a script that applies a custom shape and orientation to an element or connector, in place of that object's standard UML notation. Each script is associated with a particular stereotype, and is drawn for every object having that stereotype. Where you redefine the properties of a standard UML object to create a new object, you can apply a new shape to the object as well.
Tagged Value Types	You use Tagged Values to add further properties to a model element. You can apply them at three levels:

	• As a standard Tagged Value associated with the model element • As a customized Tagged Value based on a standard Tagged Value Type • As a customized Tagged Value based on a customized Tagged Value Type
Code Template Frameworks	Within Enterprise Architect, you can modify the way code is generated or transformed, including generating code for behavioral models, by customizing the templates that control these actions. You can also incorporate these templates in a technology, to add the customized generation and transformation to the facilities of that technology.

Developing Profiles

Profiles are collections of extensions, based on stereotypes that are applied to UML elements, connectors and features. The stereotypes can have attributes to specifically define Tagged Values that further extend the characteristics of the stereotyped element or connector. Profiles are stored as XML files with a specific format; to apply the extensions of a Profile, you add its XML file as a component of an MDG Technology, and deploy the technology; that is:

1. Create a model in which to develop the MDG Technology, and within this create a Profile Package in which you define your Profile(s)
2. Save the Profile as an XML file, with a specific format.
3. Call the XML file into an MDG Technology, using the MDG Technology Creation Wizard.
4. Deploy the MDG Technology (and hence Profile) on your system.

Create Stereotype Profiles

When you are creating a Profile to define a new modeling solution, you initially create a Package with the «profile» stereotype. You then consider the number of model elements (and hence Stereotype elements) you will need to create. If you are going to create:

- A small number of Stereotype elements, you can manage them on a single child diagram within the Profile Package, and save the diagram as the Profile
- A large number of Stereotype elements, create them on as many child diagrams as are convenient (one Stereotype per diagram if you prefer) and save the Package as the Profile

Every Stereotype element extends at least one Metaclass element. The Stereotype elements use the Profile name as their namespace. When you have created your Profile, you can incorporate it into an MDG Technology.

The process of creating a Profile and applying it to your models comprises a number of steps. Some of these steps are necessary only if you want the Profile to apply a specific meaning, display, appearance or syntax to a type of model element.

Create a Profile

Step	Description
1	Create a Profile Package in a technology development model.
2	Add Stereotype and Metaclass elements to the child diagram(s) of the Profile Package.
3	Define Tagged Values for the Stereotype elements.
4	Define constraints for the Stereotype elements.
5	Add an Enumeration element to define a drop-down list of values for a Tagged Value on the Stereotype element.
6	Add Shape Scripts for the Stereotype elements.
7	Set the default appearance for each stereotyped model element.
8	Include Quick Linker definitions in the Profile.
9	Save either the Package or the diagram as the Profile, and export it.
10	Incorporate the Profile into an MDG Technology and deploy the technology.

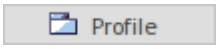
Notes

- A Profile Package can contain several diagrams and many elements and connectors, but no other Packages; do not use nested Packages in a Profile
- If you are creating a Profile to form part of an MDG Technology, note that you define the special Toolbox pages and diagrams for the Technology in separate Profiles

Create a Profile Package

The first stage in creating a UML Profile to define new model elements is to create a Package that has the stereotype «profile» in your technical development model.

Toolbox Icon



Access

Create a new Package diagram, then show the Diagram Toolbox and open the 'Profile' page.

Use one of methods outlined here to access the 'Profile' page of the Diagram Toolbox.

Ribbon	Design > Diagram > Toolbox : to display the 'Find Toolbox Item' dialog and specify 'Profile'
Keyboard Shortcuts	Ctrl+Shift+3 : to display the 'Find Toolbox Item' dialog and specify 'Profile'
Other	You can display or hide the Diagram Toolbox by clicking on the or icons at the left-hand end of the Caption Bar at the top of the Diagram View.

Create a Profile Package

Step	Description
1	On the 'New Diagram' dialog, click on 'UML Structural' in the 'Select From' field, and 'Package' in the 'Diagram Types' field. Click on the OK button. The new diagram opens in the Diagram View.
2	Open the 'Profile' page of the Diagram Toolbox (click on to display the 'Find Toolbox Item' dialog and specify 'Profile').
3	Drag the 'Profile' item onto the Package diagram. The 'New Model Package' dialog displays.
4	In the 'Package Name' field, type a name for the Profile and select the 'Automatically add new diagram' checkbox. Click on the OK button. The 'New Diagram' dialog displays.
5	In the 'Name' field, type the diagram name, then click on 'UML Structural' in the 'Select From' field and 'Class' in the 'Diagram Types' field.

6	Click on the OK button. The system creates a Package with the stereotype «profile» and a child Class diagram. Depending on your system set-up, the 'Properties' dialog for the Package might display. If necessary, you can add any basic Package details you want to assign to the Package, such as version, phase, or notes.
7	On the diagram, double-click on the Profile Package to open the child diagram. You now use this child diagram to add Stereotype elements to the Profile.

Add Stereotypes and Metaclasses

When you are extending the UML to develop a domain-specific toolset, you start by creating a Profile Package for the stereotypes you intend to customize. This Package has at least one child Class diagram, and it is on this child diagram that you specify:

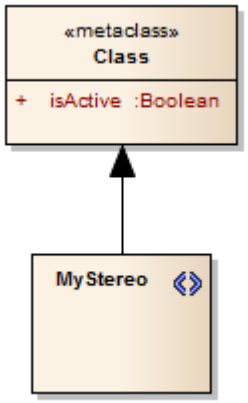
- The types of object that you are extending, represented by Metaclass elements, and
- The way in which each object is extended, represented by Stereotype elements

You can qualify the effect of a Stereotype on a Metaclass using a range of other tools, including:

- Shape Scripts in the Stereotype
- Tagged Values, defined by attributes in the Stereotype element
- Structured Tagged Value Classes, defined using attributes in the Stereotype element
- Enumerations, defined using attributes in the Stereotype element
- Tagged Value connectors, to identify possible values for a Tagged Value in an element generated with a Stereotype
- Constraints on the Stereotype element
- Special attributes, that define specific default behavior of stereotyped elements, such as the initial size and color of the element
- Modifying the default appearance of the Stereotype element

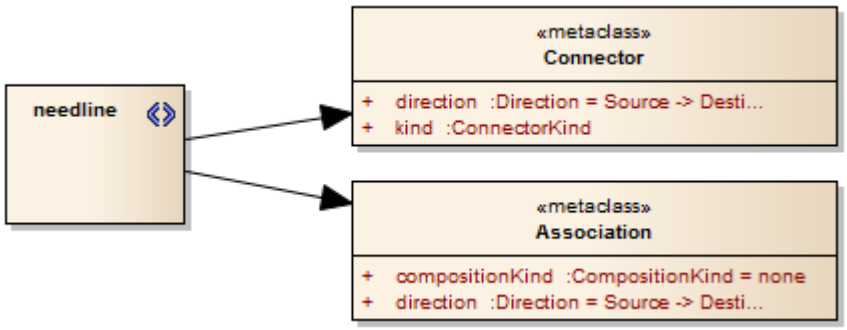
Add Metaclasses and Stereotypes to a Profile

Step	Description
1	Open the child diagram of the Profile Package.
2	Drag the Metaclass element from the 'Profile' page of the Toolbox onto the diagram. The 'Extend Metaclass' dialog displays, listing the types of object you can extend, namely: • Core UML elements, and attributes and operations • Core connectors • Abstract metatypes such as Action types, ConnectorEnd and Gate, and • Stereotypes On the 'Core Elements' tab, you can include the set of system-defined extended elements such as ActivityRegion, Change and User, by selecting the 'Include Extended' checkbox. On the 'Stereotypes' tab, to specify the technology containing the stereotypes that you want to extend, click on the drop-down arrow in the top field and select the technology name.
3	Scroll through the selected list and tick one or more object types to extend. If you want to select all objects on a tab, click on the All button.
4	Click on the OK button. For each checkbox that you have selected, a new Metaclass element is created on the diagram.
5	Drag a Stereotype element from the Toolbox onto the diagram. If the 'Properties' dialog does not display, double-click on the element on the diagram.
6	In the Name field, type a name for the stereotype.

7	Click on the OK button.
8	Click on the Extension relationship in the Toolbox and drag the connection from the Stereotype element to the Metaclass element that it will extend.
9	Your diagram now resembles this example: 
10	Optionally, you can now add to your Stereotype element: • Stereotype tags • Enumeration tags • Structured Tagged Values • Tagged Value connectors • Special attributes • Constraints and/or • Shape Scripts You can also define the default appearance of the element or connector as required.

Notes

- If you intend to extend a large number of model elements, rather than putting all of them on one diagram you can create additional child Class diagrams under the Profile Package and add different types of Metaclass element to different diagrams; in this case you save the Package as the Profile, not the individual diagrams
- If you want to have a stereotype extending more than one metaclass, create one Stereotype element with an Extension connector to each of the Metaclass elements, as shown:



- Stereotype elements must have unique names, but Metaclass elements can have the same name (for example, there can be several Action Metaclasses, each with a different ActionKind attribute)

Create Stereotypes Extending non-UML Objects

A Profile is typically defined by extending core UML object types to create your own modeling language or technology; however, you can also extend non-UML objects defined by another existing technology such as ArchiMate, BPMN, or SysML.

Extending a non-UML object allows inheritance of properties from the existing stereotype, namely:

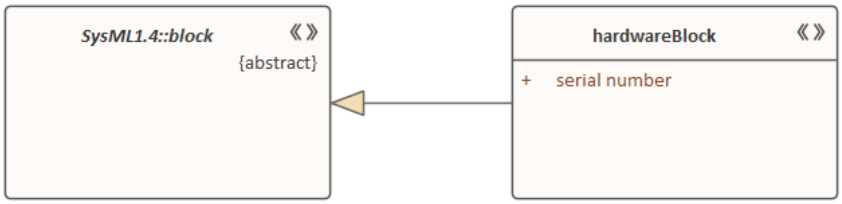
- Tagged Values
- Shape Scripts
- Stereotype colors and
- Metatype properties

Create a Stereotype extending a non-UML Object

Step	Description
1	In the Browser window, locate the Package with the <<profile>> Stereotype and open its child diagram. If you do not have an existing <<profile>> Package, use the 'Management | MDG Technology Builder' option in the Model Wizard to create a new technology, then open the diagram from the newly created <<profile>> Package.
2	Drag the 'Metaclass' icon from the 'Profile' page of the Diagram Toolbox onto the diagram. The 'Extend Metaclass' dialog displays.
3	Select the 'Stereotypes' tab.
4	From the drop-down list, select the Profile to extend (for example, 'SysML1.4') and select the checkbox next to the non-UML Stereotype to extend (for example, 'Block'). Click on the OK button. The appropriate Stereotype element is added to the Profile diagram.
5	Add a new Stereotype by dragging the 'Add Stereotype Profile Helper' from the Diagram Toolbox. This will be the custom Stereotype that extends the non-UML type added to the diagram in step 4. When you have finished, the Stereotype element and Metaclass element are displayed on the Profile diagram.
6	Draw a Generalize connector from the custom Stereotype added in step 5 to the non-UML Stereotype element added in step 4.
7	Save the diagram as a Profile.
8	Define a Toolbox Profile that has items for each of your Stereotypes.
9	Incorporate the saved Profiles into an MDG Technology.

Example Stereotype Profile

This example shows a Stereotype Profile that defines the stereotype <<hardwareBlock>>. The <<hardwareBlock>> stereotype has a generalization relationship with SysML Block, from the SysML MDG Technology. This means that anywhere a SysML Block is allowed to be used a hardwareBlock can be used instead.



This example shows how a toolbox can allow a hardwareBlock to be created. Note that the extension is always the UML type the original stereotype extends. It is never a reference to a stereotype.

Notes

- When using a Shape Script to customize the Stereotype's appearance you can use the drawparentshape() method to render the shape that is defined for the non-UML object being extended
- If you are adding any of the Metaclass element attributes to your stereotype, or if you want to use the Profile Helper to create a toolbox profile, your stereotype Class must extend a metaclass as well as specialize a stereotype

Redefine Stereotypes in Another Profile

If you want to redefine a stereotype in another profile, adding new tags and removing or modifying existing tags, while the stereotype behaves in all other ways as if it is the original stereotype, you can use a Redefines relationship as described here.

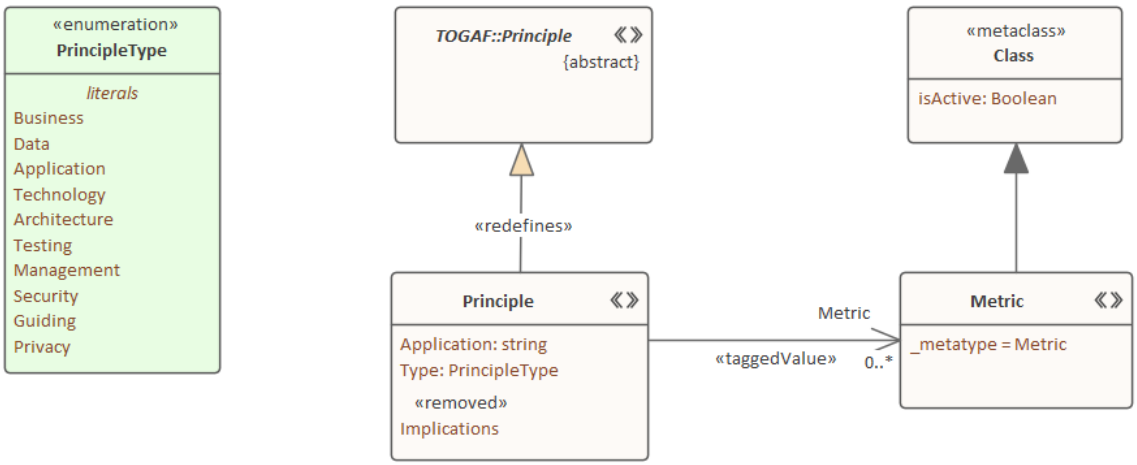
Apply a Redefines Relationship

Step	Action
1	Create a Stereotype element with the same name as the fully-qualified name of the stereotype that you are redefining. See 'TOGAF::Principle' in the example. Set this stereotype element to 'Abstract'.
2	Create a Stereotype element with the same name, *not* fully-qualified. See 'Principle' in the example. Draw a Redefines relationship from the redefining stereotype to the redefined stereotype.
3	To: • Remove a tag from the redefined stereotype, give the redefining stereotype an attribute with the same name as the tag you want to remove, and give this attribute the <<removed>> stereotype; see 'Implications' in the example A 'Principle' element created using our profile will act in all ways as a TOGAF Principle element, but will not have the usual 'Implications' tag • Add a new tag to the redefined stereotype, and simply give the redefining stereotype the tag; in the example, the new 'Application' tag is not provided by the TOGAF profile but will appear as if it were • Modify an existing Tagged Value Type in the redefined stereotype, give the redefining stereotype a tag with a different type; in the example, 'Type' is an enumeration from the TOGAF profile, but we have given it a modified set of enumeration literals, and 'Metric' is a plain text tag in the TOGAF profile, but we have redefined it as a RefGUIDList tag that references a new 'Metric' stereotype
4	After the profile has been saved and deployed in an MDG Technology, the user can, by setting the technology to 'Active', specify that any redefined elements created should be created using the redefinitions in the active technology.

Example Diagram

This diagram demonstrates a more complex scenario for extending a non-UML type. It demonstrates the capability of using a Redefines relationship to declare that this should behave like it is the original Principle element from TOGAF.

It also demonstrates how to remove and override Tagged Values defined in the original profile. Elements created with this stereotype will:
1. Not contain an Implications tag
2. Provide different options for Type from the base profile.
3. Allow metric definitions to be re-used by replacing the plain text with a RefGUIDList to a new Metric stereotype
4. Add a new simple tag "Application" that appears in the TOGAF::Principle group



Optionally, an end user can specify that creating a TOGAF::Principle should actually create an instance of Principle from this profile. They do that by setting this profile as Active (which can only be done for a single technology.)

Define Stereotype Tagged Values

You can define additional meta-information for a stereotype by adding various types of Tagged Value, which you identify as attributes of the Stereotype element. The simplest Tagged Values are those for which you type plain text into the 'Value' field.

For more complex Tagged Values, such as enumerations and Structured Tagged Values, see these topics:

- *Add An Enumeration to a Stereotype*
- *Define a Structured Tagged Value*
- *Define Stereotype Tags with Predefined Tag Types*

Access

Display the 'Attributes' page of the Features window, using one of the methods outlined here.

Ribbon	Design > Element > Editors > Features > Attributes
Context Menu	In the Browser window or a diagram | Right-click on element | Features | Attributes
Keyboard Shortcuts	F9 or Ctrl+5 > Attributes

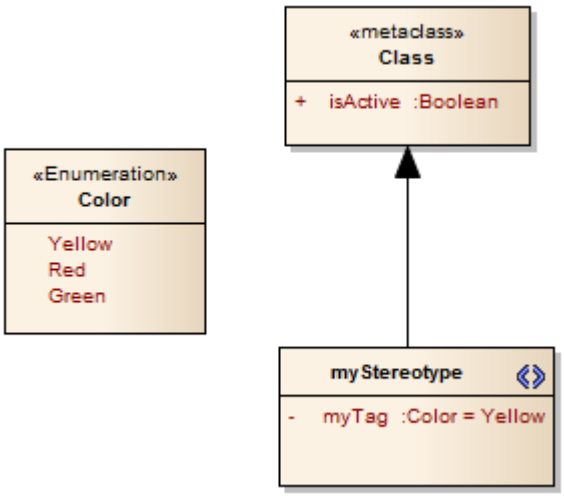
Define Tagged Values for a Stereotype element

Field	Action
Name	Overtype the *New Attribute* text with the name of the new attribute/tag.
Type	Defaults to int. If necessary, click on the drop-down arrow and select a different attribute type.
Scope	Defaults to Private. If necessary, click on the drop-down arrow and select a different scope value.
Stereotype	If an attribute stereotype is required, click on the  icon and search for and/or select a stereotype from the 'Stereotype Selector' dialog.
Alias	If necessary, type in an alias for the attribute/tag.
Initial Value	(Optional.) Type the initial value of the attribute/tag.

Add an Enumeration to a Stereotype

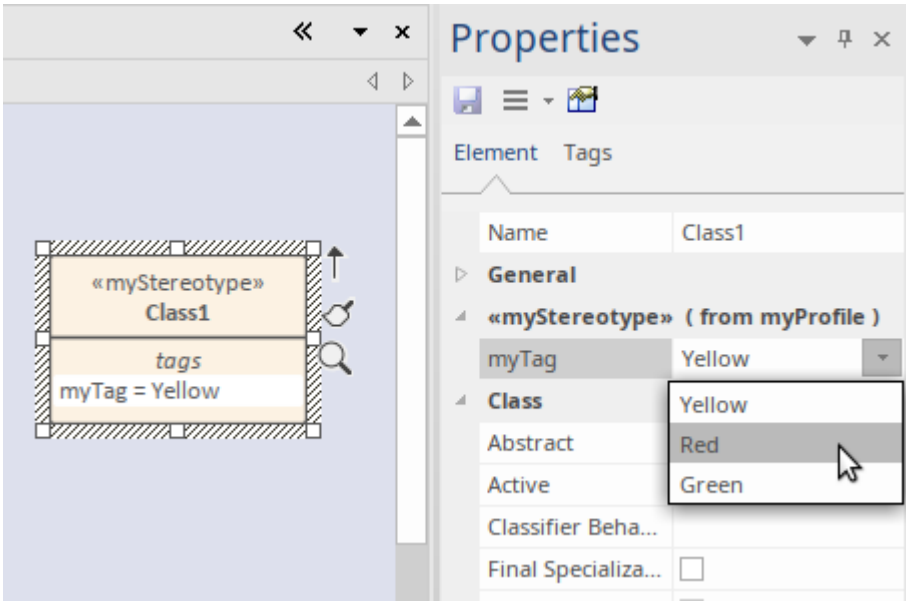
Enumeration elements can be used to generate a drop-down list of values for a Tagged Value associated with a Stereotype element. The list is displayed, and the value selected, in the 'Tags' tab of the Properties window.

Following on from the topic *Define Stereotype Tagged Values*, this example illustrates how the enumeration 'Color' can be used to provide a drop-down list of values ('Yellow', 'Red', 'Green') for the 'myTag' Tagged Value on the element 'myStereotype'.



Add an Enumeration to the Stereotype

Step	Description
1	Open the Profile Package child diagram. On this diagram, we should already have the element <<metaclass>> Class and the stereotype element 'myStereotype'.
2	In the Toolbox, locate and select the 'Profile' pages.
3	Drag the 'Enumeration' icon from the Toolbox onto the diagram.
4	If it is not already showing, open the 'Properties' dialog. Ribbon: 'Design > Element > Properties > General > Properties Dialog' (or press Alt+2)
5	In the 'Name' field, type the name of the new Enumeration element.
6	If it is not already showing, open the Features window at the 'Attributes' page: Ribbon: 'Start > All Windows > Properties > Element Features > Attributes
7	In the 'Name' field, type the name of the Enumeration attribute (for example, 'Yellow'), then press 'Enter'.
8	Click on the *New Attribute* text and type the name of the next Enumeration attribute. Repeat this step for additional attributes, to define the other values for the drop-down list.
9	Right-click on the Stereotype element 'myStereotype' and select the 'Features > Attributes' option.

	The Features window displays for the stereotype, at the 'Attributes' page.
10	In the 'Name' field type a name for the attribute.
11	In the 'Type' field click on the drop-down arrow and on the 'Select Type' option, and browse for and select the name of the Enumeration element from the 'Select <Item>' dialog.
12	In the 'Initial' field type the name of the required Enumeration attribute that defines the default value.
13	Click on the Close button. You have now generated a drop-down list for setting the value of the tag in the 'Tags' tab of the Properties window. When the Profile is in use, the Tagged Value for an element created with the stereotype might appear as shown: 

Define a Structured Tagged Value

If you want to define a property that has a number of components, such as an address, you can use a Structured Tagged Value. This consists of a set of related simple Tagged Values in a sequence that together define the property. For example, the Structured Tagged Value for the street address has the component Tagged Values:

PropertyNo - 448

Street - My Street

Town - Creswick

AreaCode - 3363

When you initially display this in the Properties window or tags compartment of an element, the values of the tags are displayed in a string, such as:

448, My Street, Creswick, 3363

You can then expand the Structured Tagged Value to list the component tag names and values.

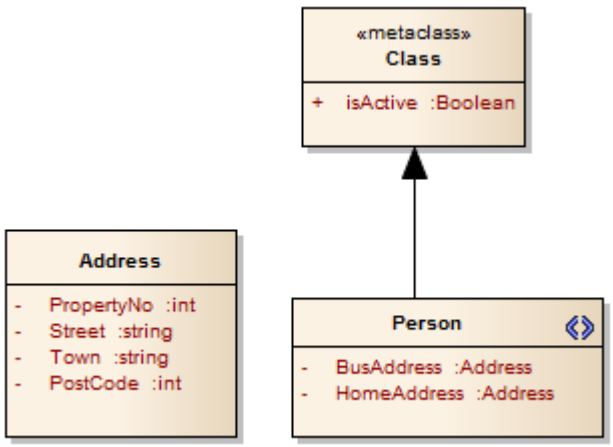
You create a Structured Tagged Value in a profile, using an unstereotyped Class. Any attribute owned by a Stereotype element in the profile that is typed by such a Class will define the Structured Tagged Value.

Create a Structured Tagged Value Class

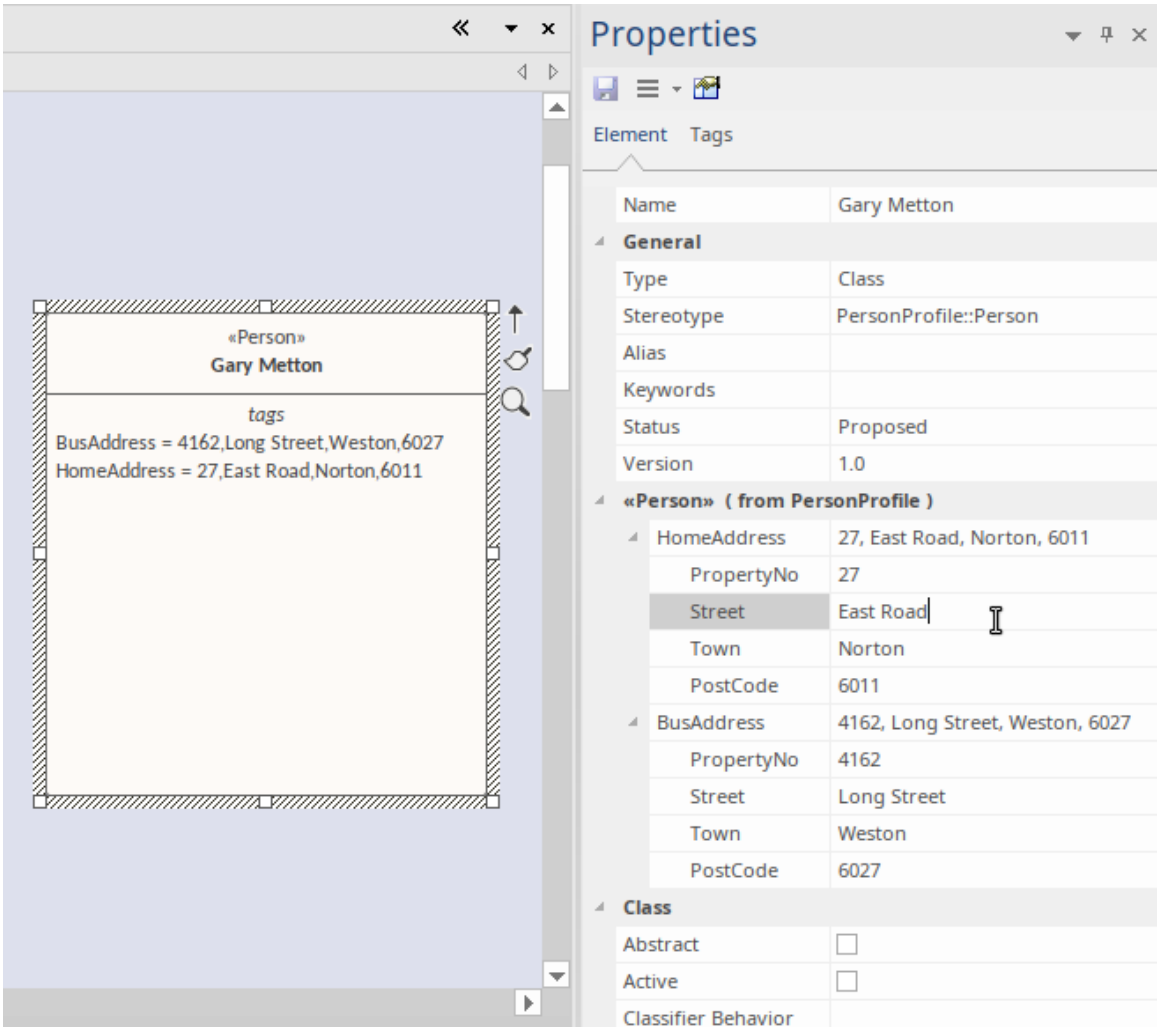
Step	Description
1	In your Profile Package, open the child Class diagram.
2	In the Toolbox, locate and select the 'Class' page.
3	Drag a Class item from the Toolbox onto the diagram. If the 'Properties' dialog does not display, double-click on the element on the diagram.
4	In the 'Name' field, type the name of the new Class element.
5	Click on the 'Details' tab and on the Attributes button. The Features window displays, showing the 'Attributes' page.
6	In the 'Name' field, type the name of the Structured Tag attribute (for example, *PropertyNo*).
7	In the 'Type' field, click on the drop-down arrow and select the appropriate type (such as 'int' or 'string').
8	Click on the *New Attribute* text, and repeat steps 6 to 8 for each remaining component tag attribute (for example: Street, Town, AreaCode).
9	When you have defined all the component tags, click on the Stereotype element; the Features window displays at the 'Attributes' page, for the Stereotype.
10	In the 'Name' field type a name for the attribute (for example: 'HomeAddress').
11	In the 'Type' field click on the  button and select the name of the Structured Tagged Value Class element from the 'Select <Item>' dialog, as the attribute's classifier. You have now generated the components of the Structured Tagged Value to be maintained in the

	Properties window for any element derived from this part of the profile.
12	Continue defining the profile, then save the diagram or Package as a profile and either export it for use or add it to an MDG Technology file.

Example



These elements, when imported into a model as a Profile, define a 'Person' stereotype that can be applied to Class elements. This stereotype allows you to enter home and business address details as Structured Tagged Values, in elements to which the stereotype is applied.



Notes

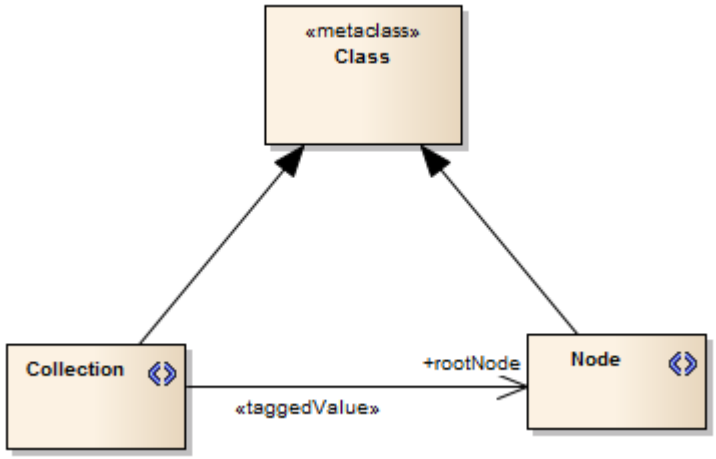
- The process of applying a Structured Tagged Value through a profile is an alternative to applying the Tagged Value through an Add-In broadcast; see the *Learn more* topics
- The Tagged Values that make up a Structured Tagged Value must be simple; Memo Tagged Values cannot be incorporated in a Structured Tagged Value

Use the Tagged Value Connector

A common situation when creating a profile is where instances of one stereotype need to reference elements with another stereotype applied. For example, an element that defines a Collection might have a Tagged Value called rootNode to identify the Root of that Collection, which will be a Class with the stereotype <<Node>>. In the Properties window, the user would click on the selection button () against the rootNode Tagged Value; when the 'Select <Item>' dialog displays, the user can locate all Nodes in the current model, and select one of these elements as the value of the tag.

To achieve this, you use the Tagged Value connector from the 'Profile' pages of the Toolbox. A Tagged Value connector defines a reference-type (that is, RefGUID) Tagged Value owned by the source stereotype; the Tagged Value name is the name of the target role of this connector, and the Tagged Value is limited to referencing elements with the stereotype of the target element.

This diagram demonstrates how you might use the connector to represent the example. A Profile defines two stereotypes: «Collection» and «Node» (both of which extend the Metaclass Class). The «Collection» stereotype owns a Tagged Value connector with the target role rootNode, pointing to the «Node» stereotype. You enter the target role name on the 'Role(s)' page of the connector 'Properties' dialog.



Notes

- The Tagged Value connector can also link directly with a metaclass element to identify base UML element type; for example: if the target is a metaclass Actor, when you select to identify a specific target element the 'Select <item>' dialog will list all elements based on Actor
- Further, the connector can link to a metaclass for groups of element type, namely Classifiers and Properties; if the connector target is the metaclass:
  - Classifier, when you select to identify a specific target element the 'Select <item>' dialog will list all Enterprise Architect-defined Classifier types such as Class and Component
  - Property, when you select to identify a specific target element the 'Select <item>' dialog will list list Port, Part and Attribute elements

With Predefined Tag Types

Tagged Values define a wide range of properties and characteristics of a model element, and some of these properties have complex or structured values. For example, you might want your user to select a value between upper and lower limits (using 'Spin' arrows), set a date and time, select a color from a palette, or work through a checklist.

You create these complex Tagged Values from any of a number of predefined simple Tagged Value types and filters, some of which you might have created yourself, using the 'Data Type' element in the 'Profile' page of the Diagram Toolbox.

The enormous advantage of using a Data Type element is that it helps you define Tagged Values that are specific to the profile, so you can create Tagged Values of different types with the same name in different profiles, without conflict in running the MDG Technologies derived from those profiles.

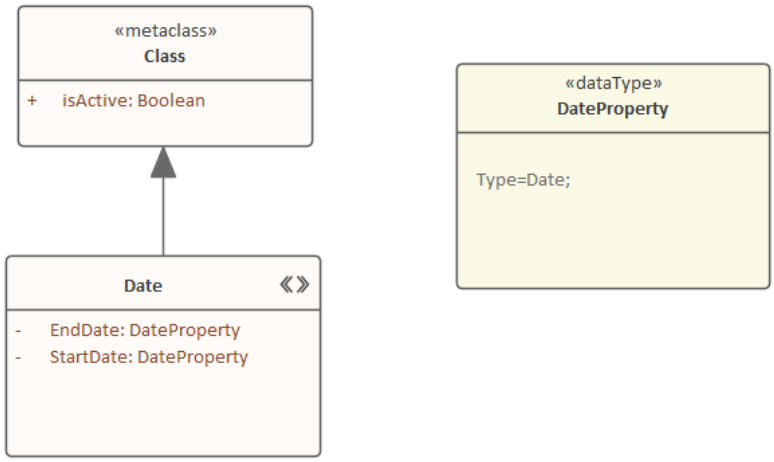
This method is recommended for creating complex Tagged Values in profiles, from predefined simple Tagged Value types and filters. The original method of defining global Tagged Value types in the UML Types dialog is still supported for the purposes of maintaining existing profiles; see the *With Predefined Tag Types (Legacy Profiles)* Help topic.

Assign Tagged Values to Stereotypes

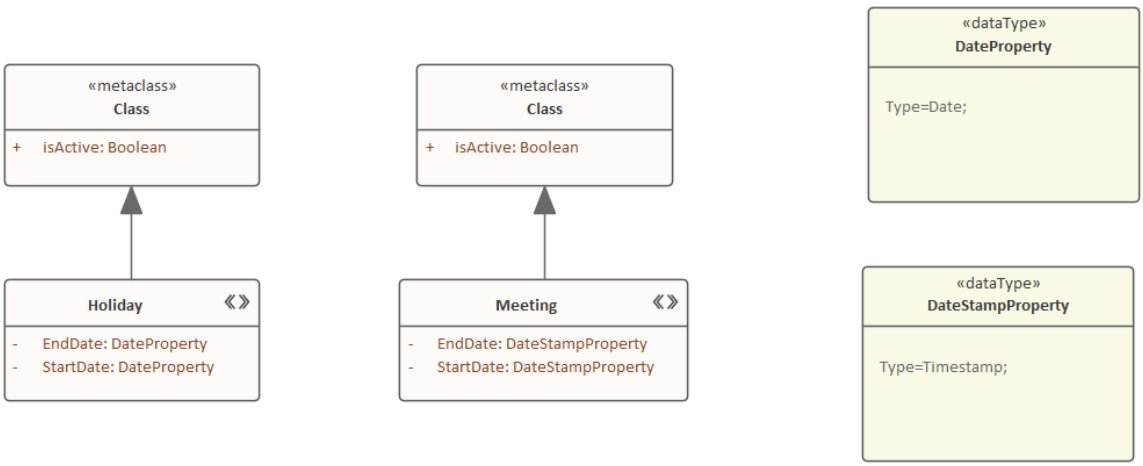
Having created a structured Tagged Value, you assign it to the Stereotype element in the same way as for simple Tagged Values, by creating an attribute in the Stereotype element with the name of the Tagged Value Type.

Example

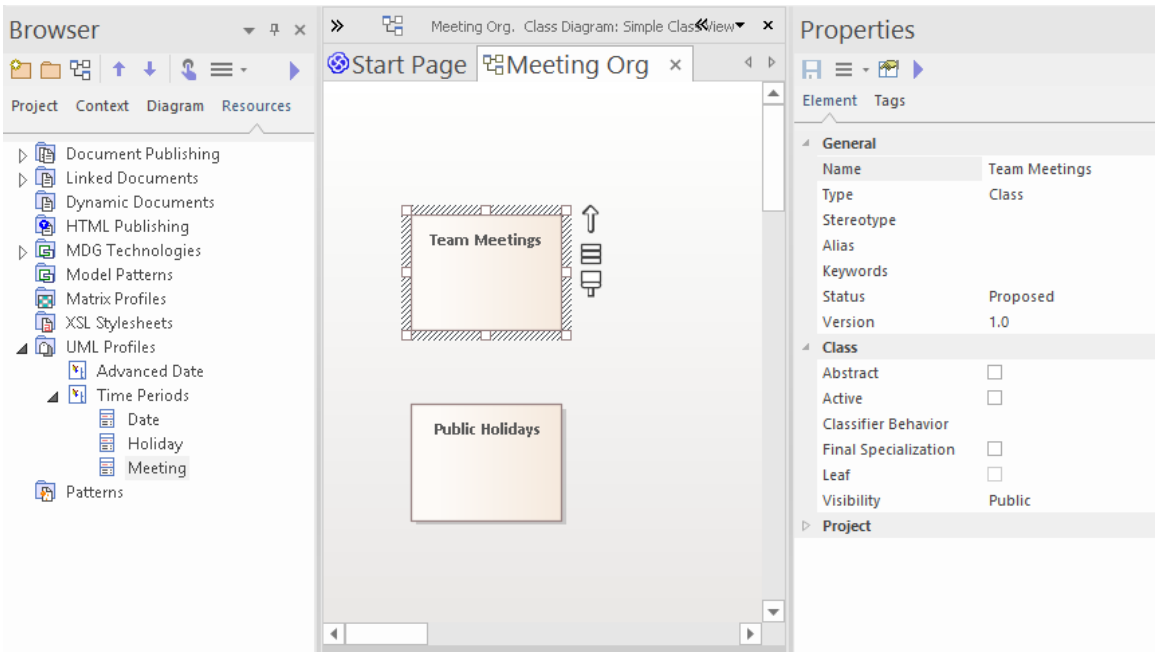
Consider the example of 'StartDate' and 'EndDate' Tagged Values. Using the Data Type element, you would define one - say - 'DateProperty' Tagged Value Type in the Notes of the Tagged Value (using the definitions listed in the *Predefined Structured Types* Help topic), and refer to that Data Type from any number of attributes in the Stereotype elements - such as 'StartDate' and 'EndDate'. This definition, and its referrents, have no involvement with any other definitions outside their parent Package.



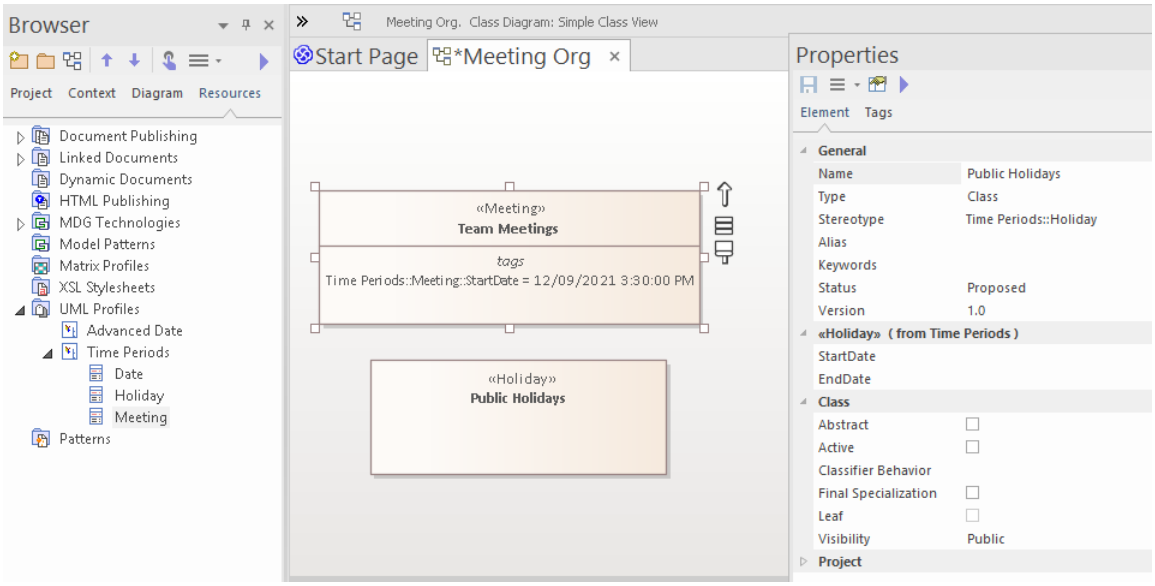
To extend this example, say you have Stereotypes called 'Holiday' and 'Meeting', and both have StartDate and EndDate properties. However, 'Holiday' uses 'DateProperty' with a definition of "Type=Date;", while 'Meeting' could use 'DateTimeProperty' with a definition of "Type=Timestamp;".



When the profile is imported into a user's model (either as a standalone profile or as a component of an MDG Technology), the stereotypes can be applied to new or existing elements, and the Tagged Value types are added (and are made available when creating more tags in the 'Tagged Value' dialog drop-down). In this illustration, the Time Periods profile has been imported into the 'Resources' tab for the model, and is about to be used to tailor two standard Class elements that exist on a diagram.

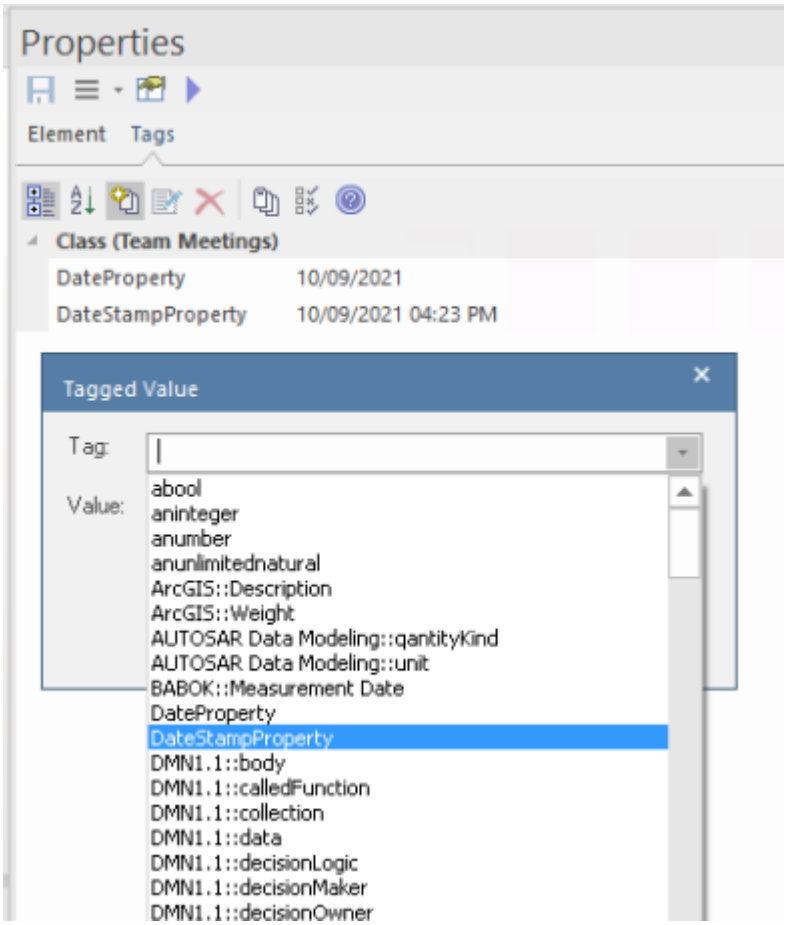


The 'Meeting' profile element is now Ctrl+dragged onto the Team Meetings Class, and the 'Holiday' profile element is Ctrl+dragged onto the Public Holidays Class. The result is that both Class elements take the appropriate stereotypes, which are displayed on the elements in the diagram and in the 'Stereotype' field on the 'Element' tab of the Properties window. Notice also that there is a stereotype group on the 'Element' tab, listing the tags defined for the stereotype.



For the Team Meetings element, we have just typed a value into the 'Start Date' field on the element, which immediately displays in the 'tags' compartment on the element on the diagram.

If you need to add the stereotype tags to other Class elements, once the profile is imported you can do so through the 'Tags' tab of the Properties window for each element, selecting whichever format is most appropriate for the element. Note how the two formats differ in this example, where both data types are inserted.



With Predefined Tag Types (Legacy Profiles)

Tagged Values define a wide range of properties and characteristics of a model element, and some of these properties have complex or structured values. For example, you might want your user to select a value between upper and lower limits (using 'Spin' arrows), set a date and time, select a color from a palette, or work through a checklist.

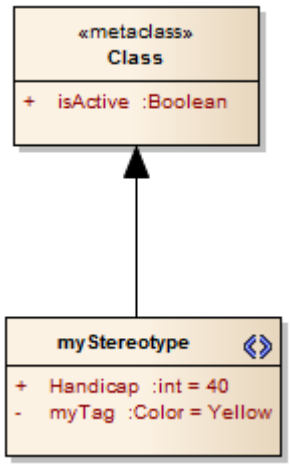
You create these complex Tagged Values from any of a number of predefined simple Tagged Value types and filters, some of which you might have created yourself, using the 'Tagged Value Types' page of the 'UML Types' dialog - 'Settings > Reference Data > UML Types > Tagged Value Types'. You assign the Tagged Value Type in the Notes of the Tagged Value (using the definitions listed in the *Predefined Structured Types* Help topic).

Note that this method is supported for maintaining existing profiles and MDG Technologies, but for new or incomplete profiles we recommend that you use Data Type elements - see the *With Predefined Tag Types* Help topic.

Using a Data Type element helps you define Tagged Values that are specific to the profile, so you can create Tagged Values of different types with the same name in different profiles without conflict in running the MDG Technologies derived from those profiles. Tagged Values created in the 'Tagged Value Types' page apply throughout the model, and all tags with the same name must be of the same type. This can hinder you in creating more than one profile in the model, when they use these global tags and one or more of them clash, both in the technology development model and in any model in which the technology is enabled.

Assign Tagged Values to Stereotypes

Having created a structured Tagged Value, you assign it to the Stereotype element in the same way as for simple Tagged Values, by creating an attribute in the Stereotype element with the name of the Tagged Value Type. For example, to make the Tagged Value 'Handicap' appear in a stereotype, create an attribute named 'Handicap'. Depending on the tag type, you can set the default value for the tag by giving the attribute an initial value.



Define Stereotype Constraints

If you need to define the conditions and rules under which the Stereotype element operates and exists, you can do this by setting Constraints on the element. Typical constraints are pre- and post- conditions, which indicate things that must be true before the element is created or accessed and things that must be true after the element is destroyed or its action is complete.

You can show the constraints for an element directly on the diagram, using the 'Compartment Visibility' function.

Access

Select the Stereotype element, then display the 'Constraints' page of the 'Properties' dialog, using any of the methods outlined in this table.

Ribbon	Design > Element > Responsibilities > Constraints
Context Menu	Right-click on element | Properties | Responsibilities > Constraints
Keyboard Shortcuts	Shift+Alt+C
Other	Double-click Stereotype element > Constraints

Define constraints for a stereotype

Field/Button	Description
New	Click on this button to clear the fields ready to create a new constraint.
Constraint	Type the value of the constraint.
Type	Click on the drop-down arrow and select the appropriate type (Pre-condition, Post-condition or Invariant).
Status	Click on the drop-down arrow and select the appropriate status.
Notes	Type any additional information required.
Save	Click on this button to save the constraint data.
OK	Click on this button to close the dialog.

Add Shape Scripts

UML elements and connectors each have a standard appearance, in terms of shape, color and labeling. It is possible to change the appearance of a type of element or connector in a number of ways, using a Shape Script to define the exact feature you want to impose on the default - or main - shape. If you want to standardize the appearance, to apply to many elements, you attach the Shape Script to an attribute of a Stereotype element in a UML Profile (such as an MDG Technology UML Profile).

Access

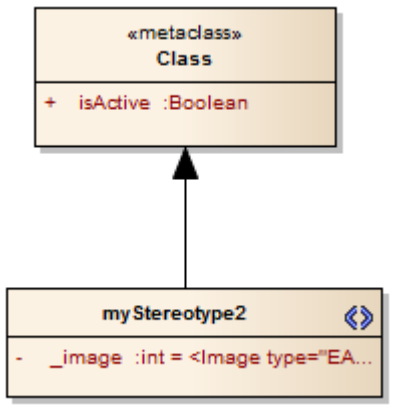
For the element that defines the stereotype within your UML Profile, define an attribute named '_image' that will specify the Shape Script.

Display the Shape Script editor by clicking the browse icon in the 'Initial Value' field of the '_image' attribute.

Ribbon	Design > Element > Features > Attributes > [define or select the attribute '_image'] > click on ... in the 'Initial Value' field.
Context Menu	Right-click on Stereotype element | Features | Attributes | <define or select the attribute '_image'> | click on ... in the 'Initial Value' field
Keyboard Shortcuts	F9 | <define or select the attribute '_image'>] | click on ... in the 'Initial Value' field

Add a Shape Script to a Stereotype element

The Stereotype element now resembles this example:



Step	Description
1	In the 'Name' field, type '_image'.
2	Click on the ... button next to the 'Initial Value' field. The 'Shape Editor' dialog displays.

3	Enter the Shape Script in the 'Shape Editor' dialog. When you have finished writing the Shape Script, click on the OK button and then the Close button.

Notes

- Your Shape Script might include externally-defined images; in this case the Shape Script would include the image method, specifying the image file name prefixed with the technology name
- If you are creating a Shape Script for an Association Class, note that the Shape Script is applied to both the Class part and the Association part; therefore, you might have to include logic in the shape main that tests the type of the element so that you can give separate drawing instructions for Class and for Association

  Such logic is not necessary in the:
  - shape source or shape target, which are ignored by Classes, or the
  - decoration shapes, which are ignored by Associations
- You can also apply Shape Scripts to elements on an ad hoc basis, attaching the Shape Script to a stereotype defined on the 'UML Types' dialog ('Settings > Reference Data > UML Types')

Set Default Appearance

If you want to define a simple default appearance for a stereotyped element or connector, you can select the Stereotype element that defines it and just set any or all of the:

- Background/fill color
- Border color
- Border line width, or
- Font color

To set these, you use the 'Default Appearance' dialog.

Access

Context Menu	Right-click on element | Appearance | Default Appearance
Keyboard Shortcuts	F4

Notes

- When you save the Profile defining the stereotyped elements and connectors, select the 'Color and Appearance' checkbox on the 'Save UML Profile' dialog

Special Attributes

It is possible to define a number of special features and behaviors of a stereotyped model element, such as the icon to represent it in the Browser window and Diagram Toolbox, the default location of any image files associated with the stereotype, the dimensions of the element in a diagram, or whether the appearance is defined by a Shape Script. You define these features in your Profile, using special attributes that can be applied to either the:

- Stereotype elements or
- Metaclass elements, referring to the stereotypes that extend them

Access

Ribbon	Design > Element > Features > Attributes
Context Menu	Right-click on element | Features | Attributes
Keyboard Shortcuts	F9

Set the Attribute(s)

Field/Button	Description
Name	Type the name of the attribute (as listed in these tables).
Initial	Type or select the initial value of the attribute.
Close	Click on this button to close the dialog.

Stereotype Element Attributes

Attribute	Meaning
_defaultAttributeType	Defines the default type of the new attributes created from the Diagram Toolbox. Use this in a Stereotype element that extends an Attribute Metaclass, and set the 'Initial Value' field to the required attribute type. If you do not provide this, the system creates attributes with the default type **int**.
icon	Contains the bitmap file location of the 16x16-pixel icon displayed beside all elements defined by the Stereotype, in the Browser window. This does not apply to Package elements. The icon is also automatically used as the Diagram Toolbox image wherever the stereotyped element is listed. For a transparent background, you can use light gray - RGB (192,192,192). For this attribute to work correctly, also set the _metatype attribute.

_image	Identifies a Shape Script definition, the script for which is created in the 'Initial Value' field. For this attribute to take effect, you need to set the 'Alternate Image' option when you save the Profile.
_instanceMode	Deprecated.
_instanceOwner	Deprecated.
_instanceType	Modifies the second option of the 'Paste as' field on the dialog to: • as Instance of Element (ProfileName::<<stereotype>>) The <<stereotype>> value is defined in the 'Initial Value' field of the attribute, and corresponds to the metatype given to the stereotyped element using the '_metatype' attribute.
_metatype	Defines stereotypes as metatypes, so that the identity of an element as a custom, stereotyped element is hidden.
_scriptlet	Defines a script to style and customize elements of this stereotype prior to the diagram being displayed.
_sizeY	Sets the initial height of the element, in pixels, at 100% zoom. For this attribute to take effect, you need to set the 'Element Size' option when you save the Profile.
_sizeX	Sets the initial width of the element, in pixels, at 100% zoom. For this attribute to take effect, you need to set the 'Element Size' option when you save the Profile.
_strictness	Defines the degree to which a stereotyped element can have more than one stereotype applied to it.

Metaclass Element Attributes

Attribute	Meaning
_AttInh	If set to 1, sets the 'Inherited Features: Show Attributes' checkbox to selected on each new stereotyped model element.
_AttPkg	If set to 1, sets the 'Attribute Visibility: Package' checkbox to selected on each new stereotyped model element.
_AttPri	If set to 1, sets the 'Attribute Visibility: Private' checkbox to selected on each new stereotyped model element.
_AttPro	If set to 1, sets the 'Attribute Visibility: Protected' checkbox to selected on each new stereotyped model element.
	If set to 1, sets the 'Attribute Visibility: Public' checkbox to selected on each new

_AttPub	stereotyped model element.
compositionKind	When applied to an Association, defines whether the source or target end is an aggregate or composite. Permitted values are: • None • Aggregate at Source • Aggregate at Target • Composite at Source • Composite at Target
_ConInh	If set to 1, sets the 'Show Element Compartments: Inherited Constraints' checkbox to selected on each new stereotyped model element.
_Constraint	If set to 1, sets the 'Show Element Compartments: Constraints' checkbox to selected on each new stereotyped model element.
_defaultDiagramType	Defines the type of child diagram created when an element is made composite.
direction	Automatically created when any type of connector Metaclass element is dragged from the 'Profile' toolbox page onto a diagram. You can set a value for this attribute in preference to using the **_SourceNavigability** or **_TargetNavigability** attributes.
_HideMetaclassIcon	Set to True if you are extending an element that will be shown in Rectangle Notation and you do not want it to display the 'Metaclass' icon in the top-right corner. Affects elements such as Requirements, Components and Use Cases.
_HideStype	Set the 'Initial Value' field to a comma-separated list of stereotypes to hide those stereotypes by setting the 'Hide Stereotyped Features' filter for each new stereotyped model element.
_HideUmlLinks	Set to True if you are using a metamodel to create your Quick Linker definitions *and* you want to exclude UML Quick Linker definitions from your stereotyped source element's Quick Linker. (The UML Quick Linker definitions would otherwise be inherited from the base UML Metaclass.)
_IsCommon	Set to True for a relationship if you do not want it offered in the quicklinker when creating the target element.
_isVertical	Set to True for a stereotyped ActivityPartition to make the default Activity Partition orientation vertical.
_lineStyle	Sets the line style of a stereotyped connector; the 'Initial Value' of the attribute can be one of: • direct • auto • custom • bezier • treeH (horizontal) • treeV (vertical) • treeLH (lateral horizontal) • treeLV (lateral vertical)

	• orthogonalS (orthogonal, square corners) • orthogonalR (orthogonal, rounded corners)
_makeComposite	Makes each stereotyped element a composite element when it is created.
_MeaningBackwards	A natural language meaning for a relationship when read from target to source. For example, a <<Flow>> relationship might have _MeaningBackwards set to 'Flows from'. Used in the Traceability window and elsewhere.
_MeaningForwards	A natural language meaning for a relationship when read from source to target. For example, a <<Flow>> relationship might have _MeaningForwards set to 'Flows to'. Used in the Traceability window and elsewhere.
_OpInh	If set to 1, sets the 'Inherited Features: Show Operations' checkbox to selected on each new stereotyped model element.
_OpPkg	If set to 1, sets the 'Operation Visibility: Package' checkbox to selected on each new stereotyped model element.
_OpPri	If set to 1, sets the 'Operation Visibility: Private' checkbox to selected on each new stereotyped model element.
_OpPro	If set to 1, sets the 'Operation Visibility: Protected' checkbox to selected on each new stereotyped model element.
_OpPub	If set to 1, sets the 'Operation Visibility: Public' checkbox to selected on each new stereotyped model element.
_PType	If set to 1, sets the 'Show element type (Port or Part only)' checkbox to selected on each new stereotyped model element.
_ResInh	If set to 1, sets the 'Show Element Compartments: Inherited Responsibilities' checkbox to selected on each new stereotyped model element.
_Responsibility	If set to 1, sets the 'Show Element Compartments: Requirements' checkbox to selected on each new stereotyped model element.
_Runstate	If set to any non-blank value, sets the 'Hide Object Runstate in current diagram' checkbox to selected on each new stereotyped model element. To show the runstate, omit this attribute or give it a blank value.
_SourceAggregation	Deprecated. See **compositionKind**.
_SourceMultiplicity	Sets the multiplicity of the source element, such as 1..* or 0..1.
_SourceNavigability	If the connector is non-navigable, set this attribute to 'Non-Navigable'. If other values are more appropriate, use the **direction** attribute.
_subtypeProperty	Specifies the fully qualified name of the Tagged Value that is used to generate a popup submenu each time an element with the stereotype is created from the Toolbox. The Tagged Value is an enumeration and the submenu consists of a command for each enumeration literal. The Tagged Value is initialized with whichever command

	is selected on the submenu; if none is selected (such as if the user clicks off the submenu) then the default value is used as normal. For example, if you create a BPMN 2 Activity element, a submenu displays listing the task types such as 'BusinessRule', 'Manual' and 'Receive'. Selecting one of these values sets it as the value of the taskType Tagged Value. The Tagged Value is effectively the Activity's subtype; in the BPMN 2 profile, in the format profile::stereotype::tag, the subtypeProperty for the Activity stereotype would be: BPMN2.0::Activity::taskType.
_Tag	If set to 1, sets the 'Show Element Compartments: Tags' checkbox to selected on each new stereotyped model element.
_tagGroupings	Maps the Tagged Values into the tag groups displayed in the 'Tags' tab of the Properties window, in the form: tagName1=groupName1;tagName2=groupName2; This facility currently is available for object types only, not for other types such as attributes.
_tagGroups	Defines a comma-separated list of required groups in the order in which they are to be displayed in the 'Tags' tab of the Properties window. For example: groupName1,groupName2,groupName3 This facility currently is available for object types only, not for other types such as attributes.
_tagGroupStates	Maps _tagGroups displayed in the 'Tags' tab of the Properties window to the state of open or closed, in the form: groupName1=open;groupName2=closed; This facility currently is available for object types only, not for other types such as attributes.
_TagInh	If set to 1, sets the 'Show Element Compartments: Inherited Tags' checkbox to selected on each new stereotyped model element.
_TargetAggregation	Deprecated. See **compositionKind**.
_TargetMultiplicity	Sets the multiplicity of the target element, such as 1..* or 0..1.
_TargetNavigability	If the connector is non-navigable, set this attribute to Non-Navigable. If other values are more appropriate, use the **direction** attribute.
_UCRect	(Only applicable to element types that have a distinct rectangle notation, or to elements that have Shape Scripts that evaluate the 'rectanglenotation' property, which can include element types that do not normally have rectangle notation.) If set to 1, initially displays the element in rectangle notation. If set to 0, initially displays the element in standard notation.

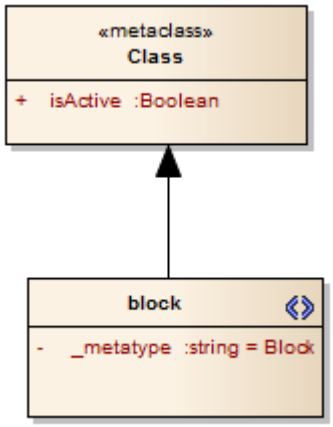
Notes

- Where an attribute is set to 1 to turn a feature on, setting it to 0 turns the feature off

Define a Stereotype as a Metatype

If you want to hide the identity of a custom element as a stereotyped UML element, you can set the _metatype special attribute in the Stereotype element that defines it. The _metatype attribute also makes custom element types appear in contexts where only Enterprise Architect's inbuilt types would normally appear; for example, in the lists of element types in the Relationship Matrix.

In this example from SysML, Block is defined as a Stereotype element that extends a UML Class.



However, a SysML user is not interested in UML Classes, only in SysML Blocks. If you set the _metatype attribute to Block, any element created from that stereotype, while behaving in the same way as a stereotyped Class in most contexts, will:

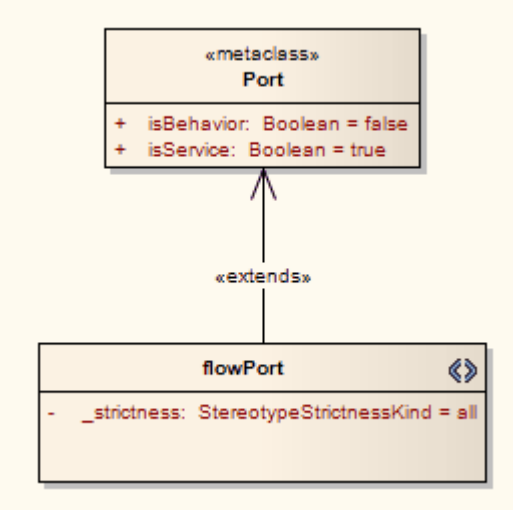
- Show Block <name> rather than Class <name> as the title of its 'Properties' dialog
- Be auto-numbered as Block1 not Class1 on creation, and
- Appear as Block not Class in many other contexts throughout Enterprise Architect

Define Multiple-Stereotype Level

An element can have more than one stereotype applied to it. You can define the level to which multiple stereotypes can be applied, by creating the _strictness special attribute in the defining Stereotype element. The type of the attribute is StereotypeStrictnessKind, with one of four values in the 'Initial Value' field:

- profile, which states that an element of this type cannot be given more than one stereotype from the same Profile
- technology, which states that an element of this type cannot be given more than one stereotype from the same technology
- all, which states that an element of this type cannot have multiple stereotypes at all, or
- none, which is the default behavior and states that there are no restrictions on the use of multiple stereotypes

This example is from SysML and shows that a «flowPort» cannot have any other stereotype applied to it.

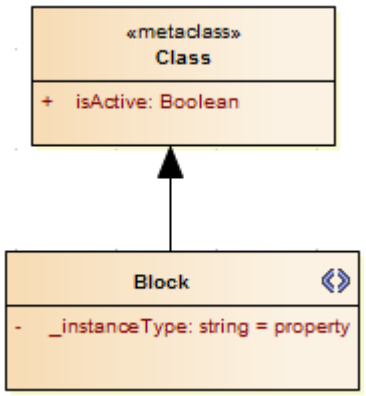


Define Creation of Instance

A stereotyped element can be the classifier of instances created from it. You can define how an instance is created from that stereotyped element, by adding special attributes to the defining Stereotype. The attributes modify the text on the 'Paste As' dialog that displays when a stereotyped element is dragged out of the Browser window onto a diagram.

Attributes

This example from SysML shows the definition of any instances of a SysML Block element that might be created.



When a user drags a SysML Block element from the Browser window onto a diagram, the system checks the _instanceType attribute value and searches the SysML Profile for an element template with a matching _metatype attribute value, and generates the instance from that. With the example definition you would get a Block element with the «property» stereotype.

Attribute	Meaning
_instanceMode	Deprecated Changes the second option for the 'Paste as' field on the dialog to either: • Instance (<element type>) or • Property (Object) The text is determined by the value ('Instance' or 'Property') of the attribute's 'Initial Value' field. If the attribute is not applied, the option defaults to 'Instance'.
_instanceOwner	Deprecated Modifies the second option of the 'Paste as' field on the dialog to: • as Instance of <element type> The text is determined by the value of the attribute's 'Initial Value' field, such as 'Block'. If the attribute is not applied, the option defaults to 'Element'.
_instanceType	Modifies the second option of the 'Paste as' field on the 'Paste as' dialog to: • as Instance of Element (ProfileName::<<stereotype>>) The <<stereotype>> value is defined in the 'Initial Value' field of the attribute, and corresponds to the metatype given to the stereotyped element using the '_metatype' attribute. Note that you can define the creation of an instance using either the _instanceType attribute or a metaconstraint. The differences are:

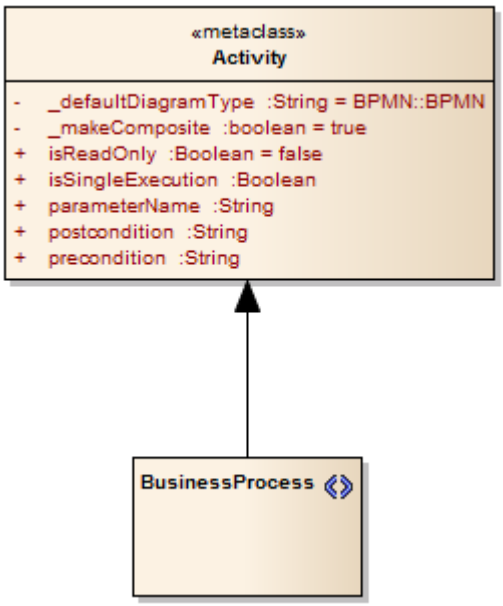
	1. In the 'Paste As' dialog, metaconstraints allow you to define multiple instance stereotypes, which _instanceType does not. The multiple instances are all listed; which is a very useful feature. 2. Metaconstraints (currently) don't have any effect on the 'Convert to Instance' command, which _instanceType does.

Define Composite Elements

A stereotyped element can be created automatically as a composite element. You can define this, and whether the child diagrams of the composite are of a specific type, using special attributes.

To define whether an element is always made composite on creation, you apply the _makeComposite special attribute to the appropriate metaclass element (not to a stereotype element). A stereotyped class, when created, does not default to having a child diagram, so you use the _makeComposite attribute to trigger creation of the child diagram. For a stereotyped composite, the child diagram is of the usual default diagram type for the metaclass; you can change the child diagram type using the _defaultDiagramType special attribute to identify the preferred diagram type,

This example from BPMN shows that a BusinessProcess element is always created as a Composite element with a BPMN custom child diagram.

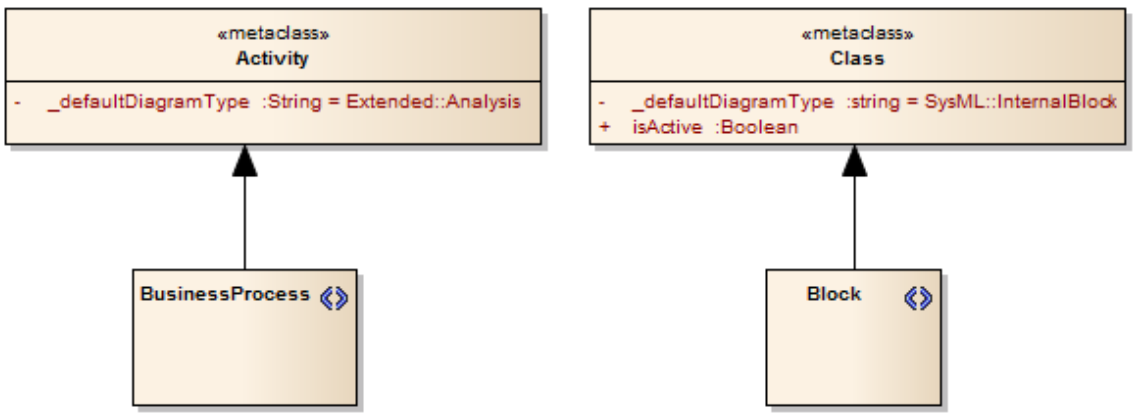


Define Child Diagram Type

If you define a stereotyped element type as being a composite, its child diagram type is initially the same as the default for the Metaclass element you extend. You can change the diagram type to any other of the inbuilt UML or Extended types, or to any of your own Custom diagram types, using the _defaultDiagramType special attribute. As the diagram type defaults from the Metaclass element, you set the attribute on that Metaclass element (and not the Stereotype element) to change the default.

You identify the child diagram type in the 'Initial Value' field for the attribute. The actual values for the inbuilt UML and Extended diagram types are listed in the *Initial Values* section. If you want to set a Custom diagram type, you prefix the diagram type name with the diagram profile name and '::'. The diagram profile name is the name given to the profile when you save it, which by default is the name of the Profile Package or Profile diagram. We recommend that the diagram profile name is based on the technology name. You can also use the _defaultDiagramType attribute for Packages, extending the Package Metaclass element.

These examples show a «BusinessProcess» Activity that, when made a composite element, automatically creates an Analysis diagram, and a «block» stereotype that creates a SysML InternalBlock Custom diagram.



Initial Values

These strings can be used in the 'Initial Value' field for _defaultDiagramType, to identify the inbuilt UML and Extended diagram types:

- UML Behavioral::Use Case
- UML Behavioral::Activity
- UML Behavioral::StateMachine
- UML Behavioral::Communication
- UML Behavioral::Sequence
- UML Behavioral::Timing
- UML Behavioral::Interaction Overview
- UML Structural::Package
- UML Structural::Class
- UML Structural::Object
- UML Structural::Composite Structure
- UML Structural::Component
- UML Structural::Deployment
- Extended::Custom
- Extended::Requirements

- Extended::Maintenance
- Extended::Analysis
- Extended::User Interface
- Extended::Data Modeling
- Extended::ModelDocument.

Notes

- Although we recommend that the diagram profile name for Custom diagram types is based on the technology name, the attribute prefix is not a direct reference to the technology name

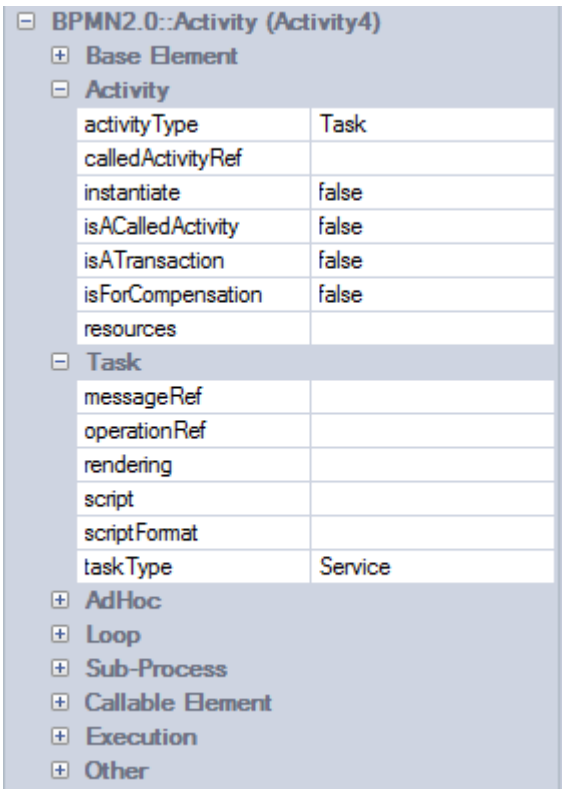
Define Tag Groupings

In developing a stereotyped element in a Profile, you might define a large number of Tagged Values. For example, a BPMN Activity element in the BPMN 2.0 Profile has 30 Tagged Values. By default, in the 'Tags' tab of the Properties window for the element, these Tagged Values would initially all be displayed in alphabetical order, which might split related tags if they happen to have alphabetically distant names. To keep related tags together and control which tags are initially shown, in the BPMN 2.0 Profile the Tagged Values have been grouped. You can apply the same solution, using three tag grouping special attributes in the Metaclass element extended by the Stereotype element in which the tags are defined as attributes.

You apply the grouping using:

- _tagGroups to define the group names
- _tagGroupings to define which tags go into each group
- _tagGroupStates to define which tag groups are initially expanded in the 'Tags' tab of the Properties window, and which are collapsed

The 'Tags' tab of the Properties window for the BPMN 2.0 Activity element initially displays as shown:



Activity Metaclass Attributes

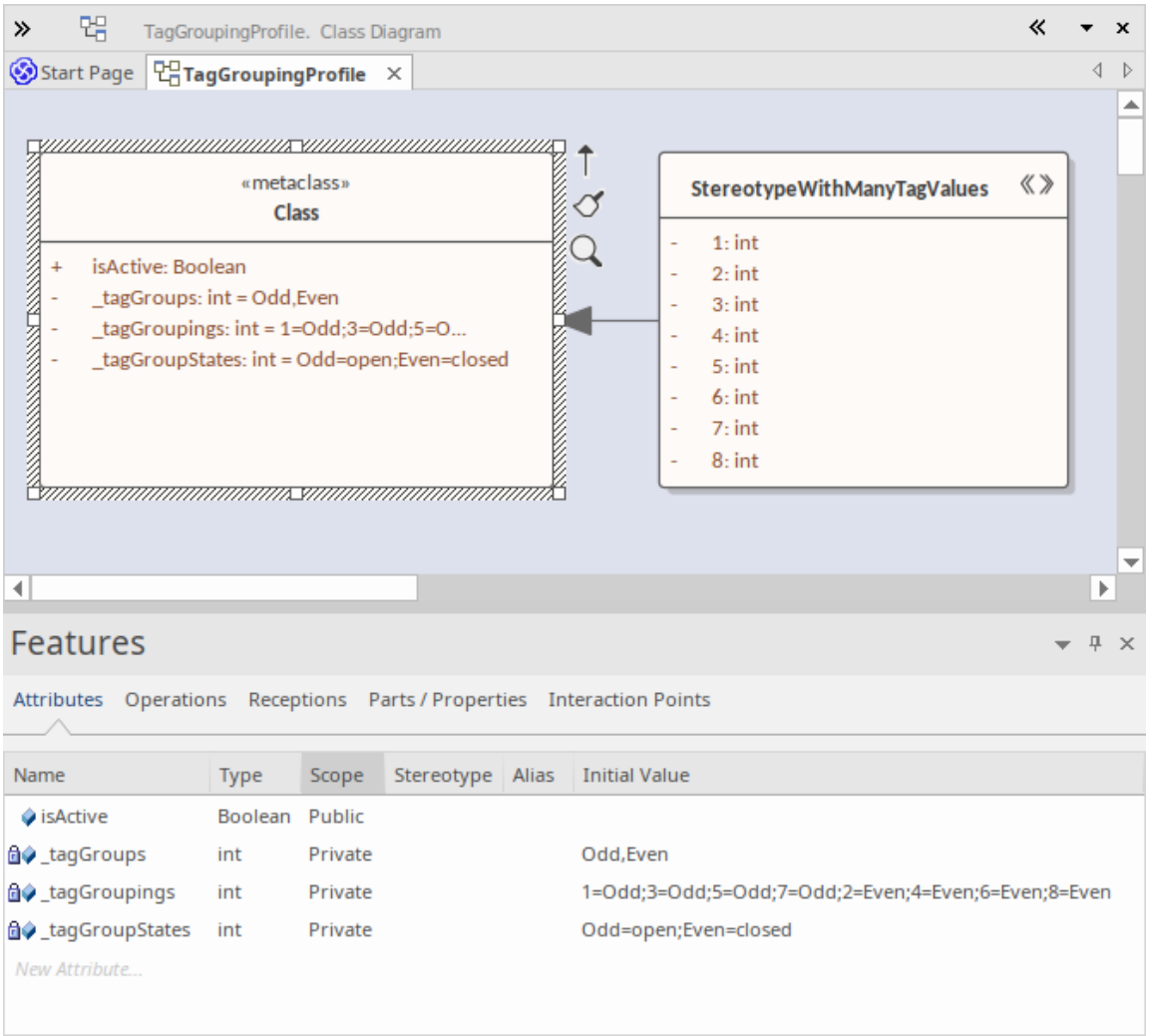
To achieve that display of the BPMN 2.0 Activity Tagged Values, the Technology Developer defined the special attributes in the Activity Metaclass element as shown:

Attribute	Values
_tagGroups	Base Element,Activity,Task,AdHoc,Loop,Sub-Process,Callable Element,Execution,Other
_tagGroupings	auditing=Base Element;categoryValue=Base Element;documentation=Base Element;monitoring=Base

	Element;activityType=Activity;calledActivityRef=Activity;instantiate=Activity;isACalledActivity=Activity;isATransaction=Activity;isForCompensation=Activity;resources=Activity;messageRef=Task;operationRef=Task;rendering=Task;script=Task;scriptFormat=Task;taskType=Task;adHoc=AdHoc;adHocOrdering=AdHoc; ... (and so on)
_tagGroupStates	Base Element=closed;Activity=open;Task=open;AdHoc=closed;Loop=closed;Sub-Process=closed;Callable Element=closed;Execution=closed;Other=closed

Example

Shown here, is an simple example of how to use the tag grouping attributes.



Notes

- This facility currently is available for object types only, not for other types such as attributes

Introducing the Metamodel Views

Enterprise Architect includes an extremely effective and flexible system of Views of both system-defined and user-defined metamodels. The Views system provides highly focused diagrams that limit the number of elements and connections available to only the core required to achieve a specific task. For example, a Hierarchy View imposed on a Class diagram might limit the only element available to 'Class' and the only connector to 'Inheritance'.

Using the Views system to guide the modeling palette and relationships available, you will build tight and purposeful diagrams that use only the required elements within the current modeling context. Cutting out the noise and reducing the set of constructs available is a great way of making sure a design is addressing the intended purpose and avoiding extraneous elements that might negatively impact the readability and correctness of the model.

Metamodel Views

Category	Description
System	Enterprise Architect provides a wide range of built-in Metamodel Views that address numerous modeling scenarios and domains. Many of the Model Wizard patterns are pre-set with a Metamodel View, and the 'New Diagram' dialog includes many derivative diagram views that extend and refine the capabilities of the base diagram types.
Custom	In addition to using the system-defined Metamodel based views in Enterprise Architect, it is also possible to create your own Metamodels and easily add them to the current model, where you and other modelers can then apply them to various diagrams as needed. For example, you might define a specific Metamodel set that addresses the needs of Requirements modeling in your organization, and then mandate that all Requirement diagrams use that Metamodel View.

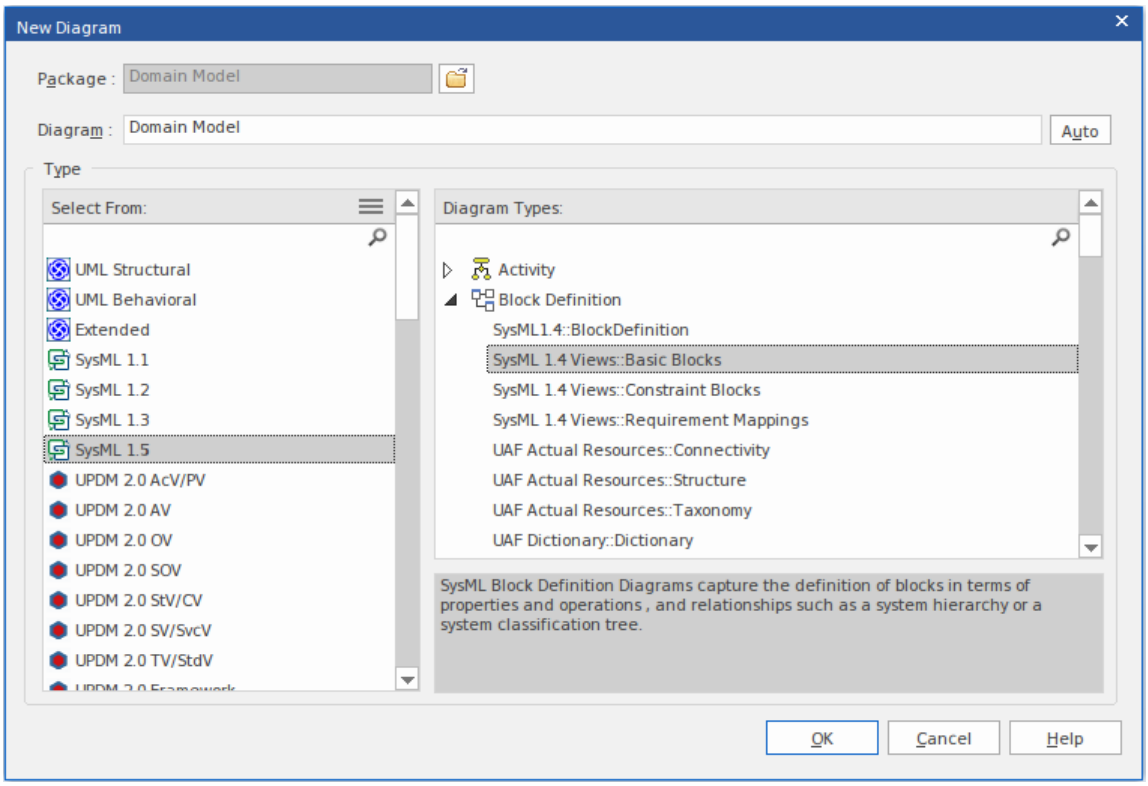
View System Facilities

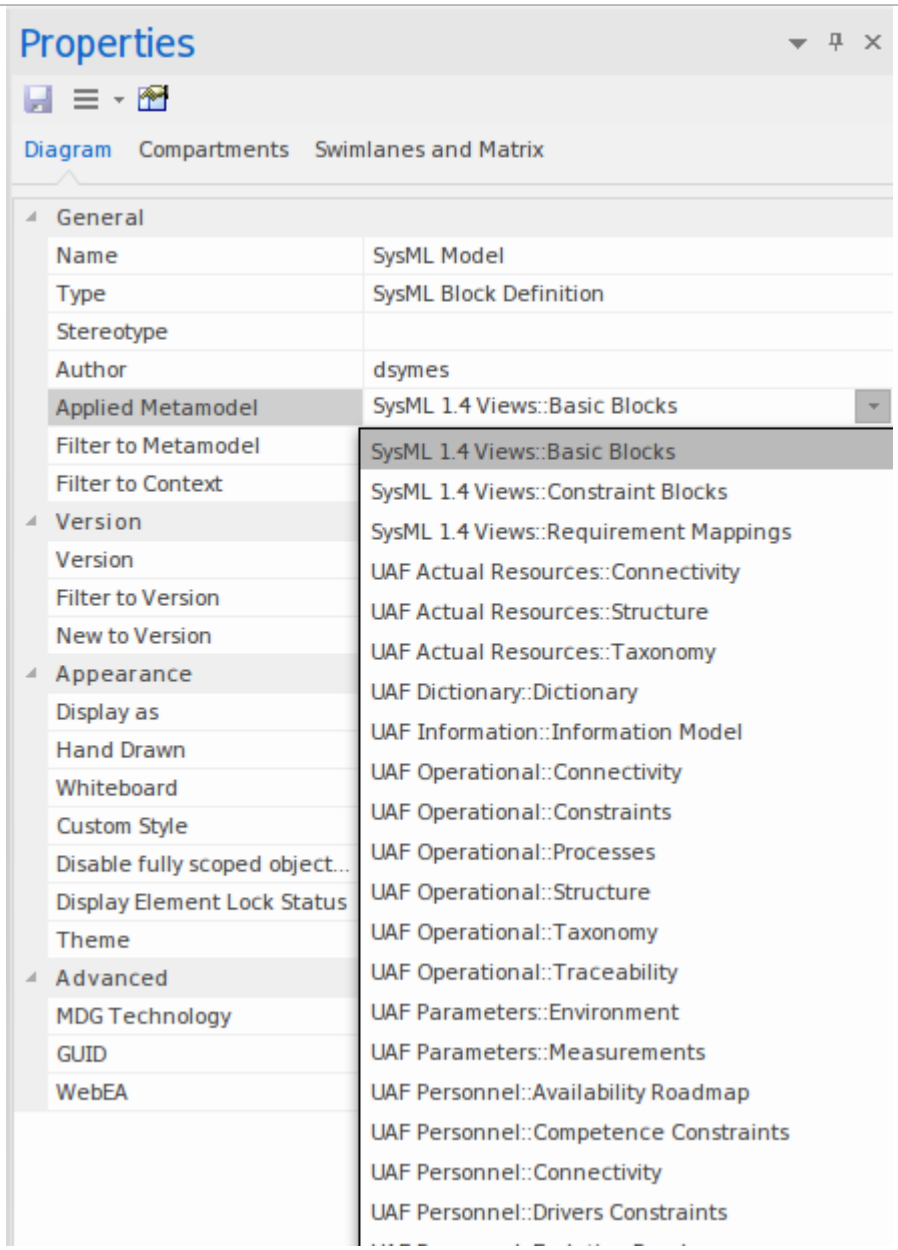
Facility	Description
Diagram Filter	In addition to limiting the available palette, the View system also allows the modeler to enable a diagram filter that will gray out any elements that are not part of the current view set. This allows the modeler to correct any parts of their model that don't meet the purpose of the selected View, or to filter out elements that are required to be there, but do not form part of the current modeling goal.
Diagram Properties	The 'Properties' dialog for a diagram includes a drop-down list of available Views for the currently selected diagram type. Selecting one of these Views will reduce the palette of constructs available and limit the entries in the Quick Linker. Modelers can easily activate a View or even remove one if necessary - the actual model content will not change.
Diagram Views	The 'New Diagram' dialog includes a number of different Views that offer different palette sets and focus goals for diagram types such as UML, SysML, BPMN and UAF, amongst others. If you have the goal of modeling a simple Activity diagram with no advanced features, the Simple Activity View under the UML Activity diagram section could be a better option than using the full Activity diagram set.

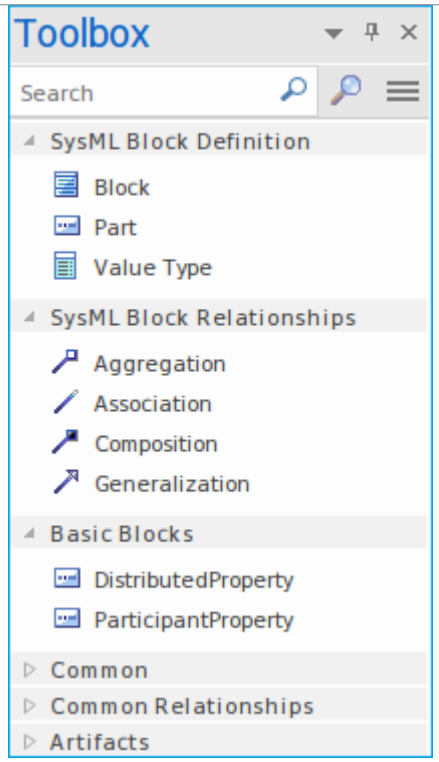
Built-in Metamodel Diagram View

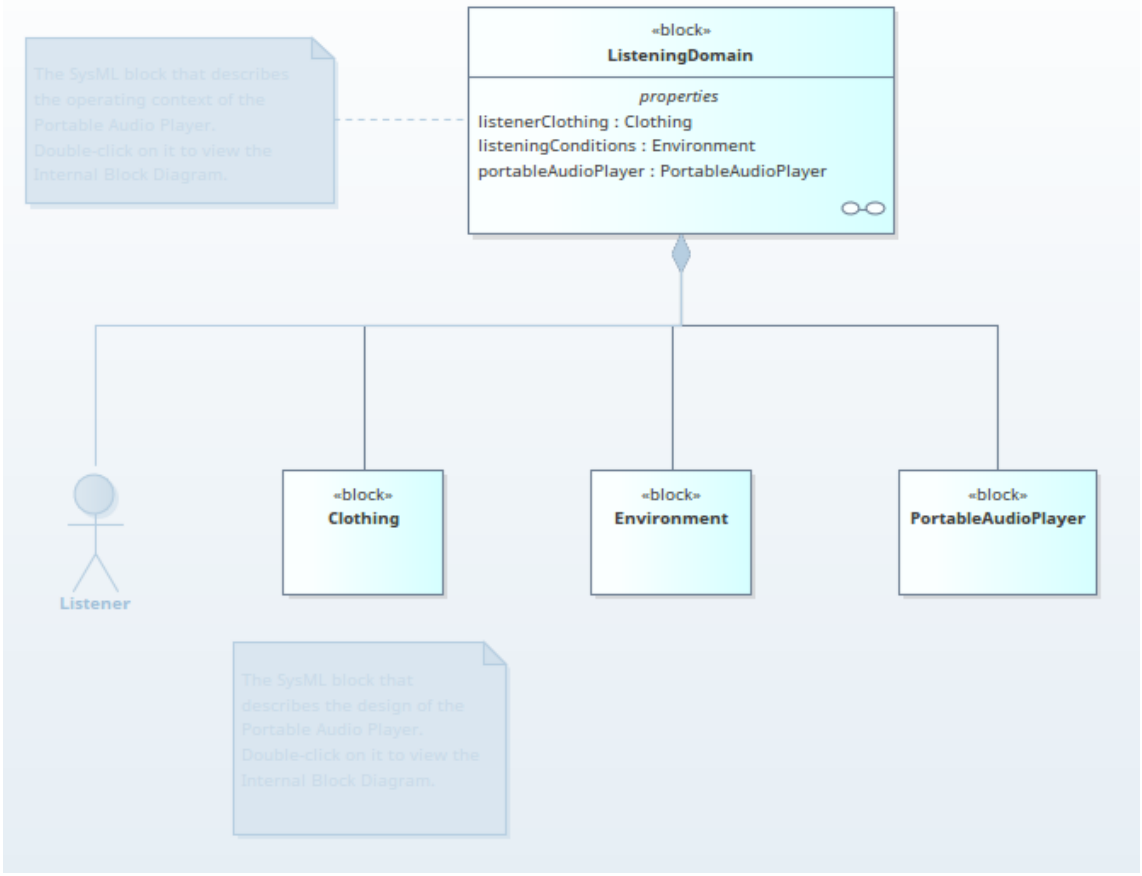
The 'New Diagram' dialog includes a number of different Views that offer different palette sets and focus goals for diagram types such as UML, SysML, BPMN and UAF, amongst others. As an example, if you have the goal of modeling a simple SysML Block Definition diagram with no advanced features, the 'Basic Blocks View' under the 'SysML 1.5 Block Definition Diagram' section might be a better option than using the full Block Definition diagram set. This example is used to provide values in the procedures in this topic.

Working with Diagram Views

Step	Action
1	In the Browser window, click on the Package or element under which to place the diagram. Open the 'New Diagram' dialog, select 'SysML 1.4 Views:: Basic Blocks' and click on the OK button to create the diagram. 
2	In the Properties window for the created diagram, the 'Applied Metamodel' field will show the applied diagram View. You can also click on the drop-down arrow in this field and select another of the available diagram Views from the list.

	
3	In the Diagram Toolbox, the restricted set of elements and relationships associated with the diagram view will be visible.

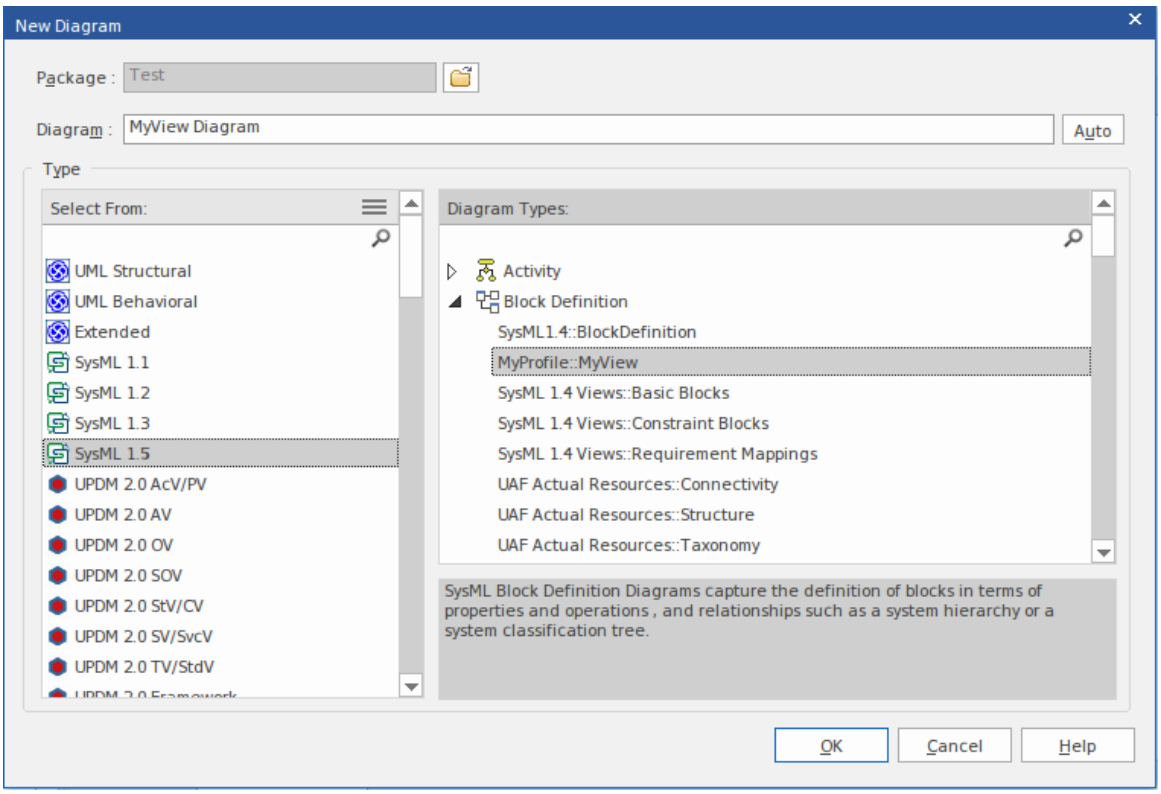
	 Changing the diagram views in the 'Applied Metamodel' option list will change the elements and relationships in the Toolbox.
4	Selecting the 'Filter to Metamodel' option in the Properties window will gray out any elements that are not part of the current diagram View set. This allows you to correct any parts of your model that don't meet the purpose of the selected View, or to filter out elements that might be required to be there, but do not form part of the current modeling goal.


«block»
ListeningDomain
properties
listenerClothing : Clothing
listeningConditions : Environment
portableAudioPlayer : PortableAudioPlayer
The SysML block that describes the operating context of the Portable Audio Player. Double-click on it to view the Internal Block Diagram.
Listener
«block»
Clothing
«block»
Environment
«block»
PortableAudioPlayer
The SysML block that describes the design of the Portable Audio Player. Double-click on it to view the Internal Block Diagram.

Custom Metamodel Diagram View

Enterprise Architect has a wide range of built-in diagram views, but you can also create your own Metamodels that define custom diagram Views. For example, you might define a specific Metamodel that addresses the needs of Requirements modeling in your organization, and then mandate that all Requirements diagrams use that diagram View instead of the built-in Requirement diagram Views. You can quickly add your diagram Views to the current model, where you or other modelers can apply them to your diagrams.

As an illustration, suppose you decide to make available a new SysML 1.4 Block Definition diagram View in your project, called 'MyView'. Users will access it through the 'New Diagram' dialog, expanding the Block Definition diagram type.

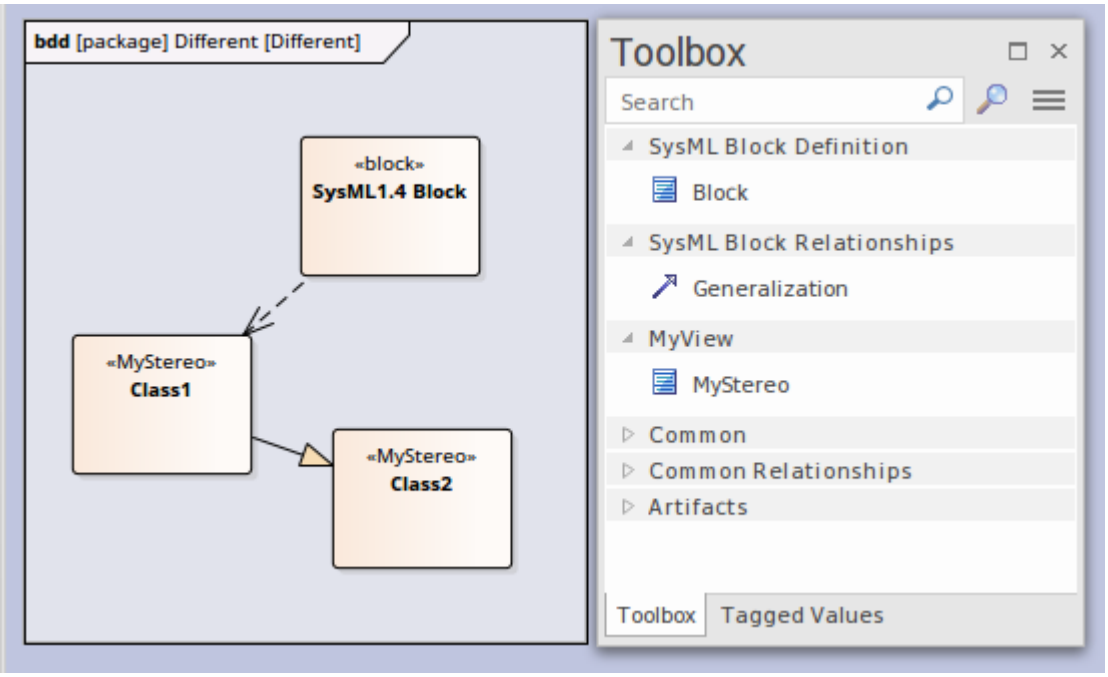


The fully extended name of the diagram View reflects the parent Profile name (MyProfile) and the View name (MyView) - hence 'MyProfile::MyView'. You could call the example View SysML 1.4 Views:: MyView to indicate that it is a member of the SysML 1.4 View suite.

If you are extending a UML base diagram type, with the Profile name 'UML', the equivalent View name could be something such as 'UML::Full Class'.

The users select the example diagram View to create a very simple SysML 1.4 Block diagram that can have:

- Two types of element:
  - a SysML 1.4 Block element (an extended Class from the SysML 1.4 technology)
  - a MyStereo element that you are defining within your new metamodel 'MyView' as a Class with the stereotype MyStereo
- One type of connector - a standard SysML Block Generalization (which is the same as a standard UML Generalization)



The diagram View makes the elements and connector available from the Toolbox, as shown, and from the Quick Linker.

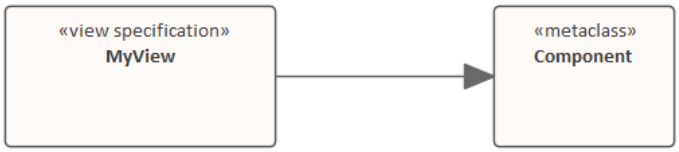
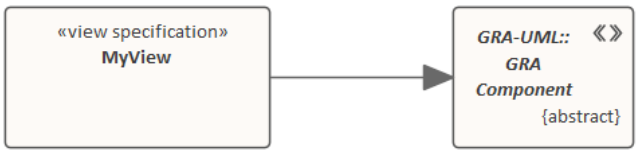
The table *Create Custom Diagram View in a Profile* explains how to create a Metamodel that defines a new diagram View, finishing with the MyView example.

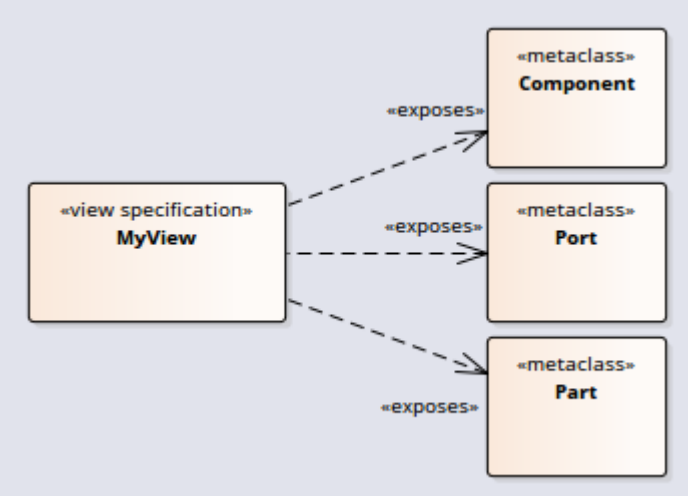
Access

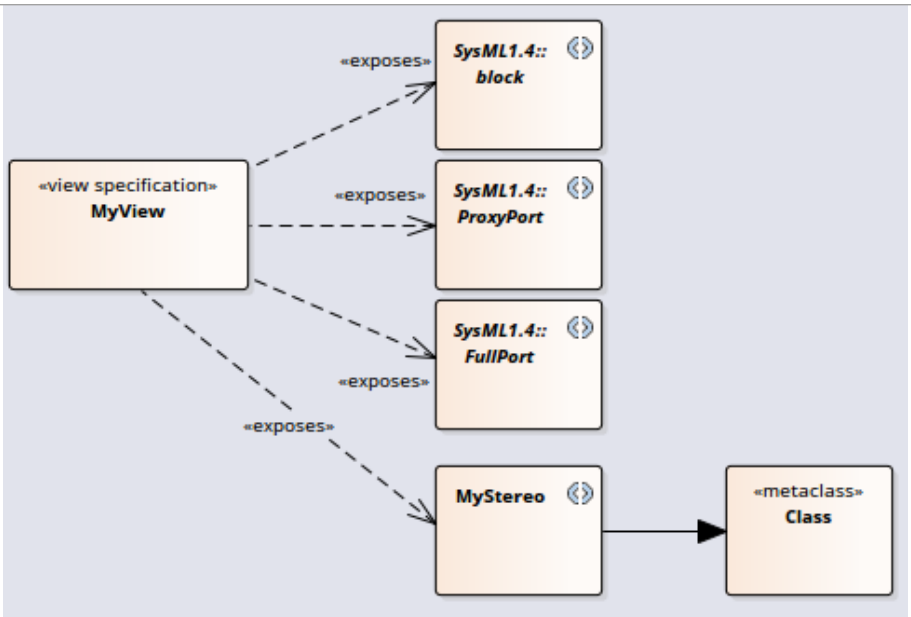
Ribbon	Design > Diagram > Toolbox: > Profile > Metamodel
Keyboard Shortcuts	Ctrl+Shift+3 : > Profile > Metamodel

Create Custom Diagram View in a Profile

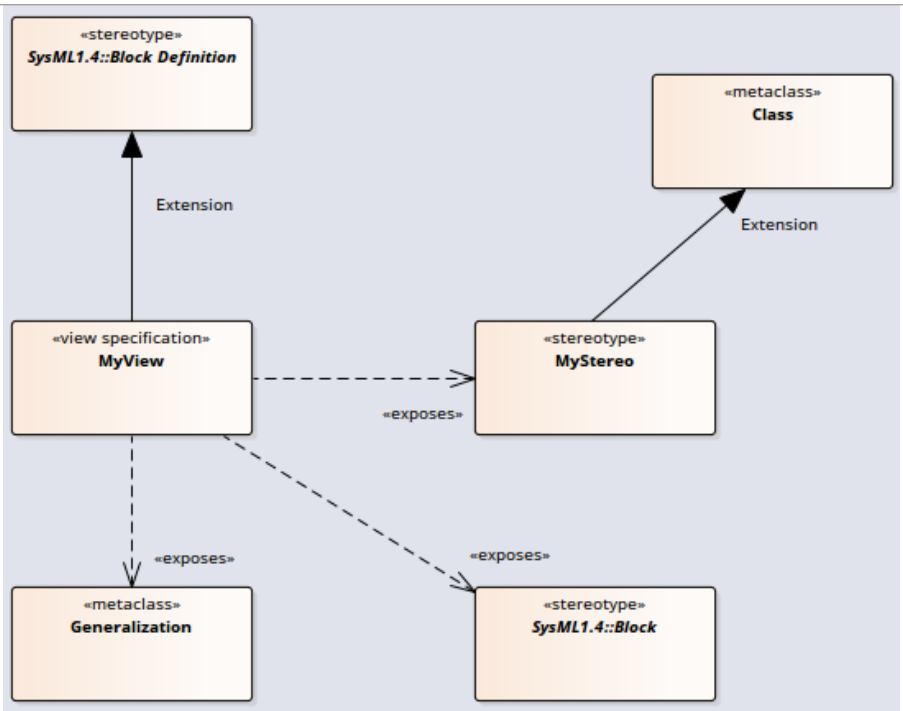
Operation	Action
Create the Profile diagram	In your profile Package, create a new Package diagram and, in the Diagram Toolbox, open the 'Profile' page (select the 'Design > Diagram > Toolbox' ribbon option, then click on and select 'Profile'). Drag the 'Profile' icon onto the diagram and give it the name 'MyProfile', selecting to add a child Class diagram of the name 'MyView', which you open. Expand the 'Metamodel' page in the Toolbox and note the: • 'View Specification' element, which you can use to create a custom diagram View • 'Exposes' connector, which you use to specify the contents of the Toolbox page associated with the custom diagram View
Add View Specification	Within a Profile, you use the 'View Specification' stereotyped element to identify the new custom diagram View as an extension of an existing built-in or stereotyped

	diagram. Drag the 'View Specification' icon onto the Profile diagram, and give the element a name; in our example, 'MyView'. The first thing to consider when defining a new View, is what diagram type or types it should be available for. The next two rows show how to define a View for a UML diagram and a Profile diagram. In both cases, click on the 'Extension' icon and drag from the View Specification to the diagram-type element, to create the Extension connector.
Extending a UML Diagram Type	To extend a base UML diagram type, drag the 'Class' icon from the Toolbox onto the diagram and, on the Properties window, give the element: • The exact name of the diagram type (as listed in the *Built-in Diagram Types* Help topic) such as 'Logical' (for a Class diagram), and • The stereotype <<metaclass>> This example shows 'MyView' as previously created, extending the UML Component diagram.  The result is that in the 'New Diagram' dialog, an extra View is added under the UML Component Diagram type.
Extending a Profiled Diagram Type	To extend a profiled diagram type, such as a BPMN or SysML diagram type, drag the 'Stereotype' icon onto the diagram and give the Stereotype element the exact fully qualified name of the diagram type. Because this is a reference to an external stereotype, it should also be marked as Abstract to prevent it being exported into the profile. To do that, display the Properties window, expand the 'Advanced' section and select the 'Abstract' checkbox. This example shows 'MyView' as previously created, extending the GRA-UML Component Diagram type.  The result is that the 'New Diagram' dialog will show the View we are defining under the GRA-UML component diagram. Note: If you do not know the fully qualified name of the diagram type you are extending, query the API to get the 'Metatype' field. In a JavaScript console you can use: **?**GetCurrentDiagram**().**MetaType
Exposing Objects in the Diagram View Toolbox	An Exposes connector adds an object to the Toolbox page for the diagram View. For each element and connector to add to the diagram View's Toolbox page, you drag a 'definition element' onto the diagram and then click on the 'Exposes' icon in the Toolbox 'Profile' page and drag the cursor from the View Specification element to the 'definition element' to create the connector. The type of definition element depends on whether you are exposing a base UML element or a stereotyped element, as shown in the next two rows.

Exposing UML Element Types	If you are using base UML element or connectors in your custom diagram View, then for each element or connector: 1. Drag the 'Metaclass' icon from the Toolbox 'Profile' page onto the diagram and give it the name of the base element or connector type it represents and 2. Add the Exposes connector between the View Specification element and the Metaclass element For example: 
Exposing Profiled Element Types	If you are defining a new stereotyped object in the diagram view, or using stereotyped elements already defined in other profiles, then for each element or connector: 3. Drag the 'Stereotype' icon from the Toolbox 'Profile' page onto the diagram, and give the element the name of the stereotyped element or connector it represents 4. If the Stereotype is defined in another profile, expand the 'Advanced' section of the Properties window and select the 'Abstract' checkbox 5. If the Stereotype is being defined here, add to the diagram the base element that the Stereotype extends, and create an Extension connector between the Stereotype and base element 6. Add the Exposes connector between the View Specification element and the Stereotype element For example:



Completing the Example	With reference to the earlier rows in the table, on the MyView Class diagram (the child of the MyProfile diagram): 7. Create the View Specification element MyView. 8. Create the Stereotype element SysML1.4::Block Definition and set it to Abstract. 9. Connect the View Specification to the SysML1.4::Block Definition with an Extension connector. 10. Create a Metaclass element called Generalization. 11. Create a Stereotype element called SysML1.4::Block and set it to Abstract. 12. Create a Stereotype element called MyStereo and a Metaclass element called UML Class and connect the Stereotype to the Metaclass with an Extension connector. 13. Connect the View Specification element to the Generalization element, the SysML1.4::Block element and the MyStereo element, each with an Exposes connector. This illustration represents the diagram that you have created:



As you complete your diagram view, you might decide that elements of one type should be connected to elements of the same type or of other types by using specific kinds of connector. You would define this using Meta-Relationship connectors, as discussed in the *Define Metamodel Constraints* Help topic.

Save the View Specification diagram. You can now can add it to an MDG Technology file as part of its parent Profile; you add the parent Profile to the 'MDG Technology Wizard - Profile files selection' page. See the *Add a Profile* Help topic.

Define Metamodel Constraints

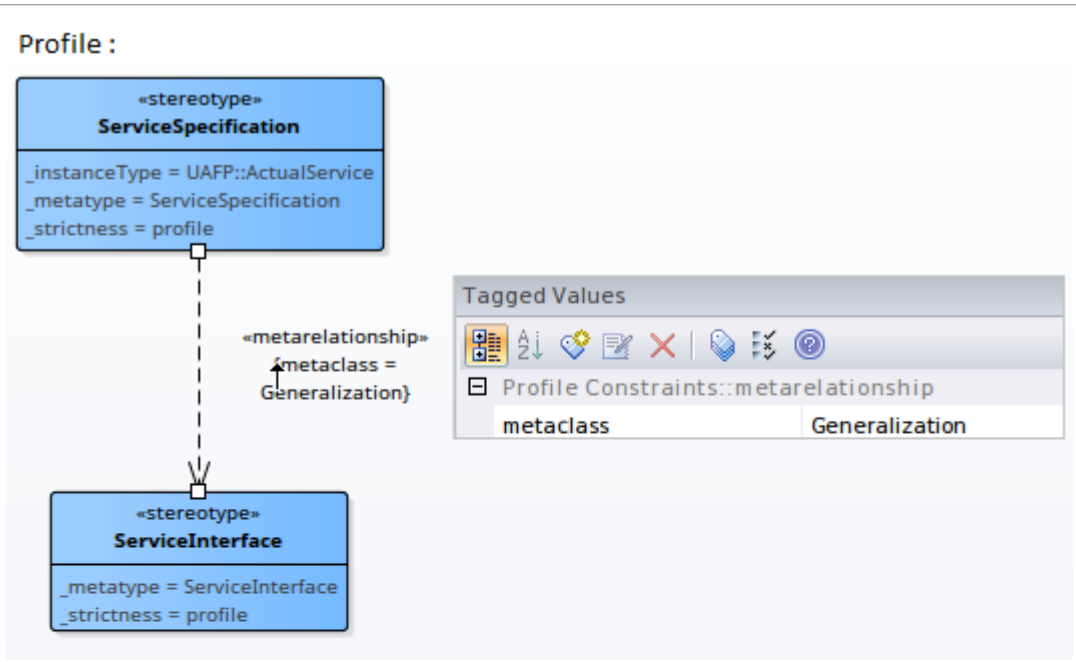
When extending UML to develop a domain-specific Profile, Enterprise Architect allows you to specify constraints to restrict the connectors that can be drawn from a Stereotype, either using the Quick Linker or from the Toolbox. These constraints are defined using the relationships under the 'Metamodel' page of the 'Profile' toolbox.

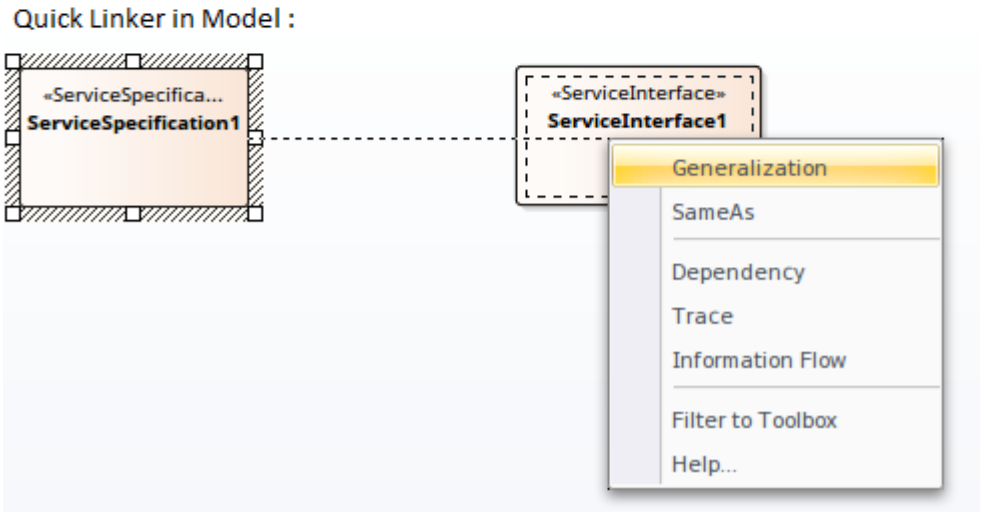
Access

Ribbon	Design > Diagram > Toolbox:  > Profile
Keyboard Shortcuts	Ctrl+Shift+3

Add Metamodel Constraints to a Profile

Item	Detail
Meta-Relationship	A «metarelationship» connector between two Stereotypes is used to specify a valid UML Connector between these two Stereotypes. The name of the UML Connector should be set in the tag 'metaclass' on the «metarelationship» connector.

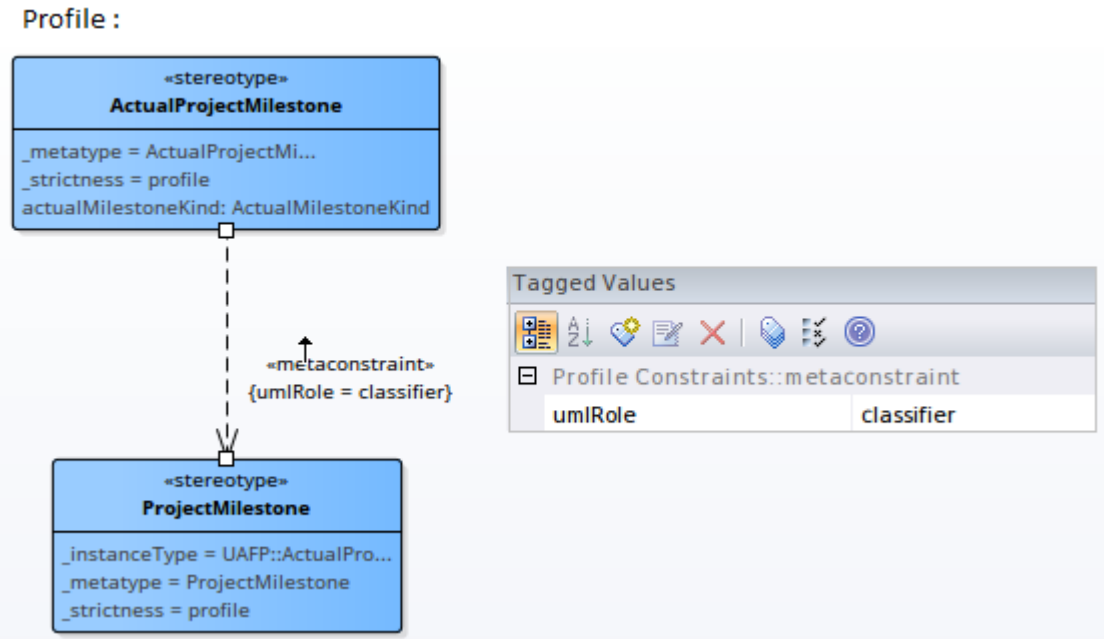




In the Profile example, a «metarelationship» connector is drawn from ServiceSpecification to ServiceInterface and the name of the UML Connector is specified in the 'Tags' tab of the Properties window for the connector.

After importing this Profile into a model, Enterprise Architect will show the UML Connector when the Quick Linker is used to draw a relationship between a ServiceSpecification and ServiceInterface.

Meta-Constraint	A «metaconstraint» connector between two Stereotypes is used to specify a constraint between these two Stereotypes. The constraint should be set in the tag 'umlRole' on the Meta-Constraint connector.



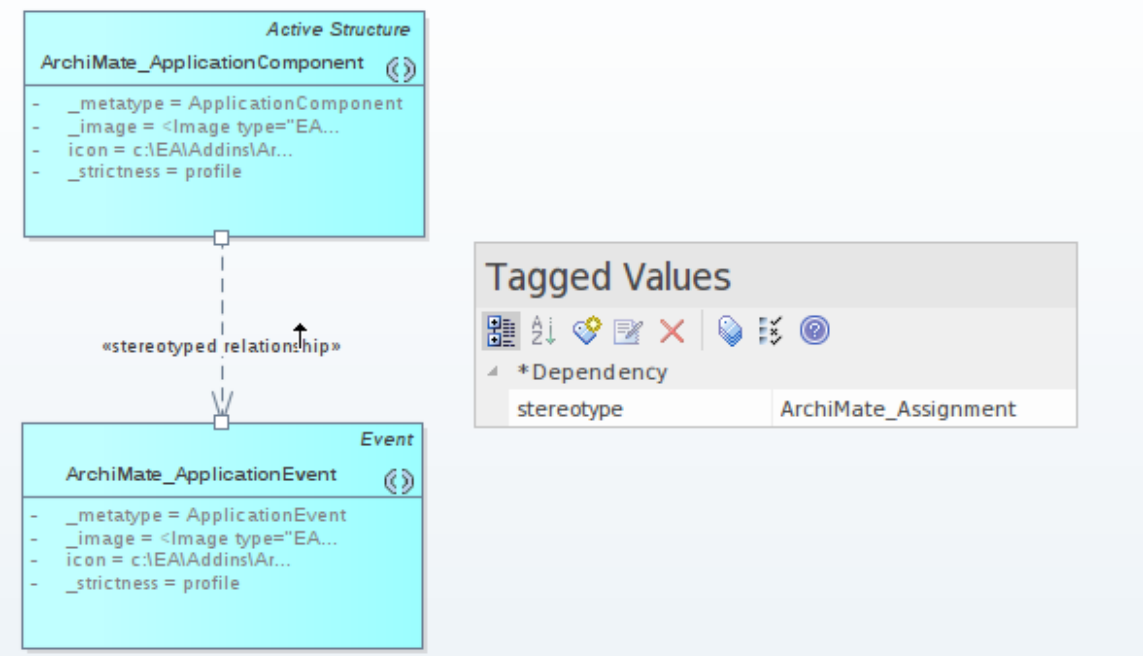
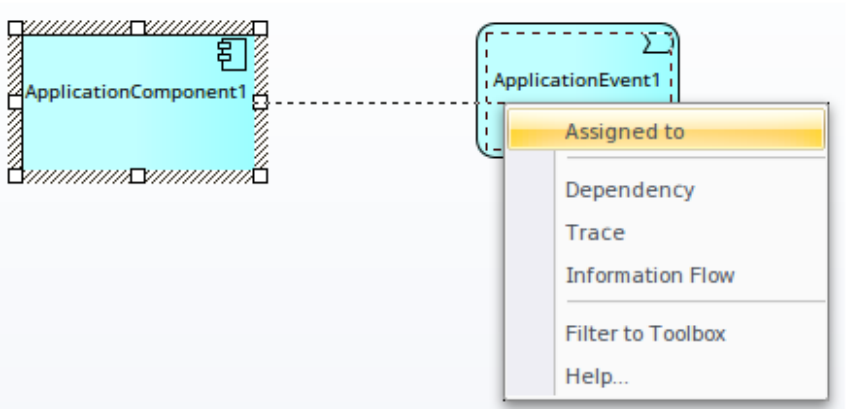
In the Profile example, a «metaconstraint» connector is drawn from ActualProjectMilestone to ProjectMilestone and the constraint is specified as classifier on the tag 'umlRole' in the connector's Tagged Values.

After importing this Profile into a model, Enterprise Architect will show only the ProjectMilestone stereotyped elements when assigning a classifier for ActualProjectMilestone element.

Constraint values for the tag 'umlRole' include:

- classifier – restricts the classifier for the source Stereotype element to the target Stereotype element
- type – restricts the type for the source Stereotype element to the target Stereotype element
- behavior - restricts the behavior for the source Stereotype element to the target Stereotype element
- conveyed - restricts the conveyed element for the source Stereotype element to the target Stereotype element
- slot - restricts the slot for the source Stereotype element to the target Stereotype element
- client/source/end[0].role/informationSource – restricts the source of a connector to the target Stereotype element
- supplier/target/end[1].role/informationTarget - restricts the target of a connector to the target Stereotype element
- realizingConnector/realizingActivityEdge/realizingMessage - restricts the relationship that can realize an information flow
- typedElement/instanceSpecification – when dropping as classifier from the Browser window, this constraint restricts the type to the target Stereotype element
- owner/class/activity/owningInstance – restricts the container of this element to the target Stereotype element; this constraint is used to create embedded element rules for the Quick Linker and validate nesting during Model Validation
- ownedElement/ownedAttribute/ownedOperation/ownedParameter/ownedPort – restricts the element/attribute/operation/parameter/port that can be owned by the source Stereotype element; this constraint is typically used to validate nesting during Model Validation
- annotatedElement/constrainedElement – restricts the target of a Note Link connector to the target Stereotype element

Stereotyped Relat	You can use a «stereotyped relationship» connector between two Stereotypes or Metaclasses to specify a valid stereotyped connector between *instances* of those elements. When specifying the relationship, if the relationship being referenced is defined in the profile in which the rule is defined, the stereotype property can be set to only the name of that stereotype. However, if the

ions hip	relationship is defined in another profile you must use a fully qualified stereotype name corresponding to where the stereotype is defined. Profile :  Quick Linker in Model :  In the Profile example, a «stereotyped relationship» connector is drawn from ApplicationComponent to ApplicationEvent and the stereotype of the relationship is set to 'Assignment' in the connector's Tagged Values. After importing this Profile into a model, Enterprise Architect will show the 'Assigned' option when the Quick Linker is used to draw a relationship between an ApplicationComponent and ApplicationEvent.

Special Metaclasses

You can specify the source of a connector to be a superclass of all specialized forms, and the target to a special metaclass that specifies a relationship to the actual metaclass when it is used. You use one of these terms as the element name for a Class element with the stereotype «metaclass».

Item	Detail

source.metatype	The target element must match the exact stereotype defined at the source.
source.metatype.general	The target element can match the exact stereotype used at the source, and any concrete (isAbstract=false) generalized stereotypes.
source.metatype.specific	The target element can match the exact stereotype used at the source, and any concrete (isAbstract=false) specialized stereotypes.
source.metatype.both	The target element can match the exact stereotype used at the source, and any concrete (isAbstract=false) generalized or specialized stereotypes.
<profile_name>::*	Replace '<profile_name>' with the name of a profile; this will expand to a list of all the concrete stereotypes in the given profile.
<none>	Use this metaclass name when you want to prevent the source element from inheriting the specified connector from its supertypes.

Constraints on Meta-Constraint Connector

When creating a domain-specific Profile, Enterprise Architect allows you to specify constraints between related Stereotypes. As an example, you can restrict the element that can be set as a classifier on a Stereotyped element.

A Meta-Constraint connector, on the 'Metamodel' page of the 'Profile' toolbox, between two Stereotypes is used to specify the constraint between the two Stereotypes. The constraint should be set in the tag 'umlRole' on the Meta-Constraint connector.

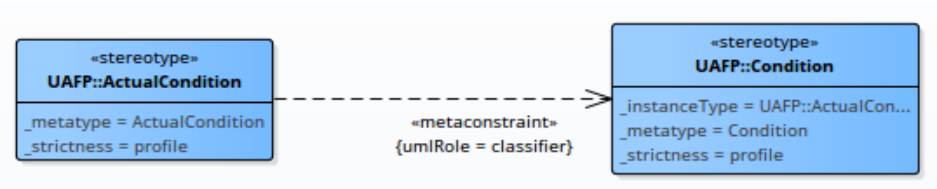
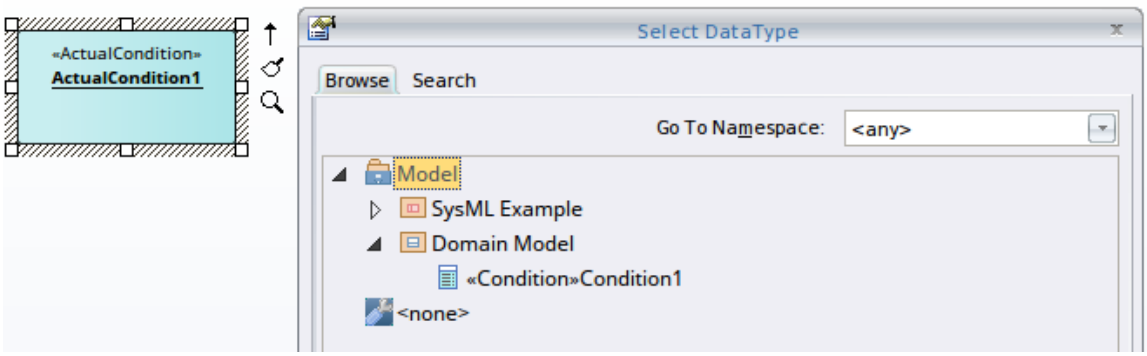
Access

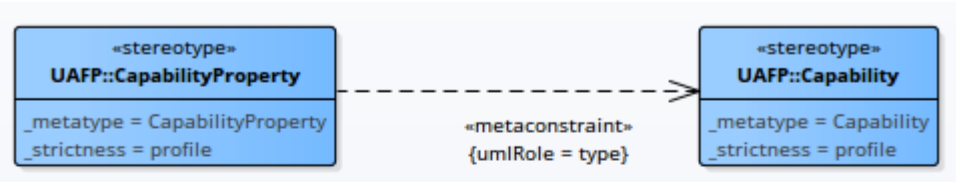
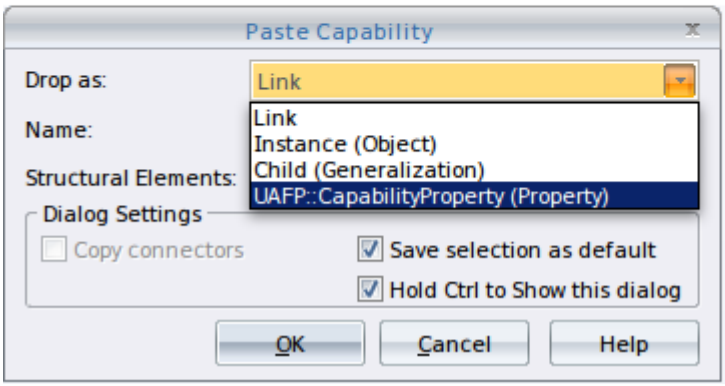
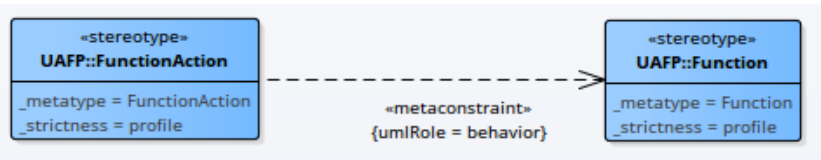
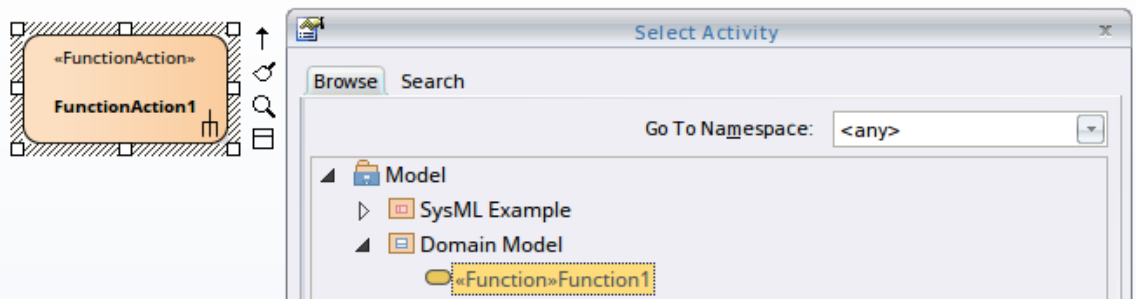
Ribbon	Design > Diagram > Toolbox : > Profile > Metamodel
Keyboard Shortcuts	Ctrl+Shift+3 : > Profile > Metamodel

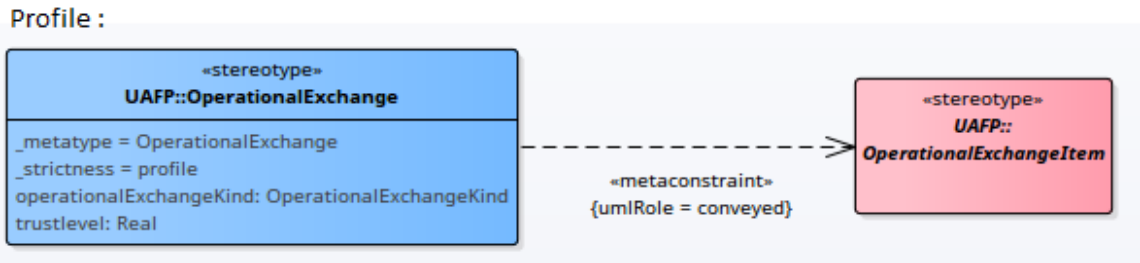
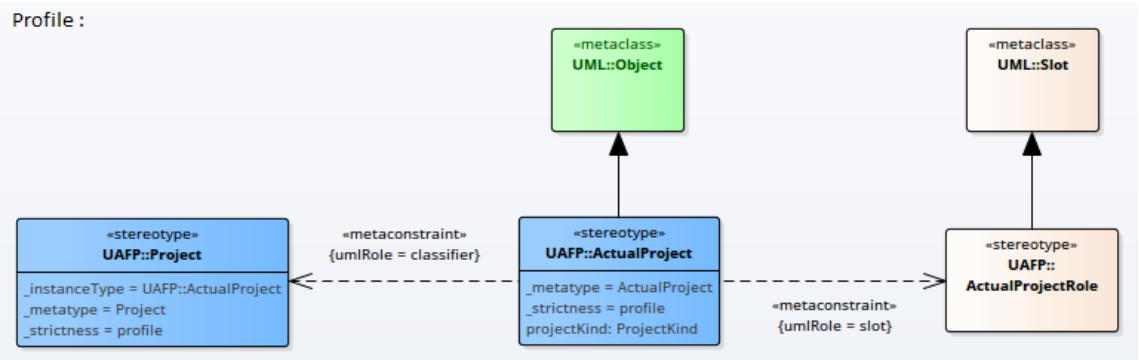
Constraint values for tag 'umlRole'

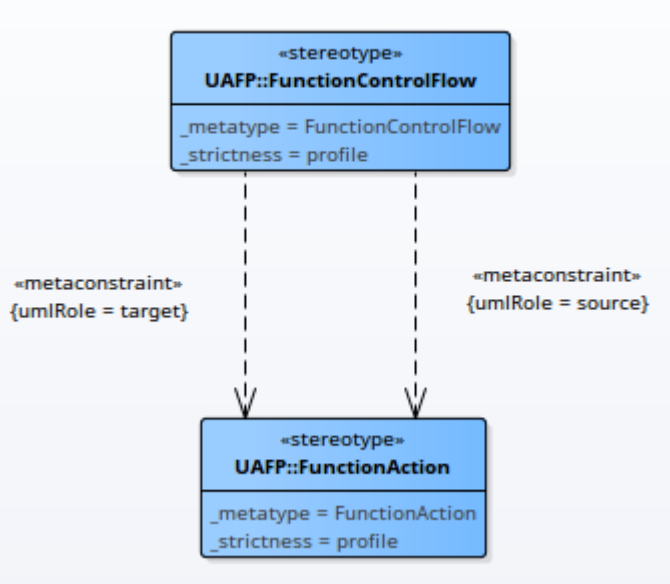
(NOTE: The table below presents all of the acceptable constraint values for the tag 'umlRole'. The values are case-sensitive and should be entered just as they are shown in the table.)

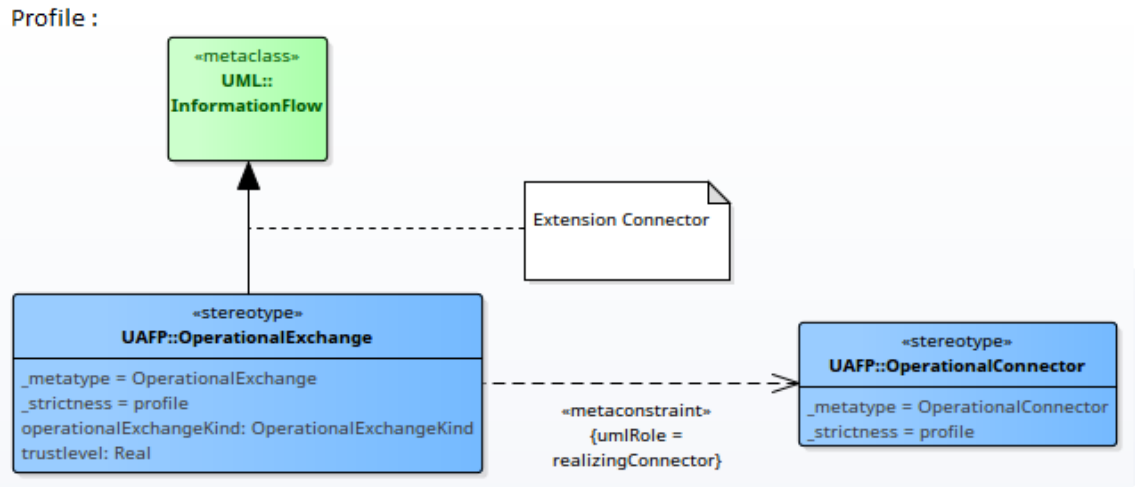
Constraint values for the tag 'umlRole' on the Meta-Constraint connector are:

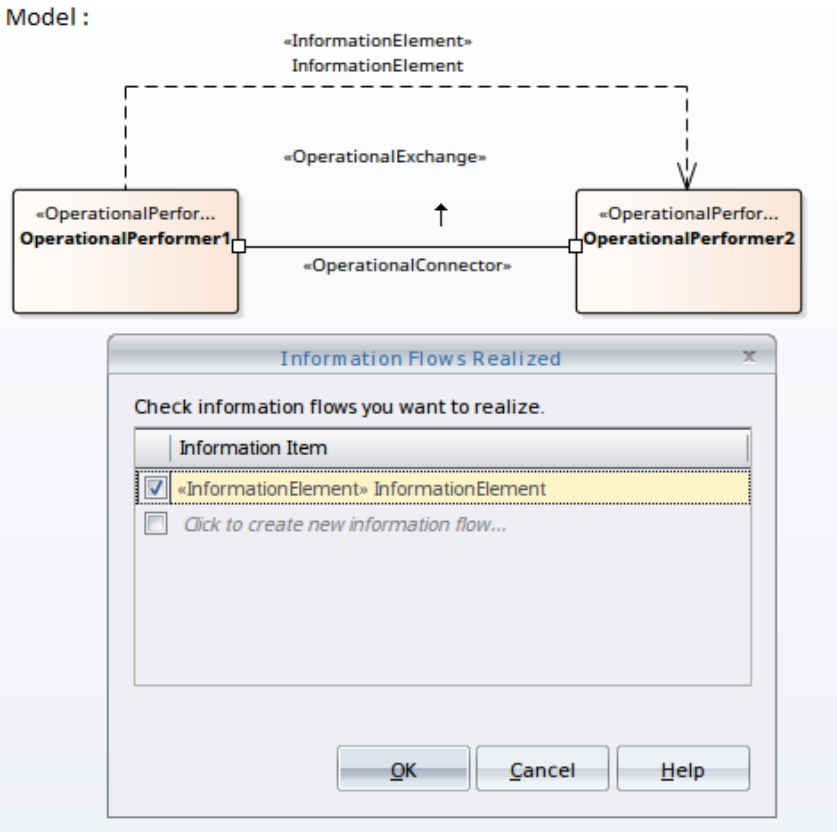
Constraint	Description
classifier	Set this constraint to restrict the classifier for the source Stereotype element as the target Stereotype element. Profile :  Model :  In the Profile example, a Meta-Constraint connector is drawn from the stereotype ActualCondition to Condition and the constraint is specified as 'classifier' on the tag 'umlRole' in the connector's list of Tagged Values. This means that only a 'Condition' stereotyped element can be set as the classifier for an

	ActualCondition stereotyped element. After importing this Profile into a model, Enterprise Architect will show only Condition stereotyped elements in the 'Select DataType' dialog when setting the DataType for an ActualCondition stereotyped element.
type	Set this constraint to specify the type for the target Stereotype element when it is dropped from the Browser window into a diagram while pressing and holding the Ctrl key. Profile :  Model :  In the Profile example, a Meta-Constraint connector is drawn from the stereotype CapabilityProperty to Capability and the constraint is specified as 'type' on the tag 'umlRole' in the 'Tags' tab of the connector's Properties window. After importing this Profile into a model, when a Capability stereotyped element is dropped from the Browser window into a diagram while pressing and holding the Ctrl key, the 'Paste <item>' dialog will display CapabilityProperty as one of the options in the 'Drop as' list.
beha vior	Set this constraint to restrict the behavior for the source Stereotype element to the same as the target Stereotype element. Profile :  Model :  In the Profile example, a Meta-Constraint connector is drawn from stereotype FunctionAction to Function and the constraint is specified as 'behavior' on the tag 'umlRole' in the 'Tags' tab of the Properties window

	for the connector. This means that only a 'Function' stereotyped element can be set as classifier for a FunctionAction stereotyped element. After importing this Profile into a model, Enterprise Architect will show only Function stereotyped elements in the 'Select Activity' dialog when setting the behavior for a FunctionAction stereotyped element.
conveyed	Set this constraint to restrict the Information Items that can be conveyed on a Stereotype that extends the Information Flow connector.  In the Profile example, a Meta-Constraint connector is drawn from stereotype OperationalExchange to OperationalExchangeItem and the constraint is specified as 'conveyed' on the tag 'umlRole' in the 'Tags' tab of the Properties window for the connector. This means that when an OperationalExchange connector is drawn, the Information Items that can be conveyed on the connector are restricted to OperationalExchangeItem stereotyped elements.
slot	Set this constraint to restrict the slot for the Stereotype element as the target Stereotype element.  In the Profile example, a Meta-Constraint connector is drawn from the stereotype ActualProject to ActualProjectRole and the constraint is specified as 'slot' on the tag 'umlRole' in the connector's Tagged Values. Note that the stereotype 'ActualProject' extends UML Object and can classify stereotype 'Project'. When an instance specification for the Project element is created (by dropping it from the Browser window into a diagram while pressing and holding the Ctrl key) in the model: • The created instance specification will be stereotyped ActualProject • Any Property in the 'Project' stereotyped element will be created as an 'ActualProjectRole' stereotyped Property in the instance specification
client/ source/ end[0].role/ informationSource	Set this Model Validation constraint to restrict the start element of a Stereotyped connector.

	Profile :  In the Profile example, a Meta-Constraint connector is drawn from stereotype 'FunctionControlFlow' to 'FunctionAction' and the constraint is specified as 'source' on the tag 'umlRole' in the connector's Tagged Values. This means that when a FunctionControlFlow connector is drawn, the source element should be a FunctionAction stereotyped element. Otherwise, Enterprise Architect will flag an error when performing a Model Validation.
supplier/ target/ end[1].role/ informationTarget	Set this model validation constraint to restrict the target element of a Stereotyped connector.
realizingConnector/ realizingActivityEdge/ realizingMessage	Set this constraint to restrict the relationship that can realize an Information Flow connector.





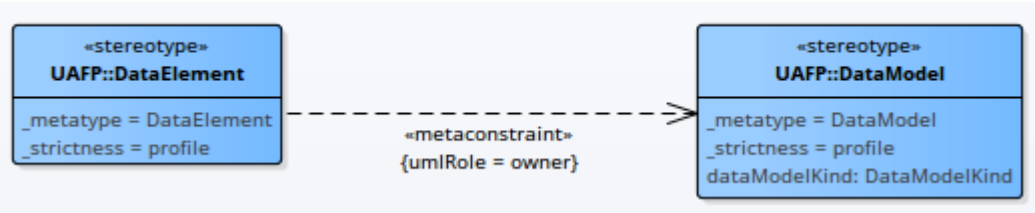
In the Profile example, a Meta-Constraint connector is drawn from stereotype OperationalExchange (which extends a UML InformationFlow metaclass) to OperationalConnector and the constraint is specified as 'realizingConnector' on the tag 'umlRole' in the connector's Tagged Values. This means that when an OperationalConnector connector is drawn, the Information Flow connector that can be realized on this connector can be an OperationalExchange stereotyped connector.

typedElement / instanceSpecification	When dropping as classifier from the Browser window, this constraint restricts the available type to the target Stereotype element.

owner/ class/ activity/ owningInstance

Set this constraint to restrict the container/owner of the element to the target Stereotype element. This constraint is used to create embedded element rules for the Quick Linker and to validate nesting during Model Validation.

Profile :

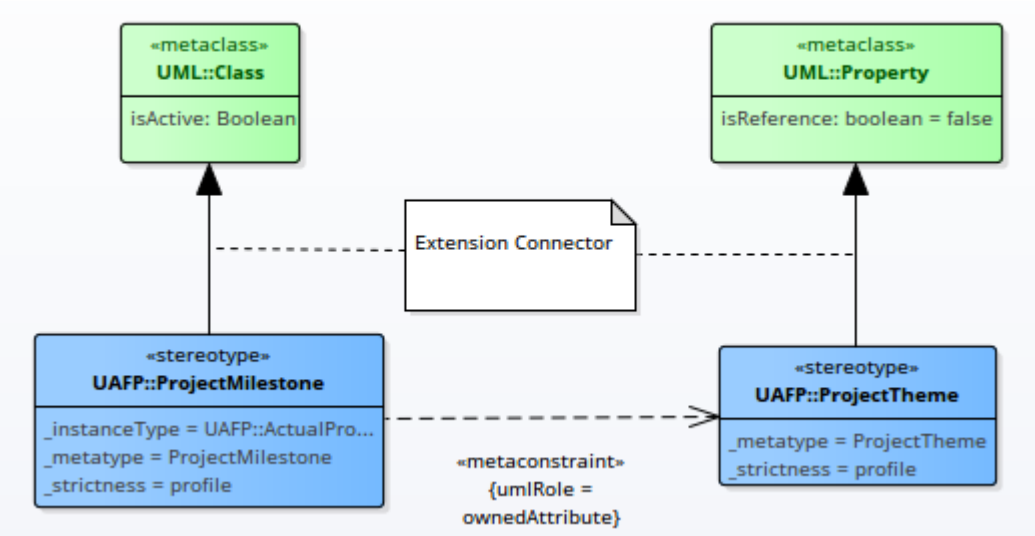


In the Profile example, a Meta-Constraint connector is drawn from the stereotype DataElement to DataModel and the constraint is specified as 'owner' on the tag 'umlRole' in the connector's Tagged Values. This means that DataElement stereotyped elements can be children of DataModel stereotyped element. In other words, only DataModel can contain/own DataElements in the Model.

ownedElement/ ownedAttribute/ ownedOperation/ ownedParameter/ ownedPort

Set this constraint to restrict the element/attribute/operation/parameter/port that can be owned by the source Stereotype element. This constraint is typically used to validate nesting during Model Validation.

Profile :

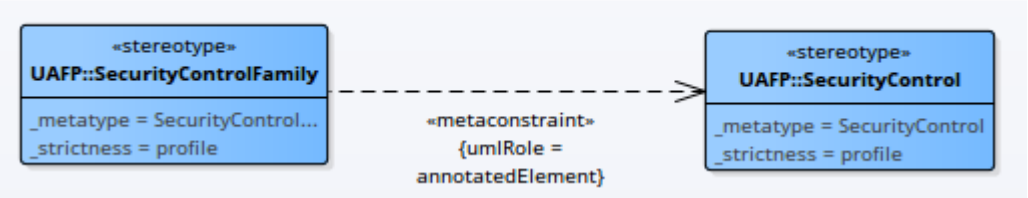


In the Profile example, a Meta-Constraint connector is drawn from stereotype ProjectMilestone to ProjectTheme and the constraint is specified as 'ownedAttribute' on the tag 'umlRole' in the connector's Tagged Values. This means that ProjectMilestone stereotyped elements can contain 'ProjectTheme' stereotyped attributes in the model.

annotatedElement/ constrainedElement

Set this model validation constraint to restrict the target of a NoteLink connector.

Profile :



In the Profile example, a Meta-Constraint connector is drawn from stereotype SecurityControlFamily to SecurityControl and the constraint is specified as 'annotatedElement' on the tag 'umlRole' in the connector's Tagged Values.

	When the Profile is imported into a model, the target of a NoteLink connector from a SecurityControlFamily stereotyped element should be a SecurityControl stereotyped element. Otherwise, Enterprise Architect will flag an error when performing a Model Validation.

Metamodel Constraints and the Quick Linker

When you drag the Quick Linker arrow to create a relationship to another element, a menu of available connector types and - if no target element is selected on the diagram - a menu of available element types display. The tables in this topic show where the names of the connector and element types are drawn from when you have - or have not - provided values for the Metamodel constraint properties.

Rule Filtering

The metamodel constraints primarily define what connections are valid. The Quick Linker is built from these valid relationships and is then filtered in a number of ways in order to present the relevant relationships to the user.

Item	Detail
Toolbox Filtering	By default for all new diagrams the elements and relationships offered by the Quick Linker are restricted to match the types available in the toolbox. This can be changed by the user on a diagram by selecting the Complete view for the diagram or unchecking the 'Filter to Toolbox' option within the Quick Linker menu.
Common Relationships	Relationships defined with the _IsCommon property will not be offered as suggestions when a new element also needs to be created. These UML relationships include this behavior when they are used with a metarelationship: • Abstraction • Dependency • InformationFlow • Realization • Usage

Connector Labels

This table identifies the points from which the Quick Linker can retrieve names to display in the menu for the available connector types.

Item	Detail
Meaning Forwards and Meaning Backwards	Stereotypes with values defined in the _MeaningForwards and _MeaningBackwards properties will use those values to describe the connector in the Quick Linker menu. Note: If _MeaningBackwards is not defined for a stereotype, the Quick Linker will offer an option to create the relationship in the backwards or reverse direction.
Metatype Name	Stereotypes with values defined in the _Metatype properties will use those values to describe the connector in the Quick Linker menu when no 'name' properties are defined.

Stereotype Name	If no _MeaningForwards, _MeaningBackwards or _Metatype values are defined, the stereotype name will be used as the menu label for a relationship.
Metaclass Name	When using a Metarelationship connector to include UML relationships between your stereotypes, you do not have control of the labels used for the relationship. The Quick Linker will use the same labels as are used when those relationships are available between UML elements.

Element Labels

When you have dragged the Quick Linker to empty space, a menu displays the types of target element available. This table identifies where the Quick Linker retrieves names from to display in the menu of available elements.

Item	Detail
Metatype Name	Stereotypes with values defined in the _metatype properties will use those values to describe the element in the Quick Linker menu.
Stereotype Name	If no _MeaningForwards, _MeaningBackwards or metatype values are defined, the name of the stereotype will be used as the menu label for an element.
Metaclass Name	When using a Metarelationship connector or Stereotypedrelationship connector to link your stereotypes to UML elements, you do not have control of the labels used for the element. The Quick Linker will use the same labels as are used when those elements are connected under UML.

Quick Linker

When a user is creating new elements and connectors on a diagram they can simplify the process by using the Quick Linker arrow, which displays a list of the common connectors that can issue from a selected element and a list of the common elements each connector can connect to. These lists are derived from a Quick Linker definition, which is a Comma Separated Value (CSV) format file.

As part of a Profile, you can add to or replace the built-in Quick Linker definitions using your own definitions. These can be derived from:

- A Quick Linker Definition Format CSV file that you integrate with the Profile by adding the CSV text to a Document Artifact element on the Profile diagram (preferred method) - see the *Quick Linker Definition Format* Help topic
- A custom metamodel diagram View, including a set of metamodel constraints that define what types of element are connected by what type(s) of connector (second preferred method) - see the *Introducing the Metamodel Views* and *Define Metamodel Constraints* Help topics)
- A Relationship Table CSV file that you integrate with the Profile also by adding the CSV text to a Document Artifact element on the Profile diagram (best only for implementing complex relationship rules that don't necessarily correspond to a defined metamodel) - see the *Relationship Table* help topic

Notes

- The philosophy behind a Quick Linker definition is not to provide a complete list of valid or legal connections, but a short and convenient list of the commonest connections for the given context

Quick Linker Definition Format

In order to replace or change the Quick Linker menus that are displayed when a user drags the Quick Linker arrow from one of your profile elements on a diagram, you can create or edit the corresponding Quick Linker definition. This is a Comma Separated Value (CSV) text file consisting of records (rows), each record consisting of 23 comma-separated fields as defined in the table.

Some of these fields define the menu command and some act as filters, with the entry being ignored if the filter condition isn't met.

A Quick Linker definition can include comments: all lines in which // are the first two characters are ignored by Enterprise Architect. Quotes (" ") in the field values are not required.

Each record of the Quick Linker definition represents a single combination of entries on the Quick Linker menus; that is, for the selected source element, a specific connector type and specific target element type. A menu is populated from all rows that satisfy the filters; that is, the first menu lists all defined connectors that are legal and valid for the source element type, and the second menu lists all target elements that are legal and valid for the combination of source element and connector type.

Quick Linker Definition fields

Column	Title (enter as comment for guidance)
A	Source Element Type Description: Identifies a valid source element in the Profile. If a connector is being dragged away from this type of element, the row is evaluated. Otherwise, the row is ignored. If the source is another connector, prefix the connector type with the word 'link:'; for example, 'link:ControlFlow'.
B	Source Stereotype Filter Description: Identifies a stereotype of the source element base type (for example, an Event source element can be a normal Event, or a Start Event, Intermediate Event or End Event stereotyped element). The stereotype can be a fully qualified stereotype or the name of a stereotype within the current profile. If set, and if a connector is being dragged away from an element of this stereotype, the row is evaluated. Otherwise, the row is ignored.
C	Target Element Type Description: Identifies a valid target element in the Profile. To indicate that the target element can be any specialization of an abstract UML Metaclass, add the prefix '@' to the Metaclass name; for example, '@Classifier', '@NamedElement'. If set, and if a connector is being dragged onto this type of element, the row is evaluated. If blank, and if a connector is being dragged onto an empty space on the diagram, the row is evaluated. Otherwise the row is ignored. If the target is another connector, prefix the connector type with the word 'link:'; for example, 'link:ControlFlow'.
D	Target Stereotype Filter Description: Identifies a stereotype of the target element base type.

	If set, if Target Element Type is also set, and if a connector is being dragged onto an element of this stereotype, the row is evaluated. Otherwise, the row is ignored.
E	Diagram Filter Description: Contains either an inclusive list or an exclusive list of diagram types, which limits the diagrams the specified connector can be created on. • Each diagram name is terminated by a semi-colon; for example: Collaboration;Object;Custom; • Custom diagram types from MDG Technologies can be referenced using the fully qualified diagram type (DiagramProfile::DiagramType); for example: BPMN2.0::Business Process;BPMN2.0::Choreography;BPMN2.0::Collaboration; • As a shorthand for all diagram types in a diagram profile you can use the '*' wildcard, which must be preceded by the diagram profile ID; for example: BPMN2.0::*; • Each excluded diagram name is preceded by an exclamation mark; for example: !Sequence; This column overrides the 'Filter to Toolbox' setting for the Quick Linker, which is enabled by default on diagrams. To force a connector to be visible on all diagrams, you can exclude a diagram type that doesn't exist. For example: !TBFilter Note: the preferred mechanism for executing a diagram filter is now the Toolbox filter. This automatically shows the relevant connector types based on the current diagram, including for diagram types as they are defined in the future by other technologies.
F	New Element Type Description: Defines the type of element to be created if the connector is dragged into open space, provided that the 'Create Element' field is set to True. This value cannot be a connector type.
G	New Element Stereotype Description: Defines the type of element stereotype to be created if the connector is dragged into open space, provided that the 'Create Element' field is set to True. This can be a fully qualified stereotype, or the name of a stereotype within the current profile.
H	New Link Type Description: Defines the type of connector to create, if 'Create Link' is also set to True.
I	New Link Stereotype Description: Defines the stereotype of the connector created, if 'Create Link' is also set to True. This field is required when adding Quick Linker records to built-in types. The stereotype can be a fully qualified stereotype, or the name of a stereotype within the current profile.
J	New Link Direction Description: Defines the connector direction, which can be: • directed (always creates an Association from source to target) • from (always creates an Association from target to source)

	• undirected (always creates an Association with unspecified direction) • bidirectional (always creates a bi-directional Association), or • to (creates either a directed or undirected Association, depending on the value of the 'Association Direction' field) Not all of these work with all connector types; for example, you cannot create a bi-directional Generalization.
K	New Link Caption Description: Defines the text to display in the 'Quick Linker' menu if a new connector is being created but not a new element.
L	New Link & Element Caption Description: Defines the text to display in the 'Quick Linker' menu if a new connector AND a new element are being created.
M	Create Link Description: If set to True, results in the creation of a new connector; leave blank to stop the creation of a connector.
N	Create Element Description: If set to True and a connector is being dragged onto an empty space on the diagram, results in the creation of a new element. Leave blank to stop the element from being created. This overrides the values of 'Target Element Type' and 'Target Stereotype Filter'.
O	Disallow Self connector Description: Set to True if self connectors are invalid for this kind of connector; otherwise leave this field blank.
P	Exclusive to ST Filter + No inherit from Metatype Description: Set to True to indicate that elements of type 'Source Element Type' with the stereotype 'Source Stereotype Filter' do not display the Quick Linker definitions of the equivalent unstereotyped element. This field is ignored if the 'Source Stereotype Filter' field (Column B) is empty.
Q	Menu Group Description: Indicates the name of the submenu in which a menu item is created. This column only applies when creating a new element; that is, the user is dragging from an element to an empty space on the diagram, or over a target element to create a new embedded element.
R	Complexity Level Description: Contains numerical bitmask values that identify complex functionality. • **0** = no complex functionality • **4** = Force blank source stereotype; this row will be skipped unless the source element has no stereotype • **8** = force blank target stereotype; this row will be skipped unless the target element has no stereotype • **16** = treat the value in the 'Source Stereotype Filter' column (column B) as a

	Source Name Filter instead • **32** = treat the value in the 'Target Stereotype Filter' column (column D) as a Target Name Filter instead, and use the value in the 'New Element Stereotype' column (column G) as the name of the newly created element • **64** = treat the value in the 'Source Stereotype Filter' column (column B) as a Source Classifier Name Filter instead • **128** = treat the value in the 'Target Stereotype Filter' column (column D) as a Target Classifier Name Filter instead, and use the value in the 'New Element Stereotype' column (column G) as the name of the classifier of the newly created element, creating an additional new element if an element of that name doesn't exist in the current model The values can be added together to combine functionality; for example, **192** combines the functionality of **64** and **128**.
S	Target Must Be Parent Description: Set to True if the menu item should only appear when dragging from a child element to its parent; for example, from a Port to its containing Class. Otherwise leave this field blank.
T	Embed element Description: Set to True to embed the element being created in the target element; otherwise leave this field blank.
U	Precedes Separator LEAF Description: Set to True to add a menu item separator to the 'Quick Linker' menu, underneath this entry; otherwise leave this field blank.
V	Precedes Separator GROUP Description: Set to True to add a menu item group separator to the 'Quick Linker' sub-menu; otherwise leave this field blank.
W	Dummy Column Description: Depending on which spreadsheet application you use, this column might require a value in every cell to force a CSV export to work correctly with trailing blank values.

Relationship Table

An additional method for specifying the Quick Linker links between elements is using a relationship table, which you initially create as a CSV file using a spreadsheet application such as Microsoft™ Excel. Having created and populated the file, you import it into a Document Artifact element in your profile.

This method results in behavior equivalent to using stereotyped relationship connectors between the described stereotypes in your profile.

In most circumstances we recommend using the original method of defining links in the Quick Linker Definition Format, or modeling relationships in a Metamodel View rather than using this Relationship Table method. However, this method is supported for the purpose of implementing complex relationship rules that don't necessarily correspond to a defined metamodel.

Format

The format for the relationship table is based on the format used in the ArchiMate specification, with the addition of two extra rows that map names to stereotypes. Set up the table according to these format guidelines:

Section	Description
Connector Aliases	The first row in the definition provides a list of single letter connector identifiers mapped to fully qualified connector stereotypes. For example: **a**=ArchiMate3::ArchiMate_Access;**c**=ArchiMate3::ArchiMate_Composition; That is, in the body of the file **a** indicates an ArchiMate 3 ArchiMate Access connector, and **c** indicates an ArchiMate 3 ArchiMate Composition connector.
Element Aliases	The second row in the definition provides a list of identifiers mapped to fully qualified element stereotypes. For example: Assessment=ArchiMate3::ArchiMate_Assessment;Constraint=ArchiMate3::ArchiMate_Constraint; That is, in the body of the file 'Assessment' refers to an ArchiMate 3 ArchiMate Assessment element.
Source Elements	The third row in the definition lists all of the possible source elements defined against the identifiers in the second row. These are the column headers in the table. For example: ,Assessment,Constraint,
Target Element	The first column, from row four onwards, lists all of the possible target elements defined against the identifiers in the second row. These are the row headers in the table.
Link Definitions	The cells at the intersections of rows and columns identify the connectors that are valid between the source and target elements, using the single letter identifiers defined on line 1. For example: scg n o, indicates that elements of the type in this column can be connected to elements of the type in this row by **S**pecialization, **C**omposition, A**g**gregation, I**n**fluence and Ass**o**ciation connectors

Add Relationship Table to Profile

Step	Discussion
1	Open the Profile child diagram containing the Stereotype elements for the Profile.
2	Select the 'Documentation' page of the Diagram Toolbox (click on  to display the 'Find Toolbox Item' dialog and specify 'Documentation'), and drag a Document Artifact element onto the diagram. Give this element the name 'relationship table'.
3	Double-click on the element to open the Linked Document Editor; cancel the prompt for a template name.
4	Open your CSV file in a text editor such as Notepad, and copy and paste the contents into the Document Artifact element Linked Document. Save and close the document.
5	Continue working on the Profile until it is complete, and save it. The QuickLink definitions are saved with the Profile and are processed and applied when the Profile is imported (within its MDG Technology) into another model. A technology can contain a number of Profiles and therefore have a number of Quick Link definitions, one for each Profile.

Quick Linker Example

If you want to create a Quick Linker definition, the easiest way is to set it up in a spreadsheet, with each menu item definition constructed across a row, as in this example:

	A	B	C	D	E	F	G	H	I	J	K
1	//Source Element Type	Source ST filter	Target Element Type	Target ST Filter	Diagram Filter	New Element Type	New Element ST	New Link Type	New Link ST	New Link Direction	New Link Caption
2	Class	quick				Component		Dependency		to	
3	Class	quick				Component		Dependency		from	
4	Class	quick	Component					Dependency		to	Dependency to
5	Class	quick	Component					Dependency		from	Dependency from
6	Class	quick	Port					Dependency		to	Dependency to
7	Class	quick	Port					Dependency		from	Dependency from
8	Class	quick	Component			Port		Dependency		to	
9	Class	quick	Component			Port		Dependency		from	
10											

	L	M	N	O	P	Q	R	S	T	U	V	W
1	New Link & Element Caption	Create Link	Create Element	Disallow Self connector	Exclusive to ST Filter & No inherit from metatype	Menu Group	Complexity Level	Target Must Be Parent	Embed element	Preceeds Separator LEAF	Preceeds Separator GROUP	DUMMY COLUMN
2	Dependency to	TRUE	TRUE	TRUE	TRUE	Component	0					
3	Dependency from	TRUE	TRUE	TRUE	TRUE	Component	0			TRUE		
4		TRUE		TRUE	TRUE		0					
5		TRUE		TRUE	TRUE		0			TRUE		
6		TRUE		TRUE	TRUE		0					
7		TRUE		TRUE	TRUE		0			TRUE		
8	Dependency to	TRUE	TRUE	TRUE	TRUE	Port	0		TRUE			
9	Dependency from	TRUE	TRUE	TRUE	TRUE	Port	0		TRUE	TRUE		
10												

The first row of the example is a comment line identifying the column headings. The subsequent lines define the connector/target element options for a Class element with the stereotype «quick». When a connector is dragged away from an element of this type, you want the user to create a Dependency either to or from a Component element. When they drag a connector onto an existing Port or Component element, you want a Dependency either to or from the Component or, in the case of a Component, you want the user to be able to create an embedded Port element.

These requirements are defined in eight records in the Quick Linker definition file:

1. Dependency to new Component
2. Dependency from new Component
3. Dependency to existing Component
4. Dependency from existing Component
5. Dependency to existing Port
6. Dependency from existing Port
7. Dependency to existing Component, create new Port
8. Dependency from existing Component, create new Port

The records save to this CSV file:

//Source Element Type,Source ST filter,Target Element Type,Target ST Filter,Diagram Filter,New Element Type,New Element ST,New Link Type,New Link ST,New Link Direction,New Link Caption,New Link & Element Caption,Create Link,Create Element,Disallow Self connector,Exclusive to ST Filter + No inherit from metatype,Menu Group,Complexity Level,Target Must Be Parent,Embed element,Precedes Separator LEAF,Precedes Separator GROUP,DUMMY COLUMN

Class,quick,,,,Component,,Dependency,,to,,Dependency to,TRUE,TRUE,TRUE,TRUE,Component,0,,,,,

Class,quick,,,,Component,,Dependency,,from,,Dependency from,TRUE,TRUE,TRUE,TRUE,Component,0,,,TRUE,,

Class,quick,Component,,,,,Dependency,,to,Dependency to,,TRUE,,TRUE,TRUE,,0,,,,,

Class,quick,Component,,,,,Dependency,,from,Dependency from,,TRUE,,TRUE,TRUE,,0,,,TRUE,,

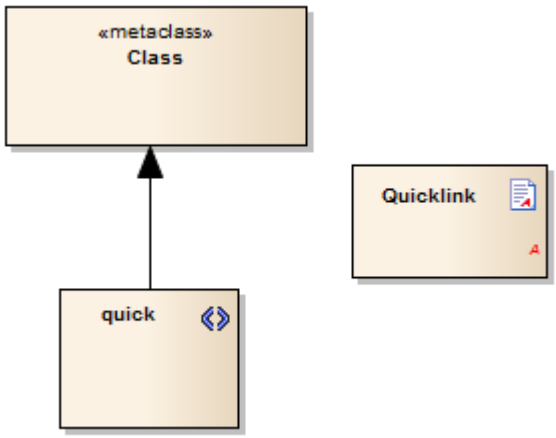
Class,quick,Port,,,,,Dependency,,to,Dependency to,,TRUE,,TRUE,TRUE,,0,,,,,

Class,quick,Port,,,,,Dependency,,from,Dependency from,,TRUE,,TRUE,TRUE,,0,,,TRUE,,

Class,quick,Component,,,Port,,Dependency,,to,,Dependency to,TRUE,TRUE,TRUE,TRUE,Port,0,,TRUE,,,

Class,quick,Component,,,Port,,Dependency,,from,,Dependency from,TRUE,TRUE,TRUE,TRUE,Port,0,,TRUE,TRUE,,

If you want to test the effect, you can create this Profile and cut and paste the CSV lines into the QuickLink Document Artifact element.



Hide Default Quick Linker Settings

If you create your own Quick Linker definition for an element, you might want to hide the default UML Quick Linker options between the given source and target elements. How you do this depends on whether you are using the metamodel definition method or the spreadsheet definition method to define your Quick Linker links.

Metamodel Method

In the <<metaclass>> element for each source stereotype element, add the attribute _HideUmlLinks set to "True" so that quicklinks with this stereotype as the source element will not include quicklinks inherited from the base UML metaclass.

Spreadsheet Method

Firstly, you can hide the default UML Quick Linker options by setting the 'Exclusive to stereotype' filter flag (column P) to True, in the definition CSV file, on each row as required.

Alternatively, you might want to hide the default Quick Linker options without having a replacement custom option. For example, normally if you don't define any Quick Links for one «quick» Class to another «quick» Class, the Quick Linker arrow displays the default Quick Links for one Class to another Class. To override this behavior, create a Quick Linker definition in which you set the:

- Source Element Type (column A)
- Source Stereotype Filter (column B)
- Target Element Type (column C)
- Target Stereotype Filter (column D)
- New Link Type (column H) to <none>
- Exclusive to stereotype + No inherit from Metatype (column P) to TRUE

Try adding this line to the Quick Linker Example:

```
Class,quick,Interface,,,,,<none>,,,,,,,,TRUE,,0,,,,,
```

With this line in the definition, when a Quick Link is dragged from a «quick» Class to an Interface element, the default Class-to-Interface Quick Links are hidden.

Note that the 'Exclusive to stereotype' filter hides all context-sensitive relationships that do not have this filter set, and this will take effect wherever a source element stereotype has been defined.

Quick Linker Object Names

When you create a Quick Linker definition file, you use a range of base element and connector types to identify the:

- Source element type (column A)
- Target element type (column C)
- New element type (column F) and
- New link type (column H)

These are then qualified by the stereotypes you specify in the definition. The base element and connector types you can use are identified here.

Object Type Names

Object Group	Object Type
Element Types	Action ActionPin Activity ActivityParameter ActivityPartition Actor Artifact Boundary CentralBufferNode Change ChoiceState Class Collaboration Component DataType Decision DeepHistoryState Deployment Specification Device DiagramGate Entity EntryPoint EntryState ExecutionEnvironment ExitPoint ExitState ExpansionNode ExpansionRegion

	Feature FinalActivity GUIElement HistoryState InformationItem InitialActivity InitialState InteractionOccurrence Interface Issue InterruptableActivityRegion JunctionState MergeNode MessageEndpoint n-ary Association Node Object ObjectNode Package Part Port PrimitiveType ProvidedInterface Receive RequiredInterface Requirement Screen Send Sequence Signal State StateLifeline StateMachine Synchronization_H Synchronization_V SynchState UMLDiagram UseCase ValueLifeline
Connector Types	Abstraction Aggregation Association AssociationClass CommunicationPath

	Composition ConnectorLink ControlFlow DelegateLink Dependency Deployment Extension Generalization InformationFlow InterfaceLink Manifest Nesting ObjectFlow PackageImport PackageMerge Realization Redefinition Sequence StateFlow Substitution TemplateBinding UCExtends UCIncludes Usage UseCase

Add Quick Linker Definition To Profile

When you have set up your Profile Quick Linker definitions as a CSV file, you can incorporate them into the Profile. To do this, you copy the file contents into the Linked Document of a Document Artifact element that exists in the same diagram as the Stereotype elements of the Profile.

Add Definition to Profile

Step	Discussion
1	Open the Profile child diagram containing the Stereotype elements for the Profile.
2	Select the 'Documentation' page of the Diagram Toolbox (click on  to display the 'Find Toolbox Item' dialog and specify 'Documentation'), and drag a Document Artifact element onto the diagram. Give this element the name 'QuickLink'.
3	Double-click on the element to open the Linked Document Editor; cancel the prompt for a template name.
4	Open your CSV file in a text editor such as Notepad and copy and paste the contents into the Document Artifact element Linked Document. Save and close the document.
5	Continue working on the Profile until it is complete, and save it. The QuickLink definitions are saved with the Profile and are processed and applied when the Profile is imported (within its MDG Technology) into another model. A technology can contain a number of Profiles and therefore have a number of Quick Link definitions, one for each Profile.

Export a Profile

Once you have created a Profile, defined the Stereotype elements, and added any Tagged Values, Shape Scripts, Constraints and Quick Linker definitions you need, you can save (export) the Profile to disk. The Profile can then be integrated with an MDG Technology and deployed to other models for use.

Save a Profile

Step	Description
1	If your Profile is: • A single Profile spread over multiple diagrams within the same Profile Package, find the Profile Package in the Browser window, and select the 'Specialize > Technologies > Publish Technology > Publish Package as UML Profile' ribbon option • One of multiple Profiles within the same Profile Package, click anywhere in the background of the Profile diagram and select either of the ribbon options 'Design > Diagram > Manage > Save as Profile' or 'Specialize > Technologies > Publish Technology > Publish Diagram as UML Profile' • A single diagram within the Profile Package, click anywhere in the background of the Profile diagram and select either of the ribbon options 'Design > Diagram > Manage > Save as Profile' or 'Specialize > Technologies > Publish Technology > Publish Diagram as UML Profile' The 'Save UML Profile' dialog displays.
2	Click on the  button, and select the destination directory path for the XML Profile file. If necessary, edit the Profile filename, but do not delete the .xml extension.
3	In the 'Profile Type' field, use the default value 'EA (UML)2.X' (or, if necessary, click on the drop-down arrow and select this value). Note: If this field is grayed out, it means that the Package from which you are exporting the profile does not have the <<profile>> stereotype. You have to give the Package that stereotype or transfer the Profile diagram and/or elements to another Package with the stereotype.
4	Set the required export options for all stereotypes defined in the Profile: • Element Size - select the checkbox to export the element size attributes • Color and Appearance - (enabled if saving the profile from a diagram; disabled if saving from a Package in the Browser window) select the checkbox to export the background color, border color, text color and border thickness attributes • Alternate Image - select the checkbox to export the metafile images • Code Templates - select the checkbox to export the code templates, if they exist
5	Click on the Save button to save the Profile to disk.

Avoiding Profile Name and ID conflicts

Each Profile should have a unique name and ID. The Profile name is specified when saving the Profile, while the ID is derived from the GUID of the diagram or Package that was used to save the Profile. To avoid name and ID conflicts:

- When creating multiple Profiles, use a new diagram or Package for each Profile

- When saving Profiles enter a Profile name that is unique

On starting Enterprise Architect or enabling an MDG Technology, if a duplicate Profile name or duplicate Profile ID is detected, a warning will be displayed in the System Output window.

Notes

- To quickly test a Profile, you can import the XML file on its own into the 'Resources' tab of the Browser window; for final deployment, incorporate the Profile into an MDG Technology

Save Profile Options

When you save a Profile, you can save it either from its parent Package or from the Profile diagram, depending on whether the Profile is:

- A single Profile spread over multiple diagrams within the same Profile Package, which is typically the case for a Stereotypes Profile
- One of multiple Profiles within the same Profile Package; for example, when creating multiple Toolbox profiles
- A single diagram within the Profile Package

Access

Ribbon	Design > Diagram > Manage > Save as Profile Specialize > Technologies > Publish Technology > Publish Diagram as UML Profile Specialize > Technologies > Publish Technology > Publish Package as UML Profile

Option Comparison

Save From Diagram	Save From Package
The Profile takes the diagram name.	The Profile takes the Package name. Notes: Package and diagram names are not necessarily the same, although you can save a lot of confusion if you make them the same or very similar. For example: Package GL with diagrams GL1, GL2, GL3.
The Profile takes the diagram's notes.	The Profile takes the Package's notes. Notes: Diagram notes can be significant in the Profile definition, such as for Toolbox Profiles. See Create Toolbox Profiles
You can take the default size and appearance (including alternate image) from the diagram object.	You cannot take the default size and appearance from the diagram object. You can use the _sizeX, _sizeY and _image properties, but there is no equivalent for default colors. Notes:
This option can be much faster.	This option can be much slower. Notes: The difference arises because diagram objects are kept in memory and Browser window elements are not. This is only likely to be an issue if the Profile is a large one and you are using a slow network connection to a remote repository.

Browser - UML Profiles in Resources

The 'Resources' tab of the Browser window contains a tree structure with entries for a range of items including UML Profiles. The UML Profiles node initially contains no entries; to be able to use Profiles from the 'Resources' tab you must import them into the project from external XML files.

Items in a Profile represent stereotypes. These can be applied to UML elements in the several ways; for example, stereotypes that apply to:

- Elements such as Classes and interfaces can be dragged directly from the 'Resources' tab to the current diagram, automatically creating a stereotyped element; alternatively, they can be dragged onto existing elements, automatically applying them to the element
- Attributes can be drag-and-dropped onto a host element (such as a Class); a stereotyped attribute is automatically added to the element's feature list
- Operations are the same as those that apply to attributes; drag-and-drop onto a host element to add the stereotyped operation
- Connectors such as Associations, Generalizations, Messages and Dependencies are added by selecting them in the 'Resources' tab of the Browser window, then clicking on the start element in a diagram and dragging to the end element (in the same manner as adding normal connectors); a stereotyped connector is added
- Association ends can be added by dragging the connector end element over the end of an Association in the diagram

Browser - Import UML Profiles Into Resources

Profiles exist as XML files, which can be imported into any project to provide tailored modeling structures for specific domains. A number of Profile XML files are available to you on the Sparx Systems website, for importing into your models. You can also import Profile XML files that you have created yourself. If a Profile includes references to any metafiles, copy these metafiles into the same directory as the Profile XML file.

Access

Ribbon	Start > All Windows > Design > Explore > Browse > Resources > right-click on 'UML Profiles' folder > Import Profile
Keyboard Shortcuts	Alt+6 | Right-click on 'UML Profiles' folder | Import Profile

Import a Profile

Field/Button	Action
Filename	Click on the  button and locate the XML Profile file to import.
Element Size	Select the checkbox to import the element size attributes for all stereotypes defined in the Profile.
Color and Appearance	Select the checkbox to import the color (background, border and font) and appearance (border thickness) attributes for all stereotypes defined in the Profile.
Alternate Image	Select the checkbox to import the metafile image for all stereotypes defined in the Profile.
Code Templates	Select the checkbox to import the code templates, if they exist, for all stereotypes defined in the Profile.
Overwrite Existing Templates	Select the checkbox to overwrite any existing code templates defined in the current project, for all stereotypes defined in the Profile.
Import	Click on this button to add the Profile to the UML Profiles folder. If the Profile already exists, a prompt displays for you to overwrite the existing version and import the new one. When the import is complete, the Profile is ready to use.

MDG Technologies - Creating

If you want to access and use resources pertaining to a specific technology within Enterprise Architect, you can do so using a Model Driven Generation (MDG) Technology. There are various options for an administrator or individual user to bring existing MDG Technologies into use with Enterprise Architect. Technology Developers can also develop new MDG Technologies and deploy them to the project team as necessary, providing a solution tailored to your working domain or environment.

Using the Profile Helpers

MDG Technologies and Profiles are developed using diagrams and elements within Enterprise Architect. These diagrams and elements use specific attributes and properties that determine the content and behavior of the resulting MDG Technology. Profile Helpers assist in creating new MDG Technologies, and these Profile types:

- Stereotype Profiles
- Toolbox Profiles and
- Diagram Profiles

The Profile Helpers consist of two components:

- MDG Technology Builder templates in the Model Wizard (Start Page 'Create from Pattern' tab), which provide a starting point for creating a new MDG Technology
- Profile Helper items in the 'Profile' Toolbox, which provide dialogs that simplify the creation of Stereotype, Toolbox and Diagram Profiles

Access

Select a Package under which to add the MDG Technology Builder templates, then display the Model Wizard (Start Page 'Create from Pattern' tab) using one of the methods outlined here.

Ribbon	Design > Package > Model Wizard
Context Menu	Right-click on Package | Add a Model using Wizard | Model Patterns
Keyboard Shortcuts	Ctrl+Shift+M
Other	Browser window caption bar menu | New Model from Pattern | Model Patterns

Create a new MDG Technology

Step	Description
1	In the Start Page 'Create from Pattern' tab (Model Wizard), click on the <perspective name> button and select 'Management | MDG Technology Builder'. In the 'MDG Technology Builder' group select the 'Basic Template' Pattern. Click on the Create Model(s) button. A prompt displays for the Technology name.
2	Enter a name for your new MDG Technology, and click on the OK button. This will create a basic template of Packages and example elements, which can be used as a starting point for creating an MDG Technology. The template includes three Packages, each having the same name as the technology but a different stereotype corresponding to the type of Profile they define: • <<profile>> - Package for defining a Profile containing the Stereotypes users will apply to elements • <<diagram profile>> - Package for a Profile describing the diagram types users will create • <<toolbox profile>> - Package for a Profile describing the elements to show in a toolbox
3	Within each Package, open the diagram and, referring to the sample elements provided, add additional

	items to the Profile. The Profile Toolbox contains a page of Profile Helper icons that, when dragged onto the diagram, help you create and populate the elements of the various Profiles.
4	Save each of these Profiles to disk.
5	Incorporate the saved Profiles into an MDG Technology.

Create Stereotype Profiles using Profile Helpers

When creating a technology to provide a domain-specific toolset, the typical starting point is to define each element, connector, feature and structural component you want to provide. These are defined by a Profile.

All Stereotypes defined in a Profile are either extensions of Core UML objects (Metaclasses) defined by Enterprise Architect, or extensions of non-UML objects (Stereotypes) defined by other existing Profiles and technologies.

When development of a Profile is complete, it is saved to an external XML file and then incorporated into an MDG Technology for final deployment.

Each Stereotype defined in a Profile modifies the behavior of the Metaclass or Stereotype that it extends. These modifications might include:

- Tagged Values to provide additional properties
- Constraints to define the conditions and rules that apply to each Stereotype
- A Shape Script to customize the overall appearance of the new object
- A change to the default appearance of the object, such as background, border and font colors
- Quick Linker definitions to provide a list of the most common connection types from each Stereotype
- Special attributes that define the specific appearance and behavior of the new object, including the initial element size and Browser window icon

Create a UML Profile

Step	Description
1	In the Browser window, locate the Package with the <<profile>> stereotype and open its child diagram. If you do not have an existing <<profile>> Package, use the 'Management | MDG Technology Builder' Perspective in the Model Wizard to create a new technology, then open the diagram from the newly created <<profile>> Package.
2	(Optional) If you intend your Stereotype elements to include Tagged Values that referenced predefined tag types, you define those tag types in Data Type elements on the Profile diagram. If you intend your Stereotype elements to include Tagged Values with a drop-down list of several pre-defined values, each set of values must be defined by an Enumeration element on the Profile diagram. If you intend your Stereotype elements to include a Structured Tagged Value to provide a composite set of information, each structure must be defined by a Class element on the Profile diagram. The Enumeration and Class elements have to exist before you can define these Tagged Value types for your Stereotype; you can either create the elements at this point, or add these Tagged Values to your Stereotype at a later time.
3	Add a new Stereotype by dragging the 'Add Stereotype Profile Helper' from the Diagram Toolbox. The dialog opened by the 'Add Stereotype Profile Helper' will allow you to specify various general Properties, Tagged Values, and the Shape Script for your Stereotype.
4	(Optional) Define Constraints for the Stereotype.
5	(Optional) Set the Default Appearance for the Stereotype.
6	Repeat steps 3 to 5 for each new Stereotype element you want to create.
7	(Optional) Add a Quick Linker Definition to the Profile.

8	Save the Package as a Profile. When saving the Profile, the name used should match the name of the Profile Package; this is necessary for the references within a Toolbox profile to function correctly
9	Incorporate the Profile into an MDG Technology.

Notes

- A Profile Package cannot contain other Packages; do not add any other Packages to the Profile

Add Stereotypes and Metaclasses using Profile Helpers

You can define Stereotypes in a Profile to either extend:

- Core UML objects (Metaclasses pre-defined in Enterprise Architect), or
- Objects (Stereotypes) defined by other Profiles and technologies (for instance objects defined in ArchiMate or SysML)

Stereotypes can extend Metaclasses in several ways:

- One Stereotype extending one Metaclass, for a specific definition of one object type
- One Stereotype extending more than one Metaclass, where the definition applies to more than one object type - such as modifying both a Class and an Object in the same way
- Several Stereotypes extending one Metaclass, where you are creating several variations of the same base object type; for example, to define types of Association connector, representing Parent, Sibling, Grandparent, Uncle/Aunt and Cousin relationships

Add Metaclasses and Stereotypes to a Profile

Step	Description
1	If you are extending a non-UML type defined by an existing Profile or technology, follow the process described in the *Create Stereotypes Extending non-UML Objects* Help topic.
2	In the Browser window, locate the Package with the <<profile>> Stereotype and open its child diagram.
3	Drag the 'Add Stereotype' icon from the 'Profile Helpers' page of the Diagram Toolbox onto the diagram. The 'Add Stereotype' dialog displays.
4	In the 'Name' field, type the Stereotype name (which will also be the name of the new modeling object).
5	Select one of these object groups by clicking on the 'Type' drop-down arrow: • Element Extension - to create a Stereotype that extends an element • Connector Extension - to create a Stereotype that extends a connector • Abstract Metaclass - to create a Stereotype that extends a structural or behavioral modifier • Metaclass Extension - to create a Stereotype that extends a Metaclass that already exists within your model (and most likely within the diagram you are currently working in)
6	Click on the Add Metaclass button. The 'Extend Metaclass' dialog displays, showing a list of object types associated with the object group selected in step 5. Select the Metaclass to be extended from the list and click on the OK button. If you selected 'Metaclass Extension' in step 5, the 'Select a Profile Element browser/search' dialog displays; search for and select the existing Metaclass element to extend with this Stereotype. The Metaclass name is added to the 'Extensions' field.
7	If you want to extend more than one Metaclass with the Stereotype, click on the Add Metaclass button again and select the next object type to extend. You can repeat this for as many Metaclasses as you want to extend with this Stereotype. To delete a selected Metaclass from the 'Extensions' list click on the Remove button.

8	Review the available properties in the 'Stereotype' panel. These properties modify the behavior of the Stereotype. To apply a property, click in the 'Value' field and type or select the appropriate value. When you select a property field, a description of the property's effect is displayed at the bottom of the 'Stereotype' panel. Only provide values for properties that you want to apply to this Stereotype.
9	Click on the name of a Metaclass in the 'Extensions' field and review the available properties in the 'Metaclass' panel. These properties further modify the behavior of the stereotype based on options specific to the Metaclass being extended. To apply a property, click in the 'Value' field and type or select the appropriate value. When you select a property field, a description of the property's effect is displayed at the bottom of the 'Metaclass' panel. Do not provide values for any properties that you do not want to apply to this Stereotype. If you are extending more than one Metaclass, click on the next Metaclass name in the 'Extensions' field and review the properties for that object type.
10	Click on the Next button. The 'Define Tagged Values' page displays.
11	In the 'Property' panel right-click to display a context menu with options for creating and grouping Tagged Values of different types. These options include: • Add Tagged Value: Create a simple Tagged Value - a prompt displays for the Tagged Value name. Add a name and click on the OK button to display the name in the 'Property' column; to set a default value, type it in to the 'Default Value' field • Add Specialized Tagged Value: - Enumeration: create an enumeration Tagged Value, based on an existing Enumeration element - Predefined: select a Predefined Tagged Value Type from a list and, in the 'Default Value' field, type or select an initial value if necessary - Structured: create a Structured Tagged Value composed of several other simple Tagged Values, typed by an existing Class element - Reference: create a Tagged Value with which the user can locate and reference an element created with a specified Stereotype (a form of RefGUID Tagged Value); in creating this, you must select the existing Stereotype element that defines the stereotype - Reference List: create a Tagged Value with which the user can locate and reference a list of elements created with a specified Stereotype (a form of RefGUIDList Tagged Value); in creating this, you must select an existing Stereotype element that defines the stereotype • Edit Tagged Value Name: displays a simple prompt in which you overtype the current name to correct or change it • Create Tag Group: create Tag Groups in the Metaclass element, through which to organize the Tagged Values you have created in the Stereotype element • Move Tag to Group (displayed when you right-click on an existing Tagged Value): displays the 'Move Tag to Group' dialog, on which you can select an existing Tag Group to contain the selected Tagged Value • Remove Grouping: remove the selected Tag Group, leaving its member Tagged Values listed at the end of the 'Property' column • Delete: remove the selected Tagged Value from the list and from the Stereotype

12	Click on the Next button. The 'Define a Shape Script' page displays. A Shape Script can be used to define the appearance of the Stereotype. To include a Shape Script, click on the Edit button. The Shape Editor window displays. Create your Shape Script using this editor. When you have finished creating the Script, click on the OK button. The image defined by the Shape Script is shown in the 'Preview' panel. Note: For the Shape Script to take effect, you must select the 'Alternate Image' option when you save the Profile. Alternatively, you can define a simple default appearance (background color, line color) for the model object, after you have created the Stereotype element.
13	Click on the Finish button. The Stereotype element and Metaclass element(s) are now displayed on the Profile diagram.
14	You can now: • Repeat steps 2 to 13 for each of the other Stereotype elements you want to create • Edit the Stereotype (and through it, the Metaclass) element properties you have defined, using the Profile Helper • Add Constraints to your Stereotype element • If a shape has not been set then you can now define the object's default appearance (background color, line color) • Set up the Quick Linker definitions for the stereotyped elements and connectors in the Profile

Notes

- If you intend to extend a large number of model elements, rather than putting all of them on one diagram you can create additional child Class diagrams under the <<profile>> Package and add different types of Metaclass element to different diagrams; in this case you save the Package as the Profile, not the individual diagrams
- Stereotype elements must have unique names, but Metaclass elements can have the same name (for example, there can be several Action Metaclasses, each with a different ActionKind attribute)
- If you have a number of Tagged Values in the Stereotype element, and you have assigned them to groups, you can define which of those groups default to expanded (open) in the 'Tags' tab of the Properties window, and which default to closed; open the Features window for the Metaclass, at the 'Attributes' page, and add the attribute _tagGroupStates with the initial value <groupname>=closed;<groupname>=closed;<groupname>=open; ...

Edit a Stereotype Element

If you want to add to or correct the properties of a Stereotype or Metaclass element in a Profile, you can edit it using the standard facilities such as the element 'Properties' dialog and the 'Tags' tab. However, you can also update the Stereotype element through the Profile Helper 'Stereotype Properties' dialog and, through the Stereotype, also update the Metaclass elements that the Stereotype extends.

Any changes you have made to the elements by other means, such as through the element 'Properties' dialog, are reflected in the contents of the Profile Helper.

Access

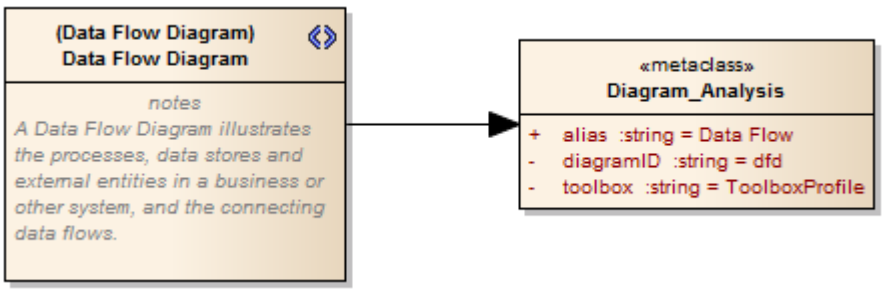
Context Menu	Right-click on Stereotype element | Edit with Profile Helper

Edit the Stereotype element

Step	Description
1	The 'Stereotype Properties' dialog defaults to the 'General' tab. On this tab you can: • Change the Stereotype element name • Add further Metaclass elements to be extended by this Stereotype element • Add or change values for the attributes of the Stereotype element • Add or change values for the attributes of each Metaclass element
2	Click on the 'Tagged Values' tab. On this tab you can: • Edit the default value of a tag • Add a new tag of one of a range of types • Create a tag group • Assign or reassign a tag to a group • Remove a tag group • Delete a Tagged Value from the Stereotype
3	Click on the 'Shape Script' tab. On this tab you can: • Add a Shape Script (if one does not exist) • Edit the existing Shape Script using the Shape Editor
4	When you have finished editing the Stereotype element, click on the OK button. The Profile Class diagram redisplays, with the edited elements showing the changes you have made.

Create Diagram Profiles using the Profile Helpers

When you develop an MDG Technology, it is possible to create extended diagram types and include them in your MDG Technology as custom Diagram Profiles. For example, you might create a DFD Diagram Profile that defines a DFD diagram as an extension of the built-in Analysis diagram, as shown:



The 'Add Diagram Extension' Profile Helper can assist you in defining your Diagram Profile, adding the necessary elements and giving them the appropriate attributes to define the functionality of the resulting Custom diagram types.

Create extended diagram types

Step	Action
1	If you have not done so already, use the Model Wizard's 'Management | MDG Technology Builder' Perspective to create a set of Packages for defining Profiles. In the Browser window, locate the Package with the <<diagram profile>> stereotype and open its child diagram.
2	Drag the 'Add Diagram Extension' item from the 'Profile Helpers' page of the Toolbox onto the diagram. The 'Add Diagram Extension' dialog displays.
3	In the 'Name' field, type the name for the Custom diagram type.
4	In the 'Extension Type' field click on the drop-down arrow and select the built-in diagram type that the Custom diagram type will extend.
5	In the 'Description' field type a brief description of what the diagram is used for. When a user selects this diagram type in the 'New Diagram' dialog, this description will be displayed in the bottom right of the dialog.
6	Within the 'Properties' pane enter values for these fields: • Alias: Defines the diagram type displayed before the word 'Diagram' on the diagram title bar; for example: 'Block Diagram' • Frame ID: Defines the diagram type that will appear in the diagram frame label • Frame Format String: Enter a string containing substitution macros for defining the frame title, with or without additional delimiters such as (); macros that can be used are: - #DGMALIAS# - #DGMID# - #DGMNAME# - #DGMNAMEFULL# - #DGMOWNERNAME# - #DGMOWNERNAMEFULL#

	- #DGMOWNERTYPE# - #DGMSTEREO# - #DGMTYPE# • Toolbox Profile: Click on the drop-down arrow and select the diagram type that defines the required Toolbox Profile (the name entered when saving the profile); the Toolbox will be opened automatically each time a diagram of this type is opened • Swimlanes: Defines swimlanes that will be displayed on the diagram; for example: Lanes=2;Orientation=Horizontal;Lane1=Title1;Lane2=Title2; (where *Lanes* can be any value, but the number of *Lane<n>* values must equal the value of *Lanes*; *Orientation* can be omitted, in which case the swimlanes default to vertical)
7	The remaining fields in the 'Properties' pane can be used to customize the diagram's default options. Any attributes left blank will not be applied. When a user selects a field, a description of the property's effect is displayed at the bottom of the 'Properties' pane.
8	Click on the OK button. The appropriate Stereotype and Metaclass elements are added to the diagram.
9	Repeat steps 2 to 8 for each diagram extension to include in the diagram Profile.
10	Save the diagram as a Profile.
11	Incorporate the Profile into an MDG Technology.

Notes

- After a diagram extension has been added you can modify its properties again by right-clicking the appropriate Stereotype element on the diagram and selecting 'Edit with Profile Helper'

Create Toolbox Profiles using the Profile Helpers

Within an MDG Technology you can create multiple Toolbox Profiles. Each Toolbox Profile defines a single Toolbox. A Toolbox consists of one or more expandable/collapsible regions, referred to as Toolbox Pages.

Create a Toolbox Profile

Step	Action
1	If a group of Packages for defining Profiles has not been created, use the Model Wizard's 'Management | MDG Technology Builder' Perspective to create this group. In the Browser window, locate the Package with the <<toolbox profile>> stereotype and open its child diagram.
2	Drag the 'Create Custom Toolbox' item from the 'Profile Helpers' Toolbox Page onto the diagram. The 'Select a Toolbox Profile Package' dialog displays.
3	Select the Package with the <<toolbox profile>> stereotype referred to in step 1. Click on the OK button. The 'Create Toolbox Page' dialog displays.
4	In the 'Toolbox Name' field type the name for your Toolbox page. This is the name that will be displayed for the Toolbox page when using the item search facilities in the Diagram Toolbox.
5	In the 'Description' field type a description for the Toolbox. This description acts as a default tool-tip for your Toolbox, unless you define a specific tool-tip for a Toolbox Page as mentioned in step 10.
6	Click on the OK button. The diagram that you will use to define your Toolbox is created and displayed.
7	(Optional) When dragging an item from a Toolbox onto a diagram, the item will typically create an element or a connector. It is also possible to have a single Toolbox item that, when dragged onto a diagram, will provide a selection of items to choose from. This is referred to as a hidden sub-menu. If you want your Toolbox to contain one or more hidden sub-menus you should define these before proceeding with the steps on this page.
8	You can now define one or more Toolbox Pages that will appear on the Toolbox. Drag the 'Add Toolbox Page' item from the 'Profile Helpers' Toolbox page onto the diagram. The 'Add Toolbox Page' dialog displays.
9	In the 'Name' field, type a name for the Toolbox Page. This is text that will display in the title bar of the corresponding Toolbox Page.
10	In the 'Tool Tip' field, type the tool-tip for the corresponding Toolbox Page.
11	The 'Icon' field in this case will be disabled. This field is only used when defining hidden sub-menu

	Toolbox pages.
12	These options can be used to determine the appearance and functionality of the Toolbox Page. When enabled: • 'Images Only': displays the Toolbox Page without the text labels next to the icons • 'Is Hidden': defines the Toolbox Page as a hidden sub-menu • 'Is Common': the Toolbox Page is common to all defined Toolboxes while your technology is active; the page is initially displayed as collapsed • 'Is Collapsed': the Toolbox Page is initially minimized
13	You can now define items to be added to the Toolbox. Click on the down arrow on the right of the Add button. Select one of these options: • 'Add Stereotype': adds a Toolbox item for a Stereotype that is defined in a UML Profile in the current model; this Profile must be included with the Toolbox Profile in the MDG Technology After you select this option, the 'Select a Profile Element' dialog displays; use this to select the Stereotype element(s) you want to add (hold down the Ctrl key while you click on multiple elements, if required) • 'Add Built in Type': - Element: adds a Toolbox item for a UML element type After you select this option the 'Create new Toolbox Item' dialog displays; in the 'Alias' field, type the label to appear on the Toolbox item, and click on the OK button The 'Select Metaclass' dialog then displays; select the UML element type to add to your Toolbox, and click on the OK button - 'Connector': adds a Toolbox item for a UML connector type After you select this option the 'Create new Toolbox Item' dialog displays; in the 'Alias' field, type the label to appear on the Toolbox item, and click on the OK button The 'Select Metaclass' dialog then displays; select the UML connector type to add to your Toolbox, and click on the OK button • 'Add Hidden Toolbox': adds a hidden Toolbox sub-menu item; the hidden Toolbox must be defined before you use this option After you select this option, the 'Create new Toolbox Item' dialog displays; in the 'Alias' field, type the label to appear on the Toolbox item and click on the OK button The 'Select a Hidden Toolbox Stereotype' dialog then displays; select the hidden Toolbox to add to your Toolbox, and click on the OK button • 'Add New Item': adds a Toolbox item with an Alias only This option alone will not create a functional Toolbox item; a Toolbox item added in this way must be later modified via the Toolbox Items list Clicking on the Add button, and not on the drop-down arrow, is the same as selecting the 'Add Stereotype' option.
14	(Optional) Define a Toolbox item that will create an item from an external MDG Technology. For example, adding a Toolbox item that creates a SysML1.3 Block element. 1. Click on the down-arrow on the right of the Add button. 2. Select the 'Add New Item' option. The 'Create new Toolbox Item' dialog displays. 3. In the 'Alias' field, type the label to appear on the Toolbox item, and click on the OK button. The Toolbox item will be added to the 'Toolbox Items' list. 4. In the 'Stereotype' field for this Toolbox item, type: Profile::Stereotype(UML::BaseUMLType) - *Profile* is the name of the Profile that the Stereotype is defined in

	- *Stereotype* is the name of the Stereotype/Metatype that this toolbox item will create - *BaseUMLType* is the base UML type of the non-UML object For example, to include a SysML Block in a Toolbox you would type: SysML1.3::Block(UML::Class) 5. To identify the Profile::Stereotype string, create an element of the type to include in your Toolbox (for example; a SysML 1.3 Block), then select the element and display the Properties window. Any predefined tags for this element will be grouped under the Profile::Stereotype heading; for example, a SysML 1.3 Block's tags are grouped under SysML1.3::Block. All non-UML objects in Enterprise Architect are an extension of a UML Type. You can reveal an element's base UML type by deleting its Stereotypes. For example, create a SysML1.3 Block and then, using the Properties window, delete the Block element's Stereotype. The element type will change from Block to Class.
15	(Optional) Create a Toolbox item that will drop a Pattern onto a diagram. 6. Click on the down arrow on the right of the Add button. 7. Select the 'Add New Item' option. The 'Create new Toolbox Item' dialog displays. 8. In the 'Alias' field, type the label to appear on the Toolbox item, then click on the OK button. 9. The Toolbox item will be added to the 'Toolbox Items' list. 10. In the 'Stereotype' field for this Toolbox item, type: TechnologyID::PatternName(UMLPattern) - *TechnologyID* is the ID of the Technology, as entered in the MDG Technology Creation Wizard - *PatternName* is the name that was entered when saving the Pattern; for example: BusFramework::Builder(UMLPattern) If you want to avoid displaying the 'Add Pattern' dialog, replace (UMLPattern) with (UMLPatternSilent). 11. To define a model-based Pattern in a custom Toolbox (such as the GoF Patterns), create an attribute with a name of the format: PatternCategory::PatternName(UMLPattern) For example: GoF::Mediator(UMLPattern)
16	After you add the Toolbox item it will appear in the 'Toolbox Items' list. You can optionally add a custom icon image for a Toolbox item. The icon image must be a 16x16 pixel bitmap file; for a transparent background use light gray - RGB(192,192,192). To set the icon for a Toolbox item: 12. Locate the item in the 'Toolbox Items' list and click within the 'Toolbox Icon' column. 13. Click on the  button within this column. The 'Select a Toolbox Icon' dialog displays. 14. Locate the image file and click on the Open button.
17	Repeat steps 13 to 16 for each item you want to add to the Toolbox Page. To remove a Toolbox item, select it in the 'Toolbox Items' list and click on the Delete button. Once all the appropriate Toolbox items have been added, click on the OK button. A Stereotype element will be added to your Toolbox Profile diagram.
18	Repeat steps 8 to 17 for each Toolbox Page you want to include in the Toolbox.
19	Save the Toolbox Profile by clicking on the background of the open diagram and selecting either of the ribbon options: • Design > Diagram > Manage > Save as Profile or • Specialize > Technologies > Publish Technology > Publish Diagram as UML Profile

20	Incorporate the Profile into an MDG Technology.

Notes

- A Toolbox Page can by modified by right-clicking the appropriate Stereotype element on the Toolbox Profile diagram and selecting the 'Edit with Profile Helper' option
- When assigning a name for a Toolbox Page, be aware that 'elements' is a reserved word; if the word 'elements' is used, it will not appear in the title bar of the corresponding Toolbox Page
- The sequence of Toolbox Pages in the Toolbox is determined by the sequence of their Stereotype elements in the Profile diagram or Profile Package; if you create and save the Profile from a:
  - Diagram, the Toolbox Page sequence is determined by the Z-order of the Stereotype elements on the diagram - the higher the Z-order number of the Stereotype element, the further down the Toolbox its Toolbox Page is placed; if you change the Z-order of a Stereotype element in the diagram it changes the position of the element's page on the Toolbox
  - Package in the Browser window, the Toolbox Page sequence is determined by the list order of the Stereotype elements in the Package - the Toolbox Page for the first listed element is at the top of the Toolbox; if you re-order the elements in the Browser window, you produce the same re-ordering of pages in the Toolbox

Create Hidden Sub-Menus using the Profile Helpers

When you create Toolbox items, some of them could be very similar in that they are based on the same type of Metaclass. For example, there are many different types of Action element. Rather than populate a Toolbox Page with every variation, you can create a 'base' Toolbox item and offer a choice of variant from a sub-menu, which is displayed when the base item is dragged onto the diagram.

Define a hidden sub-menu

Step	Action
1	If you have not already done so, create and display the diagram you will be using to define your Toolbox, as described in steps 1 to 6 of *Create Toolbox Profiles using the Profile Helpers*.
2	Drag the 'Add a Toolbox Page' item from the 'Profile Helpers' Toolbox page onto the diagram. The 'Add Toolbox Page' dialog displays.
3	In the 'Name' field, type the name for the sub-menu Toolbox item.
4	The 'Tool Tip' field can be left blank in this case.
5	Select the 'Is Hidden' checkbox. The 'Images Only', 'Is Common' and 'Is Collapsed' checkboxes should be left unselected.
6	After selecting the 'Is Hidden' checkbox, the 'Icon' field should become active. You can optionally add a custom icon image for the sub-menu Toolbox item. The icon image must be a 16x16 pixel bitmap file; for a transparent background use light gray - RGB(192,192,192). To set the icon for the sub-menu Toolbox item, click on the folder icon to the right of the 'Icon' field. Select the image file and click on the Open button.
7	You can now add items such as elements and connectors to the sub-menu. Click on the down arrow on the right of the Add button, and select one of these options: • 'Add Stereotype': adds a Toolbox item for a Stereotype that is defined in a UML Profile in the current model; this Profile must be included with the Toolbox Profile in the MDG Technology After you select this option, the 'Select a Profile Element' dialog displays; use this to select the Stereotype you want to add • 'Add Built in Type': - Element: adds a Toolbox item for a UML element type After you select this option the 'Create new Toolbox Item' dialog displays; in the 'Alias' field, type the label to appear on the Toolbox item, and click on the OK button The 'Select Metaclass' dialog then displays; select the UML element type to add to your Toolbox, and click on the OK button - Connector: adds a Toolbox item for a UML connector type After you select this option the 'Create new Toolbox Item' dialog displays; in the 'Alias' field, type the label to appear on the Toolbox item, and click on the OK button The 'Select Metaclass' dialog then displays; select the UML connector type to add to your Toolbox,

	and click on the OK button • 'Add Hidden Toolbox': adds a hidden Toolbox sub-menu item; do not use this option when creating the 'Hidden Toolbox' sub-menu itself • 'Add New Item': adds a Toolbox item with an Alias only This option alone will not create a functional Toolbox item; a Toolbox item added in this way must be later modified via the 'Toolbox Items' list Clicking on the Add button, and not on the drop-down arrow, is the same as selecting the 'Add Stereotype' option.
8	(Optional) After adding the Toolbox item it will appear in the 'Toolbox Items' list, and you can add a custom icon image for the item. The icon image must be a 16x16 pixel bitmap file; for a transparent background use light gray - RGB(192,192,192). To set the icon for a Toolbox item, locate the item in the 'Toolbox Items' list and click within the 'Toolbox Icon' column. Click on the  button within this column. The 'Select a Toolbox Icon' dialog displays. Locate the image file and click on the Open button.
9	Repeat steps 7 and 8 for each item to add to the sub-menu. To remove a Toolbox item, select it from the 'Toolbox Items' list and click on the Delete button. Once all the appropriate sub-menu items have been added, click on the OK button. A Stereotype element will be added to your Toolbox Profile diagram.
10	Repeat steps 2 to 9 for each Toolbox sub-menu to create.
11	The sub-menu(s) created earlier can now be included as an item in a Toolbox Page.

Notes

- A sub-menu can be modified by right-clicking the appropriate Stereotype element on the Toolbox Profile diagram and selecting the 'Edit with Profile Helper' option

Create MDG Technology File

When you create an MDG Technology file, you can include a wide range of facilities and tools, including UML Profiles, code modules, scripts, Patterns, images, Tagged Value Types, report templates, Linked Document templates and Toolbox pages. Building all of these into the MDG Technology file in a logical sequence is easy, using the MDG Technology Creation Wizard.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Create an MDG Technology file

Step	Description
1	Select the 'Generate MDG Technology File' option. The MDG Technology Creation Wizard screen displays.
2	Click on the Next button. The MDG Technology Wizard prompts you to: • Create an MDG Technology file based on a new MDG Technology Selection (MTS) file • Create an MDG Technology file based on an existing MTS file, or • Not use any MTS file An MTS file stores the selected options that you define during the creation of an MDG Technology; if you use an MTS file, you can later modify it to add or remove specific items in the MDG Technology, which is the recommended process.
3	Select the appropriate MTS file option. Click on the Next button. If you selected an MTS file, the MDG Technology Wizard prompts you to save the changes in the existing MTS file or into a new MTS file; this enables you to create a modification based on the existing MTS file, while preserving the original file.
4	If necessary, type in or browse for the required file path and name. Click on the Next button. The 'MDG Technology Wizard - Create' dialog displays.
5	Complete the fields on this screen: • Filename - Type or select the path and filename of the MDG Technology File; the file extension for this file is .xml • ID - Type a unique reference for the MDG Technology File, up to 12 characters long • Version - Type the version number of the MDG Technology File • Icon - (Optional) Type or select the path and file name of the graphics file containing the technology icon; the icon is a 16 or 24 bit color depth, 16x16 bitmap image that is shown in the list of

	technologies on the left of the 'MDG Technologies' dialog • Logo - (Optional) Type or select the path and file name of the graphics file containing the technology logo; the logo is a 16 or 24 bit color depth, 64x64 or 100x100 bitmap image that is shown in the display pane on the top-right corner of the 'MDG Technologies' dialog • URL - (Optional) If you have any website product information that might be helpful for users of this Technology, type or paste the URL in this field • Support - (Optional) If you have any web-based or other support facility that might be helpful for users of this Technology, type or paste the contact address in this field • Notes - Type a short explanation of the functionality of the MDG Technology
6	Click on the Next button. The MDG Technology Wizard - Contents screen displays.
7	Select the checkbox for each item to be included in the MDG Technology file. When you have selected the checkboxes for all the items you want to include, click on the Next button. Each selection runs specific dialogs to enable definition of the specific items to be included in the MDG Technology.
8	Work through the dialogs displayed in response to your choices, and when all are complete, click on the Next button. The 'MDG Technology Wizard - Finish' screen displays, providing information on the items included in the MDG Technology File.
9	If you have used an MTS file and want to update it, select the 'Save to MTS' checkbox.
10	If you are satisfied with the selection of items, click on the Finish button. You can now edit the MTS file, if required, to add further items such as: • Model Validation configurations • Model Wizard Templates When you have edited the MTS file and regenerated the Technology (.xml) file, you can add another 'Scripts' section to include Package XMI Export and/or Import scripts. Save the edited Technology file. To make the MDG Technology .xml file accessible to an Enterprise Architect model, you must add the technology file path to the 'MDG Technologies - Advanced' dialog (accessed by clicking the Advanced button on the 'MDG Technologies' dialog, via the 'Specialize > Technologies > Manage Technology' ribbon option).

Add a Profile

When creating an MDG Technology file, you can include one or more UML 2.5-compliant Profiles that you have defined to create new types of model element.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Profiles to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Profiles' checkbox. The 'MDG Technology Wizard - Profile files selection' page displays.
2	In the 'Directory' field, navigate to the directory containing the required Profile or Profiles. The Profile files are automatically listed in the 'Available Files' panel.
3	To select each required Profile individually, highlight the Profile in the 'Available Files' list and click on the --> button. The file name displays in the 'Selected Files' list. Alternatively: To select every available Profile click on the -->> button, and return each one you do not want by selecting it and clicking on the <-- button. • DO NOT select Diagram Profiles or Toolbox Profiles on this dialog; this would generate conflicting commands in the .mts file • Make sure you do include your UML Profiles
4	Click on the Next button to proceed.

Add a Pattern

When creating an MDG Technology file, you can include special Design Patterns that you want to make available in the 'Resources' tab of the Browser window and, if you prefer, in the Technology Toolbox pages. You will have published these Patterns previously.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Design Patterns to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Patterns' checkbox. The 'MDG Technology Wizard - Pattern files' selection page displays.
2	In the 'Directory' field, navigate to the directory containing the required Pattern XML file or files. The Pattern files are automatically listed in the 'Available Files' panel.
3	To select each required Pattern individually, highlight the Pattern in the 'Available Files' list and click on the --> button. The file name displays in the 'Selected Files' list. Alternatively, to select all available Patterns click on the -->> button, and return each one you do not want by selecting it and clicking on the <-- button.
4	Click on the Next button to proceed.

Add a Diagram Profile

When creating an MDG Technology file, you can include Diagram Profiles that you have defined to generate new types of diagram.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Diagram Profiles to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Diagram Types' checkbox. The 'MDG Technology Wizard - Diagram Types' page displays.
2	In the 'Directory' field, navigate to the directory containing the required Diagram Profiles. The Profiles in the directory are automatically listed in the 'Available Files' panel.
3	To select each required Diagram Profile individually, highlight the file name in the 'Available Files' list and click on the --> button. The file name displays in the 'Selected Files' list. Alternatively, to select all available Profiles (if they are all Diagram Profiles) click on the -->> button, and return each one you do not want by selecting it and clicking on the <-- button.
4	Click on the Next button to proceed.

Add a Toolbox Profile

When creating an MDG Technology file, you can include Diagram Toolbox page definitions that you have created to provide Toolbox pages to support customized diagrams.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Toolbox Profiles to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Toolboxes' checkbox. The 'MDG Technology Wizard - Toolboxes' page displays.
2	In the 'Directory' field, navigate to the directory containing the required Toolbox Profiles. The Profile files are automatically listed in the 'Available Files' panel.
3	To select each required Toolbox Profile individually, highlight the file name in the 'Available Files' list and click on the --> button. The file name displays in the 'Selected Files' list. Alternatively, to select all available Profiles (if they are all Toolbox Profiles) click on the -->> button, and return each one you do not want by selecting it and clicking on the <-- button.
4	Click on the Next button to proceed.

Add Tagged Value Types

When creating an MDG Technology file, you can include Tagged Value Types, from which the technology users can create domain-specific Tagged Values. There are two methods you can use:

- Define the Tagged Value Types in Data Type elements on the Profile diagram, as discussed in the *With Predefined Tag Types* Help topic (recommended) or
- Adding the Tagged Value Types directly in the MDG Technology Wizard, as described here.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Tagged Value Types to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Tagged Value Types' checkbox. The 'MDG Technology Wizard - Tagged Value Types' page displays.
2	To select each required Tagged Value Type individually, highlight the name in the 'Available Tagged Values' list and click on the --> button. The name displays in the 'Selected Tagged Values' list, and the name, description and notes on the Tagged Value Type are displayed in the panel at the bottom of the page. Alternatively, to select all available Tagged Value Types, click on the -->> button, and return each one you do not want by selecting it and clicking on the <-- button.
3	Click on the Next button to proceed.

Add Code Modules

When creating an MDG Technology file, you can include code modules for which you have set up code templates and data types. The modules can be for modifications to the system default languages, or for languages you have defined yourself using the code templates and the Code Template Editor. Before you can set up a code template for a new language in the editor, you must define at least one data type for the language. You can also specify code options for the language, which are additional settings that are not addressed by the data types or code templates; they are held in an XML document that you include in the MDG Technology file with the module.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Code Modules to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Code Modules' checkbox. The 'MDG Technology Wizard - Code Modules' page displays, listing the code modules defined in your current project.
2	Click on the checkboxes ('Product', 'Data Types', 'Code Grammar', and 'Code Templates') for each of the code modules you want to include in the technology.
3	If you have created a code options XML document for a selected module, click on the  button in the 'Code Options' column for that module. A browser displays, through which you locate and select the XML document.
4	Click on the Next button to proceed.

Define Code Options

When modifying code generation templates for an existing programming language, or defining a new programming language, there are additional options that are only available when building an MDG Technology. These additional options can affect how Enterprise Architect handles code generation and reverse-engineering for this language. These options are specified using an XML file, created using your preferred text editor.

The root node in the XML document is named CodeOptions. The child nodes are named CodeOption. Each CodeOption contains a name attribute corresponding to the name of one of the available code options. The body of each node contains the option value. For example:

```
<CodeOptions>
    <CodeOption name="DefaultExtension">.h</CodeOption>
    <CodeOption name="HasImplementation">true</CodeOption>
    <CodeOption name="ImplementationExtension">.cpp</CodeOption>
    <CodeOption name="Editor">C:\Windows\notepad.exe</CodeOption>
</CodeOptions>
```

Supported code options

Code Option	Description
ConstructorName	The name of a function used as a constructor. Used by the classHasConstructor code template macro.
CopyConstructorName	The name of a function used as a copy constructor. Used by the classHasCopyConstructor code template macro.
DefaultExtension	The default extension when generating code.
DefaultSourceDirectory	The default path to which Enterprise Architect generates new files.
DestructorName	The name of a function used as a destructor. Used by the classHasDestructor code template macro.
Editor	The external editor used for editing source of this language.
HasImplementation	Specifies if code generation for this language generates both a source file and implementation file.
ImplementationExtension	The extension used by Enterprise Architect to generate an implementation file.
ImplementationPath	The relative path from the source file to generate the implementation file.
PackagePathSeparator	The delimiter used to separate Package names when using the packagePath macro from the code templates.

Notes

- Once a language is available for use in a model (by importing and activating the MDG Technology), you can display and edit the code options on the 'Preferences' dialog ('Start > Appearance > Preferences > Preferences')

Add Database Datatypes

When creating an MDG Technology file, you can include DDL files defining the Database Datatypes for each of the databases you intend to use through your technology and for which you have set up data types. Before you can set up a DDL file for a new database type, you must define at least one data type for that database.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Database Datatypes to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 7, where you select the 'DDL Files' checkbox. The 'MDG Technology Wizard - DDL Files' page displays, listing the database types available in your current project.
2	Click on the checkbox against each database type for which you want to include a DDL file in the technology. Also select the corresponding 'Datatypes' checkbox if datatypes exist for the DDL in the model.
3	Click on the Next button to proceed.

Add MDA Transforms

When creating an MDG Technology file, you can include any MDA Transformation templates that you have created or modified in the model and that you want to deploy as part of the technology.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add MDA Transformation Templates to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'MDA Transforms' checkbox. The 'MDG Technology Wizard - Transform Modules' page displays, listing the MDA transform templates available on your system.
2	Click the checkbox against the name of each transformation template you want to add to your MDG Technology.
3	Click on the Next button to proceed.

Add Document Report Templates

When creating an MDG Technology file, you can include user-defined Document Report templates.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Report Templates to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'RTF Templates' checkbox. The 'MDG Technology Wizard - RTF Report Templates' dialog displays.
2	For each required user-defined report template available in the current model, select the checkbox next to the template name.
3	Click on the Next button to proceed.

Add Linked Document Templates

When creating an MDG Technology file, you can include Linked Document templates.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Linked Document Templates to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Linked Document Templates' checkbox. The 'MDG Technology Wizard - Linked Document Templates' dialog displays.
2	For each required document template available in the current model, select the checkbox next to the template name.
3	Click on the Next button to proceed.

Add Images

When creating an MDG Technology file, you can incorporate images to be used in all models in which the technology is deployed. These images must already be available in the model in which the technology is being developed; you can import the images into this model using the Add New button on the Image Manager.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Images to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Images' checkbox. The 'MDG Technology Wizard - Image Selection' dialog displays.
2	For each required model image available in the current model, select the checkbox next to the image name. A preview of each image displays on the right of the dialog as you select the checkbox.
3	Click on the Next button to proceed.

Add Scripts

When creating an MDG Technology file, you can include scripts that you have created in the model.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Scripts to the MDG Technology File

Step	Description
1	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Scripts' checkbox. The 'MDG Technology Wizard - Scripts' dialog displays.
2	For each required script available in the current model, select the checkbox next to the script name.
3	Click on the Next button to proceed.

Notes

- This facility is available in the Corporate, Unified and Ultimate Editions of Enterprise Architect

Add Workspace Layouts

When developing an MDG Technology file, you can include user-defined workspace layouts. Workspace layouts are arrangements of toolbars and windows appropriate to an area of work such as Requirements Management and Code Engineering. The workspace layout automatically opens and organizes all the tools to suit the way in which you use the system.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Workspace Layouts to the MDG Technology File

Step	Description
1	In your model, create the workspace layouts you want to include in your Technology.
2	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Workspace Layouts' checkbox. The 'MDG Technology Wizard - Workspace Layouts' dialog displays, listing the user-defined workspace layouts available to you.
3	For each workspace layout that you want to incorporate in the Technology, select the checkbox next to the layout name.
4	Click on the Next button to proceed.

Add Model Views

When developing an MDG Technology file, you can include user-defined Model Views. Model Views are based on searches that extract specific information from a model to provide different perspectives of, and 'entry points' into, the model.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Model Views to the MDG Technology File

Step	Description
1	In your model, create the Model Views you want to include in your Technology.
2	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Model Views' checkbox. The 'MDG Technology Wizard - Model Views' dialog displays, listing the user-defined views available in the current model.
3	For each Model View that you want to incorporate in the Technology, select the checkbox next to the view name.
4	Click on the Next button to proceed.

Notes

- Technology views do not store Favorite Packages, only Views
- If you incorporate a Model View that runs searches that you have defined, you must also include those searches in your MDG Technology

Add Model Searches

When developing an MDG Technology file, you can include user-defined Model Searches. You can set these searches up using the Model Search facility, in SQL, in the Query Builder or as an Add-In, and then link them into your MDG Technology.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Add Model Searches to the MDG Technology File

Step	Description
1	In your model, create the Model Searches you want to include in your Technology.
2	Follow the steps in the *Create MDG Technologies* topic up to and including Step 6, where you select the 'Model Searches' checkbox. The 'MDG Technology Wizard - Model Searches' dialog displays, listing the user-defined searches available in the current model.
3	For each Model Search that you want to incorporate in the Technology, select the checkbox next to the search name.
4	Click on the Next button to proceed.

Notes

- If you use a custom SQL search, the SQL must include ea_guid AS CLASSGUID and the object type
- If you incorporate a Model View that runs searches that you have defined, you must also include those searches in your MDG Technology

Working with MTS Files

When you are creating an MDG Technology File using the MDG Technology Wizard, you have the choice of storing all of the options and structures that you have defined in an MDG Technology Selection (.mts) file. This captures all the information you enter into the Technology Wizard, so that you do not have to type it in again. If you use a .mts file, you can subsequently edit it to change the features you selected when you generated the Technology file, and to add or remove additional, advanced features.

Access

Ribbon	Specialize > Technologies > Publish Technology > Generate MDG Technology

Manage the .MTS file

Action	Description
Create a .MTS File	To create a .mts file, launch and work through the MDG Technology Wizard; on the second page, select the 'Create a new MTS file' option.
Advanced Options For Your .MTS File	Once you have worked through the MDG Technology Wizard and set up the .mts file, you can add, separately: • Model Validation configurations • Model Templates Firstly define the XMI for the model validation configurations and model templates, then open the .mts file in a text editor and copy in the validation and/or template description just before the </MDG.Selections> line. Save the .mts file.
Update the MDG Technology	Again launch the MDG Technology Wizard, but this time on the second page select the 'Open an Existing MTS file' option and specify the file path of the .mts file you have been working on. Click on the Next button until the Wizard is finished; your MDG Technology .xml file is updated.

Notes

- Having created your MDG Technology with the Wizard and the .mts file, you can add Import and Export scripts via the Technology .xml file

Create Toolbox Profiles

As a facility of your MDG Technology, you might want to provide Diagram Toolbox pages that give access to any elements and connectors that you have created within the technology. You define these Toolbox pages within specific Profiles, each Profile defining the element and connector Toolbox pages that open or can be selected for a diagram type.

Create custom Toolboxes

Step	Action
1	Create a set of Toolbox Profiles that contain the definitions required to generate the Toolbox pages.
2	Edit the definitions, where appropriate, to: • Include hidden sub-menus • Override the default Toolboxes • Change the default icons for Toolbox items
3	Create a .mts file containing instructions on how to build your MDG Technology, and include the Toolbox Profiles in the technology.

Create Toolbox Profiles

Within an MDG Technology you can create multiple Toolbox Profiles. Each Toolbox Profile contains definitions that determine what pages appear in the Diagram Toolbox when it is opened, either by selection from the search facilities in the Diagram Toolbox, or by opening or creating a diagram of the type that is linked to the Toolbox Profile.

Toolbox Profile Errors

When a Diagram Toolbox defined in your MDG Technology is in use, certain error messages might be displayed. This table explains what those error messages mean.

Message	Meaning
Missing base type <name>	For example: 'Missing base type: 'SysML1.3::Block' does not extend 'UML::State' The base type is either missing or does not correspond to the extended element type (in the example, SysML::Block actually extends UML::Class).
No profile found with id <name>	This error message could mean that the profile cannot be found, or that the MDG Technology containing the profile has been disabled (check using 'Specialize> Technologies > Manage').
No stereotype <name> found in profile <name>	For example: 'No stereotype 'ProxyPort' found in profile 'SysML 1.2'. This message indicates that there is a mismatch between the stereotype required and the profile it is supposed to be in. In the example, SysML1.2 does not have ProxyPorts, so perhaps the stereotype should be 'FlowPort', or the profile 'SysML 1.3'.
Unknown/Illegal base type: <name>	There can be a number of reasons for this message being displayed. For example: • Unknown/Illegal base type: UML::Capability - displayed because there is no such UML metaclass as 'Capability' • Unknown/Illegal base type: SysML 1.3::Block - displayed because you are trying to extend a stereotype from another profile, in this case <<Block>> from the SysML 1.3 profile; you must extend the same thing as the stereotype you are specializing extends (in this case 'UML::Class')

Create a Toolbox Profile

Step	Action
1	In a Profile Package, create a Class diagram with an appropriate name by which you can refer to it later, such as MyClassDiagram.
2	Double-click on the diagram background to display the diagram 'Properties' dialog and, in the 'Notes' field, give the diagram an alias and a description in this format: Alias=MyClass;Notes=Structural elements for Class diagrams;
3	On the diagram, create a Metaclass element with the name ToolboxPage.
	Create a Stereotype element for each of the Toolbox pages to create within your Toolbox, such as

4	MyClassElements and MyClassRelationships. Double-click on each element to display the 'Properties' dialog and, in the 'Alias' field, type the text to display in the title bar of the corresponding Toolbox page, such as My Classes or My Class Relationships. In the 'Notes' field of each element, type the tool-tip for the corresponding Toolbox page; for example, 'Elements for Class Diagrams' or 'Relationships for Class Diagrams'. Create an Extension connector between each Stereotype element and the ToolboxPage Metaclass element.
5	In each of the Stereotype elements, press F9 and create an attribute for each Toolbox item in the page defined by that element. The name of each attribute is the name of the element or connector to be dropped, including the element's namespace; for example, UML::Package, UML::Class and UML::Interface. You might not want to display names including text such as UML::Package or UML::Class in your Toolbox, so give the attributes an 'Initial Value' of, for example, Package or Class. The Toolbox items display in the same sequence as their attributes in the element, so use the attribute ordering options in the 'Attributes' page of the Features window to define the order of icons in your Toolbox page. In the name of an attribute for an element or connector from your own technology, use your Profile name as the namespace, and then follow the item name with the element or connector type that you are extending, in brackets (to identify to Enterprise Architect what type of object to create); for example, a SysML Block element would appear as: SysML::Block(UML::Class) Many elements and connectors can be extended for use in Toolboxes.
6	To define a Toolbox item to drop a Design Pattern onto a diagram, name the attribute: My Technology::MyPattern(UMLPattern) 'MyTechnology' is the ID of the technology and 'MyPattern' is the name of the Pattern to drop; for example: BusFramework::Builder(UMLPattern) If you want to avoid displaying the 'Add Pattern' dialog, replace (UMLPattern) with (UMLPatternSilent). To define a model-based Pattern in a custom Toolbox (such as the GoF Patterns), create an attribute with a name of the format: PatternCategory::PatternName(UMLPattern) For example: GoF::Mediator(UMLPattern)
7	Define any attributes you need to modify the display of the Toolbox pages, such as whether the Toolbox pages are minimized or displayed without item names (labels).
8	To save the Toolbox profile, click on the background of the open diagram and select either of the ribbon options: • Design > Diagram > Manage > Save as Profile or • Specialize > Technologies > Publish Technology > Publish Diagram as UML Profile

Notes

- When assigning an Alias for a Toolbox page, 'elements' is a reserved word; if the word 'elements' is used, it will not appear in the title bar of the corresponding Toolbox page
- Each Profile element incorporated into an MDG Toolbox page enables a context menu option to synchronize the

Tagged Values and Constraints of all objects created from it

- The sequence of Toolbox pages in the Toolbox is determined by the sequence of their Stereotype elements in the Profile diagram or Profile Package; if you create and save the Profile from a:
  - Diagram, the Toolbox page sequence is determined by the Z-order of the Stereotype elements on the diagram - the lower (closer to 1) the Z-order number of the Stereotype element (the closer it is to the 'surface' of the diagram), the further down the Toolbox its Toolbox page is placed; if you change the Z-order of a Stereotype element in the diagram, it changes the position of the element's page on the Toolbox
  - Package in the Browser window, the Toolbox page sequence is determined by the list order of the Stereotype elements in the Package - the Toolbox page for the first listed element is at the top of the Toolbox; if you re-order the elements in the Browser window, you produce the same re-ordering of pages in the Toolbox

Toolbox Page Attributes

When you create a Stereotype element to define a Toolbox page in an MDG Technology, you can add a number of attributes to control how the page itself behaves in the Diagram Toolbox. The Stereotype element can be one of several that extend the ToolboxPage Metaclass.

The attributes you can add are:

- Icon - see Assign Icons To Toolbox Items
- ImagesOnly - if you set Initial Value to true, the Toolbox page displays without the text labels next to the icons
- isCollapsed - if you set Initial Value to true, the Toolbox page is initially minimized
- isCommon - if you set Initial Value to true, the Toolbox page is common to all defined Toolboxes while your technology is active; the page is initially displayed as collapsed
- isHidden - see Create Hidden Sub-Menus

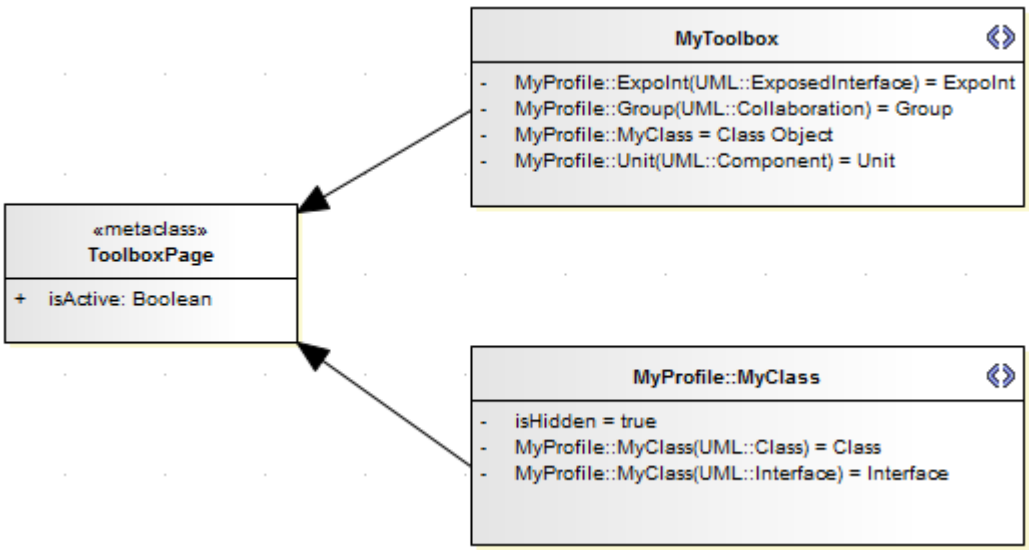
Create Hidden Sub-Menus

When you create items on a Toolbox page, some of them might be very similar and be based on the same type of Metaclass. For example, there are many different types of Action element and, in BPMN 2.0, you can create each type of Event element either stand-alone or edge-mounted on another element. Rather than populate a Toolbox page with every variation, you can create a 'base' Toolbox item and offer a choice of variant from a sub-menu, which is displayed when the base item is dragged onto the diagram but is otherwise hidden. This technique is very useful for 'disambiguating' Stereotypes that can be applied to multiple Metaclasses.

In the submenu, you define just the variant types (as for the Action element list). However, if the variant also has a ToolboxItemImage defined for it, that icon is displayed against the variant name in the sub-menu (as for the BPMN 2.0 Events). You can also use this method to specifically define icons that will be applied to the submenu options.

Define a hidden sub-menu

Step	Action
1	Create a Stereotype element on the same diagram as the ToolboxPage Metaclass, with a name prefixed by the Profile name (this is mandatory). For example: MyProfile::MyClass The name must not match the name of any external stereotype that exists in any other Profile. The sub-menu element can have an alias.
2	In this sub-menu Stereotype element, create the attribute isHidden with an initial value of True. For each sub-menu item, add an attribute to identify that item. Set the 'Initial Value' to the name to display in the menu. For example, if the «MyClass» stereotype could be applied to a UML Class or UML Interface, the attributes for these two options would be: MyProfile::MyClass(UML::Class) Initial Value = Class MyProfile::MyClass(UML::Interface) Initial Value = Interface
3	Create a second Stereotype element and define an attribute with the same name as the sub-menu Stereotype element, and with the initial value of the text to display in the Toolbox item. For example: MyProfile::MyClass = Class Object Define additional attributes for the rest of the items in the Toolbox, as normal.
4	Create <<Extension>> relationships between each Stereotype element and the ToolboxPage Metaclass element, as illustrated.

	 When this Profile is in use, and when the Class Object item is dragged onto a diagram from the Toolbox, the hidden menu displays giving the choice of Class or Interface; on selection, the element is dropped onto the diagram.
5	If no icon has been assigned to the Toolbox item from existing definitions, and you want to display one, define the image as a ToolboxItemImage icon.

Assign Icons To Toolbox Items

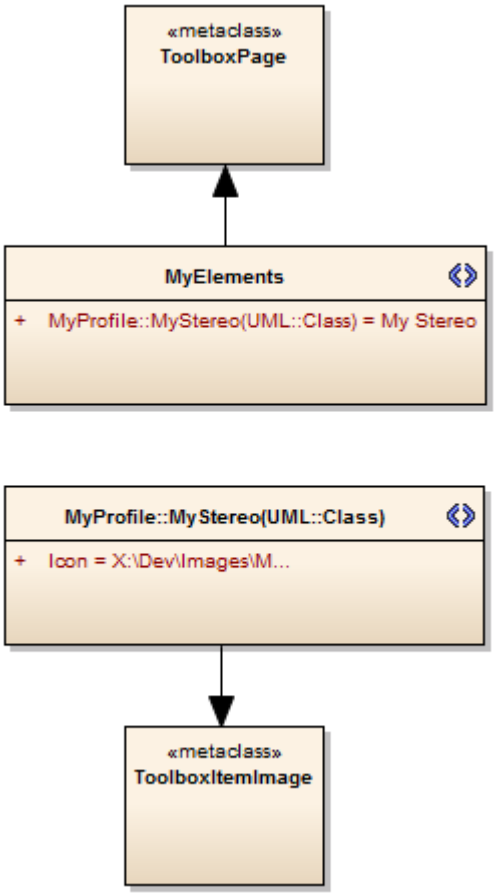
When you create a stereotyped model element to define an element or connector that is represented in a Diagram Toolbox page, you can define the image that is displayed against both the element name in the Browser window and the element or connector type in the Toolbox page, by assigning the special attribute icon to the Stereotype element.

This image definition for the Toolbox item can be overridden or replaced by extending the ToolboxItemImage Metaclass, a process that is generally optional. However, if you want to show an icon against an item on a hidden sub-menu, you must use this method; the system picks up the ToolboxItemImage definition as the icon for the hidden menu item.

If you do not use either the icon attribute or the ToolboxItemImage Metaclass to define the Toolbox icon, the image defaults to the one used for the standard UML model element that has been extended. If there is no such image, the icon uses the system default generic 'Toolbox Item' image.

Extend the ToolboxItemImage Metaclass

Step	Action
1	Create a new Stereotype element in the same Toolbox profile as the Toolbox item.
2	Give the Stereotype element the same name as the element that it is assigning an image to; for example: MyProfile::MyStereo(UML::Class)
3	Give the Stereotype element the special attribute Icon with Initial Value set to the full path and file name of the image to be used. The icon image is a 16x16 pixel bitmap file; for a transparent background use light gray - RGB(192,192,192).
4	Create a Metaclass element named ToolboxItemImage and create an Extension association from the Stereotype element to this Metaclass.


«metaclass»
ToolboxPage
MyElements
+ MyProfile::MyStereo(UML::Class) = My Stereo
MyProfile::MyStereo(UML::Class)
+ Icon = X:\Dev\Images\M...
«metaclass»
ToolboxItemImage

Override Default Toolboxes

When you are creating a diagram of one of the inbuilt diagram types, the system displays a Diagram Toolbox page based on the corresponding default Toolbox Profile. If you have customized a diagram type, it will still apply the system default Toolbox page for the base diagram type that you have extended, unless you override that default with an alternative Toolbox page that you might have created yourself. For example, you might have your own version of the UML::Class Toolbox page that you want to be displayed every time a Class diagram is opened, when your technology is active.

Note that for the default Toolbox pages to be overridden by the custom Toolbox pages in your MDG Technology, the MDG Technology must be set to 'Active'. ('Specialize > Technologies > Manage Technology', then select the checkbox against your MDG Technology name and click on the Set Active button.)

Access

To replace a system default Toolbox with one of your own:

Use one of the methods outlined here to display the 'Properties' dialog for your Toolbox Profile diagram, and display the 'General' tab.

Then, in the 'Notes' field type a RedefinedToolbox clause.

For example:

RedefinedToolbox=UML::Class;Alias=Class;Notes=Structural elements for Class diagrams;

This states that the Toolbox defined by this Profile replaces the system Toolbox UML::Class as the default Toolbox for all UML Class diagrams.

Ribbon	Design > Diagram > Manage > Properties > General
Context Menu	Right-click on the Toolbox Profile diagram | Properties | General

Names of system default Toolbox pages that can be overridden

- UML::Activity
- UML::Class
- UML::Communication
- UML::Component
- UML::Composite
- UML::Deployment
- UML::Interaction
- UML::Metamodel
- UML::Object
- UML::Profile
- UML::State
- UML::Timing
- UML::UseCase
- Extended::Analysis
- Extended::Custom

- Extended::DataModeling
- Extended::Maintenance
- Extended::Requirements
- Extended::UserInterface
- Extended::WSDL
- Extended::XMLSchema

Elements Used in Toolbox pages

When you are creating Toolbox pages for your MDG Technology, you can incorporate both standard UML elements and new elements that you have created by extending the UML elements. You define the elements you want to use in the Toolbox Profile. The table lists the names you use to identify either:

- The standard elements to include in the Toolbox page or
- The standard elements you are extending to define new elements to include in the Toolbox page

Each name you list in the Toolbox Page Stereotype elements is preceded by the namespace UML::. The text in parentheses indicates the label name displayed in the default Toolbox pages, where this differs in any way from the UML:: statement text.

Element names for Toolbox Page definitions

- Action
- ActionPin
- Activity
- ActivityFinal (Final)
- ActivityInitial (Initial)
- ActivityParameter
- ActivityPartition (Partition)
- ActivityRegion (Region)
- Actor
- Artifact
- AssociationElement (Association)
- Boundary (for Use Cases)
- CentralBufferNode (Central Buffer Node)
- Change
- Choice
- Class
- Collaboration
- CollaborationOccurrence (Collaboration Use)
- Comment (Note)
- Component
- Constraint
- Datastore
- Decision
- DeploymentSpecification (Deployment Specification)
- Device
- DiagramLegend (Diagram Legend)
- DiagramNotes (Diagram Notes)
- DocumentArtifact (Document Artifact or Document)
- Entity (Information)
- EntityObject (Entity)

- EntryPoint (Entry)
- Enumeration
- ExceptionHandler (Exception)
- ExecutionEnvironment (Execution Environment)
- ExpansionRegion
- ExitPoint (Exit)
- Feature
- FinalState (Final)
- FlowFinalNode (Flow Final)
- ForkJoinH (Fork/Join - Horizontal)
- ForkJoinV (Fork/Join - Vertical)
- Gate (Diagram Gate)
- GUIElement (UI Control)
- HistoryState (History)
- Hyperlink
- InformationItem (Information Item)
- InitialState (Initial)
- Interaction
- InteractionFragment (Fragment)
- InteractionState (State/Continuation)
- Interface
- InterruptibleActivityRegion
- Issue
- Junction
- Lifeline
- MergeNode (Merge)
- MessageEndPoint (Endpoint or Message Endpoint)
- MessageLabel (Message Label)
- Metaclass
- Node
- Object
- ObjectBoundary (Boundary)
- ObjectControl (Control)
- ObjectEntity (Entity)
- Package
- PackagingComponent
- Part
- Port
- Primitive
- PrimitiveType
- Process
- Profile

- ProvidedInterface (Expose Interface)
- ReceiveEvent (Receive)
- Requirement
- RobustBoundary (Boundary)
- RobustControl (Control)
- RobustEntity (Entity)
- Screen
- SendEvent (Send)
- SequenceBoundary (Boundary)
- SequenceControl (Control)
- SequenceEntity (Entity)
- Signal
- State
- StateMachine (StateMachine)
- StateTimeLine (State Lifeline)
- Stereotype
- StructuredActivity (Structured Activity)
- SynchState (Synch)
- Table
- Terminate
- TestCase (Test Case)
- Text
- UseCase (Use Case)
- UMLBoundary (Boundary)
- ValueTimeLine (Value Lifeline)

Notes

- You can also identify standard or extended UML connectors to add to the Toolbox Page definition
- When the element items are deployed in an MDG Toolbox page, you can also synchronize the Tagged Values and Constraints of all elements created from them

Connectors Used in Toolbox pages

When you are creating Toolbox pages for your MDG Technology, you can incorporate both standard UML connectors and new connectors that you have created by extending the UML connectors. You define the connectors you want to use in the Toolbox Profile. The *Connector names for Toolbox Page definitions* table lists the names you use to identify either:

- The standard connectors to include in the Toolbox page or
- The standard connectors you are extending to define new connectors to include in the Toolbox page

Each name you list in the 'Toolbox Page Stereotype elements' is preceded by the namespace UML::. The text in brackets indicates the label name displayed in the default Toolbox pages, where this differs in any way from the UML:: statement text.

Connector names for Toolbox Page definitions

- Abstraction
- Aggregation (Aggregate)
- Assembly
- Association (Associate)
- AssociationClass (Association Class)
- CallFromRecursion (Call)
- CommunicationPath (Communication Path)
- Composition (Compose)
- Connector
- ControlFlow (Control Flow)
- Delegate
- Dependency
- Deployment
- Extension
- Generalization (Generalize or Inheritance)
- InformationFlow (Information Flow)
- InterruptFlow (Interrupt Flow)
- Invokes
- Manifest
- Message
- Nesting
- NoteLink (Note Link)
- ObjectFlow (Object Flow)
- Occurrence
- PackageImport (Package Import)
- PackageMerge (Package Merge)
- Precedes
- ProfileApplication (Application)
- Realization (Realize or Implements)

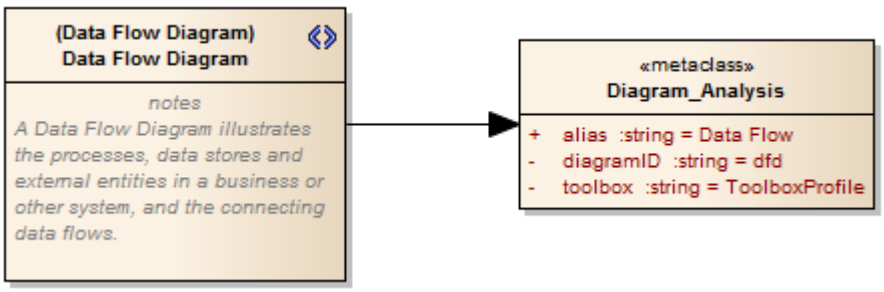
- Recursion
- Redefinition
- Representation
- Represents
- RoleBinding (Role Binding)
- SelfMessage (Self-Message)
- Substitution
- TagValAssociation (Tagged Value)
- TemplateBinding (Template Binding)
- TraceLink (Trace)
- Transition
- UCExtend (Extend)
- UCInclude (Include)
- Usage
- UseCaseLink (Use)

Notes

- You can also identify standard or extended UML elements to add to the Toolbox Page definition

Create Custom Diagram Profiles

When you develop an MDG Technology, it is possible to create extended diagram types and include them in your MDG Technology as custom Diagram Profiles. For example, you might create a DFD Diagram Profile that defines a DFD diagram as an extension of the built-in Analysis diagram, as shown:



Create extended diagram types

Step	Action
1	Create a Profile, with the same name as the MDG Technology in which it is to be included; for example, SysML. This Profile automatically contains one child Class diagram. Depending on how many new diagram types you intend to create, you can define: • One diagram type on one child diagram • Several diagram types on one diagram, or • Several diagram types grouped on several diagrams In the third case, create any further child Class diagrams you need. The diagram names do not have to reflect the technology name.
2	Open the child Class diagram and create a Stereotype element, giving it the name of the Custom diagram type; for example, *BlockDefinition*. Also on the Stereotype element 'Properties' dialog, in the 'Notes' field, type a brief description of what the diagram is used for. When the Technology is deployed and a diagram of this Custom type is being created, this description will display in the bottom right-hand corner of the 'New Diagram' dialog.
3	Create a Metaclass element and give it the name of the selected built-in diagram type, with the prefix Diagram_. For example Diagram_Logical to customize the Class diagram type, or Diagram_Use Case to customize the Use Case diagram type.
4	Drag an Extension connector from the Stereotype element to the Metaclass element.
5	Click on the Diagram_xxxx Metaclass element, press F9 and create any or all of these attributes, to set properties of the Custom diagram type: • alias: string = Type (where Type will appear before the word 'Diagram' on the diagram title bar; for example, 'Block Diagram') • diagramID: string = abc (where abc is the diagram type that will appear in the diagram frame label) • toolbox: string = ToolboxName (where ToolboxName is the name of the Toolbox Profile for the

	Toolbox that opens automatically each time a diagram of this type is opened) • toolboxPage: string = list of status values in the form "PageName=1;" (where PageName is the name of the stereotype element that extends ToolboxPage; if this string is not empty, all toolbox pages with the value "1" will be expanded and all other toolbox pages will be collapsed) • frameString: string = FrameFormatString (where FrameFormatString is a string containing substitution macros for defining the frame title, with or without additional delimiters such as (); macros that can be used are: - #DGMALIAS# - #DGMID# - #DGMNAME# - #DGMNAMEFULL# - #DGMOWNERNAME# - #DGMOWNERNAMEFULL# - #DGMOWNERTYPE# - #DGMSTEREO# - #DGMTYPE# • swimlanes: string = Lanes=2;Orientation=Horizontal;Lane1=Title1;Lane2=Title2; (where Lanes can be any value, but the number of Lane<n> values must equal the value of Lanes; Orientation can be omitted, in which case the swimlanes default to vertical) • styleex: string = one or more of a range of values • pdata: string = one or more of a range of values
6	Depending on what Profile Package organization you adopted at step 1, and whether you need any further Stereotype-Metaclass element pairs, repeat steps 2 - 5 on this diagram or on another child diagram.
7	Save the diagram(s) as a Diagram Profile, using the method most appropriate to the Profile Package organization you have set up.
8	Add the Diagram Profile(s) to the .mts file used in the MDG Technology.

Built-In Diagram Types

In customizing Enterprise Architect to better suit your needs, you might create a Profile that:

- Redefines the type of built-in child diagram created under a new composite element
- Defines the types of built-in diagram on which a Quick Linker menu offers a type of connector, or
- Extends a built-in diagram type to create a custom diagram type

In each case, you provide the precise name of each built-in diagram type you are working with; these names are:

- Activity
- Analysis
- Collaboration
- Component
- CompositeStructure
- Custom
- Deployment
- InteractionOverview
- Logical (for Class diagrams)
- Object
- Package
- Sequence
- Statechart
- Timing
- Use Case (note the space between the two words)

Attribute Values - styleex & pdata

When creating a diagram profile you can define a range of characteristics of the diagrams created with the profile, using the pdata and styleex attributes. If one of these attributes is defining several characteristics at once, you put the values in a single string separated by semicolons; for example:

HideQuals=0;AdvanceElementProps=1;ShowNotes=1;

Access

Select the Metaclass element, then display the 'Attributes' dialog and define or update the attributes 'styleex' or 'pdata'.

Specify the attribute type as 'string', then specify the diagram characteristics you require, in the 'Initial Value' field.

Use any of these methods to display the 'Attributes' dialog.

Ribbon	Design > Element > Editors > Attributes
Context Menu	In the Browser window or a diagram | Right-click on Metaclass element | Features | Attributes
Keyboard Shortcuts	F9

styleex: string =

- AdvancedConnectorProps=1; (to show connector property strings)
- AdvancedElementProps=1; (to show the element property string)
- AdvancedFeatureProps=1; (to show the feature property string)
- AttPkg=1; (to show Package visible Class members)
- DefaultLang=Language; (to set the default language for the diagram; Language can be one of the built-in languages such as C++ or Java, or it can be a custom language)
- ExcludeRTF=1; (to exclude the diagram image from generated reports)
- HandDraw=1; (to apply hand drawn mode)
- HideConnStereotype=1; (to hide the connector stereotype labels)
- HideQuals=0; (to show qualifiers and visibility indicators)
- NoFullScope=1; (to hide fully scoped element names, e.g. "ParentClass::ChildClass" will be shown as "ChildClass")
- SeqTopMargin=50; (to set the height of the top margin on Sequence diagrams)
- ShowAsList=1; (to make the diagram open directly into the Diagram List)
- ShowAsList=2; (to make the diagram open directly into the Gantt Chart view)
- ShowAsList=3; (to make the diagram open directly into the Specification Manager)
- ShowAsList=4; (to make the diagram open directly into the Relationship Matrix)
- ShowMaint=1; (to show the element Maintenance compartment)
- ShowNotes=1; (to show the element Notes compartment)
- ShowOpRetType=1; (to show the operation return type)
- ShowTests=1; (to show the element Testing compartment)

- SuppConnectorLabels=1; (to suppress all connector labels)
- SuppressBrackets=1; (to suppress brackets on operations without parameters)
- TConnectorNotation=Option; (where Option is one of UML 2.1, IDEF1X, or Information Engineering)
- TExplicitNavigability=1; (to show non-navigable connector ends)
- VisibleAttributeDetail=1; (to show attribute details on the diagram)
- Whiteboard=1; (to apply whiteboard mode)

pdata: string =

- HideAtts=0; (to show the element Attributes compartment)
- HideEStereo=0; (to show element stereotypes in the diagram)
- HideOps=0; (to show the element Operations compartment)
- HideParents=0; (to show additional parents of elements in the diagram)
- HideProps=0; (to show property methods)
- HideRel=0; (to show relationships)
- HideStereo=0; (to show attribute and operation stereotypes)
- OpParams =3; (to show operation parameters)
- ShowCons=1; (to show the element Constraints compartment)
- ShowIcons=1; (to use stereotype icons)
- ShowReqs=1; (to show the element Requirements compartment)
- ShowSN=1; (to show sequence notes)
- ShowTags=1; (to show the element Tagged Values compartment)
- SuppCN=0; (to show collaboration numbers)
- UseAlias=1; (to use the aliases or elements in the diagram, if available)

Set Up Technology Element Images

As you define the elements available for use in your technology, you might want to represent those elements with graphical images that will be displayed on the diagrams the users create through the technology, when it is deployed in the users' model.

Capture images to represent MDG Technology elements

Step	Action
1	Display the Image Manager and, using the Add New button, import suitable images into the MDG Technology development model from their source locations.
2	Design and create a Stereotype (UML) Profile containing (if appropriate) a stereotype definition for each element or connector to be owned by the technology. These stereotype definitions can contain Shape Scripts that in turn incorporate the imported images.
3	Design and create a Toolbox Profile with stereotype elements that contain an attribute for each element or connector that can be dropped onto a diagram from the Toolbox. These attributes identify the name of the technology element or connector, any modifying stereotype (which might incorporate the required image) and the UML or Extended element or connector on which the technology object is based. For example: SysML::Block(UML::Class) • SysML is the Technology Profile • UML::Class is the UML element used as the base, and • Block is the stereotype that modifies the Class to turn it into a SysML Block element
4	Design and create a Diagram Profile that identifies the Toolbox Profile. When a diagram of the type defined in the Diagram Profile is opened, it in turn opens a set of toolbox pages as defined by the Toolbox Profile.
5	Create or update the technology as required, adding the UML Profile, Diagram Profile, Toolbox Profile and Image files to the technology from the development model.
6	Deploy the technology as appropriate. When a user applies the technology to their own model, and creates a diagram under that technology, the elements they create on the diagram should be represented by the images you assigned to those elements when you created the technology.

Notes

- It is recommended that if you create a Shape Script incorporating an MDG Technology image (step 2), you should use the fully qualified image name to avoid conflicts with images used in other technologies
- You would probably work backwards and forwards through the steps many times, adding objects as you identify the requirement for them

Define Validation Configuration

Using the 'Model Validation Configuration' dialog, you can choose which sets of validation rules are and are not executed when a user performs a validation.

Rather than perform this configuration manually and potentially have to change the settings back for your Technology every time Enterprise Architect is started and a different Technology has been set active, you can define the configuration settings within the MDG Technology Selection (MTS) file of your Technology.

Access

Locate and open the .MTS file in whatever file browser you use in your work. You edit the file as indicated in these two tables, and then save the file.

White List

To specify a set of rules as a white-list (that is, anything added to this list is turned ON), open your MTS file in a text editor and copy and paste this <ModelValidation> block at the top level inside the <MDG.Selections> block:

```
<ModelValidation>
    <RuleSet name="BPMNRules"/> <!-- ruleset ID defined in the Project.DefineRuleCategory call -->
    <RuleSet name="MVR7F0001"/> <!-- notice you can turn on/off system rules as well! -->
</ModelValidation>
```

Ensure that the ruleset IDs do not contain any spaces.

Black List

To specify a set of rules as a black-list (that is, anything added to this list is turned OFF), open your MTS file in a text editor and copy and paste this <ModelValidation> block at the top level inside the <MDG.Selections> block:

```
<ModelValidation isBlackList="true">
    <RuleSet name="BPMNRules"/>
    <RuleSet name="MVR7F0001"/>
</ModelValidation>
```

In this example, "BPMNRules" is the rule-set ID defined in the Project.DefineRuleCategory call - see *Project Class* for details. "MVR7F0001" is a built-in rule-set. These validation options are applied when you activate the appropriate technology. The global (default) technology has all rules turned on.

Incorporate Model Wizard Templates

When a user creates a model within their project, they can choose the type of model to develop from a range of system-supplied model templates presented through the Start Page 'Create from Pattern' tab (Model Wizard). You can also develop custom model templates and add them to this list via your MDG Technology.

Access

You edit the .mts file directly, using whatever file browser you work with to locate and open the file.

Add Custom Model Wizard Templates to MDG Technology

Step	Action
1	Create a Package that contains all sub-Packages, diagrams, elements, notes and information links that you want to provide in your model template. See the EAExample.eap model for illustrations of what you might include, or create a model from a standard template and see what is generated. As a model template, the Package needs to be self contained and not contain any dependencies or other links to elements outside the Package.
2	Export your Package to XML. If you want your template to have supporting documentation displayed in the right-hand panel of the Model Wizard, create a .rtf file containing this documentation in the same directory location as the XML file. The .rtf file must also have the same filename as the XML file. It is recommended that you create the .rtf file within a Document Artifact element in the model, and then export the file (the 'Document-Edit > File > Save as (Export to File)' ribbon option) to the location of the Pattern XML file. This keeps the documentation within your development model.
3	Create a reference to the XML file in the .mts file; open your .mts file in a text editor and copy and paste this <ModelTemplates> block at the top level inside the <MDG.Selections> block: <ModelTemplates> <Model name="Template Name" location="MyTemplatePackage.xml" default="yes" icon = "34" isFramework="false"/> </ModelTemplates> You can include as many <Model> rows within the <ModelTemplates> block in your .mts file, one row for each model template. The attributes within a <Model> block have these meanings: • name: The name of the model template to show in the Start Page 'Create from Pattern' tab (Model Wizard), which displays when you create a new model or when you execute the 'Add a Model using Wizard' menu option

	• location: The path of the XML file that contains the export of the model template Package, relative to the location of the ModelPatterns directory in the Enterprise Architect install path: - If the XML file is directly in the ModelPatterns directory then the path just contains the file name (for example, MyPattern1.xml) - The XML can be in the same folder as the MDG Technology XML file, with the RTF file in the same folder - If you have placed all your files in a subdirectory of ModelPatterns, the path includes the directory name (for example, MyTechnology\MyPattern2.xml) - You can also specify a fixed path (for example, C:\Program Files\MyTechnology\MyPattern3.xml) • icon: Contains an index to Enterprise Architect's base icons list; to show the appropriate view icon, use one of these values: - 29 = Use Case - 30 = Dynamic - 31 = Class - 32 = Component - 33 = Deployment - 34 = Simple • isFramework: Defines the possible uses of a model Pattern; there are three possible values: - isFramework="true" - never strip GUIDs; the Pattern is intended as a re-usable Package for any model - isFramework="optional" - prompt to strip GUIDs; the Pattern is intended as a re-usable Package, but the user can choose - isFramework="false" - always strip GUIDs (the default, if not stated); the Pattern could be applied multiple times within the one model
4	Regenerate the MDG Technology using the edited MTS file.
5	To allow multiple custom categories per technology, go to the <Documentation> row of the *MDG Technology* file and add the attributes: • *categoryList*, which contains either a comma-separated list of custom category names, or the name of a single built-in category (such as 'Business') • *categoryMappings,* which contains a list of option pairs of the form 'Group Name 1=Category Name A;Group Name 2=Category Name B;" and so on; the category names must all be in 'categoryList' In the <ModelTemplates> block of the MDG Technology file, each <Model> row will have an attribute *groupName*. The group name must be in *categoryMappings*.

Add Import/Export Scripts

In Enterprise Architect, it is possible to import Packages from and export (or Publish) Packages to external files in a range of XMI and XML formats. You can also incorporate this facility in your MDG Technology, adding a script that contains your own Extensible Stylesheet Language Transformation (XSLT) to convert between the file formats.

Incorporate an Export (Publish) script

Step	Description
1	In your preferred editor, create an XSLT to convert from the source format (as listed on the 'Publish Model Package' dialog) into the target format you are generating.
2	In Enterprise Architect, open the Scripter window and create a script under your preferred script engine as a Normal script. Cut and paste the XSLT into the script editor.
3	Add the script to your MDG Technology, in the MDG Technology Creation Wizard.
4	Make any additions to the technology .mts file you require, then use the MDG Technology Creation Wizard again to fully generate the technology .xml file. Open the technology .xml file (not the .mts file) in a text editor and locate the <Script section.
5	Edit the <Script line to set the appropriate name, type and language: • *name* is the technology option text to display in the 'Publish > Technologies' ribbon panel • *type* is the word 'Publish-' followed by the name of the file format to export, as listed on the 'Publish Model Package' dialog • *language* is XSLT For example: <Script name="YourTechnology" type="Publish-UML 2.1(XMI 2.1)" language="XSLT"> <Content xmlns:dt="urn:schemas-microsoft-com:datatypes" dt:dt="bin.base64"> </Content> </Script>
6	Save the MDG Technology .xml file, and deploy it on your system.

Incorporate an Import script

Step	Description

1	In your preferred editor, create an XSLT to convert from the source format into the target XMI format.
2	In Enterprise Architect, open the Scripter window and create a script under your preferred script engine as a Normal script. Cut and paste the XSLT into the script editor.
3	Add the script to your MDG Technology, in the MDG Technology Creation Wizard.
4	Make any additions to the technology .mts file you require, then use the MDG Technology Creation Wizard again to fully generate the technology .xml file. Open the technology .xml file (not the .mts file) in a text editor and locate the <Script section.
5	Edit the <Script line to set the appropriate name, type and language: • *name* is the technology option text to display in the 'Publish > Technologies > Publish' ribbon option in Enterprise Architect • *type* is the word 'Import-' followed by the name of the XMI file format to generate, as listed on the 'Publish Model Package' dialog • *language* is XSLT For example: <Script name="YourTechnology" type="Import-UML 2.1(XMI 2.1)" language="XSLT"> <Content xmlns:dt="urn:schemas-microsoft-com:datatypes" dt:dt="bin.base64"> </Content> </Script>
6	Save the MDG Technology .xml file, and deploy it on your system.

Notes

- Create the content of your scripts in XSLT 1.0

Deploy An MDG Technology

An MDG Technology can be deployed in one of two ways: as a .xml file or from an Add-In.

Deploy From a .xml File

To deploy your technology as a file, you have a number of choices:

- Import the technology .xml file into the %APPDATA%\Sparx Systems\EA\MDGTechnologies folder (for your personal use)
- Import the technology .xml file into the 'Resources' tab of the Browser window (for all project users to access)
- Copy the file to the MDGTechnologies folder under your Enterprise Architect installation directory (by default this is C:\Program Files\Sparx Systems\EA); when you restart Enterprise Architect, your MDG Technology is deployed
- Copy the file to any folder in your file system, including network drives - use the 'Specialize > Technologies > Manage Technology' ribbon option, click on the Advanced button and add the folder to the 'Technologies' path; this deployment method enables you to quickly and easily deploy a technology to all Enterprise Architect users on a LAN
- Upload the file to an internet or intranet location: use the 'Specialize > Technologies > Manage Technology' ribbon option, click on the Advanced button and add the URL to the 'Technologies' path; this deployment method enables you to quickly and easily deploy a technology to an even wider group of Enterprise Architect users

Deploy From an Add-In

To deploy your Technology from an Add-In, you must write an EA_OnInitializeTechnologies function. This example is written in VB.Net:

```
Public Function EA_OnInitializeTechnologies(ByVal Repository As EA.Repository) As Object
EA_OnInitializeTechnologies = My.Resources.MyTechnology
End Function
```

Shape Scripts

The elements and connectors you initially use in modeling conform to the standard UML notation in terms of shape, color and labeling. You can, however, extend the standard objects to create new ones, and customize the appearance of these new objects using Shape Scripts to define the exact feature you want to impose on the default - or main - shape. You create a Shape Script in a dedicated scripting language, to define the new shape, orientation, color and labeling of the element or connector. Each script is associated with a stereotype, and every element or connector that has that stereotype will adopt the appearance defined by the Shape Script.

If you want to standardize the appearance, to apply to many elements, you can attach the Shape Script to an attribute of a Stereotype element in an MDG Technology Stereotype Profile.

If you have applied Shape Scripts to certain elements and/or connectors but do not want to show those Shape Scripts on a particular diagram, you can turn off the display of Shape Scripts on that diagram using the 'Properties' dialog for the diagram.

Getting Started With Shape Scripts

As Shape Scripts are associated with stereotypes, you define them through the 'Stereotypes' tab of the 'UML Types' dialog; each stereotype can have one Shape Script. The process of setting up a Shape Script is quite simple yet very flexible.

Access

Ribbon	Settings > Reference Data > UML Types > Stereotypes

Shape Script Process

Step	Action
1	Select the stereotype to which to attach the Shape Script, from the list on the right of the dialog. You select an existing stereotype, but if a suitable one is not available you can create a new stereotype that, once saved, displays in the list and can be selected.
2	In the 'Override Appearance' panel, select the 'Shape Script' radio button and then click on the Assign button. The Shape Editor displays.
3	Type or copy the script into the Edit window. To review the shape in the 'Preview' panel, click on the Refresh button.
4	If you define a composite Shape Script (a main shape with decorations and labels, or separate parts such as a connector with source-end and target-end shapes), click on the Next Shape button to page through the components of the shape, in the 'Preview' panel.
5	Once you have finished writing your Shape Script, click on the OK button to return to the 'Stereotypes' tab. Then click on the Save button to save the Shape Script and its assignment to the stereotype.
6	Drag and drop the appropriate standard UML element or connector into your diagram. The object will be of the type you selected as the 'Base Class' of the stereotype. Right-click on the object and select the 'Properties' option. On the 'Properties' dialog, click on the 'Stereotype' drop-down arrow, select the stereotype you created and click on the OK button. The object's shape now reflects the Shape Script assigned to the stereotype.

Notes

- Using a Shape Script to modify an element's appearance makes some of the normal 'Appearance' context menu

options redundant for that element, so they will be disabled

- It is not possible to modify or override Shape Scripts for types that are defined in an MDG Technology
- Font selection is not supported in Shape Scripts because the best user experience is achieved by allowing the user to set fonts themselves
- UML defines the standard mechanism for extending the syntax of UML to be through Profiles; for this reason Shape Scripts can not be applied to any element independently of a stereotype
- Shape Scripts cannot be used for connectors that use the Bezier line style
- Shape Scripts do not currently support:
  - Looping constructs
  - String Manipulation
  - Arithmetical Operations
  - Variable declaration

Shape Editor

When you create a Shape Script through the 'Stereotypes' tab of the 'UML Types' dialog, you write the script using the Shape Editor. This provides the facilities of the Common Code Editor, including Intelli-sense for Shape Script attributes and functions.

Access

Ribbon	Settings > Reference Data > UML Types > Stereotypes : (select or specify stereotype) : Shape Script + Assign

Editor Options

Option	Action
Format	Click on the drop-down arrow and select the Shape Script version (currently only EAShapeScript 1.0 is available).
Import	Click on this button to import a Shape Script from a text file (.txt). A file browser displays through which you can locate the file to import. When you have located and selected the file, click on the Open button to import the script into the editing panel.
Export	Click on this button to export a Shape Script to a text file. A file browser displays through which you can specify the file to export to. When you have identified the file, click on the Save button to complete the export and return to the Shape Editor.
<editing panel>	Type the script commands in this panel.
OK	Click on this button to exit from the Shape Editor. To SAVE your Shape Script, click on the Save button on the 'Stereotypes' tab.
Next Shape	If you have a shape made up of different components, click on this button to rotate through the multiple shape definitions in the 'Preview' panel.
Refresh	Click on this button to parse your script and display the result in the Preview window.

Write Scripts

To create an alternative representation for an element or connector, you write a Shape Script that defines the size, shape, orientation and color of the representation. A Shape Script contains a number of sections for defining different aspects of the shape; for an element these include:

- Main object
- Labels
- Decoration (for example, a Document element might contain an icon depicting a document)

For a connector the sections include:

- Main object
- Shape Source
- Shape Target
- Labels

Shape Scripts operate on the basis that the default (UML) representation is used unless the script contains an alternative definition. That is:

- If you have a Shape Script containing just a decoration, this decoration is added on top of the normally-drawn object
- If you have an empty shape routine, it overrides the default; so, a blank 'shape label' prevents the creation of the normal floating text label for elements that have them

You can also comment your scripts using C-style comments; for example:

```
// C Style Single Line comment
/* Multi Line
comment supported */
```

Scripting is not case-sensitive: 'Shape' is the same as 'shape'.

Script Structure

Layout	Description

Example of Element Script Layout	shape main
	{
	// draw the object
	}
	shape label
	{
	// draw a floating text label
	}
	decoration <identifier>
	{
	// draw a 16x16 decoration inside the object
	}
	
	The < identifier > string is an alphanumeric word.

Example of Connector	shape main

<table>
<tr>
<td>Script Layout</td>
<td>
{
// draw the line
}
shape target
{
// draw the shape at the target end
}
shape source
{
// draw the shape at the source end
}
label <positionLabel>
{
// define the text for the label
}

The <positionLabel> string can be any of:

lefttoplabel
leftbottomlabel
middletoplabel
middlebottomlabel
righttoplabel
rightbottomlabel

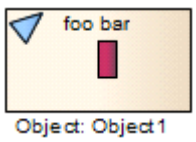
</td>
</tr>
<tr>
<td>Sub-shapes</td>
<td>
A shape can have Sub-shapes, which must be declared after the main Shape Script, but called from the Method commands.
This is an example of the ordering for declarations:

shape main
{
// Initialisation Attributes - these must be before drawing commands
noshadow = "true";
h_align = "center";

//drawing commands (Methods)
rectangle (0,0,100,100);
println ("foo bar");

// call the sub-shape
addsubshape ("red", 20, 70);

// definition of a sub-shape
shape red
{
setfillcolor (200,50,100);
</td>
</tr>
</table>

	rectangle (50,50,100,100);
	}
	}
	
	//definition of a label
	shape label
	{
	setOrigin ("SW",0,0);
	println ("Object: #NAME#");
	}
	
	//definition of a Decoration
	decoration triangle
	{
	// Draw a triangle for the decoration
	startpath ();
	moveto (0,30);
	lineto (50,100);
	lineto (100,0);
	endpath ();
	setfillcolor (153,204,255);
	fillandstrokepath ();
	}
	
	The shape resulting from this script is:
	 

Order of declaration	Shapes can consist of Attribute declarations, Method/Command calls and Sub-shape definitions, which must appear in that order; that is, Attribute declarations must appear before all Method calls and Sub-shape definitions must appear last.

Shape Attributes

When you define a shape using a Shape Script, you define the properties of that shape using attributes. Properties include:

- The position of the shape relative to the diagram and to other elements
- The positions of components of the shape relative to the shape borders
- Whether the shape has user-editable regions
- Whether the shape can be resized, scaled, rotated or docked

Attribute Syntax

attribute "=" value ";"

Example

```
shape main
{
    //Initialisation attributes - must be before drawing commands
    noshadow = "true";
    h_align = "center";
    //drawing commands
    rectangle (0,0,100,100);
    println ("foo bar");
}
```

Attributes

Attribute Name	Description
bold	string Description: Set to True if you want all print commands in the current shape or sub-shape to be displayed in bold. Valid values: True or False (default = False)
italic	string Description: Set to True if you want all print commands in the current shape or sub-shape to be displayed in italics. Valid values: True or False (default = False)
bottomAnchorOffset	(int,int) Description: When creating a Shape Script for an embedded element (such as a Port), use this attribute to offset the shape from the bottom edge of its parent. For example:

	bottomAnchorOffset= (0,-10); move embedded element up 10 pixels from the bottom edge.
dockable	string Description: Makes the shape default to dockable, so that it can be aligned with and joined to other elements (both other Shape Scripts and standard elements) on a diagram. You cannot reverse the dockable status with the 'Appearance' menu option; to change the status, you must edit the Shape Script. Valid values: standard or off
editableField	string Description: Defines a shape as an editable region of the element. This field impacts element shapes only, line glyphs are not supported. Valid Values: alias, name, note, stereotype
endPointY, endPointX	integer Description: Only used for the reserved target and source shapes for connectors; this point determines where the main connector line connects to the end shapes. Default: 0 and 0
fixedAspectRatio	string Description: Set to True to fix the aspect ratio. Do not use this if you do not want to fix the aspect ratio.
h_Align	string Description: Affects horizontal placement of printed text and sub-shapes depending on the layoutType attribute. Valid values: left, center, or right
layoutType	string Description: Determines how sub-shapes are sized and positioned. Valid values: leftright, topdown, border
leftAnchorOffset	(int,int) Description: When creating a Shape Script for an embedded element (such as a Port), use this attribute to offset the shape from the left edge of its parent. For example: leftAnchorOffset= (10,0); move embedded element right 10 pixels from the left edge
noShadow	string Description: Set to True to suppress the shape's shadow from being rendered. Valid values: True or False (default = False)
orientation	string Description: Applies to decoration shapes only, to determine where the decoration is positioned within the containing element glyph. Valid values: NW, N, NE, E, SE, S, SW, W

preferredHeight	Description: Used by the border layoutType - north and south. Used in drawing the source and target shapes for connectors to determine how wide the line is.
preferredWidth	Description: Used by the border layoutType - east and west. Used by leftright layoutType shapes where scalable is false to determine how much space they occupy for layout purposes.
rightAnchorOffset	(int,int) Description: When creating a Shape Script for an embedded element (such as a Port), use this attribute to offset the shape from the right edge of its parent. For example: rightAnchorOffset= (- 10,0); move embedded element left 10 pixels from the right edge.
rotatable	string Description: Set to False to prevent rotation of the shape. This attribute is only applicable to the source and target shapes for line glyphs. Valid values: True or False (default = True)
scalable	string Description: Set to False to stop the shape from being relatively sized to the associated diagram glyph. Valid values: True or False (default = True)
topAnchorOffset	(int,int) Description: When creating a Shape Script for an embedded element (such as a Port), use this attribute to offset the shape from the top edge of its parent. For example: topAnchorOffset= (0,10); move embedded element down 10 pixels from the top edge.
v_Align	string Description: Affects vertical placement of printed text and sub-shapes depending on the layoutType attribute. Valid values: top, center, or bottom

Drawing Methods

When you create a shape using a Shape Script, you define the values of the shape using methods. The values include things such as:

- What the shape is - a rectangle, a line, a sphere
- The size of the shape
- The colors of the shape and borders
- The compartments and compartment text the shape has
- The text and labels displayed in and around the shape
- Whether the shape consists of or includes a captured image

You can list the valid methods (commands) for any point in a script by pressing Ctrl+Space.

Method Syntax

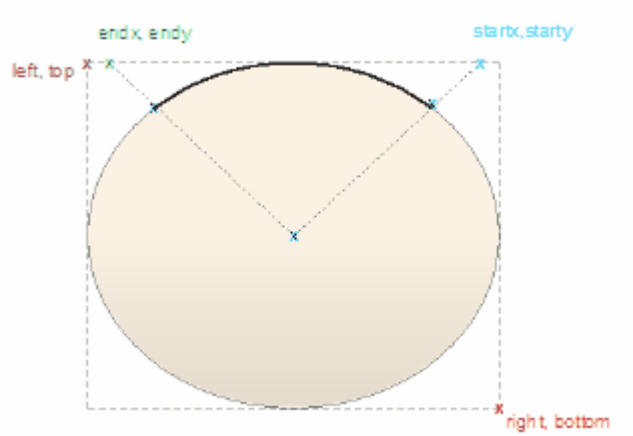
<MethodName> "(" <ParameterList> ")";";

Example

```
shape main
{
    // Initialisation Attributes - these must be before drawing commands
    noshadow = "true";
    h_align = "center";
    //drawing commands (Methods)
    rectangle (0,0,100,100);
    println ("foo bar");
}
```

Methods

Method Name	Description
addsubshape(string shapename(int width, int height))	Adds a sub-shape with the name 'shapename' that must be defined within the current shape definition.
appendcompartmenttext(string)	Appends additional strings to a compartment's text. The compartment the text is added to depends on the compartment name set using 'setcompartmentname' prior to using 'appendcompartmenttext'. This method must be called to have the compartment displayed.
arc(int left, int top, int right, int bottom, int	Draws an elliptical anticlockwise arc with the ellipse having extents at left, top, right and bottom.

startingpointx, int startingpointy, int endingpointx, int endingpointy)	The start point of the arc is defined by the intersection of the ellipse and the line from the center of the ellipse to the point (startingpointx, startingpointy). The end of the arc is similarly defined by the intersection of the ellipse and the line from the center of the ellipse to the point (endingpointx, endingpointy). For example: Arc(0, 0, 100, 100, 95, 0, 5, 0); 
arcto(int left, int top, int right, int bottom, int startingpointx, int startingpointy, int endingpointx, int endingpointy)	As for the arc method, except that a line is drawn from the current position to the starting point of the arc, and then the current position is updated to the end point of the arc.
bezierto(int controlpoint1x, int controlpoint1y, int controlpoint2x, int controlpoint2y, int endpointx, int endpointy)	Draws a bezier curve and updates the pen position.

defSize(int width, int height)	Sets the default size of the element.
	This can appear in IF and ELSE clauses with different values in each, and causes the element to be resized automatically each time the values change.
	`if(HasTag("horizontal","true"))`
	`{`
	`defSize(100,20);`
	`rectangle(0,0,100,100);`
	`}`
	`else`
	`{`
	`defSize(20,100);`
	`rectangle(0,0,100,100);`
	`}`
	This example sets the shape to the specified default size each time the Tagged Value 'horizontal' is changed.
	When this is set, Alt+Z also resizes the shape to the defined dimensions.
	The minimum value for both int width and int height is 10.

drawnativeshape()	Renders the shape in its usual, non Shape Script notation; subsequent drawing commands are superimposed over the native notation. This method is only supported for element Shape Scripts; line Shape Scripts are not supported.
drawparentshape()	Used when extending non-UML Object types. Renders the shape as defined from a parent stereotype. Behaves identically to drawnativeshape() if no inherited Shape Script is available.
ellipse(int left, int top, int right, int bottom)	Draws an ellipse with extents defined by left, top, right and bottom.
endpath()	Ends the sequence of drawing commands that define a path.
fillandstrokepath()	Fills the previously defined path with the current fill color, then draws its outline with the current pen.
fillpath()	Fills the previously defined path with the current fill color.
getdefaultfillcolor()	Gets the default fill color for an element. This can be the standard fill color for all elements or, if the 'Use Element Group Style' option is selected on the 'Diagram > Appearance' page of the 'Preferences' dialog, the default fill color defined for the element **type**.
getdefaultlinecolor()	Gets the default line color for an element. This can be the standard line color for all elements or, if the 'Use Element Group Style' option is selected on the 'Diagram > Appearance' page of the 'Preferences' dialog, the default line color defined for the element **type**.

hidelabel(string labelname)	Hides the label specified by labelname, where labelname is one of these values:
	• middletoplabel
	• middlebottomlabel
	• lefttoplabel
	• leftbottomlabel
	• righttoplabel
	• rightbottomlabel
	Note: This functions by setting the specified label to hidden. Any subsequent changes to the script will not show the label again.
	The recommended way to suppress a label is to override that shape. For example, suppress the default stereotype label:
	shape middlebottomlabel
	{
	print("");
	}

image(string imageId, int left, int top, int right, int bottom)	Draws the image that has the name imageId in the Image Manager. The image must exist within the model in which the stereotype is used; if it does not already exist in the model, you must import it as reference data or select it from within a technology file. If the image is in a technology file, it should have a filename of the format <technology ID>::<imagename>.<extension>.

lineto(int x, int y)	Draws a line from the current cursor position to a point specified by x and y, and then updates the pen cursor to that position. (See the *Notes* section also.)
moveto(int x, int y)	Moves the pen cursor to the point specified by x and y.
polygon(int centerx,int centery, int numberofsides, int radius, float rotation)	Draws a regular polygon with center at the point (centerx, centery), and numberofsides number of sides.
print(string text)	Prints the specified text string. You cannot change the font size or type of this text.
printifdefined(string propertyname, string truepart(, string falsepart))	Prints the 'truepart' if the given property exists and has a non-empty value, otherwise prints the optional 'falsepart'. You cannot change the font size or type of this text.
println(string text)	Appends a line of text to the shape and a line break. You cannot change the font size or type of this text.
printwrapped(string text)	Prints the specified text string, wrapped over multiple lines if the text is wider than its containing shape. You cannot change the font size or type of this text.
rectangle(int left, int top, int right, int bottom)	Draws a rectangle with extents at left, top, right, bottom. Values are percentages.
roundrect(int left, int top, int right, int bottom, int abs_cornerwidth, int abs_cornerheight)	Draws a rectangle with rounded corners, with extents defined by left, top, right and bottom. The size for the corners is defined by abs_cornerwidth and abs_cornerheight; these values do not scale with the shape.
setcompartmentname(string)	Sets a compartment name to the string provided. This method must be used before calling appendcompartmenttext; calling this after calling appendcompartmenttext clears any text that has already been added to the compartment.
setdefaultcolors()	Returns the brush and pen color to the default settings, or to the user-defined colors if available.
setfillcolor(int red, int green, int blue) or setfillcolor(Color newColor)	Sets the fill color. You can specify the required color by defining RGB values or using a color value returned by any of the Color Queries such as: GetUserFillColor() or GetUserBorderColor() In all cases setfillcolor takes precedence over any color definition that applies to the element.
setfixedregion(int xStart, int yStart, int xEnd, int yEnd)	Fixes a region in a connector into which a sub-shape can be drawn, so that the sub-shape is not rescaled with the length or orientation of the connector line. For an example, see the 'Rotation Direction' script in the *Example Scripts* topic.

setfontcolor(int red, int green, int blue) or setfontcolor(Color newColor)	Sets the font color of a text string. You can specify the required color by defining RGB values or using a color value returned by any of the Color Queries such as: GetUserFontColor() or GetUserFillColor() You can use this command with any of the text print commands.
setlinestyle(string linestyle)	Changes the stroke pattern for commands that use the pen. string linestyle: has these valid styles: • solid • dash • dot • dashdot • dashdotdot • double (See the *Notes* section also.)
setorigin(string relativeTo, int xOffset, int yOffset)	Positions floating text labels relative to the main shape. • relativeTo is one of N, NE, E, SE, S, SW, W, NW, CENTER • xOffset and yOffset are in pixels, not percentage values, and can be negative
setpen(int red, int green, int blue, int penwidth) or setpen(Color newcolor, int penwidth)	Sets the pen to the defined color and sets the pen width. This method is only for line-drawing commands. It does not affect any text print commands.
setpencolor(int red, int green, int blue) or setpencolor(Color newColor)	Sets the pen color. You can specify the required color by defining RGB values or using a color value returned by any of the Color Queries such as: GetUserFillColor() This method is only for line-drawing commands. It does not affect any text print commands.
setpenwidth(int penwidth)	Sets the width of the pen. Pen width should be between 1 and 5. This method is only for line-drawing commands. It does not affect any text print commands.
showlabel(string labelname)	Reveals the hidden label specified by labelname, where labelname is one of these values: • middletoplabel • middlebottomlabel • lefttoplabel • leftbottomlabel • righttoplabel • rightbottomlabel
startcloudpath(puffWidth, puffHeight, noise)	Similar to startpath, except that it draws the path with cloud-like curved segments (puffs). Parameters:

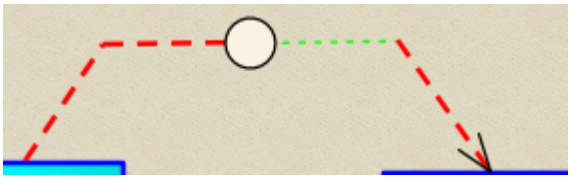
	• float puffWidth (default = 30), the horizontal distance between puffs • float puffHeight (default = 15), the vertical distance between puffs • float noise (default = 1.0), the randomization of the puffs' positions
startpath()	Starts the sequence of drawing commands that define a path.
strokepath()	Draws the outline of the previously defined path with the current pen.

Notes

- If you draw a Shape Script for a line consisting of several segments and define different line styles for the segments, all segments except for the center segment use the first line style defined; the center segment uses the second line style defined, as shown:

```
shape main
{
    noShadow=true;
    // This pen style will be ignored because nothing is drawn.
    setpen(0,0,0,1);
    SetLineStyle("solid");

    // This pen style will be used for non-center segments because it is
    // the first that is used for drawing.
    setpen(255,0,0,2);
    SetLineStyle("dash");
    moveto(0,0);
    lineto(50,0);

    // This line style is used in the center segment, but no others because it
    // isn't the first one drawn with.
    setpen(0,255,0,1);
    SetLineStyle("dot");
    lineto(100,0);

    // This line style is used for an annotation in the center segment only.
    setpen(0,0,0,1);
    SetLineStyle("solid");
    setfixedregion(40,-10,60,10);
    ellipse(40,-10,60,10);
}
```

A Dependency connector with this Shape Script might resemble this:



Color Queries

In defining your shape, you might want to retain the fill, border and font colors you have already defined for the base shape. You can set the color definition using a color query to retrieve arguments for the SetPenColor and SetFillColor commands. These queries can be used in place of arguments.

- getUserFillColor() - returns the user-selected fill color of the current element
- getUserBorderColor() - returns the user-selected border/line color of the current element
- getUserFontColor() - returns the user-selected text font color of the current element
- getUserPenSize() - returns the user-selected line thickness ofthe current element
- getDefaultFillColor() - returns the default fill color for the current element without using the colors applied to this element
- getDefaultLineColor() - returns the default line color for the current element without using the colors applied to this element
- getStatusColor() - returns the status color for the current element; if no color is defined for this status, or status colors are not displayed against this type, this query will return the same as getUserFillColor

For example:

```
shape main
{
   setfillcolor(getuserfillcolor());
   setpencolor(getuserbordercolor());
   rectangle(0,0,100,100);
}
```

Notes

- The user colors are those that would be set on the base object if it were not being modified by the Shape Script; they would have been defined using - in order of decreasing precedence - the Format toolbar options, the 'Appearance' options (F4) or the 'Preferences' dialog ('Start> Appearance > Preferences > Preferences')
- Because the user colors are those defined for an element to which the stereotype and Shape Script are subsequently applied, they cannot be depicted in the 'Preview' panel of the Shape Editor

Conditional Branching

You can incorporate condition branching in your Shape Scripts, using either the 'IfElse' statement or query methods that evaluate to True or False.

When you use these conditional branching statements, you can use the return command to terminate execution of the script when a branch condition has been satisfied. The *Example Scripts* topic provides several examples of this, such as the 'Return Statement Shape' script.

Query Methods

When you are using IfElse statements in a Shape Script, the condition is usually that the object has a certain tag or property, and possibly if that tag or property has a particular value. You can set up the conditional statement to check for the property and value using one of the two query methods described here.

Queries

Method	Description
boolean HasTag(string tagname, (string tagvalue))	HasTag(tagname) evaluates to 'True' if 'tagname' exists and its value is non-empty; otherwise it evaluates to 'false'. HasTag(tagname,tagvalue) evaluates to 'True' if 'tagname' exists and its value is 'tagvalue'. HasTag(tagname,tagvalue) will also evaluate to 'True' if 'tagname' doesn't exist and 'tagvalue' is empty, treating 'empty' and 'missing' as having the same meaning in this context.

boolean HasProperty(string propertyname,
(string propertyvalue))
	Evaluates to True if the associated element has a property with the name propertyname.
	If the second parameter propertyvalue is provided, the property must be present, and the value of the property has to be equal to propertyvalue for the method to evaluate to True.
	The propertyvalue parameter can have multiple values, separated by commas; for example:
	if(HasProperty("Type","Class,Action,Activity,Interface"))
	{
	SetFillColor(255,0,0);
	DrawNativeShape();
	}
	This Shape Script will use the standard element fill color for elements of any type other than one of the four specified in the if(HasProperty()) statement; elements of any of those four types will display with a red fill.

HasProperty and user-selected settings

A particular application of the HasProperty() method is to check for property settings where you have provided the facility for the user to set that property for a specific instance of use of the stereotyped element. So, the user can drag the element onto the diagram and, through the element context menu, set one or more properties that the Shape Script responds to in rendering the diagram object. The element might, therefore, have one appearance on one diagram but a different appearance on another, because it has different property settings on the two diagrams.

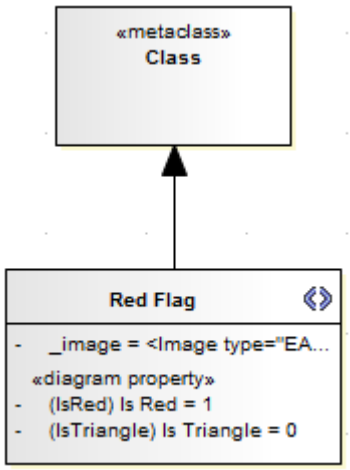
To specify user-selectable properties in your Profile, create the appropriate Stereotype element and - for each property being defined - add an attribute with the stereotype «diagram property» to this element. For the attribute name, type the text of the option that will display on the context menu for the stereotyped element; for example, 'Is Red'. Also give the attribute an alias, which would be the name of the property as it is stored and which the HasProperty() method will evaluate. If you set the attribute's initial value to 1, the context menu option will initially be set; if there is no initial value, the property option will default to not set.

Also define an _image attribute with a Shape Script that applies the HasProperty() method. In this example, the Shape

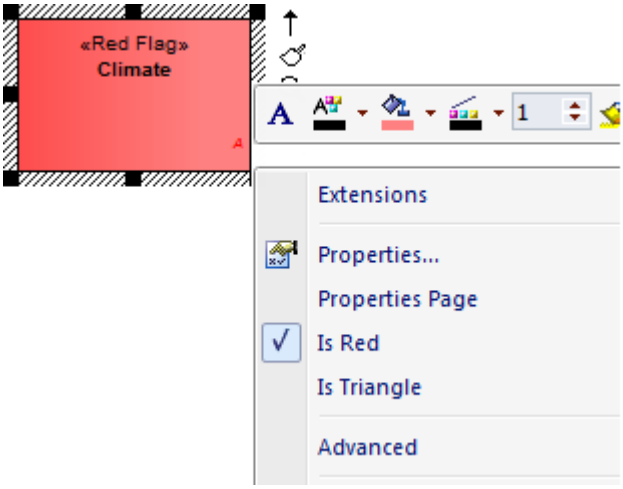
Script defines two Class properties (Is Red and Is Triangle) for the HasProperty() method to check whether the option is set or not.

```
shape main
{
    if (HasProperty("IsRed","1"))
        {
        SetFillColor(255,128,128);
        }
    if (HasProperty("IsTriangle","0"))
        {
        Polygon(50,50,3,50,0);
        }
    else
        {
        DrawNativeShape();
        }
    }
```

When the Stereotype for the extended element type is defined, it will resemble this:



After the MDG Technology is created and released to your users, when they drag the stereotyped element from the Toolbox it will be rendered according to current settings for the defined properties, which the users can access and re-set through the context menu, as shown:


«Red Flag»
Climate
Extensions
Properties...
Properties Page
Is Red
Is Triangle
Advanced

Display Element/Connector Properties

A common component of a customized shape is a text string, which can include the name and value of one of the properties of the element or connector. To display the text, you use one of the commands:

- print
- println and
- printwrapped

These all take a string parameter representing the text to be displayed. The element or connector property can be added to the text using the substitution macro #<propertyname>#; for example:

```
println("name: #NAME#");
```

You can display several properties by issuing the commands several times, once for each property. The element and connector properties you can display are listed here. Additionally, you can display Tagged Values by prefixing the tag name with TAG, as shown:

```
print("#TAG:condition#");
```

You can also test for and display an element's custom properties in the same way as you do the system-named properties; for example:

```
if(hasproperty("Name","Value"))
...
```

and:

```
print("#Name#");
```

Properties for Element Shape Scripts

- actualname - same as 'name' except that it does not react to the 'Use Alias if Available' setting
- addin - returns a value from an invoked Add-In function; syntax:
  addin:<addin_name>, <function_name>, <parameter> [, <parameter> ...]
  Note that in the hasproperty() argument, Enterprise Architect requires the hash characters for addin values:
  if(hasproperty("#ADDIN:MyAddin,MyValue#", "TheValue")) {
- alias
- author
- cardinality
- classifier
- classifier.actualname - same as 'classifier.name' except that it does not react to the 'Use Alias if Available' setting
- classifier.alias
- classifier.metatype
- classifier.name
- classifier.stereotype
- classifier.type
- complexity
- concurrency
- datecreated
- datemodified
- diagram.author
- diagram.handdrawn

- diagram.mdgtype
- diagram.mdgview
- diagram.name
- diagram.stereotype
- diagram.type
- diagram.version
- ES (adds the End Stereotype character(s) as determined by the "Use extended << and >> characters" option)
- haslinkeddocument
- incomingedge (returns "none", "left", "right", "top", "bottom", or "multiple")
- isabstract
- isactive
- iscomposite
- isdrawcompositelinkicon
- isembedded
- isinparent
- isleaf
- islocked
- isroot
- isspec
- istagged
- isvisible
- keywords
- language
- metatype
- multiplicity
- name
- notes
- notesvisible
- outgoingedge (returns "none", "left", "right", "top", "bottom", or "multiple")
- packagename
- packagepath
- package.stereotype
- parentedge ("right", "left", "top", "bottom")
- parent.metatype
- partition (returns "vertical" or "horizontal")
- persistence
- phase
- priority
- propertytype
- propertytype.alias
- propertytype.metatype
- propertytype.name

- propertytype.stereotype
- qualifiedname
- rectanglenotation
- scope
- showcomposeddiagram (returns "True" or "False")
- SS (adds the Start Stereotype character(s) as determined by the "Use extended << and >> characters" option)
- status
- stereotype
- stereotypehidden
- subtype
- type
- version
- visibility

Properties for Connector Shape Scripts

- actualname - same as 'name' except that it does not react to the 'Use Alias if Available' setting
- addin - returns a value from an invoked Add-In function; syntax:
  addin:<addin_name>, <function_name>, <parameter> [, <parameter> ...]
  Note that in the hasproperty() argument, Enterprise Architect requires the hash characters for addin values:
  if(hasproperty("#ADDIN:MyAddin,MyValue#", "TheValue")) {
- alias
- diagram.author
- diagram.connectornotation
- diagram.handdrawn
- diagram.mdgtype
- diagram.mdgview
- diagram.name
- diagram.stereotype
- diagram.type
- diagram.version
- direction
- effect
- ES - adds the End Stereotype character(s) as determined by the "Use extended << and >> characters" option
- guard
- isroot
- isleaf
- name
- rotationdirection ("up", "down", "left", "right")
- source.actualname - same as 'source.name' except that it does not react to the 'Use Alias if Available' setting
- source.aggregation
- source.alias
- source.changeable

- source.constraints
- source.element.name
- source.element.stereotype
- source.metatype for details of these four source.metatype properties, see the
- source.metatype.general *Define Metamodel Constraints* Help topic
- source.metatype.specific
- source.metatype.both
- source.multiplicity
- source.multiplicityisordered
- source.name
- source.qualifiers
- Source.RectangleNotation
- source.stereotype
- source.targetscope
- SS - adds the Start Stereotype character(s) as determined by the "Use extended << and >> characters" option
- stereotype
- target.actualname - same as 'target.name' except that it does not react to the 'Use Alias if Available' setting
- target.aggregation
- target.alias
- target.changeable
- target.constraints
- target.element.name
- target.element.stereotype
- target.metatype
- target.multiplicity
- target.multiplicityisordered
- target.name
- target.qualifiers
- Target.RectangleNotation
- target.stereotype
- target.targetscope
- triggers
- type
- weight

Sub-Shapes

When you define an element or connector shape using a Shape Script, you can build the shape from separate components, defined as sub-shapes. Using sub-shapes, you can create complex shapes that more closely resemble the objects that they represent.

Sub-shape Layout

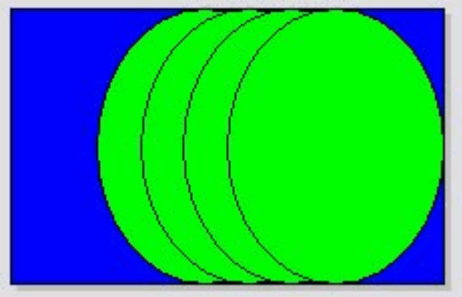
To set the layout type you use the layoutType attribute, which must be set in the initialization attributes section of the script; in other words, before any of the methods are called. Valid values for this attribute are:

- LeftRight - Shapes with this layout position the sub-shapes side by side, with the first added on the left, and subsequent sub-shapes to the right
- TopDown - Places the sub-shapes in a vertical arrangement, with the first sub-shape added to the top and subsequent sub-shapes added beneath
- Border - This requires an additional argument to the addsubshape method to specify which region of the containing shape the sub-shape is to occupy: N, E, S, W or CENTER; each region can only be occupied by one sub-shape
  A sub-shape that is assigned to the E or W region must have its preferredwidth attribute specified in its declaration and, similarly, sub-shapes added to N or S must have their preferredheight attribute set; in this case, the values for these attributes are treated as static lengths and do not scale glyphs

Example

```
shape main
{
    layouttype="topdown";
    setfillcolor(0,0,255);
    rectangle(0,0,100,100);
    addsubshape("sub",50,100,20,0);
    addsubshape("sub",50,100,30,-100);
    addsubshape("sub",50,100,40,-200);
    addsubshape("sub",50,100,50,-300);

    shape sub
    {
        setfillcolor(0,255,0);
        ellipse(0,0,100,100);
    }
}
```

The script defines this shape:



Add Custom Compartments to Element

When you display an element on a diagram in normal, rectangular format, it is possible to show a number of compartments within that frame to reveal added characteristics such as attributes, operations and Notes, using the diagram 'Properties' and element 'Compartment Visibility' dialogs. If you want to reveal other added characteristics, such as related elements or Ports and Parts, you can use a Shape Script to add custom compartments to the diagram display of the element. You would usually add this Shape Script to a Stereotype element in a Profile.

Having created a custom compartment, you can add a linked Note to the element to display the content of the compartment, as you can for the other features of the element.

Access

Define a Stereotype element in a Profile, and use the special attribute '_image' to specify a Shape Script that adds custom compartments.

Ribbon	Design > Element > Features > Attributes : [create an attribute named '_image'] > click on the  icon in the 'Initial Value' field Settings > Reference Data > UML Types > Stereotypes : (select or specify stereotype) : Shape Script > Assign
Context Menu	In diagram, right-click on element | Features | Attributes : [create an attribute named '_image'] | click on  in the 'Initial Value' field
Keyboard Shortcuts	F9 : [create an attribute named '_image'] > click on the  icon in the 'Initial Value' field

Add custom compartments to elements

This table provides notes on creating Shape Scripts that define custom compartments, and a variety of examples.

Process	Description
Develop script	For the selected stereotype, open the Shape Editor. In the script, replace *shape main* with: • *shape ChildElement* or • *shape RelatedElement* You can keep *shape main* if you prefer, to adjust some properties of the main element (such as color); however, the main shape then requires a call to 'DrawNativeShape()' in order to work correctly. At this point, you can use the 'HasProperty' query method to search child or related elements for specific properties (such as stereotypes) to be displayed in compartments. A RelatedElement Shape Script determines properties of elements that are linked to the current element via connectors. Visibility of each individual custom compartment defined by a Shape Script is controlled using the 'Compartment Visibility' dialog. ChildElement compartments are visible by default and can be hidden using the compartment visibility options, whilst RelatedElement compartments are hidden by default and must be explicitly

	enabled using the compartment visibility options. Be aware, also, that child elements can be shown in a custom compartment either when they are on the diagram with the parent element or when they are not on the diagram (as in examples 1, 2 and 3). Related elements can only be listed in a compartment if they are NOT on the same diagram (as in examples 4 and 5).
Attach Linked Note	You can use one of two methods to create a linked Note to display custom compartment contents: • Method 1 (the element is currently displaying custom compartments) - highlight the related or child element name in the custom compartment, then right-click on it and select the 'Create Linked Note' option; the custom compartment is automatically closed, and the linked Note added to the diagram listing all element names in that compartment • Method 2 (the element is not necessarily showing custom compartments) - drag a Note element from the 'Common' page of the Diagram Toolbox and link it to the element containing the custom compartment with a Notelink connector Right-click on the connector and select the 'Link this note to an element feature' option, to display the 'Link note to element feature' dialog; click on the drop-down arrow in the 'Feature Type' field and click on the name of the custom compartment, such as 'Properties', then click on the OK button The contents of that compartment are displayed in the Note In Method 2, if the compartment is displayed the method will NOT hide the compartment. It is recommended that you use this method if the compartment is already hidden. Any changes you make to the list of elements in the compartment, or their names, are immediately reflected in the Note to maintain the accuracy of the displayed information.

Script Example 1: Add compartment without adjusting the parent element	//Add compartments for Child elements.
	shape ChildElement
	{
	//Check if a child element has the property stereotype, if so set
	//the compartment name to Properties.
	if(HasProperty("stereotype", "property"))
	{
	SetCompartmentName("Properties");
	}
	//Check if the child element has a public scope and if so add the +
	//symbol to the child compartment.
	if(HasProperty("scope", "public"))
	{
	AppendCompartmentText("+");
	}
	//Add the child elements name to the child compartment.
	AppendCompartmentText("#NAME#");
	}
	
	The Shape Script checks all child elements to see if they have a stereotype of <<property>>. If this stereotype is found, the 'SetCompartmentName' function sets a compartment called 'Properties'.
	The script then checks whether the child element has a 'public' scope and, if it does,

	appends the '+' symbol. Finally, the 'AppendCompartmentText' function adds the child element's name to the compartment. If a compartment has already been declared by 'SetCompartmentName', any additional child elements that fall under the same compartment are automatically added to it without having to declare a new compartment name (that is, all child elements with the stereotype <<property>> end up in the 'Properties' compartment).

Script Example 2: Adjust the color of the parent element and add child compartments	//Shape main affects the parent
	shape main
	{
	//Set the color of the parent element to red
	setfillcolor(255,0,0);
	//draw the parents native shape
	drawnativeshape();
	}
	
	//Shape ChildElement adds Child Compartments to the parent.
	shape ChildElement
	{
	if(HasProperty("stereotype", "part"))
	{
	SetCompartmentName("Parts");
	}
	else if(HasProperty("stereotype", "mystereotype"))
	{
	SetCompartmentName("My Stereotype");
	}
	
	AppendCompartmentText("#NAME#");
	}
	
	The 'shape main' section sets the color of the main element to red and adds child compartments based upon stereotyped child elements.
	The script checks whether a child element has either the stereotype value 'part' or 'mystereotype' applied to it. If there are multiple child elements, having a combination of 'part" and 'mystereotype' stereotypes, two compartments are created called 'Parts' and 'My Stereotype'.
	In order to display the compartments, 'AppendCompartmentText' must be called to insert content into the compartment.
	Values passed to 'SetCompartmentName' and 'AppendCompartmentText' can not contain new line characters.

Script Example 3: Only list child element in compartment if it is not already visible on the diagram	shape ChildElement
	{
	//Check if the child element is on the diagram or not.
	if(hasproperty("IsVisible", "False"))
	{

	//Create a compartment for parts.
	if(hasproperty("type", "part"))
	{
	SetCompartmentName("Parts");
	}
	//Create a compartment for ports.
	else if(hasproperty("type", "port"))
	{
	SetCompartmentName("Ports");
	}
	//Add child element name to compartment.
	AppendCompartmentText("#NAME#");
	}
	}
	
	This script adds custom compartments for Port and Part elements that belong to the current element but that are not visible on the current diagram.
	The 'IsVisible' property returns True if the child element is already visible on the diagram, False if the child element is not visible.
	This can be used to prevent the child element from being listed in the custom compartment if it is already visible on the diagram, avoiding display of redundant information.

Script Example 4: Display elements that are the target of a Dependency connector from the element that owns the Shape Script	shape RelatedElement
	{
	//Check if the current connector we are processing has a
	//dependency type.
	if(HasProperty("Connector.Type", "Dependency"))
	{
	//Check if the element we are currently checking is
	//the target of the current connector.
	if(HasProperty("Element.IsTarget"))
	{
	//Set the compartment Name
	SetCompartmentName("dependsOn");
	if(HasProperty("Element.Stereotype", ""))
	{
	}
	else
	{
	AppendCompartmentText("«#Element.Stereotype#»");
	}
	AppendCompartmentText("#Element.Name#");
	}
	}
	}

	With this script, if a Class1 has a stereotype with the 'RelatedElement' Shape Script and Class1 is the source of a Dependency connector to the target Class2, then the name Class2 is displayed in a compartment of Class 1, called 'dependsOn'.

Script Example 5: Display a list of Realized Interfaces within a compartment on an element	shape RelatedElement
	{
	//Check if the current connector being processed is a Realization
	if(HasProperty("Connector.Type", "Realization"))
	{
	//Only display this compartment if the related element we
	//are checking is the target of the connector that has this
	//Shape Script element as the source
	if(HasProperty("Element.IsTarget"))
	{
	//If the element is an interface, display it in
	//'realizedInterfaces' compartment
	if(HasProperty("Element.Type", "Interface"))
	{
	SetCompartmentName("realizedInterfaces");
	AppendCompartmentText("#Element.Name#");
	}
	}
	}
	}
	
	If an element Class 1 has this Shape Script and is the source of a Realization connector to an element Interface 1, the name 'Interface 1' is displayed in the 'realizedInterfaces' compartment of Class 1.

Notes

- If you use punctuation within a compartment name, it is stripped out when the script is saved; for example: 'Ports, Parts and Properties' becomes 'Ports Parts and Properties'
- The 'RelatedElement' Shape Scripts have extended capabilities to check both a connector and the element on the other end of the connector; they are applied only to an element and are solely used to retrieve information to be displayed within a compartment of that element

Show Composite Diagram

You can define an element as being Composite (using the 'New Diagram | Composite Structure Diagram' context menu option), in which case the element has a child Composite diagram depicting the substructure of the element. You can also use context menu options to display the Composite diagram on the element, either recasting the element as a frame or adding a compartment to the element. Ordinarily, a Shape Script that redefines the appearance of the Composite element effectively circumvents the effect of these options, but you can edit the script to respond to the 'Show Composite Diagram in Compartment' option and show the child Composite diagram in the center compartment of the element.

To show Composite diagrams, the script requires a layout type of 'border', with the Composite diagram added to the center sub-shape of the main shape when drawing. The defining Shape Script statements are, therefore:

```
shape main
{
    layouttype="Border";
    if(HasProperty("ShowComposedDiagram", "true"))
    {
        addsubshape("ComposedDiagram", "CENTER");
    }
    shape ComposedDiagram
    {
        DrawComposedDiagram();
    }
}
```

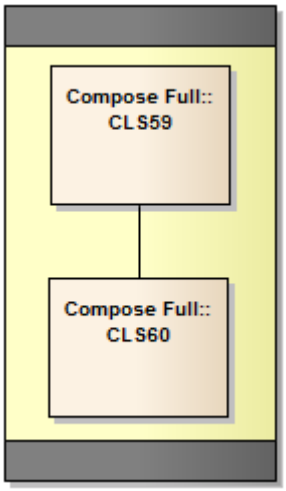
Examples

An example of a Shape Script including a composed diagram is:

```
Shape main
{
    //Set the border type
    layouttype="Border";
    //Set a cream fill color
    setfillcolor(255, 255, 200);
    //Draw a base rectangle for the object.
    rectangle(0, 0, 100, 100);
    //Add some padding to the top of the shape
    addsubshape("Padding", "N");
    //Check the setting of the context menu option
    if(HasProperty("ShowComposedDiagram", "true"))
    {
        //Add the composed diagram to the center of the object
        addsubshape("ComposedDiagram", "CENTER");
```

```
    }
    //Add some padding to the bottom of the shape.
    addsubshape("Padding", "S");
    shape Padding
    {
        //Set the height of this element
        preferredHeight = 20;
        //Set the fill color to gray
        setfillcolor(128, 128, 128);
        //Draw a rectangle that will take up the width of the object and
        //have a height of 20 pixels.
        rectangle(0, 0, 100, 100);
    }
    shape ComposedDiagram
    {
        //Draw the composed diagram.
        DrawComposedDiagram();
    }
}
```

This script generates the shape:



Composed diagrams are currently only supported as the center sub-shape of the main shape. Adding the diagram to any other location will cause the composed diagram to either not draw correctly or not draw at all. The diagram can be a sub-shape of a sub-shape, but only if the parent shape and sub-shape(s) all have a "CENTER" orientation. For example:

```
//This shapescript is fine, because shape E is the center of shape C, which is the center of shape D; that is, all shapes leading to //DrawComposedDiagram are "CENTER".

shape main
{
    layouttype = "Border";
```

```
    rectangle (0, 0, 100, 100);
    addsubshape ("D", "CENTER");
    shape D
    {
        layouttype= "Border";
        addsubshape ("C", "CENTER");
        shape C
        {
            layouttype= "Border";
            addsubshape ("E", "CENTER");
            addsubshape ("Padding", "N");
            addsubshape ("Padding", "S");
            shape E
            {
                DrawComposedDiagram ();
            }
            shape padding
            {
                preferredHeight = 20;
                setfillcolor (10, 30, 80);
                rectangle (0, 0, 100, 100);
            }
        }
    }
}

//This shapescript is not good - shape E is "CENTER", shape C is "S" and shape D is "CENTER"; because shape C is oriented "S"
//the diagram will not draw.

shape main
{
    layouttype = "Border";
    rectangle (0, 0, 100, 100);
    addsubshape ("D", "CENTER");
    shape D
    {
        layouttype= "Border";
        addsubshape ("C", "S"); //<- this is bad, all parent subshapes of a DrawComposedDiagram call MUST be
        //  "CENTER" oriented
        shape C
        {
```

```
            layouttype= "Border";
            addsubshape ("E", "CENTER");
            addsubshape ("Padding", "N");
            addsubshape ("Padding", "S");
            shape E
            {
                DrawComposedDiagram ();
            }
            shape padding
            {
                preferredHeight = 20;
                setfillcolor (10, 30, 80);
                rectangle (0, 0, 100, 100);
            }
        }
    }
}
```

Notes

- To display the Composite diagram, the 'New Diagram | Show Composite Diagram in Compartment' option should be selected on the element's context menu in the diagram
- The composed diagram is displayed at natural size, so the parent element can not be resized to be smaller than the composed diagram

Reserved Names

When you write a Shape Script, there are certain terms that are reserved because they have special meaning in the script; use them for their specific purposes.

Elements

Elements (such as Class, State or Event) have these reserved names for parts of the shape.

Name	Description
shape main	The main shape is the whole shape.
shape label	The shape label gives the shape a detached label.
decoration <identifier>	Decoration gives the shape a decoration as defined by the name in <identifier>.
shape ChildElement	Allows addition of custom compartments based on child elements belonging to the current element.
shape RelatedElement	Allows addition of custom compartments based on related elements belonging to the current element.

Connectors

Connectors (such as Association, Dependency or Generalization) have these reserved names for parts of the shape.

Name	Description
shape main	The main shape is the whole shape.
shape source	The source shape is an extra shape at the source end of the connector.
shape target	The target shape is an extra shape at the target end of the connector.
shape LeftTopLabel	Shapes defines a detached label for the connector in the left top corner.
shape MiddleTopLabel	Shapes defines a detached label for the connector in the middle top.
shape RightTopLabel	Shapes defines a detached label for the connector in the right top corner.
shape LeftBottomLabel	Shapes defines a detached label for the connector in the left bottom corner.
shape MiddleBottomLabel	Shapes defines a detached label for the connector in the middle bottom.
shape RightBottomLabel	Shapes defines a detached label for the connector in the right bottom corner.

Syntax Grammar

A section of a Shape Script can be quite complex, containing a number of commands and parameters. This table provides a breakdown of the Shape Script structure, illustrating how commands and parameters are constructed. The first entry is the top-level declaration, and subsequent entries show the composition of successively more detailed components.

Grammar Symbols

- * = zero or more
- + = one or more
- | = or
- ; = terminator

Symbol	Description
ShapeScript ::=	<Shape>*;
Shape ::=	<ShapeDeclaration> <ShapeBody>;
ShapeDeclaration ::=	<ShapeType> <ShapeName>;
ShapeType ::=	"shape" | "decoration" | "label";
ShapeName ::=	<ReservedShapeName> | <stringliteral>;
ReservedShapeName ::=	See *Reserved Names* for full reserved shape listing.
ShapeBody ::=	"{" <InitialisationAttributeAssignment>* <DrawingStatement>* <SubShape>* "}";
InitialisationAttributeAssignment ::=	<Attribute> "=" <Value> ";";
Attribute ::=	See *Shape Attributes* for full listing of attribute names.
DrawingStatement ::=	<IfElseSection> | <Method>;
IfElseSection ::=	"if" "("<QueryExpression>")" <TrueSection> (<ElseSection>);
QueryExpression ::=	<QueryName> "(" <ParameterList> ")"; See *Query Methods* for descriptions of the queries and their parameters.
QueryName ::=	See *Query Methods* for the possible Query names.
TrueSection ::=	"{" <DrawingStatement>* "}"
ElseSection ::=	"else" "{" <DrawingStatement>* "}"
Method ::=	<MethodName> "(" <ParameterList> ")" ";";

MethodName ::=	See *Drawing Methods* for a full listing of method names.

Example Scripts

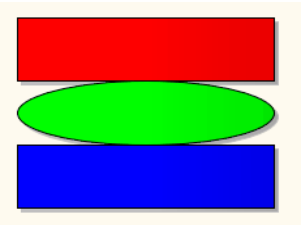
You can create a wide range of shapes, effects and text statements using Shape Scripts, to enhance the appearance and information value of the elements and connectors you create. Some examples of such scripts are provided here.

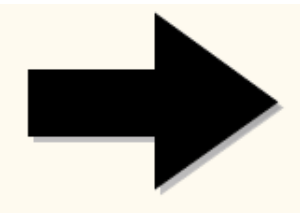
Access

Ribbon	Settings > Reference Data > UML Types > Stereotypes (specify stereotype) : Shape Script + Assign, or Settings > Reference Data > UML Types > Stereotypes (specify stereotype) : Shape Script + Edit

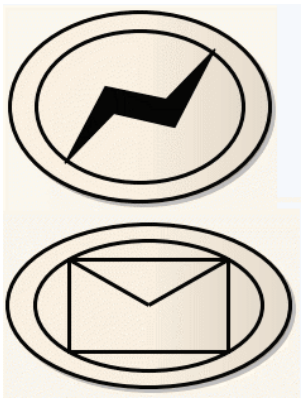
Examples

Shape	Script

	// BASIC SHAPES
	shape main
	{
	setfillcolor(255, 0, 0); // (R,G,B)
	rectangle(0, 0, 90, 30); // (x1,y1,x2,y2)
	
	setfillcolor(0, 255, 0); // (R,G,B)
	ellipse(0, 30, 90, 60); // (x1,y1,x2,y2)
	
	setfillcolor(0, 0, 255); // (R,G,B)
	rectangle(0, 60, 90, 90); // (x1,y1,x2,y2)
	}

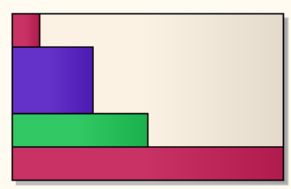
	// SINGLE CONDITIONAL SHAPE
	shape main
	{
	if (HasTag ("Trigger", "Link"))
	{
	// Only draw if the object has a Tagged Value Trigger=Link
	// Set the fill color for the path
	setfillcolor(0, 0, 0);
	startpath(); // Start to trace out a path
	moveto(23, 40);
	lineto(23, 60);
	lineto(50, 60);
	lineto(50, 76);

```
            lineto(76, 50);
            lineto(50, 23);
            lineto(50, 40);
            endpath(); // End tracing out a path
            // Fill the traced path with the fill color
            fillandstrokepath();
            return;
    }
}
```

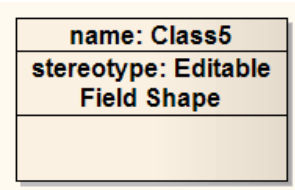


```
// MULTI CONDITIONAL SHAPE
shape main
{
    startpath();
    ellipse(0, 0, 100, 100);
    endpath();
    fillandstrokepath();
    ellipse(3, 3, 97,97);

    if (HasTag ("Trigger", "None"))
    {
            return;
    }

    if (HasTag ("Trigger", "Error"))
    {
            setfillcolor(0, 0, 0);
            startpath();
            moveto(23, 77);
            lineto(37, 40);
            lineto(60, 47);
            lineto(77, 23);
            lineto(63, 60);
            lineto(40, 53);
            lineto(23, 77);
            endpath();
            fillandstrokepath();
            return;
    }
    if (HasTag ("Trigger", "Message"))
    {
            rectangle(22, 22, 78, 78);
            moveto(22, 22);
            lineto(50, 50);
            lineto(78, 22);
```

```
            return;
        }
    }
```

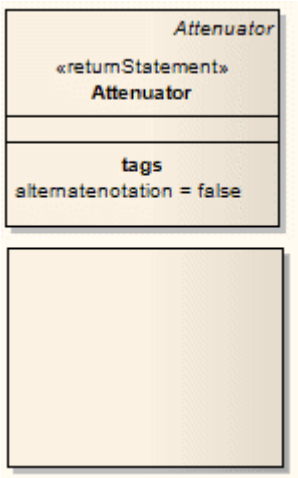


```
// SUB SHAPES
shape main
{
    rectangle(0, 0, 100, 100);

    addsubshape("red", 10, 20);
    addsubshape("blue", 30, 40);
    addsubshape("green", 50, 20);
    addsubshape("red", 100, 20);

    shape red
    {
            setfillcolor(200, 50, 100);
            rectangle(0, 0, 100, 100);
    }

    shape blue
    {
            setfillcolor(100, 50, 200);
            rectangle(0, 0, 100, 100);
    }

    shape green
    {
            setfillcolor(50, 200, 100);
            rectangle(0, 0, 100, 100);
    }
}
```



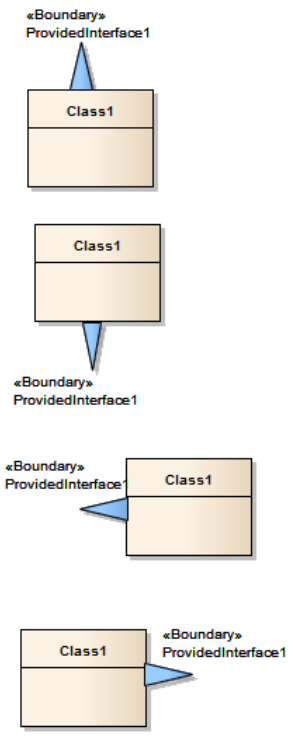

```
// EDITABLE FIELD SHAPE
shape main
{
    rectangle(0, 0, 100, 100);
    addsubshape("namecompartment", 100, 20);
    addsubshape("stereotypecompartment", 100, 40);

    shape namecompartment
    {
            h_align = "center";
            editablefield = "name";
            rectangle(0, 0, 100, 100);
```

```
            println("name: #name#");
    }

    shape stereotypecompartment
    {
            h_align = "center";
            editablefield = "stereotype";
            rectangle(0, 0, 100, 100);
            println("stereotype: #stereotype#");
    }
}
```

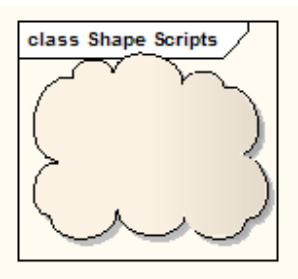



```
// RETURN STATEMENT SHAPE
shape main
{
    if (hasTag("alternatenotation", "false"))
    {
            //draw ea's inbuilt glyph
            drawnativeshape();
            //exit script with the return statement
            return;
    }
    else
    {
            //alternate notation commands
            //...
            rectangle(0, 0, 100, 100);
    }
}
```

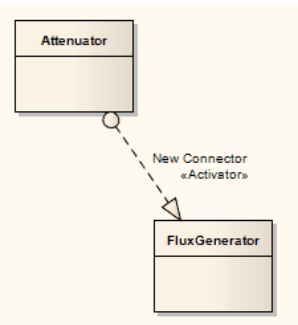
```
//EMBEDDED ELEMENT SHAPE POSITION ON PARENT EDGE
shape main
{
    defsize(60,60);
    startpath();
    if(hasproperty("parentedge","top"))
    {
            moveto(0,100);
            lineto(50,0);
            lineto(100,100);
    }
    if(hasproperty("parentedge","bottom"))
    {
            moveto(0,0);
            lineto(50,100);
```




```
            lineto(100,0);
        }
        if(hasproperty("parentedge","left"))
        {
            moveto(100,0);
            lineto(0,50);
            lineto(100,100);
        }
        if(hasproperty("parentedge","right"))
        {
            moveto(0,0);
            lineto(100,50);
            lineto(0,100);
        }
        endpath();
        setfillcolor(153,204,255);
        fillandstrokepath();
}
```

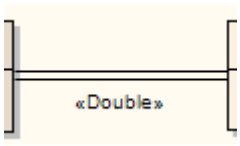


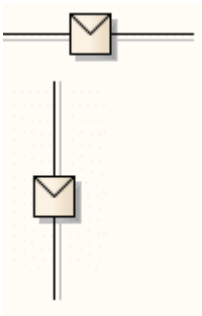

```
// CLOUD PATH EXAMPLE SHAPE
shape main
{
    StartCloudPath();
    Rectangle(0, 0, 100, 100);
    EndPath();
    FillAndStrokePath();
}
```



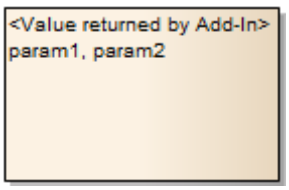

```
// CONNECTOR SHAPE
shape main
{
    // draw a dashed line
    noshadow=true;
    setlinestyle("DASH");
    moveto(0,0);
    lineto(100,0);
}

shape source
{
    // draw a circle at the source end
    rotatable = true;
    startpath();
    ellipse(0,6,12,-6);
    endpath();
```

	fillandstrokepath();
	}
	
	shape target
	{
	// draw an arrowhead at the target end
	rotatable = true;
	startpath();
	moveto(0,0);
	lineto(16,6);
	lineto(16,-6);
	endpath();
	fillandstrokepath();
	}

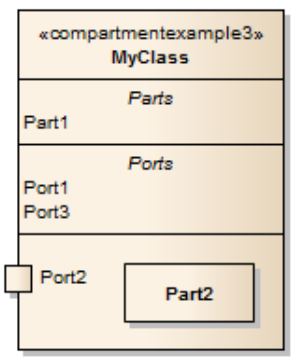
	// DOUBLE LINE
	shape main
	{
	setlinestyle("DOUBLE");
	moveto(0,0);
	lineto(100,0);
	}

	// ROTATION DIRECTION
	shape main
	{
	moveto(0,0);
	lineto(100,0);
	setfixedregion(40,-10,60,10);
	rectangle(40,-10,60,10);
	if(hasproperty("rotationdirection","up"))
	{
	moveto(60,-10);
	lineto(50,0);
	lineto(60,10);
	}
	if(hasproperty("rotationdirection","down"))
	{
	moveto(40,-10);
	lineto(50,0);
	lineto(40,10);
	}
	if(hasproperty("rotationdirection","left"))
	{
	moveto(40,-10);

```
        lineto(50,0);
        lineto(60,-10);
    }
    if(hasproperty("rotationdirection","right"))
    {
        moveto(40,10);
        lineto(50,0);
        lineto(60,10);
    }
}
```



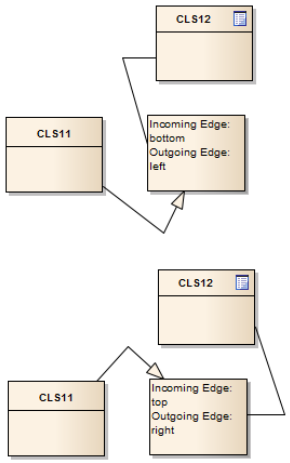

```
// GET A VALUE RETURNED BY AN ADD-IN
shape main
{
    //Draw a simple rectangle
    Rectangle(0,0,100,100);

    //Print string value returned from Add-In "MyAddin",
    //Function "MyExample" with two string parameters
    Print("#ADDIN:MyAddin, MyExample, param1, param2#");
}

    // METHOD SIGNATURE FOR ADD-IN FUNCTION:
    // Public Function MyExample(Repository As EA.Repository,
    // eaGuid As String, args As Variant) As Variant
```



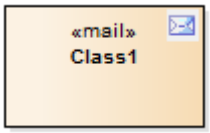

```
// ADD CUSTOM COMPARTMENTS BASED UPON CHILD ELEMENTS
// OR RELATED ELEMENTS
```

(See the *Add Custom Compartments to Element* Help topic)

```
// RETURN THE INCOMING AND OUTGOING EDGE FOR CONNECTORS
// GOING INTO AND OUT OF AN OBJECT
shape main
{
     //Draw a simple rectangle
    Rectangle(0,0,100,100);

    //Print incoming edges on the element
    Print("Incoming Edge: #incomingedge#\n");
```




```
    //Print outgoing edges on the element
    Print("Outgoing Edge: #outgoingedge#\n");
}
```

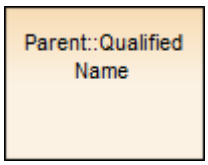


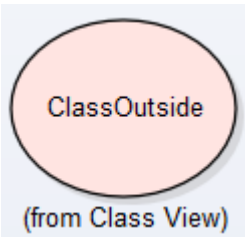

```
// DRAW A DECORATION ICON ON TOP OF THE DEFAULT
// ELEMENT SHAPE
decoration mail
{
    orientation= "NE";
    image ("icon image", 0, 0, 100, 100);
    // "icon image" being the name of the 16x16 image which is loaded into the
Image Manager
}
```


```
// DRAW AN IMAGE FROM A FILE, AND AN EDITABLE NAME FIELD
shape main
{
    addsubshape ("theimage", 100, 100);
    addsubshape ("namecompartment", 100, 100);

    shape theimage
    {
        image ("element image", 0, 0, 100, 100);
        // "element image" being the name of the image that is loaded into the
Image Manager
    }
    shape namecompartment
    {
        h_align = "center";
        editablefield = "name";
        println ("#name#");
    }
}
```

```
// CHECK WHETHER A COMPOSITE ELEMENT ICON IS REQUIRED
// AND, IF SO, DRAW ONE
decoration comp
```

	{
	orientation="SE";
	if(hasproperty("IsDrawCompositeLinkIcon","true"))
	{
	startpath();
	ellipse(-80,29,-10,71);
	ellipse(10,29,80,71);
	moveto(-10,50);
	lineto(10,50);
	endpath();
	strokepath();
	}
	}

	// ALLOW A SHAPESCRIPT TO SHOW THE FULLY SCOPED OBJECT
	// NAME OF AN OWNED ELEMENT, INCLUDING OWNING ELEMENTS
	// AND OWNING PACKAGES, WHEN THE DIAGRAM PROPERTIES
	// 'DISABLE FULLY SCOPED OBJECT NAMES' OPTION IS
	// DESELECTED, JUST AS FOR AN ELEMENT WITHOUT A
	// SHAPESCRIPT.
	shape main
	{
	layouttype= "border";
	rectangle (0, 0, 100, 100);
	addsubshape ("padding", "N");
	addsubshape ("name", "CENTER");
	shape padding
	{
	preferredheight=8;
	}
	shape name
	{
	v_align= "top";
	h_align= "center";
	printwrapped ("#qualifiedname#");
	}
	}

	// SHOW THE NAME OF THE OWNING PACKAGE WHEN THE ELEMENT
	// IS USED ON A DIAGRAM NOT IN THAT PACKAGE, AND THE
	// DIAGRAM PROPERTIES 'SHOW NAMESPACE' OPTION IS SELECTED.
	shape main
	{
	layouttype= "border";
	v_align= "CENTER";

```
    h_align= "CENTER";
    ellipse (0, 0, 100, 100);
    printwrapped ("#name#");
    addsubshape ("path", "S");
    shape path
    {
        v_align= "top";
        h_align= "center";
        if (hasproperty ("packagepath", ""))
        {
        }
      else
        {
            printwrapped ("(from #packagepath#)");
        }
    }
}
```

Tagged Value Types

When you are working with Tagged Values, you can create your own, custom, Tagged Values based on predefined, system-provided Tagged Value Types. With these, you can create:

- Tagged Values that are complex and based on predefined types, with or without tag filters
- Structured Tagged Values that are composite, containing other Tagged Values
- Tagged Values that return values from the various reference data tables
- Masked Tagged Values that insert user-provided data into a text string such as line of prompts or field names

By adding Tagged Values of any type to a Stereotype element in a Profile, you can define additional meta-information for the way in which a modeling element appears and behaves in a Technology. The Tagged Values are identified by attributes of the Stereotype element.

Notes

- You can transport Tagged Value Type definitions between models, using the 'Settings > Model > Transfer > Export Reference Data' and 'Import Reference Data' ribbon options; Tagged Value Types are exported as Property Types

Create Tagged Value Type from Predefined Types

When you are working with Tagged Values, you might want to use structured Tagged Values; that is, Tagged Values that capture and present more complex information in a specific format. The base types for such Tagged Values (the type you call in when you create a tag in the 'Tags' page of the Properties window) can be easily created specifically for your model, as you can base the customized structured Tagged Value types on a range of predefined Tagged Value types and filters.

Access

Ribbon	Settings > Reference Data > UML Types > Tagged Value Types

Create a Custom Structured Tagged Value type

Field/Button	Description
Tag Name	Type an appropriate name for your new Tagged Value type.
Description	Optionally, type a short description or the purpose of the Tagged Value type.
Detail	Either copy-and-paste or type the syntax of the predefined structured Tagged Value Type on which to base your new Tagged Value type.
Save	Click on this button to save the new structured Tagged Value type. The Tagged Value type displays in the Defined Tag Types list.
New	Optionally, click on this button to clear the fields so that you can enter information for another new Tagged Value type.

Predefined Structured Types

Tagged Values define a wide range of properties and characteristics of a model element, and some of these properties have complex values. For example, you might want your user to select a value between upper and lower limits (using 'Spin' arrows), set a date, select a color from a palette, or work through a checklist.

You create these complex Tagged Values from any of a number of predefined Tagged Value types and filters, some of which you might have created yourself ('Settings > Reference Data > UML Types > Tagged Value Types').

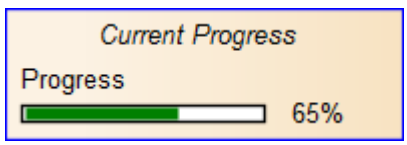
Tagged Value Type Formats

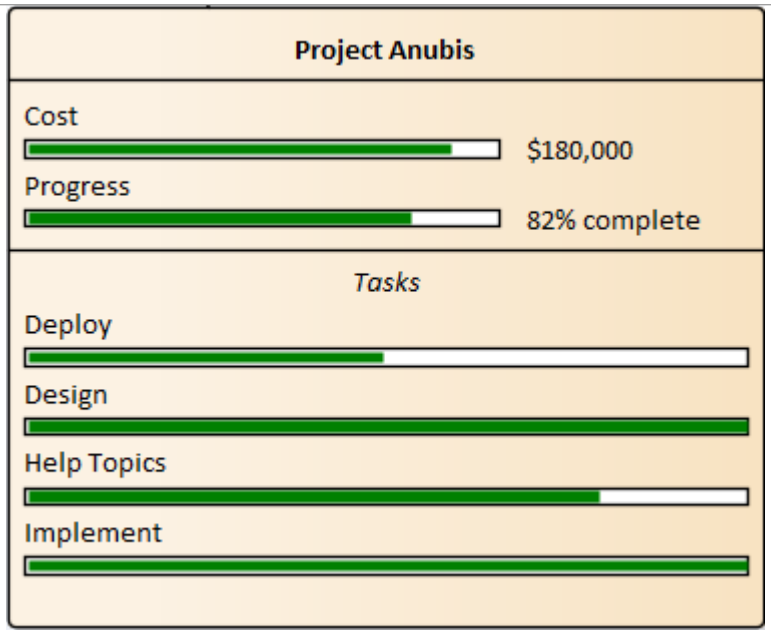
For each Tagged Value Type, the description includes the syntax for creating the initial values for use of the Tagged Value. The name and format are case-sensitive.

Tagged Value Type	Format
AddinBroadcast	Type=AddinBroadcast; Values=YourAddinName; Used to: Allow an Add-In to respond to an attempt to edit this Tagged Value by showing a dialog in which the value and notes can be edited.
Boolean	Type=Boolean; Default=Val; Used to: Provide for the input of True or False, either of which can be the default value.
CheckList	Type=CheckList; Values=Val1,Val2,Val3; Used to: Create a checklist of things to be completed or satisfied before an action is approved or performed. Val1, Val2, Val3 and so on specify the checklist items, each of which is rendered via the 'Tags' tab of the Properties window with a checkbox; the tag has the value 'Incomplete' until each checkbox is selected, at which point the value is 'Complete'. For example: Type=CheckList; Values=Does the change solve the task\issue given,Does the code have sufficient error handling,Does the code make sense,Does the code comply with the coding conventions; Whilst the element Tagged Value compartment and the 'Tags' tab window fields display the values 'Complete' or 'Incomplete', document and web reports will show the list of checklist items and the status of each (True for selected, False for unselected).
Classifier	Type=Classifier; Values=Type1,Type2; Stereotypes=Stereotype1; Used to: Deprecated - use **RefGUID** and **RefGUIDList**
Color	Type=Color; Default=Val; Used to: Input a color value from a color chooser menu, where the value is the

	color's Hex RGB value. For example, the Hex RGB for Blue is 0000FF, whilst the Hex RGB for Green is 00FF00.
Const	Type=Const; Default=Val; Used to: Create a read-only constant value.
Custom	Type=Custom; Used to: Create your own template for predefined types, using a masked value.
Date	Type=Date; Used to: Input the date for the Tagged Value, from a calendar menu.
DateTime	Type=DateTime; Used to: Deprecated - Use **Date** Input the date for the Tagged Value, from a calendar menu.
DiagramRef	Type=DiagramRef Used to: Reference a diagram in the model.
Directory	Type=Directory; Default=Val; Used to: Enter a directory path from a browser. You can set a default directory path as a string value.
Enum	Type=Enum; Values=Val1,Val2,Val3; Default=Val2; Used to: Define a comma-separated list, where Val1, Val2 and Val3 represent values in the list and Default represents the default value of the list.
File	Type=File; Default=Val; Used to: Input a filename from a file browser dialog. The named file can be launched in its default application. You can set a default file as a string containing the file path and file name.
Float, Decimal, Double	Type=Float; Type=Decimal; Type=Double; Default=Val; Used to: Enter a Float, Decimal or Double value. These types all map to the same type of data. You can set a default for any or all of these.
ImageRef	Type=ImageRef; Used to: Provide a link to an image file held in the Image Manager.

Integer	Type=Integer; Default=Val; Used to: Enter an Integer value, and a default.
Memo	Type=Memo; Used to: Input large and complex values for a tag.

ProgressBar	Type=ProgressBar;
	Compartment=<Name>; - sets the name of the compartment in which to display the progress bar; more than one Tagged Value can add a progress bar to one compartment
	Text=<Text>; - displays <text> to the right of the progress bar; to display the value of the tag with the text, use #VALUE#, for example $#VALUE# or #VALUE#%
	MinVal=n; - sets the minimum value that can be shown in the progress bar (must be an integer)
	MaxVal=n; - sets the maximum value that can be shown in the progress bar (must be an integer)
	Used to: Display a progress bar in a compartment of an element, when that element is shown on a diagram and the Tags compartment is enabled on the 'Elements' page of the diagram 'Properties' dialog. The tag name displays above the progress bar, as its label.
	• If neither MinVal or MaxVal are set, the progress bar has default values of 0 and 100
	• If MinVal is set but MaxVal is not, the maximum value defaults to MinVal+100
	• If MaxVal is set but MinVal is not, the minimum value defaults to 0
	• If both MinVal and MaxVal are set, MinVal must be lower than MaxVal
	Examples:
	Compartment=Current Progress;
	Type=ProgressBar;
	Text=#VALUE#%;
	  when used in a tag called Progress with value set to 65.
	
	Type=ProgressBar;
	MinVal=1000;
	MaxVal=100000;
	Text=$ #VALUE#;
	  when used in a tag called Progress with value set to 4530.
	
	An element with multiple progress bars.

	
RefGUID	Type=RefGUID; Values=Type1,Type2; Stereotypes=Stereotype1; Or Type=RefGUID; Metatype=Type; Used to: Reference an element from the model by specifying the element's GUID, where: • Type1 and Type2 specify one or more allowed diagram objects (such as Class, Component, attribute or operation) • Stereotype1 represents an allowed stereotype Metatype can be used to reference Classifiers or Property types: • Metatype=Classifier; presents all Enterprise Architect-defined Classifier types to select from • Metatype=Property; presents all Ports, Parts and attributes to select from You can set the classifier, attribute or operation for a Tagged Value of this type by clicking on the ... button against the Tagged Value in the Properties window. You can also right-click on the RefGUID Tagged Value name in the Properties window and select the 'Find in Project Browser' option to locate a referenced object in the Browser window. When printing a RefGUID Tagged Value, Shape Scripts will print the name of the referenced element.
RefGUIDList	Type=RefGUIDList; Values=Type1,Type2; Stereotypes=Stereotype1; OR Type=RefGUIDList; Metatype=Type; Used to: Reference a list of elements from the model by specifying each element's

	GUID, where: • Type1 and Type2 specify one or more allowed diagram objects (such as Class or Component) • Stereotype1 represents an allowed stereotype Metatype can be used to reference Classifiers or Property types: • Metatype=Classifier; presents all Enterprise Architect-defined Classifier types to select from • Metatype=Property; presents all Ports, Parts and Attributes to select from You set the classifier, attribute or operation for a Tagged Value of this type by clicking on the  button against the Tagged Value in the 'Tags' tab of the Properties window.
Spin	Type=Spin; LowerBound=x; UpperBound=x; Default=Val; Used to: Create a spin control with the value of LowerBound being the lowest value and UpperBound being the highest value. You can also set a default within that range.
String	Type=String; Default=Val; Used to: Enter a string value, up to 255 characters in length, and a default text string. For longer texts, use Type=Memo.
Time	Type=Time; Used to: Input the time for the Tagged Value.
Timestamp	Type=Timestamp; Used to: Input the date and time for the Tagged Value, from a calendar menu.
URL	Type=URL; Default=Val; Used to: Enter a web URL. The URL should start with: • 'http://' • 'https://' or • 'www.' You can set a default URL as a string value.

Tag Filters

You can use filters to restrict where a Tagged Value can be applied.

Filter	Format

AppliesTo	AppliesTo=Type1,Type2; Description: Restricts the element types this tag can be applied to, where Type1 and Type2 are the valid types. Possible values are: • All element types • All connector types • Attribute • Operation, and • OperationParameter
BaseStereotype	BaseStereotype=S1,S2; Description: Restricts the stereotypes that this tag belongs to, where S1 and S2 are the allowed stereotypes.

Create Custom Masked Tagged Value Type

If you are creating a custom predefined Tagged Value type, you can achieve great flexibility in designing model components to accept data entries, by defining a mask that formats the data into a template.

Access

Ribbon	Settings > Reference Data > UML Types > Tagged Value Types

Create a masked Tagged Value Type

Field	Action
Tag Name	Type an appropriate name for the masked Tagged Value Type.
Description	Optionally, type a description or the purpose of the Tagged Value Type.
Detail	Type or copy-and-paste the Tagged Value structure: Type=Custom; Mask=<mask values>; Template=<template text>; The mask values are explained in the next table, with an example to demonstrate how to use the template. The template text defines information to be displayed in every use of this custom Tagged Value, such as field names and prompts for data.
Save	Click on this button to save the new masked Tagged Value type. The Tagged Value type displays in the Defined Tag Types list.
New	Optionally, click on this button to clear the fields so that you can enter information for another new Tagged Value type.

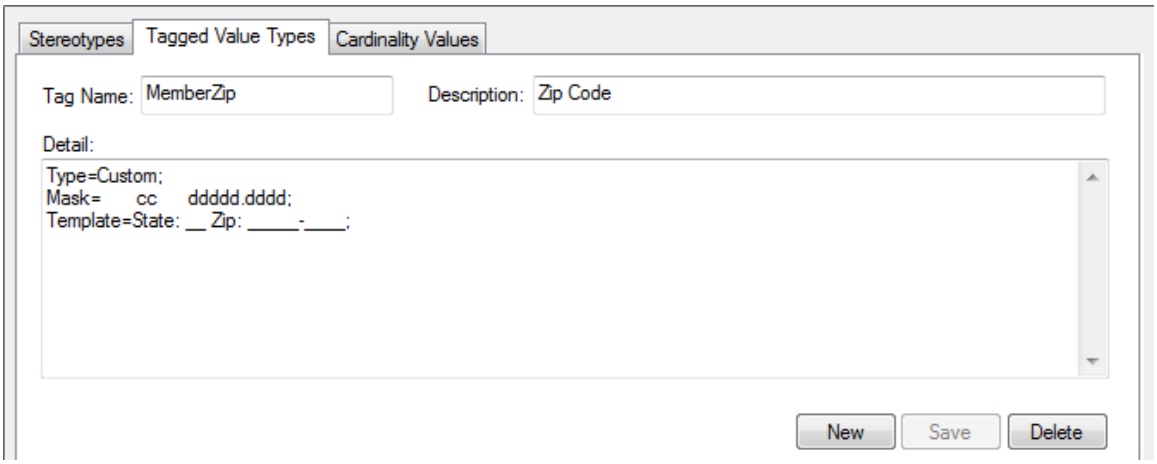
Mask Values

When defining the format of the mask in a masked Tagged Value type, use these characters:

Mask	Action
D	Display a digit only in this character space.
d	Display a digit or space only in this character space.
+	Display +, - or a space in this character space.

C	Display a letter of the alphabet only in this character space.
c	Display a letter of the alphabet or a space only in this character space.
A	Display any alphanumeric character in this character space.
a	Display any alphanumeric character or a space in this character space.
. or <space>	Leave a character space, to be filled by text from the Template parameter. Using dots might make it easier to see how many spaces you have set.

Example



In the diagram, the Mask parameter first defines seven blank spaces, which are occupied by characters defined by the Template parameter.

The first two visible characters in the Mask are each represented by a lower case c, indicating that the user can enter information as either an alphabetic character or a space.

The next six blank spaces again indicate characters defined by the Template, followed by five characters each represented by a d, which indicates that the user can input data in the form of digits or spaces. The dot marks a space to be filled by a hyphen from the Template, followed by four more ds (digits or spaces).

The Template syntax defines the template for the Mask parameter, filling in the blank spaces in the Mask. The text is the information to be printed with every use of this Tagged Value; the underscored values indicate the character spaces that are to be occupied by data input by the user, as defined in the 'Mask' option.

Create Reference Data Tagged Values

When working with Tagged Values, you might want to use a Reference Data Tagged Value, which is used to return the values held in an Enterprise Architect reference table. The base types for such Tagged Values (the type you call in when you create a tag in the Tags page of the Properties window) can be easily created specifically for your model, as you can base the customized Reference Data Tagged Value types on a range of predefined Tagged Value types and filters.

Access

Ribbon	Settings > Reference Data > UML Types > Tagged Value Types

Create a custom Reference Data Tagged Value type

Field/Button	Description
Tag Name	Type an appropriate name for the new Tagged Value type.
Description	Optionally, type the a description or the purpose of the Tagged Value type.
Detail	Either copy-and-paste or type the syntax of the predefined Reference Data Tagged Value type on which to base your new Tagged Value type.
Save	Click on this button to save the new Reference Data Tagged Value type. The Tagged Value type displays in the Defined Tag Types list.
New	Optionally, click on this button to clear the fields so that you can enter information for another new Tagged Value type.

Notes

- If the values in the reference data are changed after the Tagged Value Type is created, you must reload the system in order to reflect the changes in the Tagged Value Type

Predefined Reference Data Types

If you want to create your own, customized, Reference Data Tagged Values, you can base them on a range of predefined Reference Data Tagged Value types. Each of the predefined Reference Data Tagged Value types returns the values held in a specific reference data table.

Tagged Value Types

Each description includes the syntax for creating the initial values for use of the Tagged Value. The Tagged Value Type and Format entries are case-sensitive.

Tagged Value Type	Format
Authors	Type=Enum; List=Authors; Drop-Down List Returned, of Data Defined for the Model: Authors.
Cardinality	Type=Enum; List=Cardinality; Drop-Down List Returned, of Data Defined for the Model: Cardinality types.
Clients	Type=Enum; List=Clients; Drop-Down List Returned, of Data Defined for the Model: Clients.
ComplexityTypes	Type=Enum; List=ComplexityTypes; Drop-Down List Returned, of Data Defined for the Model: Complexity types. Whilst complexity types can be exported and imported as project reference data, they cannot be updated and so are effectively standard across all projects.
ConstraintTypes	Type=Enum; List=ConstraintTypes; Drop-Down List Returned, of Data Defined for the Model: Constraint types.
EffortTypes	Type=Enum; List=EffortTypes; Drop-Down List Returned, of Data Defined for the Model: Effort types.
MaintenanceTypes	Type=Enum; List=MaintenanceTypes; Drop-Down List Returned, of Data Defined for the Model : Maintenance types.
ObjectTypes	Type=Enum; List=ObjectTypes; Drop-Down List Returned, of Data Defined for the Model: Object types.
Phases	Type=Enum;

	List=Phases; Drop-Down List Returned, of Data Defined for the Model: Phases.
ProblemTypes	Type=Enum; List=ProblemTypes; Drop-Down List Returned, of Data Defined for the Model: Problem types.
RoleTypes	Type=Enum; List=RoleTypes; Drop-Down List Returned, of Data Defined for the Model: Role types.
RequirementTypes	Type=Enum; List=RequirementTypes; Drop-Down List Returned, of Data Defined for the Model: Requirement types.
Resources	Type=Enum; List=Resources; Drop-Down List Returned, of Data Defined for the Model: Resources.
RiskTypes	Type=Enum; List=RiskTypes; Drop-Down List Returned, of Data Defined for the Model: Risk types.
RTFTemplates	Type=Enum; List=RTFTemplates; Drop-Down List Returned, of Data Defined for the Model: Document Report Templates.
ScenarioTypes	Type=Enum; List=ScenarioTypes; Drop-Down List Returned, of Data Defined for the Model: Scenario types.
TestTypes	Type=Enum; List=TestTypes; Drop-Down List Returned, of Data Defined for the Model: Test types.