SPARX SYSTEMS

ENTERPRISE ARCHITECT

User Guide Series

Enterprise Architect 16.0 Reviewer's Guide

Provides a comprehensive overview of the features and capabilities for version 16.0 of Sparx Systems' Enterprise Architect visual modeling tool.

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CREATED WITH **ENTERPRISE ARCHITECT**

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Introduction

This document provides a comprehensive overview of the capabilities of Sparx Systems Enterprise Architect at Release 16. Each section focuses on a particular aspect of Enterprise Architect, providing an introduction to the purpose and benefits of each capability.

What is Enterprise Architect?

Enterprise Architect is a visual platform for designing and constructing software systems, for business process modeling, and for more generalized modeling purposes.

Enterprise Architect is based on the latest Unified Modeling Language (UML®) 2.5 specification. UML is a visual language that is used to model a particular domain or system (either proposed or existing).

Enterprise Architect is a progressive tool that covers all aspects of the development cycle, providing full traceability from the initial design phase through to deployment, maintenance, testing and change control.
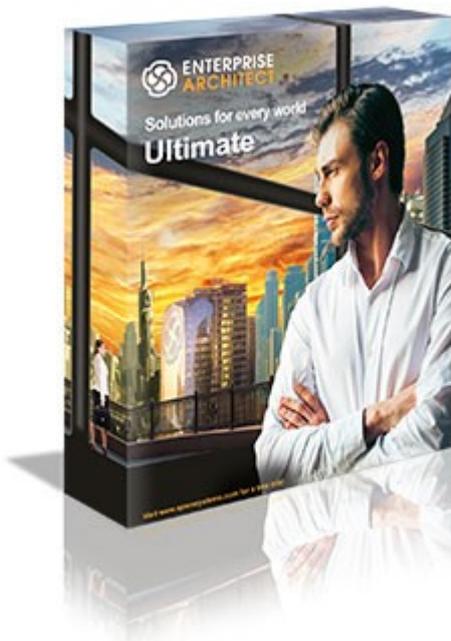
What differentiates Enterprise Architect from other UML tools?

- Comprehensive UML 2.5-based modeling

- Built-in Requirements Management

- Extensive Project Management support, including resources, tasks, project calendar and metrics

- Code engineering support for many languages out of the box

- An integrated Visual Execution Analyzer to profile, debug and document executing applications; instantiate run-time model objects; and record sequence diagrams from a stack trace

- Extensible modeling environment that can host user-defined profiles and technologies

- Model Simulation: a range of options for simulating and testing models

- Test Management built-in: Testpoint management, model-based test execution, test case specification and support for JUnit and NUnit

- Web based accessibility including WebEA and Prolaborate

- Flexible documentation options: HTML, PDF and DOCX report writers

- Usability: Enterprise Architect makes it easy to get up and running quickly with UML

- Speed: Enterprise Architect is a spectacularly fast performer

- Scalability: Enterprise Architect can handle extremely large models and many concurrent users with ease

- Price: Enterprise Architect is priced to outfit the entire team, making collaboration and team development cost effective

How popular is Enterprise Architect now?

With over 1 million effective users worldwide, Enterprise Architect has proven remarkably popular across a wide range of industries and is used by thousands of companies. From large, well-known, multi-national organizations to smaller independent companies and consultants, Enterprise Architect has become the UML modeling tool of choice for developers, consultants and analysts in over 150 countries.

Sparx software is used in the development of many kinds of software systems in a wide range of industries, including aerospace, automotive, banking and finance, defense, electrical engineering, medicine, research and academia, retail, transport and utilities. It is also used effectively for UML and business architecture training in many prominent colleges, training companies and universities around the world. Actual implementations range from single users to companies with 1000s of installations globally, involving teams working on large, distributed projects.

What benefits does Enterprise Architect provide?

Model and Manage Complex Information

Enterprise Architect helps individuals, groups and large organizations model and manage complex information. Often this relates to software development and IT system design and deployment, but it can also relate to business analysis and business process modeling. Enterprise Architect integrates and connects a wide range of structural and behavioral information, helping to build a coherent and verifiable architectural model, either what-is or what-will-be. Tools to manage versions, track differences, audit changes and enforce security help control project development and enforce compliance with standards.
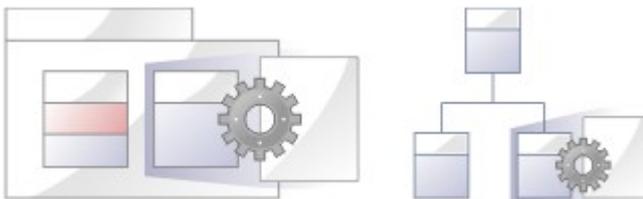
Model, Manage and Trace Requirements

Capture requirements using Enterprise Architect's built in Requirements Management, which supports full traceability from the base requirements through the design, build and deployment stages.

Use impact analysis to trace any proposed changes from the source requirements through their design and implementation, ensuring that you build the 'right' change into the system.
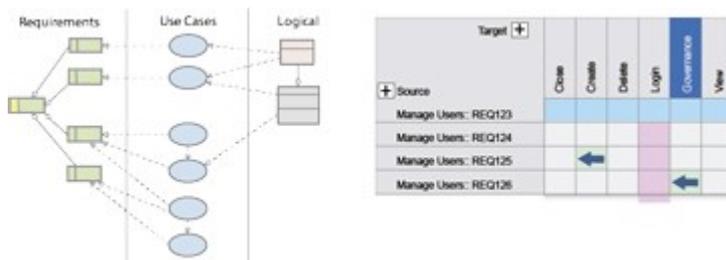
Integrate Teams and Share a Vision

A scalable, easily deployed, multi-user environment, Enterprise Architect integrates team members from all sections and all phases of a product's (or system's) development and maintenance life-cycle, providing significant benefits from built-in collaboration and inherent information sharing. It provides a single repository for business analysts, software architects, developers, project managers, testers, and roll-out and support staff. It provides a 'unified' view of a complex system having many view points and many possible subsystems. Shared models can be accessed easily and securely by remote team members with Enterprise Architect's Cloud Server.


Design and Build Diverse Systems using UML

UML 2.5, an open standard, provides a rich language for describing, documenting and designing software, business and IT systems in general. Enterprise Architect allows you to leverage the full expressive power of UML 2.5 to model, design and build diverse systems in an open and well understood manner. You can generate code, database structures, documentation and metrics, transform models, and specify behavior and structure as the basis for contractual agreements.
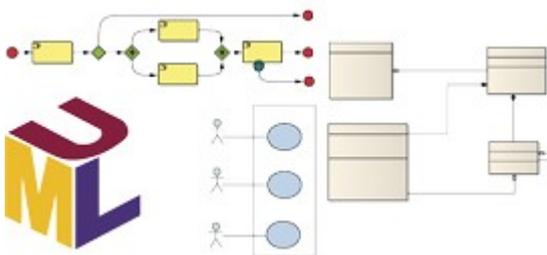
Visualize, Inspect and Understand Complex Software

Software is complex and can often be hard to understand. Use Enterprise Architect to reverse engineer a wide variety of source code to understand static structure. To complete the picture, use the unique built-in profiling and debugging tools at run-time to capture and visualize executing software. Create run-time instances of model elements and invoke methods using the built in Object Workbench. Integrate existing data models by reverse engineering database schema for a wide range of systems.
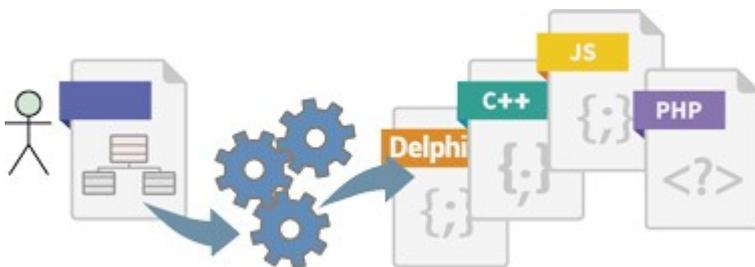
Use Full Life-Cycle Modeling and Project Management

Capture and track information about model elements that are important to success. For example: Testing, Project Management and Maintenance details. Use this information to drive and track product development and delivery.
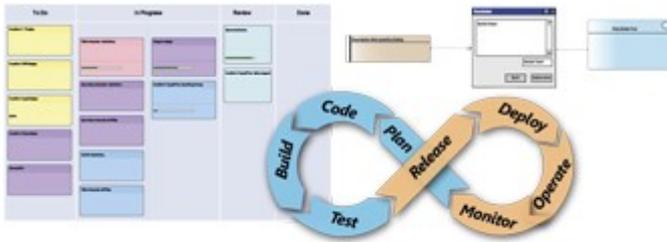
Share and Re-Use Information Across Tools

Enterprise Architect supports a number of mechanisms for exporting and importing models using industry standard XMI. This allows modelers to use information created in other tools, to copy information between Enterprise Architect models and even to write and use custom tools that take XMI directly as input. Enterprise Architect can also be used as an Open Services for Lifecycle Collaboration (OSLC) Provider, allowing other tools to identify and access modeled Requirements via a unique URL.

Create Platform Independent Models using Model Driven Architecture

Model Driven Architecture (MDA) is an open standard designed to facilitate rapid application development in a platform independent manner. Models can be built at a high level of abstraction and, with MDA based tools, transformed into models and code targeting a specific platform or domain. Enterprise Architect has a rich set of tools built-in to support MDA.

Summary of Enterprise Architect Features

Enterprise Architect enables you to:

- Model complex information, software and hardware systems using UML-compliant notation
- Specify, model, manage and trace requirements to deployed solutions
- Leverage industry-standard enterprise architecture frameworks
- Generate and reverse engineer code in 10+ programming languages
- Model databases, generate DDL scripts, and reverse engineer database schema via ODBC
- Manage, track and control change using Baseline model merge and auditing capabilities
- Centralize enterprise-wide documentation of processes and information systems
- Model dependencies between elements, system dynamics and state
- Model Class hierarchies, deployment, components and implementation details
- Record project issues, tasks and system glossary
- Assign resources to model elements and track effort expended against required effort
- Connect to shared database repositories using MS SQL Server, MySQL, Oracle and more
- Share models via the Pro Cloud Server, WebEA, Sparx Systems Prolaborate or the Reusable Asset Service (RAS)
- Exchange models from other tools using the XMI format
- Produce detailed and quality documentation in PDF, HTML, DOCX and RTF formats
- Manage Version Control through XMI using TFS, SCC, CVS and Subversion configurations
- Migrate changes across a distributed environment using Controlled XMI Packages
- Use UML Profiles to create custom extensions for domain-specific modeling
- Save and load complete diagrams as UML patterns
- Analyze and trace relationships between elements using the tabular Relationship Matrix
- Script and automate common tasks using the Automation Interface and Model Scripts
- Perform model-to-model transformations using Model Driven Architecture (MDA)
- Create and share dynamic views of model elements and diagram sets using Model Views
- Create Mind Maps, Business Process Models, Data Flow diagrams and Wireframes for mobile apps
- Generate executable business logic from DMN business rules
- Generate BPEL scripts automatically from business process models in BPMN™ notation
- Visualize executing applications using the Visual Execution Analyzer
- Transform behavioral models into executable source code both for software and for hardware description languages (HDLs) such as Verilog, VHDL, and SystemC
- Simulate models, including Activity models, business process models, DMN models and SysML parametric models
- Model and generate XML schema (XSD) and WSDL; Debug XSLT; Edit and Validate XML, XSD

[*] Available features vary across editions. See https://sparxsystems.com/products/ea/editions.html

Summary of Supported Standards

Enterprise Architect supports a range of open industry standards for designing and modeling software and business systems. The core standards supported are:

- UML® 2.5
- BPMN™ 2.0
- DMN™
- ArchiMate® 3.0
- SysML® 1.5
- SysPhS® 1.1
- MARTE 1.2 ®
- BPEL
- SoaML®
- SPEM™
- WSDL
- XSD
- DDS™
- ArcGIS™
- IFML™
- CMMN™
- Geography Markup Language (GML)
- ODM™, OWL and RDF
- BMM™ 1.3
- VDML™ 1.0
- AWS, Google & Azure icon libraries

Enterprise Architect also supports industry Frameworks such as:

- Zachman Framework™
- TOGAF® (including FEAF)
- UAF - UPDM™ framework that supports DoDAF, MODAF, FACE and NAF
- Service-Oriented Modeling Framework (SOMF™)

Enterprise Architect supports Frameworks supplied by industry bodies:

- GeoSciML
- NIEM™

Enterprise Architect supports XML Service Oriented Architectures:

- Service Oriented Architecture Modeling Language™ (SoaML)
- Service-Oriented Modeling Framework (SOMF 2.1)
- Web Services Description Language (WSDL 1.1)
- National Information Exchange Modeling (NIEM) 5.0

This includes round trip engineering of WSDL and XSD, which are used to facilitate BPEL generation.

Modeling Based on Open Standards

As a contributing member of the Object Management Group, Sparx Systems understands the importance of open standards to communicate effectively to a wide range of stakeholders. To this end, Enterprise Architect helps you to:

- Visualize systems using the latest UML 2.5 notation

- Document and describe business processes with BPMN 2.0

- Model and simulate systems engineering projects with SysML 1.5

- Leverage numerous other open modeling standards – all in the one modeling environment!

UML, BPMN and SysML

Enterprise Architect supports all UML 2.5 models and diagrams. You can model business processes, web sites, user interfaces, networks, hardware configurations, messages and many other aspects of your development.

In brief, Enterprise Architect:

- Was the first UML tool to introduce comprehensive UML 2 support in April 2004

- Continues to refine and update UML 2.5 support

- Supports all 14 diagram types from UML 2.5

In addition to UML, Enterprise Architect supports the latest Business Process Model and Notation (BPMN) and Systems Modeling Language (SysML) specifications. Enterprise modeling notations are also supported out-of-the-box, including TOGAF, ArchiMate 3.1, UAF and DMN.

Enterprise Architect supports numerous other diagram types that extend core UML diagrams for strategic modeling, mind mapping, formal requirements specifications, data-flow diagrams, user interface prototyping and domain-specific modeling. The tool also provides alternative views that make editing the core UML diagrams more intuitive and effective. One example is the State Table editor, which renders a standard UML StateMachine diagram as an editable logic table.

Business Process Modeling and Simulation
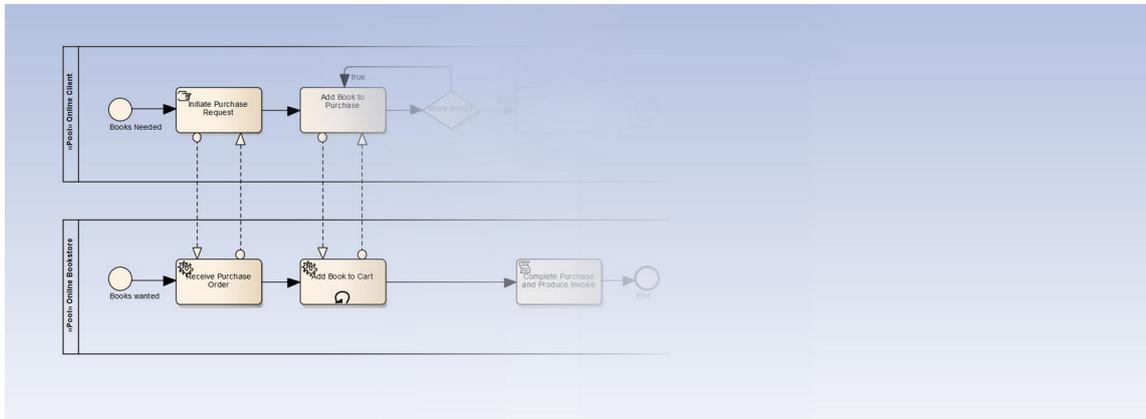
There are numerous approaches to business process modeling (BPM) used in conjunction with other modeling languages. In particular, Activity diagrams, Object diagrams and custom Profiles provide a wealth of modeling possibilities for BPM analysts to use. Enterprise Architect complements business process modeling via the underlying UML 2.5 language palette with custom analysis, requirements management and process management elements, along with extensive simulation options.

The BPMN profile

One popular notation among business analysts is the Business Process Model and Notation (BPMN). This notation specifically targets the business modeling community and is mapped to UML through a BPMN Profile. Enterprise Architect provides built-in support of the latest BPMN 2.0 profile.

BPMN 2.0 models are simulated using Enterprise Architect's built-in simulation engine. This allows you to dynamically examine process flows, validate the model and collect timing and resource information on proposed or legacy processes with a view to business process improvement.

BPSim – Business Process Simulation and execution engine

The BPSim specification facilitates configuration and assignment of resources to activities or tasks, raising events, decision making and other real-world capabilities. The BPSim execution engine integrates with BPMN models defined in Enterprise Architect, providing the capability to run and store results from multiple simulations and to perform comparisons across each configuration's result set. Analysts and business strategists therefore gain unprecedented flexibility in assigning operating information to a model and then assessing the quality of a solution based on information returned from the Simulation engine.

BPEL generation

Enterprise Architect generates Business Process Execution Language (BPEL) scripts from BPMN models. Generated BPEL scripts can then be executed using a third-party execution engine. Specific model validation rules help to ensure that models generate valid BPEL code.

Decision Model and Notation (DMN)
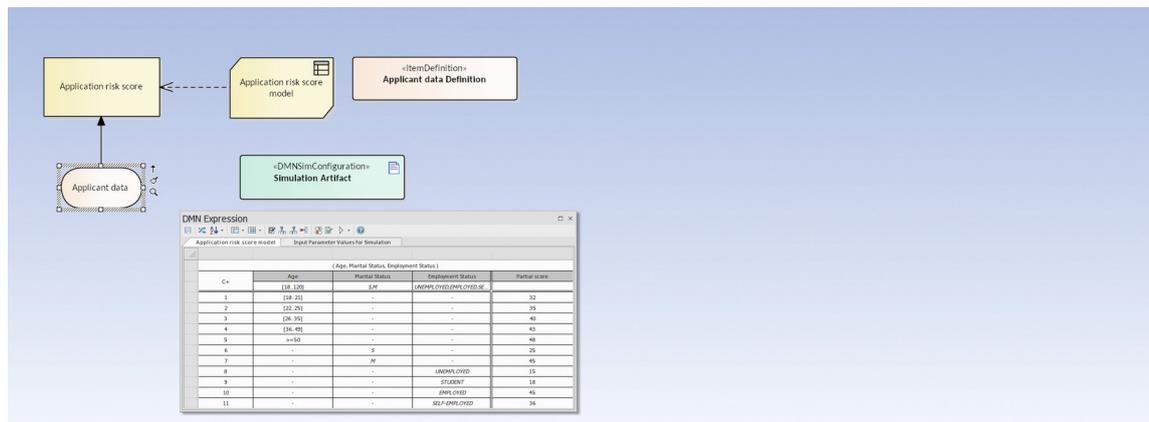
Enterprise Architect includes extensive and highly effective support for the Decision Modeling Notation standard, providing modelers with tightly integrated features that support rule based decision modeling in a standards-compliant manner, allowing for various simulations, as well as the generation of code that can be integrated into applications that require evaluation of these rules.

DMN Diagrams and Expressions

DMN models consist of a visual grammar that allows decisions and business rules to be documented in a way that makes them readable by both business and technical audiences, thus ensuring that decisions and rules are not misinterpreted.

Decision Model notation provides a language for evaluating the logic of decisions - Friendly Enough Expression Language (FEEL). Using FEEL expressions in Decision Tables, you can define the logic for assessing the outcome of your business process.

DMN Simulation

After creating a Decision Model there are features for firstly validating the model, then simulating the model to return results of the decision process being modeled. The simulation includes standard run/step/debug options for stepping through the logic of the model. This includes features for defining data-sets used for running variations on the core variables set in the model. The simulation results are displayed on the diagram, as well as by highlighting the active rules set in the DMN expression.

DMN Model Code Generation

As well as simulating the DMN model, Enterprise Architect also supports the generation of code that can be integrated into larger applications that require evaluation of those rules. This includes generation to Java/JavaScript/C++/C#.

Integration with BPMN

Enterprise Architect provides interaction between BPMN diagrams and DMN models. Using a broader business-process BPMN simulation you can call a simulation of the DMN model.

Data Modeling and Database Engineering
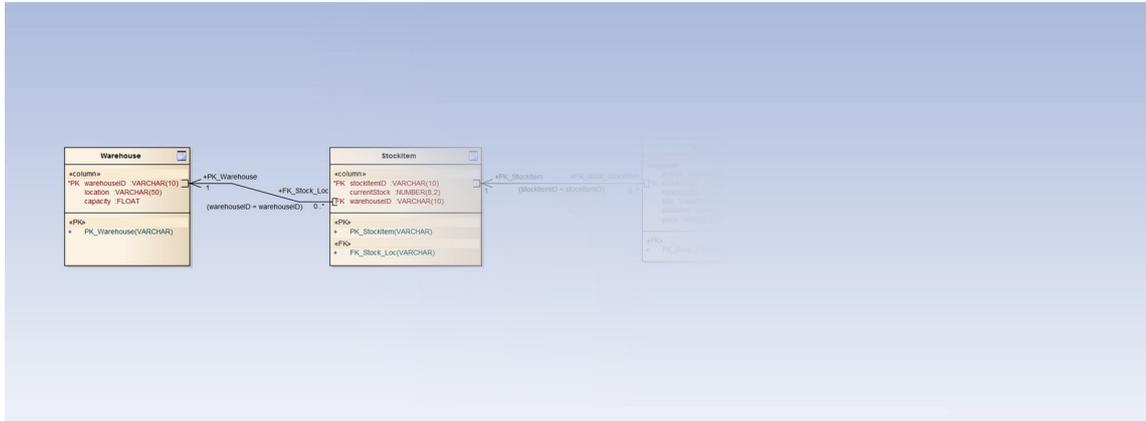
Enterprise Architect has extensive support for the data modeling discipline, ranging from the representation of information in a conceptual model right down to the generation of database objects. Whether you are generating database objects from the UML model or reverse engineering a legacy DBMS into a model for analysis, the tool features will save time and valuable project resources.

Enterprise Architect's Database engineering features support the top 10 most popular DBMSs, including model patterns used as starters for modeling each of these DBMSs.

Data modeling

When designing databases Enterprise Architect's built-in Data Modeling profiles extend the UML to provide intuitive representations of database concepts. Supported notations include:

- IDEF1X
- Information Engineering
- UML DDL
- Entity-Relationship (ER) notation

These extensions model database tables, columns keys, triggers, constraints, procedures and other aspects of relational database schemas.

MDA Transforms

When laying out your data model in conceptual and logical models, Enterprise Architect also supports MDA Transforms for generating your Logical model (Platform Independent Model) to a Physical model (DBMS Specific Model).

Database Builder

Enterprise Architect's Database Builder tool, which extends these data modeling features, can be used to create and maintain physical data models and can connect to a running DBMS, supporting direct interaction with the live database to import the model, compare the updated model with the DBMS, and generate alterations directly from within Enterprise Architect, providing comprehensive syncing between the model and the database.

When implementing or maintaining databases, leverage Enterprise Architect's Database Builder to:

- Quickly visualize your database schema with DBMS-specific model patterns and diagrams
- Create tables, columns, primary keys, foreign keys, views and stored procedures

- Define indexes, sequences, functions and triggers
- Generate DDL and Alter DDL statements for all or part of your schema
- Selectively update your live database from Generated DDL statements
- Import an entire database schema via ODBC, or selectively update your physical model
- Connect to and query your databases from within the model environment

The Database Builder is designed to maintain updates across development, testing and production environments.

Requirements Management
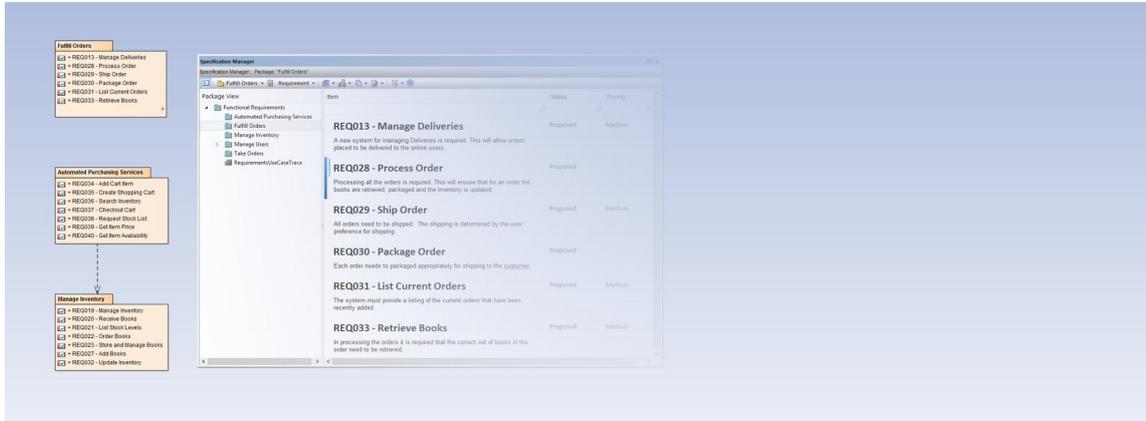
Gathering requirements is typically the first step in developing a solution, be it a software application or a business process. Requirements are essentially 'what the system needs to do'. Enterprise Architect's built-in requirements management features help you to:

- Define an organized and hierarchical formal requirements model

- Clearly differentiate requirement types, such as functional and non-functional requirements

- Link and trace system requirements to analysis and design elements and implementation artifacts

- Search on requirements and perform impact analysis with respect to requirement changes

- Generate custom reports or a complete requirements specification directly from the model

- Create custom attributes or properties appropriate to your organization or project

- Relate formal requirement elements directly to Use Case scenario steps, connecting early analysis artifacts to subsequent system development

Enterprise Architect is distinguished among UML tools by its built-in Requirements Management capabilities. Being able to create requirements directly in the model resolves a number of traditional development issues such as traceability, interdisciplinary team divisions, integration with change and configuration management systems.

You can readily connect your Requirements model with downstream processes, external artifacts such as files or other resources, and technical documentation including architecture and implementation models.

Specification Manager

Business analysts will be especially productive with Enterprise Architect's Specification Manager – a document-based interface for rapid entry of requirements into the model repository. A key feature of the Specification Manager is the speed and ease with which you can create, filter and review a large number of elements from one point, without necessarily developing or examining complex detail on each element.

Structured Use Case Scenarios

Use Case scenarios capture vital analysis information using natural language. Enterprise Architect's Structured Scenario editor lets you use this information to drive downstream development and maximize traceability across the development life-cycle. From structured scenarios, you can generate Test Cases, Activity diagrams and other UML behavior diagrams. You can even reverse engineer existing process diagrams into structured, textual specifications to produce documentation deliverables.

Systems Engineering
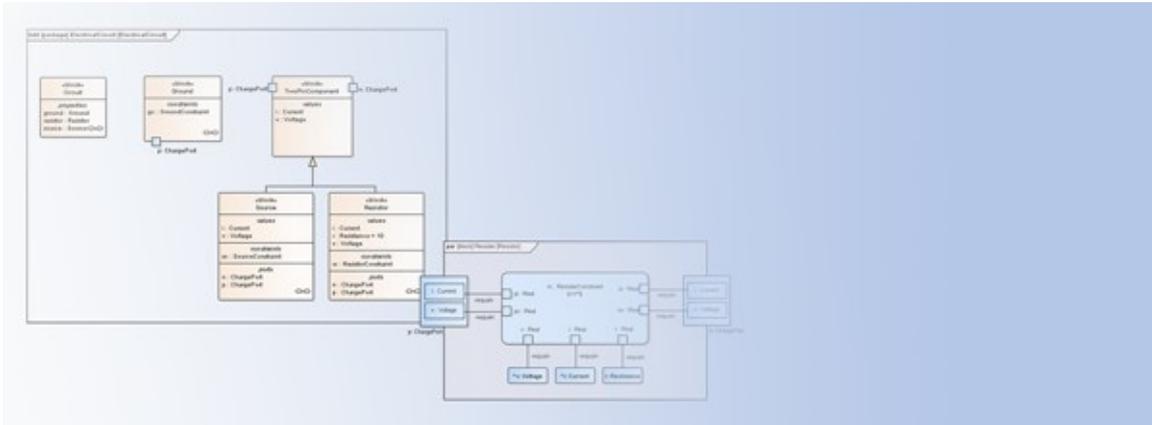
Integrating many high-end features for systems engineers, the Ultimate and Unified Editions of Enterprise Architect provide SysML modeling, parametric model simulation, Real Time Embedded Systems modeling using MARTE, executable code generation, and model-to-code transformations for Hardware Description Languages (HDLs) and ADA 2005 and 2012.

SysML and model simulation

Enterprise Architect enables you to develop SysML models quickly and simply, through a tightly integrated profile. The SysML profile for Enterprise Architect supports each of the nine SysML 1.5 diagram types and model guidance using the Quick Linker.

Enterprise Architect can associate detailed behaviors with UML Activity and Interaction elements, allowing for executable code to be generated from Interaction (Sequence) and Activity models. This allows for more than just code stubs to be derived from models, by generating any nested behavioral models that define executable statements such as conditional logic, looping constructs and assignments.

SysPhS

The SysPhS Standard is a SysML Extension for Physical Interaction and Signal Flow Simulation. It provides a standard way to define the simulation of a SysML model using OpenModelica or MATLAB's Simulink/Simscape, providing a simpler model-based method for defining simulations. The SysML model can be set up to generate to both of these tools, allowing flexibility of use in either environment.

Simulation with MATLAB, Simulink and Simscape

Using SysPhS, SysML diagrams including Internal Block diagrams, Parametric diagrams and StateMachine diagrams, can be generated out to MATLAB script and run as a simulation in Simulink and Simscape, giving a clear and tight mechanism to visually test the modeling from initial requirements through to the SysML Blocks. The simulations can be run from Enterprise Architect. The diagrams generated in these tools can also be viewed and simulated in the tools independently.

Simulation with OpenModelica

Enterprise Architect's SysML simulation features support simulating SysML Internal Block diagrams and Parametric

diagrams using OpenModelica. This provides engineering analysis of critical system parameters, including the evaluation of key metrics such as performance, reliability and other physical characteristics. Furthermore, a SysML model generated to a Modelica model can be solved and viewed independently using OpenModelica.

MARTE

Enterprise Architect supports the OMG's MARTE profile for modeling Real Time and Embedded Systems (RTESs). MARTE is used for modeling both the hardware and software aspects of RTESs and enables interoperability between requirements, design, verification and code generation.

This feature is available in the Unified and Ultimate Editions of Enterprise Architect, from Release 15.0.

Hardware Description Languages

The Unified and Ultimate Editions of Enterprise Architect support code generation from StateMachine models into Hardware Description Languages (HDLs) such as VHDL, Verilog and SystemC.

Software Engineering
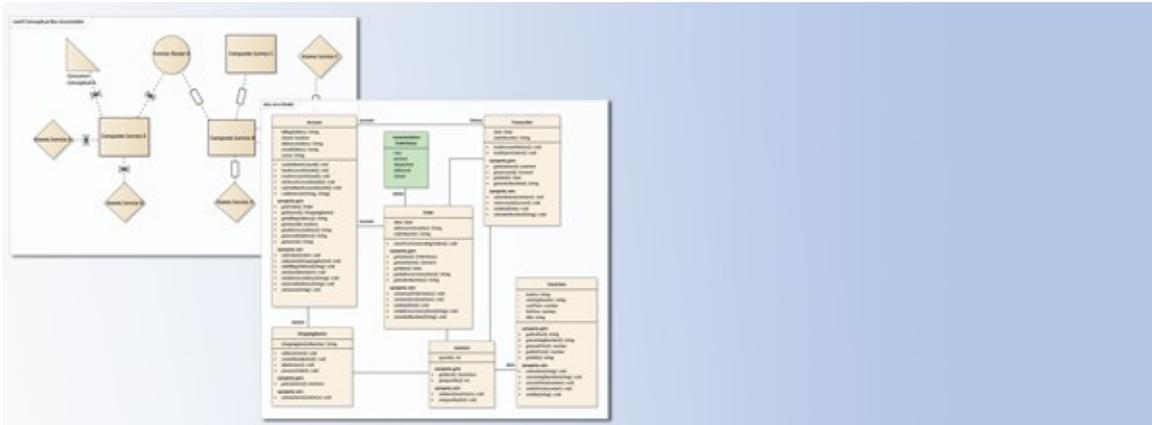
Enterprise Architect has a rich set of tools and features that assist Software Engineers to perform their work efficiently. The features include design tools to create models of software, automated code generation, reverse engineering of source code, binaries and schemas, and tools to synchronize source code with the design models. The programming code can be viewed and edited directly in the integrated Code Editors within Enterprise Architect, which provide Intelli-sense and other features to aid in coding.

Integrated Development

Enterprise Architect provides a tightly integrated development environment with outstanding tools and functionality to provide for true Model Driven Development including:

- Code editors to author the code base
- Debuggers to investigate behavior
- Analyzer Scripts to manage your applications
- Fast and precise user-definable searches for performing complex source code queries on large code-bases
- Testpoints for validation of programming contracts

Code Generation

The Source code generation creates programming code from UML models and ensures that the architecture and design are synchronized with the programming code including:

- Generation of standard Classes to code
- Generation of Behavioral models to code
- Customizable code generation with user-definable templates

Code Import

Enterprise Architect provides the ability to reverse engineer source code into a UML model. A wide range of programming languages are supported and there are user-definable options that govern how the code is read and the models are generated.

Visual Execution and Analysis

The Visual Execution Analyzer (VEA) is made up of an advanced and comprehensive suite of tools that allows you to build, debug, record, profile, simulate and otherwise construct and verify your software development whilst keeping the code tightly integrated within your model. Features include:

- Profilers to visualize behavior
- Analyzers to record behavior
- Generation of Sequence diagrams from executable code

Enterprise Architecture Frameworks

Architecture Frameworks provide organizations with an understanding of the fundamental aspects of their business. Enterprise Architect has built-in support for enterprise architecture frameworks and enterprise modeling languages, allowing an organization to be modeled from the business goals and drivers down to Cloud-based infrastructure services. Enterprise Architect provides built-in support for these architectural frameworks:

ArchiMate 3.1 (Open Group)

ArchiMate® is a language for describing the construction and operation of business processes, organizational structures, information flows, IT systems and technical infrastructure.

TOGAF (Open Group)

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. This includes the Federal Enterprise Architecture Framework (FEAF).

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.

UAF - UPDM 2.1 , DoDAF 2.0 and MODAF 1.2

UAF/UPDM provides a model-based framework for planning, designing and implementing the Unified Profile for DoDAF and MODAF (UPDM) architectures and the Unified Architecture Framework (UAF).

For a guide covering Enterprise Architecture Frameworks see the *Enterprise Architecture* Guidebook.

Strategic Modeling
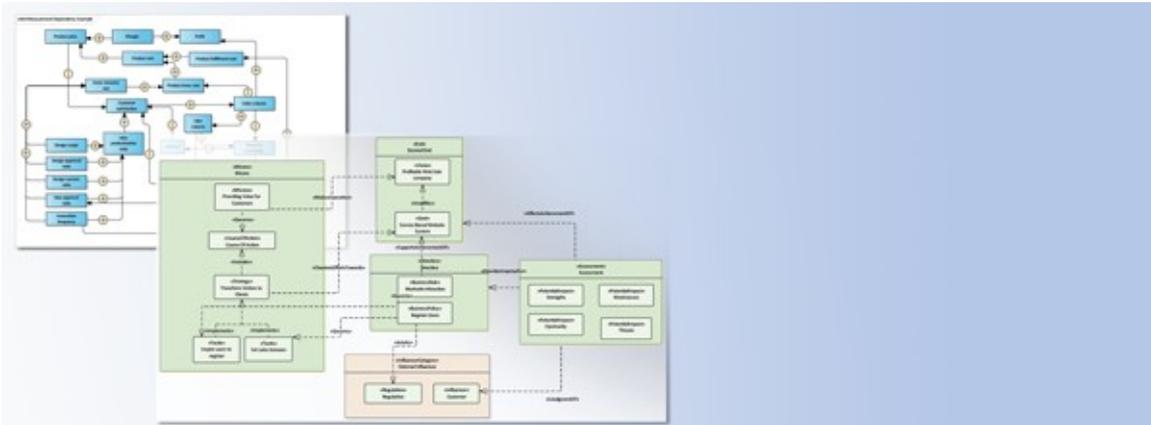
Strategic Modeling enables an organization to plan for the future and make decisions in accordance with its mission and values. Enterprise Architect supports two key modeling frameworks: Business Motivation Model (BMM) and Value Delivery Modeling Language (VDML), along with a number of standard business strategy diagram types.

Each of these high-level models can be traced directly to the analysis of the business processes and the designs used to implement the corporate strategy; in the long term, they provide a platform to verify what resources are committed to the initiatives that reflect business priorities.

Business Motivation Modeling (BMM)

The Business Motivation Model (BMM) can be used for developing, communicating, and managing business plans. It is used for modeling high level enterprise governance with support for linking the governance to the modeling of processes that are needed to achieve the desired goals and objectives, as well as outlining and assessing any possible influences.

Value Delivery Modeling Language (VDML)

VDML closes the gap between mapping strategic plans for the transformation of business operations and the design of operational systems, all in support of achieving an agile enterprise. It is targeted at business executives and business analysts for defining the connectivity between the business strategy and the business models, including all activities, processes and roles that are involved in the general operation of the enterprise.

Additional strategy tools

You can also document initial concepts using Mind Mapping diagrams and capture important strategic goals, business objectives and structure using:

*   Strategy Maps
*   Value Chains
*   Decision Trees
*   Balanced Scorecards
*   Flow Charts
*   Organization Charts

Schema Modeling

Using the Schema Composer you can create message definitions, called schemas, that allow for efficient and secure exchange of information between parties that is compliant with a structure set by a standardized meta-model definition.

The Schema Composer helps you rapidly build schemas from selected elements in your model. The elements could be selected from your own models or sourced from generic reference models such as CIM, NIEM and UN/CEFACT.

The Schema Composer can compose messages based on a variety of schema sets including:

- Common Information Model (CIM)
- National Information Exchange Model (NIEM)
- UN/CEFACT Modeling Methodology (UMM)
- UN/CEFACT UML Profile for Core Components (UPCC)
- Core Components CCTS (UN/CEFACT) - NDR 3.1
- Universal Business Language (UBL) - NDR 3.0

Depending on the selected schema set, the Schema Composer can then export messages in these formats:

- Generic XML Schema (XSD)
- JavaScript Object Notation (JSON)
- Resource Description Framework Schema (RDFS)
- CIM Augmented RDFS
- Business Data Type (BDT)
- Business Information Entity (BIE)
- Unqualified Data Type (UDT)
- Qualified Data Type
- National Information Exchange Model (NIEM)

Schema Composer

Enterprise Architect's Schema Composer helps you rapidly build XSD schemas (and other XSD-based schemas) from selected elements in your model. The elements could be selected from your own models or sourced from generic reference models such as CIM, NIEM and UN/CEFACT NDR. The Schema Composer can compose messages based on a variety of schema sets.

Service Oriented Architecture (SOA)

Enterprise Architect implements the OMG's Service oriented architecture Modeling Language (SoaML), which provides a standards-based approach to modeling SOA solutions using the UML.

As a natural complement to SoaML, Enterprise Architect also supports the [Service Oriented Modeling Framework (SOMF)](), which encourages a holistic view of enterprise software entities via a technology-independent notation. The SOMF modeling notation provides an intuitive approach to visualize "used-to-be", "as-is" and "to-be" states of the enterprise service portfolio.

XSD and WSDL capability

Enterprise Architect can model, forward engineer and reverse engineer two key W3C technologies: XML Schema (XSD) and Web Service Definition Language (WSDL).

XSD and WSDL support is critical for the development of a complete Service Oriented Architecture. The coupling of UML with XML provides a natural mechanism for specifying, constructing and deploying XML-based SOA artifacts within an organization. Enterprise Architect's XSD and WSDL capabilities also support [BPEL generation]() from UML models.

XSLT Debugger

Using built-in visual analysis tools, Enterprise Architect provides comprehensive support for working with XSLT documents, allowing you to perform transformations on XML data with the ability to debug the transformation process.

When working with XSLT documents you can:

- Create XLST, XSD and XML documents as model elements (UML Artifacts)
- View and Edit XML content in a dedicated Document Editor with a structural overview
- Run XML transformations
- Step through the execution transformations using built-in debug tools
- Inspect the instance values of transformation variables.

Spatial Information Modeling with GML and ArcGIS™
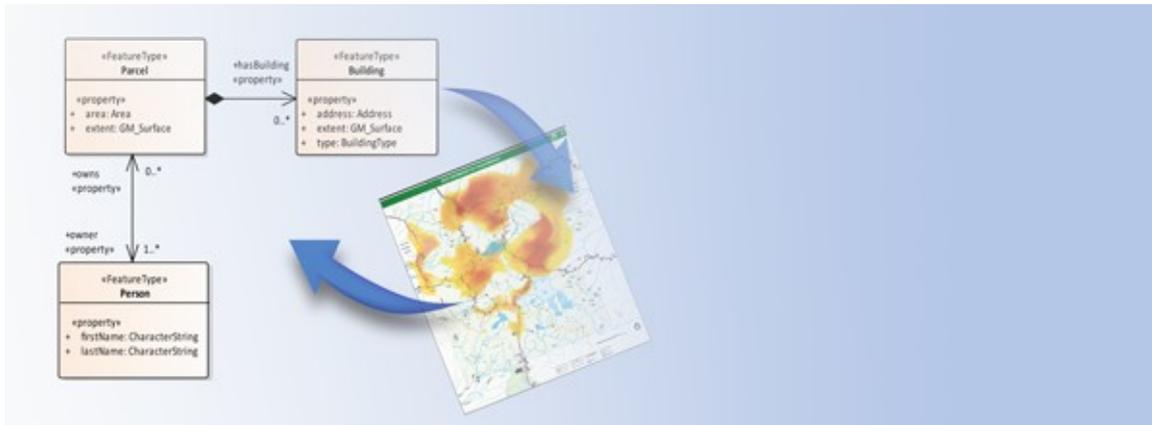
Enterprise Architect supports model-based engineering of spatial data and geodatabase designs to aid development of geographic information systems (GIS). Interoperable spatial data is modeled in Enterprise Architect using Open Geospatial Consortium's Geography Markup Language (GML).

You can also design commercial geospatial databases specifically for the ArcGIS platform developed by Esri Inc. Enterprise Architect provides a built-in UML profile for ArcGIS, which means your spatial database design is directly traceable to your corporate information model and leverages industry standard modeling notation. You can export geodatabase models to ArcCatalog as an XML Workspace document that contains feature Class definitions, feature datasets, spatial references, domains and more.

Existing spatial databases can be documented and visualized with ease – simply pass the XML Workspace document to Enterprise Architect and reverse engineer the ArcGIS geodatabase schema!

Enterprise Architect supports the latest ArcGIS 10.3 platform and the GML 3.2.1 specification.

Test Management
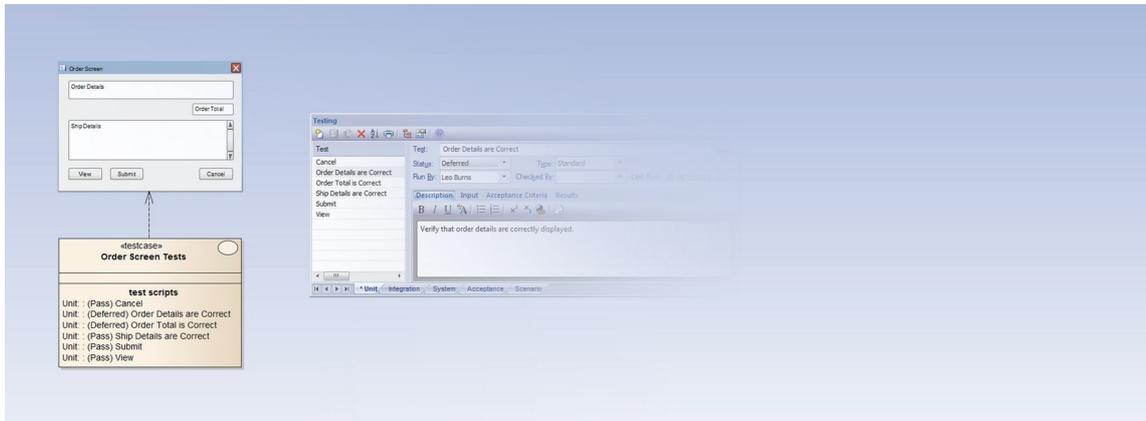
Enterprise Architect helps you to define test specifications, execute tests and record results directly from model elements. Keeping model elements and testing documentation in one integrated model can significantly improve the communication between quality assurance teams, software developers, analysts and architects.

Enterprise Architect provides the tools you need for numerous test-related activities including:

- Test definitions and results recording:
  You can attach detailed test specifications to any element in Enterprise Architect, along with a record of the test results, when tests were last run, and by whom. Unit, System, Integration, Acceptance and Scenario tests can all be captured and viewed with filtered for up-to-date monitoring, providing tight traceability between architecture and test information. Enterprise Architect can also generate test cases from your structured Use Case scenarios!

- Testpoints on software:
  Provides effective model-based test execution. You can define Testpoints on your system design elements, execute the code with these tests in the modeling environment and record the results in real-time as your application runs - without the need to manually construct test harness code. Testpoints can also be aggregated into reusable Test Suites, saving you valuable time.

- JUnit and NUnit support:
  Enterprise Architect provides model transformations that automatically create testing elements from your system design elements. Code stubs can then be automatically generated by Enterprise Architect, allowing you to focus on defining the testing logic. You can compile, execute and record test results using your unit testing program, all without leaving Enterprise Architect.

Enterprise Architect is not only a modeling environment, it is also a complete Test Management environment.

UI Design and Wireframes for Mobile Apps and Web Pages
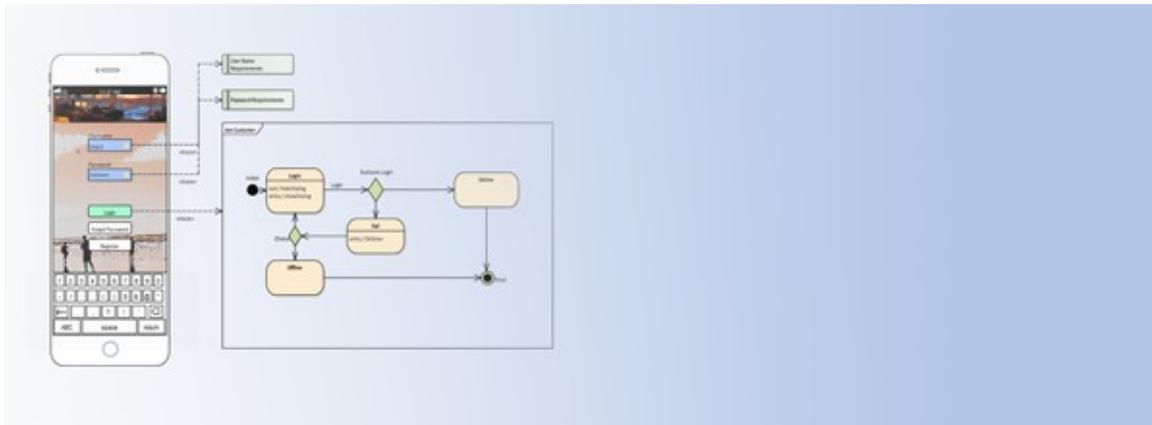
A key process in modeling a new system is designing the screens that users interact with. Enterprise Architect supports user interface design and wireframes for a wide range of devices and platforms including Android, Apple and Windows operating systems, and web pages.

Wireframes can be created with varying levels of detail – from a simple, abstract dialog, through to precise designs that visualize all the controls to be used on implemented device interfaces or web pages. You can leverage this capability to model apps for tablets, phones and other devices with rich graphical user interfaces.

Wireframes are fully traceable to other modeling elements, such as Requirements and Use Cases, for end-to-end model design. This provides customers, managers and developers with a complete picture of how the user will interact with the system.

Wireframing Features:

- Comprehensive wireframing library for modeling common devices and user interfaces
- Diagram types and toolboxes for Android, Apple and Windows and web dialogs
- Pre-defined wireframe patterns and models supplied
- Supports customization of control data displays

Cloud Services Modeling

The advantage of modeling Cloud Infrastructure in Enterprise Architecture is that you can link Cloud deployment to existing enterprise strategy, with complete traceability and transparency. This allows you to understand the impact that Cloud deployments might have on the underlying corporate strategy. Tightly integrate your business process, governance and Cloud systems to the existing enterprise, to improve planning, resource allocation and decision making.

Design your Amazon Web Service (AWS) or Google Cloud Platform (GCP) in Enterprise Architect using a comprehensive series of patterns and element-images. Combine these Web Service elements with standard Deployment diagrams and link them to Components and Classes for full traceability of your deployment model.

AWS elements and patterns

Model your Amazon Web Service (AWS) configuration using a sets of artifacts and patterns covering:

- AWS Groups
- AWS Illustrations
- AWS General Resources

Google Cloud Platform elements and patterns

Model your Google Cloud Platform using model patterns. Use any of the artifacts and patterns covering the Google Cloud Platform for modeling GCP diagrams.

Patterns include:

- Zones
- Networking
- Big Data
- Storage and Databases
- and more.

Microsoft Azure

Create expressive Azure diagrams that layout designs for new Azure virtual infrastructures and platforms or retrospectively create documentation for any existing infrastructure. These patterns include:

- Networking

- Development
- Security
- AI
- and more

Productivity Boosters

With so many modeling languages and capabilities built into Enterprise Architect, you need to be able to set a clear focus on the tasks to be performed. To facilitate this, Enterprise Architect provides a series of features to get you started quickly and keep you productive and in focus.

These features include:

- Perspectives
- Model Wizard (Start Page 'Create from Pattern' tab)
- Process Guides
- General Interface Tools

Core to productivity enhancement is the tight integration between the Perspective selected by the user and the refined set of options presented in features such as the Model Wizard and the element Properties window. This includes:

- Filtering of Toolbox options
- Context aware Properties window
- Filtering Model Patterns by Perspective

Perspectives
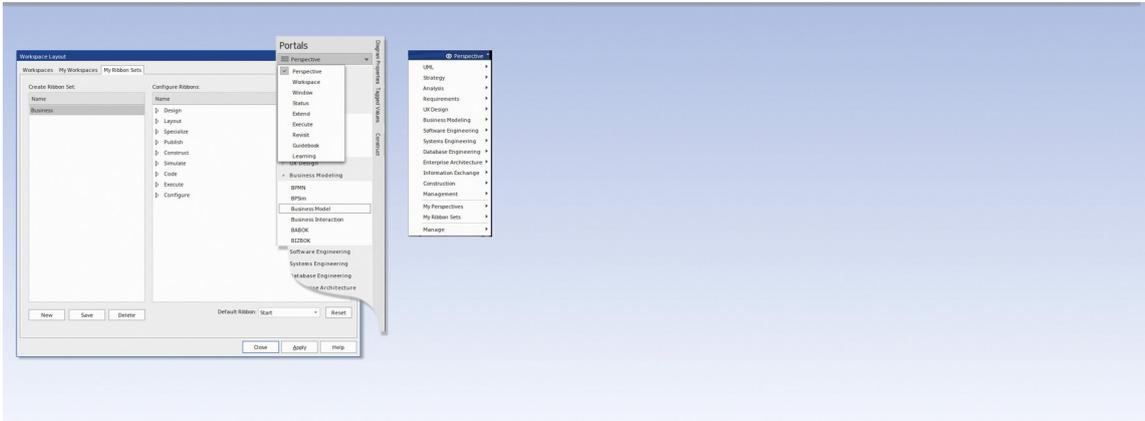
Perspectives provide a quick and effective way to narrow the scope of tools and options available to match the modeling requirement or scenario at hand. Using Perspectives you can remove the 'noise' that arises when options for multiple technologies are all presented concurrently.

Set your Technology

Perspectives allow you to focus on a particular modeling language or technology, enabling you to work effectively and efficiently on the task at hand. When your modeling focus changes you can simply select another Perspective from a conveniently grouped list of Perspective Sets. Enterprise Architect will then hide the previous languages and Technologies and open the newly selected set.

The 'Create from Pattern' tab (Model Wizard) provides a huge range of model patterns and guidance notes. With a specific Perspective Set, the Model Wizard presents a group of patterns restricted to those relevant to your target domain, ready for you to initiate a new model.

Built In Perspectives

Enterprise Architect includes many built-in Perspectives targeting Business, Software, Systems, Architecture, Project Management and more. With so many modeling languages and capabilities built into Enterprise Architect it can be difficult to find the right approach and keep focus. Using the Perspectives facility helps you to quickly and effectively refine the scope of tools and options available to match your modeling requirement or scenario.

Personal Perspectives

Enterprise Architect provides facilities to set your own personal Perspectives. Personal Perspectives allow you to open a number of technologies at the same time. For example, you might want to focus on Mind Mapping diagrams to record information in Stakeholder meetings, BPMN to sketch out the processes and Decision Modeling Notation (DMN) to model decisions. All three technologies can be included in a single Perspective entitled, for example, 'Process Analysis and Modeling'.

Model Wizard and Process Guidance

Enterprise Architect provides a rich and highly detailed set of patterns in the Model Wizard (Start Page 'Create from Pattern' tab) to find and use the right modeling approach for a particular domain or purpose. With Model Patterns and Process Guidance for a wide range of technologies, you can quickly generate starters for new models in your project.

Model Wizard

With a specific Perspective Set, the Model Wizard presents a group of patterns restricted to those relevant to your target domain, ready for you to initiate a new model. From basic modeling tasks to Business, Systems, Architecture, Project Management and more, the model patterns have solutions to kick start your design process.

Application Patterns

Application Patterns provide a quick starter for a code based project to get you going as fast as possible. These patterns generate starter projects including model information, code and build scripts for one of several basic application types. Available patterns include Microsoft Foundation Class (MFC) Windows applications, Java programs and ASP.NET web services.

Process Guidance

Process Guidance patterns step the modeler through the more challenging tasks, providing a repeatable and easily followed set of steps, for a well defined goal. Each Process Guide is a combination of an Activity chart and a checklist for you to step through the activities and tick off the processes followed. These provide a clear diagrammatic view of actions to be performed when using a complex Enterprise Architect feature.

Visual Execution Analyzer starters

The Visual Execution Analyzer starters make it simple to explore and try out the Visual Execution Analyzer. There are complete sample models including all necessary model information, code and build scripts for Java, Microsoft.NET, Microsoft C++ and PHP in Apache.

User Interface and Tools
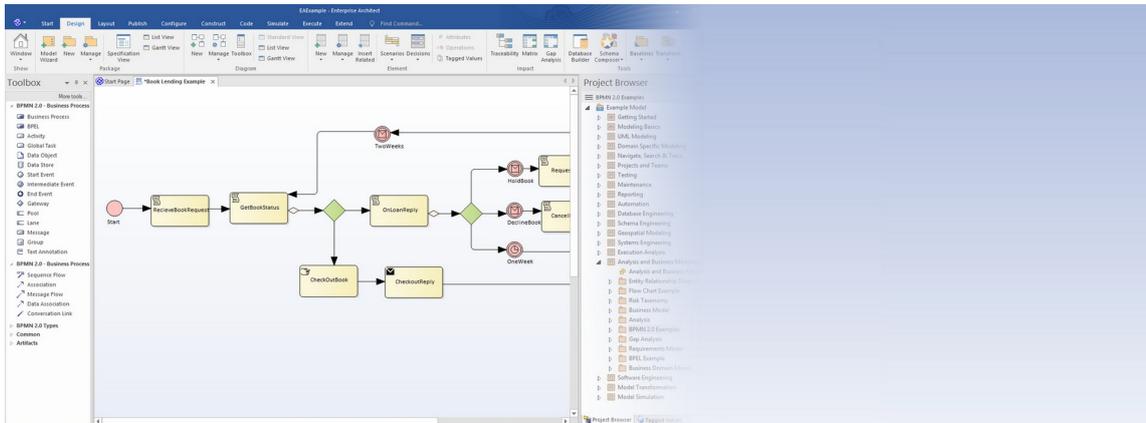
Enterprise Architect's user interface consists of a range of high-impact windows, ribbons and toolbars that you can arrange to suit your work methods. Key amongst these windows are:

- **The Browser window,** which displays the model hierarchy of your project and facilitates adding, selecting, reorganizing or deleting Packages, diagrams and elements

- **The Diagram Toolbox,** which is context-sensitive to the diagram being edited, and provides an efficient means of creating appropriate model elements or connectors

- **The Diagram View,** which brings the model to life visually:

    - Stylize and color connectors and elements for enhanced presentation and identification

    - Display diagrams in 'Hand-drawn' and 'Whiteboard' styles.

      These denote draft status and encourage feedback.

    - Edit multiple views concurrently, easily transferring elements between several open diagrams

    - View elements in tabular or list format

    - Browse search results:

      Trace seamlessly between visual representations and underlying source code, and more...

- **Context menus,** which provide options specific to the type of object and its environment

Floating diagram and docking views

It is often useful to see multiple views simultaneously for comparisons, editing of related diagrams or referring to downstream representations of a given model. Enterprise Architect allows you to open several diagrams at once and dock these anywhere on the screen. You can do the same for other views, such as the Model Search, Linked Document Editor, Source Code Editor, State Table or Element List views. This means, for example, you can:

- Edit a diagram with all its related views immediately visible

- Easily move or copy elements between open diagrams and take advantage of large or multiple monitors

- Maintain context and continuity between editing sessions simply by saving your window layouts and open views to a Working Set in Enterprise Architect

In-line editing of diagram elements

Enterprise Architect enables fast editing of element properties directly from the diagram. Using in-place edit commands, you can rapidly add and update element features such as attributes, operations and parameters, all without leaving the

Diagram View. Rapid editing of diagram elements is further enhanced by numerous keyboard shortcuts for creating and connecting elements.

Quick linking technology

The Quick Linker provides a fast and 'in-place' mechanism for creating new elements and connectors on a diagram. Its context-sensitive selection menus guide the creation of 'correct' models, saving users time and improving overall productivity.

Other diagramming features

- Export diagrams to a range of image formats (.bmp, .jpg, .png, .gif, .emf and .wmf)
- Swimlanes enable logical partitioning of diagrams
- Pan and Zoom window provides a preview and easy navigation of complex diagrams
- Diagram Filters dynamically compare 'as-is' and 'to-be' architectures or highlight changes
- Compare and merge diagram baselines visually and roll-back changes between revisions
- Locks on diagrams prevent accidental modification
- Shape Scripts customize rendering of elements and support alternative modeling notations
- Alternative Images can be superimposed on elements, to replace the standard image
- Kanban diagrams help you to automatically arrange elements into lanes according to a particular status value or other filter

Model validation

Model validation checks UML and SysML models against known rules from the specifications, as well as any constraints defined within the model using the Object Constraint Language (OCL). You can perform Model Validation against a single UML element, a diagram or an entire Package. The Model Validation capability is therefore a convenient tool during your model review process.

Distributed Teams and Collaboration

Sparx Systems' Enterprise Architect is designed for use within large corporate environments. As a scalable modeling platform, Enterprise Architect provides a range of deployment options to accommodate distributed teams and provide collaboration between the players in these teams, covering the unique needs of a modern organizational layout.

The core features useful in optimizing collaboration throughout distributed teams include:

- Options for Cloud and Network deployment
- Support for a range of Repository types
- Features for team-based collaboration
- Web-based access for reviews and feedback
- A range of Change Management features

Cloud sharing model repositories

The Sparx Systems Pro Cloud Server enables you to host and connect to your model repositories in a local or public Cloud. There are several benefits to sharing and accessing models this way:

- Firstly, Pro Cloud Server helps you access shared models no matter where you are; with a Cloud-enabled model, team members only need Enterprise Architect installed on their machine and HTTP/HTTPS connectivity, they do not need to install client database drivers that match the particular RDBMS product that you chose as a model repository

- Secondly, Enterprise Architect's Connect-To-Cloud facility is geared for enhanced performance over remote networks; it has been specifically designed to enhance performance over a WAN by reducing network chatter between the model repository and the Enterprise Architect client

Corporate modeling teams will find the Pro Cloud connection particularly helpful. For example, if you are only permitted to share information over http or https in a locked down environment, you can still access and edit shared models because the Connect-To-Cloud option only uses http or https.

Creating shared models is easy with the Sparx Systems Pro Cloud Server Client. You might use a dedicated DBMS back-end for the model repository or take advantage of the Cloud Service's built-in FireBird® server. Either way, administrators can easily create shared models on the fly and monitor active repository connections.

Support for large models and many concurrent users

The Corporate and above editions of Enterprise Architect enable the use of dedicated DBMS (server based) repositories, rather than the file based .QEA, .FEA and .EAP repositories, to store shared model data. Enterprise Architect supports these DBMSs as model repositories:

- Access 2007®
- MS SQL Server®
- MariaDB™
- MySQL™
- Oracle®
- PostgreSQL™
- FireBird® (Via the Pro Cloud server).

Pro Cloud Server Features
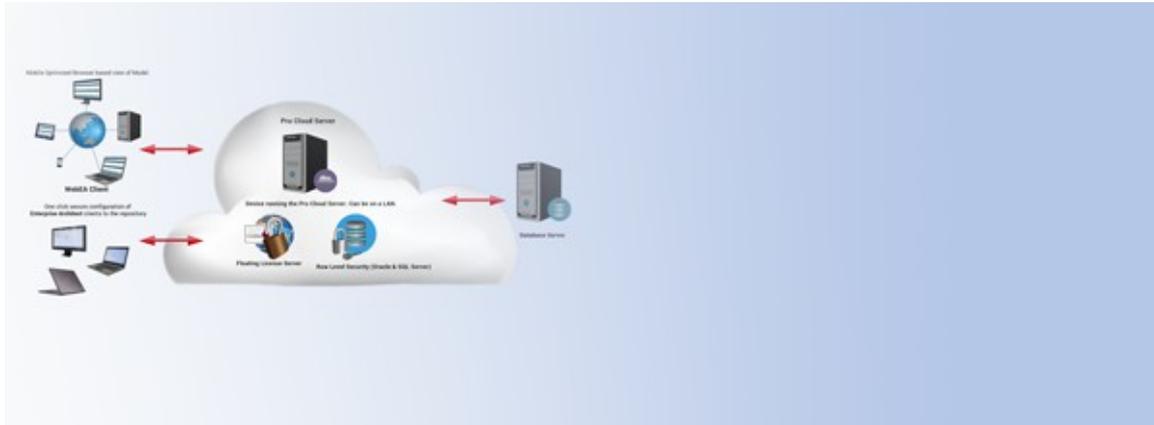
The Pro Cloud Server provides secure access to all users in your organization for up-to-date viewing of models, options to provide feedback and reviews via web browsers, integration with other applications via OSLC and the ability to restrict viewing of sections of the repository.

HTTP/S access

For the workstation installations of Enterprise Architect that are involved in the creation of models, the Pro Cloud Server provides access to a central repository via HTTP or HTTPS connection. This can facilitate both in-house server-based repositories or repositories hosted on Cloud-based services such as Amazon Web Service (AWS) or Azure. Using data compression and a parallel flow of data, it supports efficient model interaction across web-based networking.

WebEA

Pro Cloud Server's WebEA provides real-time web browser-based access to models for external users such as stakeholders, clients and testers, to review and comment on the current state of a model. WebEA allows your entire organization to read and consume models, and provide feedback where appropriate.

Prolaborate

Prolaborate leverages the model data in Enterprise Architect to allow the wider user community to analyze, interact and take key decisions. This includes:

- Sharing selected parts of Enterprise Architect models

- Creating dynamic dashboards

- Generating model-driven reporting

- Seamless collaboration

- Performing impact analysis

External Data Source Integration and OSLC

Using the Pro Cloud Server's Integration feature you can harness information and data in external tools, making Enterprise Architect a highly effective information hub. The Pro Cloud Server's Integration supports linking objects and

elements from external systems into an Enterprise Architect client. The External Data window supports browsing the external provider's items and retrieving lists of elements and objects based on the provider's queries. This supports a pre-configured range of external applications, as well as user-definable integrations using the likes of OSLC RESTful for interfacing with other applications that support OSLC or SOAP.

Visibility Levels (Row Level Security)

The Pro Cloud Server supports Visibility Levels for setting tight restriction on the repository data down to the Enterprise Architect Package level. Visibility Levels uses the native Row Level Security functionality implemented by certain Database Management Systems (DBMS), meaning that users with an imposed restriction are not able to bypass the restrictions using third party tools, no matter what method of connection they use.

Reusable Asset Service

Within a large organization, groups of users – such as model developers – can be separated by geographical distance and/or being on different networks. This can make it difficult to share common data, standards and modeling structures easily, without the complexity of using external Version Control tools or manually distributing model files between projects. However, within Enterprise Architect the Reusable Asset Service (RAS) provides a simple and convenient mechanism for modelers to distribute or download reusable model structures, information, corporate directives and standards, through a shared repository, accessible via a Cloud Service connection. The person who sets up the reusable data can retain ownership and management of the resource – or asset – whilst their distant colleagues can quickly review the currency of the information and download the latest versions into their models or file folders.

The RAS gives distributed teams convenient access to a single 'source of truth' for shared data, including project milestones, architectural frameworks and industry standards.

Teams and Collaboration

The Enterprise Architect collaboration facilities help you and your colleagues work together as an effective team. You can informally chat, or more formally discuss and review design decisions and model solutions. You can also keep a personal daily journal to record ideas, notes and other useful information.

Model Mail

The Model Mail facility provides you with the ability to send, receive and respond to emails within the project team, either as an individual user or as a member of a group that has a shared mail inbox. This provides a foundation for repository-based collaboration, on issues related to any projects being modeled.

Chat

Chat provides an informal and relaxed way to raise issues, discuss general points and communicate with team members concerning issues not directly related to specific model items.

Journal

Journal entries, being user-specific notes on an element, are a great facility for maintaining a daily log of ideas, comments, notes, suggestions, events, to-do lists and other reminders.

Discussions

Team members can view and post messages on specific model Elements to raise issues, suggest refinements, highlight important impacts.

Review

Use the review window to get the relevant people on board to formally discuss and review the model. Involve your stakeholders, involve WebEA users, involve customers, get feedback and ensure your project is on track and moving forward.

As a review or discussion develops, the number of responses is displayed, so that you can see when a discussion has a new reply without having to expand and work through the thread. You can also set a status on a discussion, helping you to resolve and close off points that have been raised.

Diary

The Diary lets you type in a personal stream of consciousness - ideas, comments, notes, suggestions, events, to do lists and more. A great way to keep the momentum flowing day to day.

Model Library

The Model Library facilitates the sharing of documents, files, guidance material, specification documents, informal notes and more, directly inside your model.

Calendar

The Project Calendar provides a project management overview in calendar format of the deployment of resources, timeframes for tasks, and upcoming project events such as meetings and milestones.

Change Management
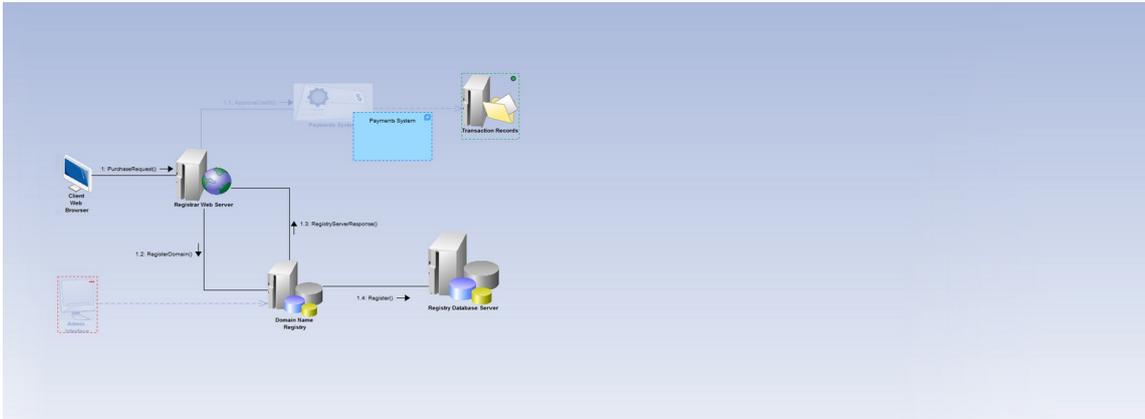
Enterprise Architect supports a number of features for monitoring and controlling changes to the model. Each of these features has its different uses depending on the organization of your model and the content that is being developed. Baselines, Version Control, Time Aware modeling and XMI Import/Export each provide different options for managing changes. Restrictions on changes can be defined using User Security.

Model Baseline, Compare and Merge

Enterprise Architect provides a facility to 'baseline' a model Package at a particular point in time. The baseline can then be used with Enterprise Architect's 'Compare' utility to visually explore changes to the Package, its elements or its diagrams and identify differences at a later point in development. Differences can be merged from the baseline into the current model, allowing you to 'roll-back' changes to a previous revision of that Package. Multiple users can thus contribute revisions to a Package offline and later incorporate them back into the common model.

The 'diagram compare' utility helps you to visually analyze changes to diagrams between revisions. Color-coded change items and connectors help you to see what has been added, deleted or moved in the diagram – with the ability to instantly restore any element to a previous state if required.

As well as comparing and merging changes from a baseline stored within the current model, Enterprise Architect's Compare utility allows you to compare a Package against:

• A file created using the Enterprise Architect XMI export facility on the Package

• A version-controlled XMI file for the selected Package

• Any baseline of the Package residing in an external model to which you have access

Time Aware Models

Use Time Aware Modeling to easily see the evolution of a model over different versions, and create new versions of model elements automatically without altering the underlying structure of the 'As-Is' model. Time Aware Modeling allows analysts to create incremental versions of their models for the migration of elements and diagrams through multiple versions.

Version Control

Enterprise Architect supports Version Control of model Packages and their sub-Packages. Package revisions can be managed directly from within Enterprise Architect, with Package data being stored and maintained using a dedicated

third-party Version Control application.

Applying Version Control to Enterprise Architect models provides two key benefits:

• The ability to coordinate sharing of Packages between users

• A history of changes to Enterprise Architect Packages, facilitating retrieval of prior versions

Enterprise Architect supports Subversion, CVS and Microsoft Team Foundation Server (TFS) Version Control applications, as well as any Version Control product that complies with the Microsoft Common Source Code Control (SCC) standard, version 1.1 or higher. For example Visual Source Safe or Clear Case.

XML import and export

Enterprise Architect supports an XML-based model interchange format known as XML Metadata Interchange (XMI). You can use Enterprise Architect's XMI facility to share model information between developers. XMI enables you to export discrete Packages or entire model branches into XML files, which can be imported into other models or maintained in a Version Control repository.

Security

Role-based (user) security in Enterprise Architect helps you to control access to various editing functions by requiring that authors log into the model with administrator defined privileges and restrictions. It also allows model authors to lock elements per-user or per-group. This can help to improve collaborative modeling by preventing different users unintentionally editing the same information at the same time. It also eliminates the possibility of inadvertent model changes by users not designated as model authors.

Traceability and Accountability
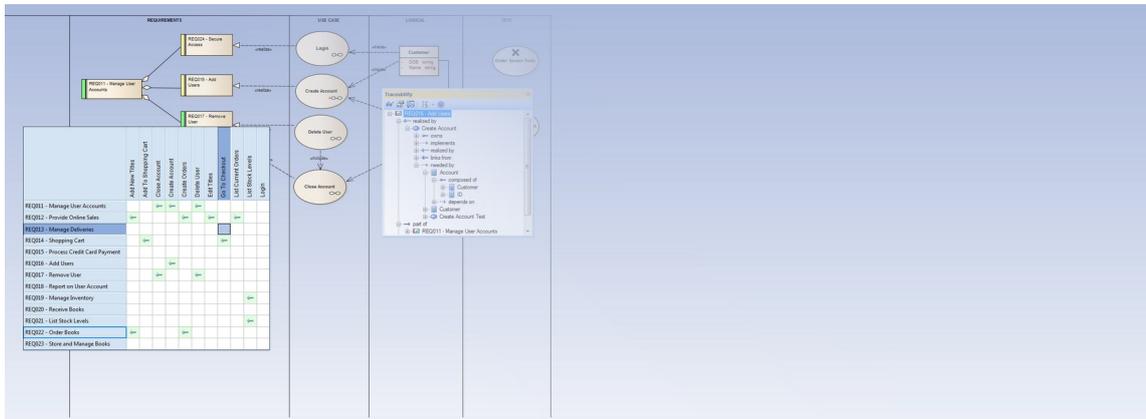
Traceability Window

The Traceability Window provides a dynamic, navigable view of the current element's relationships to other elements in the model. Relationships shown include Aggregation, Inheritance and Dependency; embedded elements are also shown. By highlighting interconnections between levels of abstraction in the model, the Traceability Window provides a handy impact analysis tool – helping you to see the effect of changing requirements on downstream elements.

Relationship Matrix

The Relationship Matrix helps you to study the relationships between model elements in a tabular view. Use it to easily identify traceability gaps and to conveniently create, modify or delete relationships. You can document which relationships form CRUD operations using textual overlays, or customize the matrix overlays to suit your particular modeling domain.

Model Auditing

Enterprise Architect's Auditing feature tracks and records changes made to the model over time. Model administrators can use Auditing to monitor information about changes, such as:

- Who changed an element
- How many elements they changed
- When they changed the data
- What the previous values were, and
- What types of element they changed.

The Audit View can be tailored to display specific types of change, and to filter changes by time period or user.

Gap Analysis Matrix

Enterprise Architect's built-in Gap Analysis Matrix helps you to model gaps between your 'as-is' and 'to-be' architectures. The matrix provides a convenient interface for defining and monitoring identified Gap elements, which can be traced to other elements in the enterprise model.

Finding Elements and Searching Metadata

Model Search

The Model Search facility retrieves each element in the model that meets the versatile criteria you define. The elements listed in the search results are selectable for printing, reporting, editing, adding to documentation and inserting into Team Review topics.

Model Views

Enterprise Architect's Model Views window provides a dynamic, filtered view of elements from the underlying model hierarchy. You can organize elements according to search criteria, favorite elements and diagrams, or technology-specific information, such as elements belonging to a particular framework view point. Model Views can be stored locally for use by individuals or included in a shared repository to achieve collaborative views. Automatic notifications can be set for a given Model View to alert you when an element created by another author is added to the view.

Details Tab of the Inspector Window

The 'Details' tab of the Inspector window provides a context-sensitive view of all metadata related to the selected element. This allows you to trace information on testing, project management, structured scenarios, maintenance and model semantics. The 'Details' tab thus provides a central hub for dynamic model reviews and a launchpad for related actions.

Specification View - Package Browser

The Specification View is a document style, editable view of elements – use it to streamline the process of creating and updating elements in a given Package. This can be particularly useful for analysts to edit formal requirement definitions within the model. You can also print the list or generate an RTF document directly from it.

Track Element Usage

Enterprise Architect makes it easy to track and display the use of an element. The 'Find' and 'Usage' features for Enterprise Architect's diagrams, Browser window and Package Browser show all occurrences of a given element

throughout the model, and enable you to easily navigate to any occurrence.

Create Diagrams with Related Elements

Enterprise Architect can automatically populate a diagram with all elements that relate to a given element. You can filter the inserted elements based on the type, direction and depth of the relationship. The 'Insert Related Element' feature provides a fast and effective way to build up specific relationship overviews for your frameworks or reverse engineered source code.

Publishing
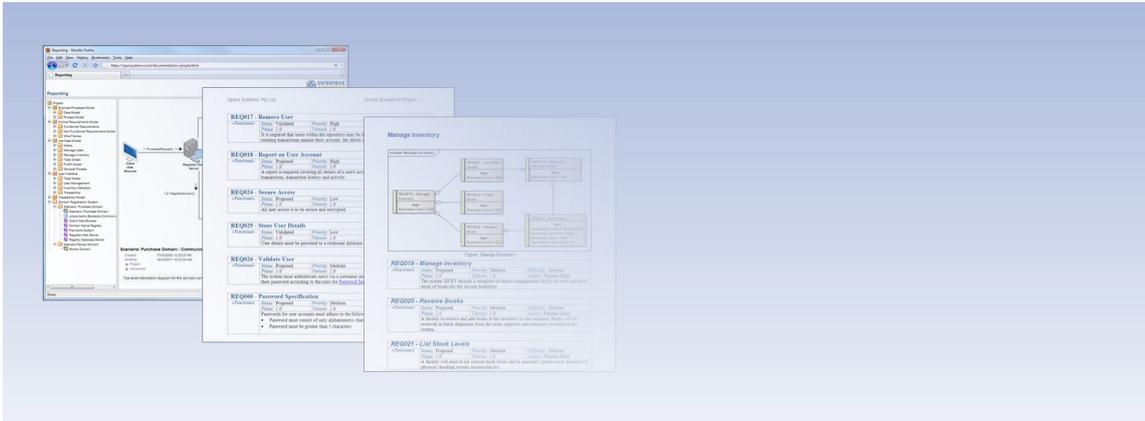
Producing documentation is essential to realizing the full benefit of Enterprise Architect. Enterprise Architect generates high quality documentation in DOCX, PDF, HTML and RTF formats. You can easily report on an entire project, selected parts of the model, or even group Packages in a different structure from the Browser window using Dynamic Documents, Virtual Documents or Model Searches.

Document-based reports (DOCX, PDF and RTF)

Compatible with Microsoft® Word® or LibreOffice™, Enterprise Architect's document generator can create entire specifications directly from the model. Documents are generated using customizable templates, helping you to create reports and project deliverables that suit your corporate standards. You can selectively include or exclude specific information items and apply custom stylesheets to tailor reports for diverse stakeholders. You can generate reports in Docx, RTF or PDF formats.

Using **Custom Documents** you can create on-the-fly, highly customizable documents by simply dragging and dropping any model content onto a Document Artifact, then selecting a template to render the dropped content to your specification.

The HTML report writer

Enterprise Architect can export an entire model or a single branch of the model to HTML pages for convenient browsing via the web or corporate intranet. The HTML report provides an easy-to-use and highly detailed model tree. In addition, hyperlinked elements make browsing to related information very easy. Alternatively, you can also publish your model directly to Joomla!.

Built-in document editor, Linked Documents and Document Artifacts

Enterprise Architect features a built-in document editor, with which you can attach rich-text documents to any element in the model. These Linked Documents are created from customizable templates and are included in generated web and document-based reports. **Linked Documents** thus provide a way to associate rich, free-form information with model elements. You can also store externally created documents and other files directly in the model as **Document Artifacts**.

Model Exchange

To help analysts and modelers to exchange designs, models can be published and external models can be imported into

Enterprise Architect, which greatly improves the flexibility and robustness of the modeling process. The supported exchange protocols include:

- XMI import and export - for a range of XMI UML protocols including Magic Draw MDZIP, EMX/UML2 and Rhapsody exchange

- Other XML formats, including Enterprise Architect's Native XML, BPMN 2.0 XML, ArchiMate Exchange and Ecore, ArcGIS

- OSLC exchange

Data can also be abstracted from a range of external data sources, using Enterprise Architect's Data Miner facility.

Other reports

Enterprise Architect supports a variety of useful out-of-the-box reports including: Resource and Task Details, Project Issues, Project Glossary, Project (size) Statistics, Dependency and Implementation Details and Testing Details.

Charts and Dashboards

Enterprise Architect can provide you with a wealth of data that is crucial to business planning, organizational strategy, decision making and project management. One way of summarizing this data in a format suitable for swift and easy appraisal is to present it in the form of charts and graphs, which are ideal for including in reports and distributing via the internet.

Within Enterprise Architect you can create Chart elements that define the type, source, content and appearance of a chart, either on a Dashboard diagram or on other types of diagram, as best suits your requirements. This provides a simple and fast mechanism for collating and presenting a lot of information automatically, such as summaries of Requirement Status or Test Case Status values across the current project.

Using Enterprise Architect, you can create a variety of charts including:

- Pie - 2D and 3D
- Doughnut - 2D and 3D
- Torus
- Line Graph (Time Series)
- Table (Model Views)
- Horizontal bar - 2D and 3D
- Vertical column - 2D and 3D.

You can also generate some of these charts filtered according to another data quantity, presenting this as table columns, segments of a bar or separate bars in a cluster.

Prolaborate Dashboards

Prolaborate provides a focus on dashboard presentation of the model. It is a platform for 'out of model' reviews and discussions for C-level executives looking for critical and strategic information, impact analysis and other 'outside the model' features that derive information from the model or provide unique windows into the model for a custom audience. In addition to the Enterprise Architect Charts, Prolaborate supports:

- Bubble Charts
- Roadmaps
- Heat Maps
- Nested Pie Charts
- Landscape Charts

Project Management
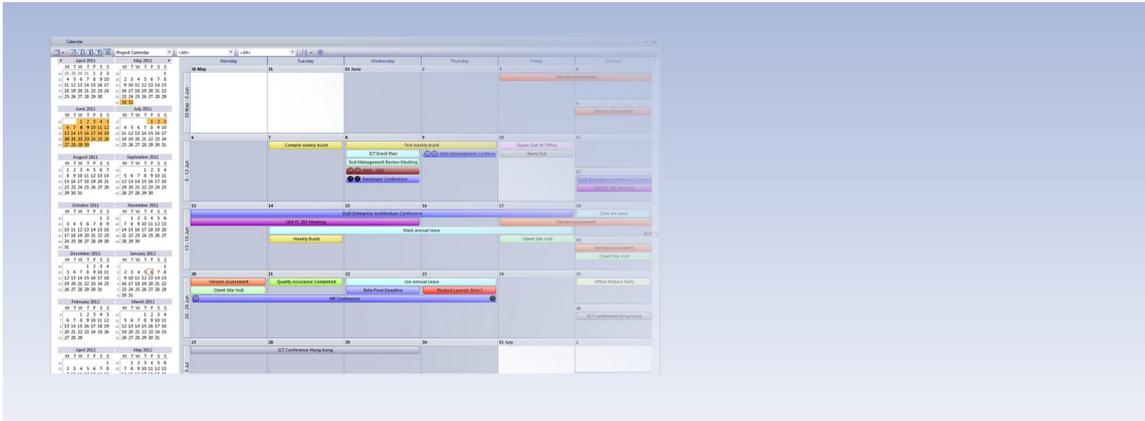
Enterprise Architect provides support for managing your project. Project Managers can use Enterprise Architect to assign resources to elements, to measure risk and effort, and to estimate project size.

Project Estimation with Use Case Metrics

The Use Case Metrics capability within Enterprise Architect makes it easy to assess the relative complexity of a software project, based on the number and type of Use Cases within the model, and on the type of development project and the capabilities of the development environment. With experience, the Use Case Metrics approach is a great way to quickly assess the scope of a project.

Resources

Enterprise Architect can store resource information along with the model. This helps to connect the Project Manager and development team, allowing for up-to-the-minute reporting and assessment of how a project is developing. What 'hot spots' have occurred, what elements are overdue and other critical resource issues can be tied directly to model elements and searched with ease using the comprehensive Model Search facility.

Model Tasks, Gantt View, Project Calendar and Project Management Checklists

Tracking, prioritizing and assigning tasks is a critical part of managing a model's development over time. Enterprise Architect allows you track model tasks against individual resources and against the project as a whole. Task allocations can be viewed as a Gantt chart, allowing you to monitor progress visually. Project Checklists help you model important aspects of your development process. These Checklists can be audited to facilitate tracking and accountability.

The built-in Project Calendar allows you to define and track important events, milestones and meetings directly within the modeling environment.

Each model author has access to a personalized view of the project via the Personal Information window, which allows users to record progress of their own tasks, send and receive Model Mail and define Working Sets of diagrams and other views specific to their roles.

Project Glossary

Each Enterprise Architect project includes a model glossary, making it simple to define and disseminate new terms that might be unfamiliar to team members new to the project or the problem domain.

Model Driven Architecture
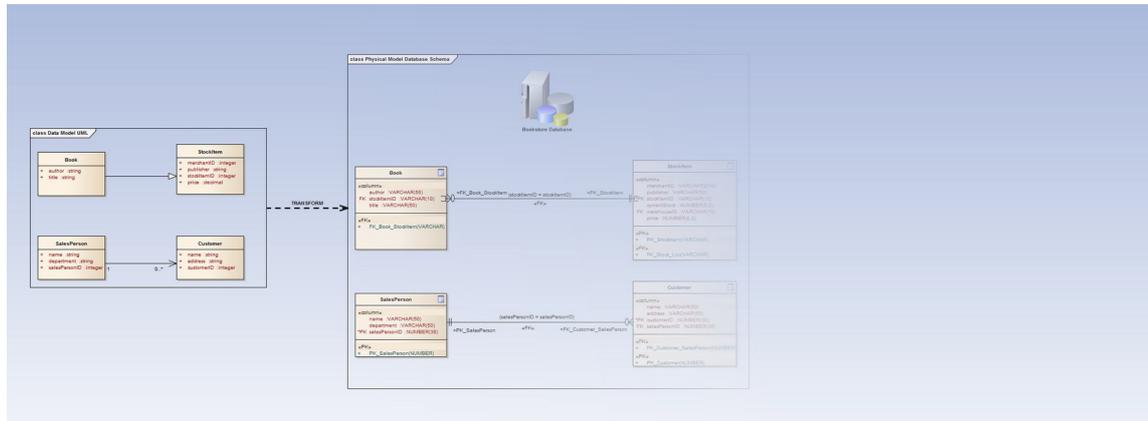
Enterprise Architect provides the capability of executing Model Driven Architecture (MDA) transforms. It provides a fully configurable method of converting model elements and model fragments from one domain to another. This typically involves converting Platform-Independent Model (PIM) elements to Platform-Specific Model (PSM) elements. A single element from the PIM could be responsible for creating multiple PSM elements across multiple domains.

Transformations are a huge productivity boost, and reduce the need to manually implement stock classes and elements for a particular implementation domain. For example, database tables can be automatically derived from persistent PIM classes.

Enterprise Architect's MDA capabilities provide built-in transformations to automatically derive:

• Data Models (DDL)

• Code Models, including C++, C#, PHP, VBNET and Java

• XML models, such as XSD and WSDL

• Test Models for JUnit and Nunit

• Activity diagrams and test scripts from Structured Use Case Scenarios

In addition to the built in transformations there is support to:

• Define new transformations using a useful, template driven approach

• Repeat transformations to ensure consistency between source and target models as they change over time.

Code Engineering

Code engineering encompasses automated code generation, reverse engineering of source code and synchronization between the source code and model. Enterprise Architect supports code engineering for **more than ten programming languages out of the box!**

- ActionScript
- C
- C#
- C++ (and .NET managed extensions)
- Delphi
- Java (including Aspects and Generics)
- PHP
- Python
- Visual Basic
- Visual Basic .NET

Import .jar files and .NET assemblies

In addition to source code files, Enterprise Architect can reverse-engineer binary modules from:

- Java Archive files (.jar)
- .Net PE files (.exe, .dll)
- Intermediate Language files (.il)

Customizable source code generation

Enterprise Architect's **Code Template Framework** provides versatile and flexible forward engineering of UML models into source code. Code templates specify customizable transformations from UML elements into a target programming language. This means you can tailor generated source code to suit your standards. Furthermore, you can use the Code Template Framework to forward engineer additional languages, that are not already built into Enterprise Architect.

On-demand and live-generation of code

Enterprise Architect provides a Live Code Generation feature that automatically updates your source code as you make changes to your model. For example, when you create new operations and attributes for a Class in the model, these are instantly written out to the source file.

Built-in syntax highlighting source code with dynamic source 'outliner'

You can use the built-in source code editor to open, view and modify source code files. Simply select an element in the model and the editor displays its source code with syntax highlighted and a navigable code outline. Use the editor's toolbar to quickly generate code or synchronize the model.

Code Miner

The Code Miner supports a wide range of functions, including finding information in large code sets and using the Code Miner database for Intelli-sense support in Enterprise Architect (or other tools). The Code Miner provides an incredibly fast response time when searching extremely large code bases; for instance, when finding all calls to a named function, or all reads of an attribute. The Code Miner is an excellent tool for supporting refactoring and other code management activities. Features include:

- Ability to compile your code base into a Code Miner repository
- The mFQL query language for searching and inspecting specific parts of your code
- Connecting with Enterprise Architect's code editors to provide on-the-fly Intelli-sense
- Options to expose the Code Miner repository as a team-based service, either local or shared
- Support for supplied or user-defined language grammars

Visualize, Debug and Profile Executing Code

Enterprise Architect's **Visual Execution Analyzer** provides facilities to model, develop, debug, profile and manage an application from within the modeling environment. Outputs generated by the Visual Execution Analyzer benefit the development process by:

- Giving you a better understanding of how your system works

- Enabling you to document system features automatically

- Providing information on the sequence of events that lead to erroneous events or unexpected system behavior

Analysis tools provided by the Visual Execution Analyzer can be used to:

- Generate Sequence diagrams, recording live execution of an application or specific call stacks; visualize how multiple instances of each Class interact at run-time

- Derive State Transition diagrams, illustrating changes in data structures

- Dynamically build Object diagrams as you control a debug session; selectively add objects with their run-state information and their relationships to other objects

- Create Profiler reports, showing application sequences and operation call frequency

- Optimize existing system resources and understand resource allocation

- Ensure that the system is following the rules as designed

- Produce high quality documentation that accurately reflects system behavior

- Understand how and why systems and existing code work

- Train new employees in the structure and function of a system

- Identify costly or unnecessary function calls

- Illustrate interactions, data structures and important relationships within a system

- Trace problems to a specific line of code, system interaction or event

- Visualize why a sequence of events is important

- Establish the sequence of events that occur immediately prior to system failure

- Debug .Net, C++ and Java applications, including remote debugging and support of Android physical devices and emulator, using the Java Debug Wire Protocol (JDWP)

StateMachine Code Generation and Execution

Enterprise Architect offers industry-leading code generation from StateMachine models. Generating code that is clean and ready to compile, Enterprise Architect removes the need to hand-write the source, helping you reduce development time and avoid 'human error'. Detailed model validation performed prior to code generation further helps you to define the right model. Advanced UML constructs are supported, including deep history and parallel regions, with an array of target languages (C, C++, Java, JavaScript and more).

When running the code generated from StateMachines, Enterprise Architect can trace this as visual simulation of the model. The built-in Debugger leverages Enterprise Architect's model simulation capability to highlight State transitions diagrammatically during execution. So you can effectively watch the StateMachine execute within the modeling environment. As your compiled code executes, the diagrams update live to show what is happening. On top of that, Enterprise Architect's simulation capabilities help you interact with and stimulate the running application. For example, you can fire triggers to test how the system responds. So, before you invest resources in deploying the StateMachine application to its final environment, you can verify that both the design and the code behave as expected first. If you need to make adjustments, you can do so quickly and easily.

To simplify your modeling and assist with the 'generate-build-run' process, Enterprise Architect provides an Executable StateMachine element that encapsulates your State models. You can even model several of these artifacts to generate and visualize interacting StateMachines!

Model Simulation
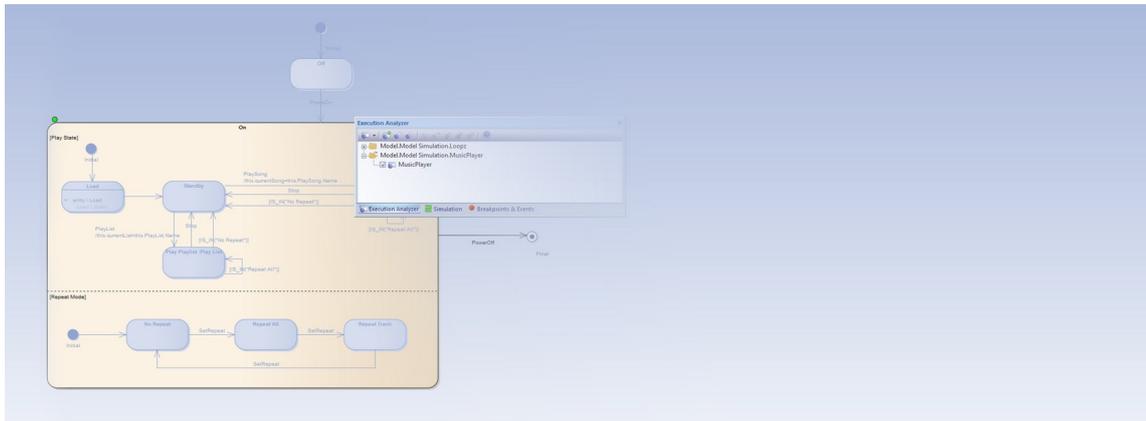
Enterprise Architect's model simulation brings your behavioral models and user interface designs to life with real-time execution. Simulating models offers several benefits by helping you to:

- Gain a better understanding of how a model actually works at run-time

- Validate that your behavioral models describe the correct process or event flow

- Verify the behavior of user interface wire-frames before committing to implementation

- Identify potential bottlenecks, inefficiencies and other problems in your system model or business process

- Detect errors early in the development cycle – prior to committing resources for implementation

Simulation options

Enterprise Architect supports a wide range of model simulation options, ranging from business model and behavioral model simulation through to precise mathematical simulation and plotting. These simulation options include:

Options	Discussion
DMN	Using Decision Model and Notation (DMN) simulation, you can bring your Decision models to life with your own input data. Watch branch points, decision tables and logic in action, as outcomes are reached. Generate code from these models for execution in larger systems.
Dynamic Simulation	Run simulations of Behavioral models including: • UML Activities • UML Interactions • UML StateMachines, including those rendered as a State Table • Business Process Models using BPMN notation With Dynamic Simulation you can also simulate the behavior of dialogs and controls that have been modeled using Enterprise Architect's Win32 profile for user interface designs.
Executable StateMachines (ESM)	Executable StateMachines provide a helpful means of rapidly generating, executing and simulating complex State models. In contrast to dynamic simulation of State Charts using Enterprise Architect's Simulation engine, Executable StateMachines provide a complete language-specific implementation that can form the behavioral 'engine' for multiple software products on multiple platforms.

BPSim	Use BPSim for simulating BPMN models as a repetitive process, including Monte Carlo based probability simulations. Also use BPSim to simulate BPMN models that call your DMN models.
Modelica	Using OpenModelica with SysML Internal Block Diagrams and Parametric Simulation, you can generate compelling model simulations of complex mechanical, electrical, electronic, hydraulic, thermal and electric power systems. Using SysPhs you can define Modelica objects using SysML Blocks and then generate a Modelica model and run the simulation to produce a plot of the results. Enterprise Architect's model simulation capability is a convenient tool for analyzing decision making, and improving business processes or executable system models in a risk-free environment.
MATLAB	Using SysPhS, SysML diagrams including Internal Block Diagrams, Parametric diagrams and StateMachine diagrams can be generated to MATLAB script and run as a simulation in Simulink and Simscape, giving a clear and tight mechanism to visually test the modeling from the initial requirements through to the SysML Blocks. From the generated script the diagrams generated in these tools can be viewed and run independently.
Solvers Octave and MATLAB	Solvers help you bring the computational power of MATLAB and Octave into Enterprise Architect in simulations. Using scripts in a simulation you can call mathematical functions from either Octave or MATLAB. You can then use the results for determining the simulation flow, or plot the results as graphs running from the model simulation.

Connectivity and Integration with Other Tools

Enterprise Architect provides a number of mechanisms for integrating your model with third-party tools, including a direct integration with popular tools via the Pro Cloud Server, a programmable API, an Add-In framework, and off-the-shelf Model Driven Generation (MDG) solutions provided by Sparx Systems.

Integration

The Pro Cloud Server provides tight integration of data from external providers into an Enterprise Architect Cloud model. Integration offers support for linking objects and elements from the external system into an Enterprise Architect client. The External Data window allows browsing of the external provider's items and the retrieval of lists of elements and objects based on the provider's queries.

Integration is supported for a variety of third-party providers:

- Application Lifecycle Management (formerly HP Quality Center)
- Polarion
- Jazz (interacts with:
    - IBM Rational DOORS Next Generation's requirements management tool
    - Rational Rhapsody Design Management (DM)
    - Rational Team Concert Change and Configuration Management (CCM)
    - Rational Quality Manager (QM))
- Jira and Confluence
- DevOps / Team Foundation Server
- Wrike
- ServiceNow
- Salesforce
- Autodesk
- Bugzilla
- SharePoint
- Dropbox
- Other Enterprise Architect models

MDG Link for Microsoft Office

- MDG Link for Microsoft Office provides integration of Enterprise Architect with the MicrosoftWord

- Excel
- PowerPoint
- Visio

The MDG Link allows you to leverage information captured in Word documents, Excel spreadsheets and Visio diagrams in your enterprise model, as well as publish models via PowerPoint.

Data Miner

The Data Miner is a unified interface to a range of data sources, providing a comprehensive means of abstracting external data from formats including:

- CSV
- ODBC
- ADO
- OLEDB
- JET
- XML
- XLS
- OSLC

The Data Miner is based on a data configuration process that is used to import the external data as a tabular data set, then run JavaScript over the data set to create model objects.

Import - export capability

Exchanging data between different models, and between different tools, is an integral part of any development project, making it easy for information and models to be ported into different tools and repositories as needed.

Enterprise Architect supports the common data exchange formats:

- XMI (including EMX/UML2/MDZip)
- BPMN XML 2.0
- ArchiMate Exchange
- CSV

Coupled with the Enterprise Architect API, you can automate model import/export to simplify dissemination of models and automate software construction.

Open Services for Lifecycle Collaboration (OSLC)

The Pro Cloud server acts as an OSLC Provider (OSLC 2.0), with support for creating, retrieving and querying Objects in an external application via a Cloud connection. With this OSLC support, resources in an Enterprise Architect model can be identified and accessed using a unique URL that can be linked to resources in other lifecycle products and tools.

CSV

In addition to XMI import/export, Enterprise Architect offers a simple CSV data import/export facility. This is useful for exporting information to tools such as Microsoft Excel, and for importing similar lists of elements stored in spreadsheets.

Integration with math engines

In engineering-based modeling there are a number of integration features for working with MATLAB, OpenModelica and Octave:

- With the Solvers - these provide a scripted interchange with MATLAB and Octave, and can be used in simulations that work through complex Mathematical formulas, as well as generating plots of the results

- With SysPhS based SysML modeling scripts - SysML diagrams can be generated to run simulations in both Modelica and MATLAB's Simulink and Simscape

Extending Enterprise Architect
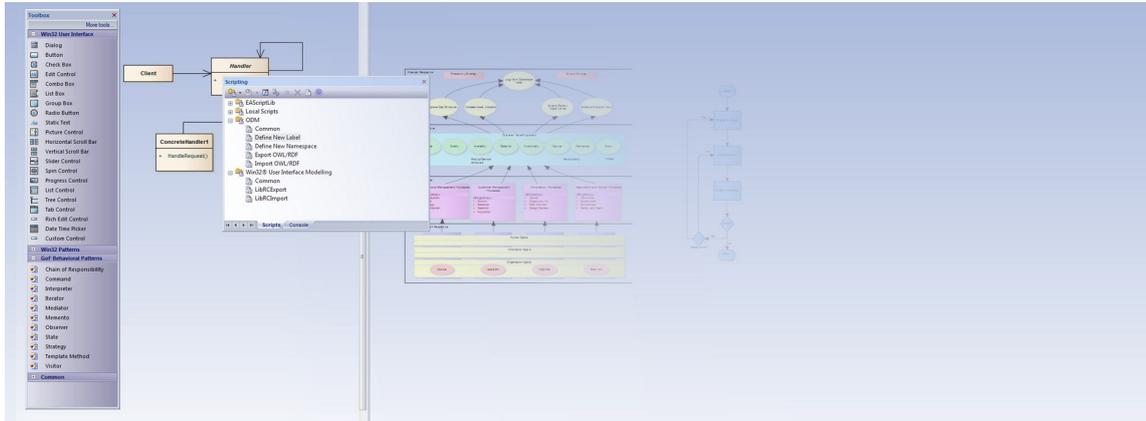
Enterprise Architect provides a number of facilities for further expanding its already extensive functionality. Users are able to expand the range of modeling notations for specific domains and add custom modeling resources such as model patterns.

UML Profiles

UML Profiles extend the UML language for constructing models in particular domains. Enterprise Architect has a generic UML Profile mechanism that allows users to create, share and use profiles as seamless extensions to the core modeling environment. For example, the UML Profile for XML Schema defined by David Carlson in *Modeling XML Applications with XML* is available for Enterprise Architect. This profile describes a set of extensions to UML Class models for accurate modeling of XSD schemas.

UML Patterns

Enterprise Architect's support for UML Patterns provides an excellent means of achieving re-use and robustness. Patterns represent a group of collaborating objects and classes that can be abstracted from a general set of modeling scenarios. As patterns are discovered in any new project, the basic pattern template from previous engagements can be re-used with the appropriate variables renamed to suit the current project.

Patterns generally describe how to solve an abstract problem, and it is the task of the pattern user to modify elements in the pattern to meet the demands of the current engagement.

MDG Technologies

MDG Technologies encapsulate a logical collection of resources (such as UML Patterns and Profiles) that pertain to a specific technology or modeling domain. These are 'pluggable' resources for Enterprise Architect that reside either in a physical directory or a URL.

Users can create their own MDG Technologies with the aid of Profile Helpers, which guide them through the process of creating a UML profile, its associated toolboxes and new diagram types. Furthermore, users can take advantage of MDG Technologies that are packaged with the Enterprise Architect installer, such as ArchiMate and Mind Mapping. Free Plug-in technologies are available that support activities such as CORBA code engineering, Distributed Data Services (DDS) and other modeling domains; these are available for download from:

https://sparxsystems.com/products/mdg/index.html

Automation Interface

Enterprise Architect has a formidable set of features for accessing and manipulating the contents of a repository programmatically. This facility gives you unlimited ability to query and manipulate models, add to the Enterprise Architect user interface, interface with other applications, generate reports and more.

All development environments capable of generating ActiveX™ Com clients should be able to connect to the Enterprise Architect Automation Interface.

Scripts

Model Scripts can be written in a repository using JScript, JavaScript or VBScript. This provides the option to write simple scripts that call the Automation Interface and can be run within the model.

Add-Ins

Add-Ins enable you to add functionality using Enterprise Architect's Add-In framework, which builds on the Automation Interface, providing several key advantages over stand-alone automation clients:

- Add-Ins can define Enterprise Architect menus and sub-menus
- Add-Ins receive notifications about various Enterprise Architect user-interface events including menu clicks and file changes
- Because the Add-In receives object handles associated with the currently running copy of Enterprise Architect, more information is available about the current user's activity, such as which diagram objects are selected

Model Add-Ins

Model Add-Ins are easily transferred between models using the standard model exchange such as a copy/paste or XMI export/import of a Package-tree. They are written in the model using JavaScript and can be event driven.

Model Add-Ins can:

- Access all Repository based behavior
- Respond to repository events (signals)
- Set up and use property lists

External Add-Ins

External Add-Ins are written as in-process (DLL) components providing:

- Lower call overhead and better integration into the Enterprise Architect environment
- Options to extend the user interface with dialog and windows

Just install the Add-In on a machine to make it usable; that is, you do not have to configure Add-Ins to run on your system.

Enterprise Architect Editions

Enterprise Architect is available in four Editions: Ultimate, Unified, Corporate, and Professional. Each Edition offers a range of features to support the requirements of different groups of users, from single-person projects to large enterprise teams.

A floating license arrangement is also available for Ultimate, Unified and Corporate Editions. The floating license is particularly useful for companies that need to manage a central store of license keys. Floating license keys can be used by different employees over time, temporarily or permanently.

More information about Enterprise Architect Editions is available from: https://sparxsystems.com/products/ea/compare-editions.html

Pro Cloud Server editions

Pro Cloud Server provides your entire enterprise with access to your modeling efforts, enabling all stakeholders to have customized secure access for discussion and review, options to integrate with popular CMDB and APM tools, and enhanced security.

The core features include access to:

- WebEA - web browser access to models

- Integration - for integrating with external applications

- Prolaborate - for customized views of Enterprise Architect

- Visibility level - for tighter security using restricted DBMS-based Row Level access

For more details see:

https://sparxsystems.com/products/procloudserver/index.html

Process support

UML is a language, not a process. It prescribes the elements of a modeling language and how those elements can be joined together to represent things in the real world. It does not prescribe how you use those elements over time to build new software systems. Similarly, Enterprise Architect is process neutral, meaning that it includes all the features and functionality necessary to implement some chosen development process, but does not dictate what that process should be or how it should be implemented.

Many Enterprise Architect users adopt highly structured processes, such as RUP, while others use more flexible and lighter weight Agile processes. Regardless of the degree of process management you require, Enterprise Architect has the tools and features needed to support the ongoing process of software development.

Operating System support

Enterprise Architect is a desktop application distributed as a Windows installer (*.msi) file, which can be installed on computers running:

- Windows 7 or later

- Linux®*

- Mac OSX *

For details on system requirements, see:

https://sparxsystems.com/products/ea/sysreq.html.

* Sparx Systems actively supports installation of Enterprise Architect on operating systems where the WINE compatibility software is available.

About Sparx Systems

Sparx Systems is a global software company specializing in innovative visual modeling tools for planning, designing and documenting collaborative business architectures.

Sparx Systems' flagship modeling platform, Enterprise Architect, provides robust support for enterprise-wide, cloud-enabled collaboration that captures an integrated view of what is, what will be, and the journey there.

Company vision

Sparx Systems believes that a complete modeling and design tool should be used throughout the full product life-cycle. Our subscription plan reflects this, as does our belief that 'life-cycle' software should be as dynamic and modern as the business or systems that you design and maintain.

Modeling software developed by Sparx Systems is intended for use by analysts, designers, architects, developers, testers, project managers and maintenance staff; that is, almost everyone involved in a system development project and in business analysis.

It is Sparx Systems' belief that highly priced tools severely limit their usefulness to a team, and ultimately to an organization, by narrowing the effective user base and restricting easy access to the model and the development tool. Our aim is to satisfy the growing needs of users involved in managing and modeling complex systems, by providing affordable, productive and user-friendly modeling software.

Ongoing commitment to enterprise modeling tools

Sparx Systems has been developing enterprise modeling tools for over twenty years, and has been active in developing the capabilities of Enterprise Architect to reflect the needs of enterprise modeling. In addition, Sparx Systems has been diligent in listening to requests and suggestions from its extensive user base, implementing many features critical to developing useful and well-rounded models. Sparx Systems is committed to the ongoing development of Enterprise Architect. A single tool to expertly cut across multiple domains for building a fully integrated, unified view of your business, your software, your systems, your processes, your enterprise and your relationship to the outside world.

Service and support

To support our customers Sparx Services, Sparx Systems and Sparx Global Partner organizations provide training, consulting, mentoring, presales, support and reselling. Sparx Systems provide local support to customers wherever they are located.

User base diversity

Sparx Systems Enterprise Architect is used by organizations of all sizes from large, well-known multi-national organizations to smaller independent companies and consultants. Enterprise Architect is also deployed across a wide range of spheres including: government, aerospace, banking, web development, engineering, finance, medicine, military, research, academia, transport, retail, utilities (such as gas and electricity), electrical engineering and many more. It is used effectively for training and research purposes in many prominent colleges and universities around the world.

Contact details

Contact Sparx Systems at these email addresses:

- Sales and purchase enquiries: sales@sparxsystems.com
- Product support enquiries: support@sparxsystems.com

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Acknowledgement

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Firebird Foundation Incorporated	FireBird®
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Wrike	Wrike®
Zachman International	Zachman Framework™, Zachman®, Zachman International®
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