CASE TOOL MATRIX

Die Auswahl des richtigen Modellierungstools ist ein wichtiger Baustein modellbasierter Systementwicklung (MBSE). Die Eignung eines Tools für die eigene Organisation lässt sich jedoch nicht anhand einer Feature-Liste beurteilen. Entscheidend ist die Fähigkeit zur Einbettung in die bestehende Umgebung. Hier spielen Dinge wie Interoperabilität und Anpassbarkeit eine ebenso große Rolle wie Usability und Standard-Konformität. Wir empfehlen folgende Punkte zu beachten.

Machen:

- Identifizieren Sie die Benutzer, Stakeholder und deren Anforderungen
- Definieren Sie die wichtigsten Anwendungsfälle und deren In- und Outputs
- Identifizieren Sie Workflows und Schnittstellen zu weiteren Tools
- Evaluieren Sie mögliche Tools mit entsprechenden Testfällen gründlich
- Betrachten Sie die MBSE als Thema für kontinuierliche Verbesserung

Nicht machen:

- Kaufen einer Lizenz aufgrund der Feature-Liste
- Übernehmen Sie für die Systementwicklung einfach das Tool der Softwareentwicklung
- Schöne Diagramme höher gewichten als Modelldaten
- Usability und Standardkonformität unterschätzen
- Überlassen Sie die Tool-Auswahl dem IT-Einkauf

oose Innovative Informatik eG berät Sie gern bei der Einführung von MBSE. Wir unterstützen Sie beispielsweise mit dem Definieren von Anforderungen an die Modellierungsumgebung, bei der Evaluation entsprechender Lösungen, in der Durchführung von Pilotprojekten sowie der Anpassung von Entwicklungsprozessen und -methoden.

Vom Wissen zum Können

						Current		Supported version		
Tool name [if applicable, alternate name]	List entry date	Vendor	Vendor website	Tool website [if deviating]	Contact	version	Target audience	UML	SysML	BPMN
Astah	29.03.2018	Change Vision, Inc.	http://astah.net/	http://astah.net/	sales@astah.net	7.2	System Developers and Engineers, Business Analyst, students			
Enterprise Architect [EA]	20.04.2018	SparxSystems	www.sparxsystems.de www.sparxsystems.eu www.sparxsystems.com		Peter.Lieber@sparxsystems.eu	14	Business, Software, Systems, Architecture	2.5.1	1.5	2.0
Rhapsody	30.05.2018	IBM		https://www.ibm.com/uk-en/marketplace/rational-rhapsody https://www.ibm.com/developerworks/downloads/r/rhapsodydeveloper/index.html	graham.bleakley@uk.ibm.com	8.3 (8.3.1 due June 15 th)	Enterprise Architects, Systems Architects, System Engineers, Software Engineers	2.4.1	1.4	N/A
MacA&D (Mac OS) WinA&D (Windows OS)	28.03.2018	Excel Software	www.excelsoftware.com		Harold Halbleib, 704-445-7645, info@excelsoftware.com	5.0.3	System Engineers, Architects, Analysts, Programmers	2,2	-	2
MagicDraw		No Magic	www.nomagic.com		contacts@nomagic.com	19.0	Enterprise Architects, Information Architects, Software Architects, Systems Engineers, Systems Architects, Business Process Analysts,	2.5.1	1.5	2.0
MetaEdit+	28.03.2018	MetaCase	www.metacase.com		info@metacase.com	v.5.5	language engineers, architects, developers, domain experts	2.5	1.4	1.0
Modelio	28.03.2018	Modeliosoft / SOFTEAM Group	http://www.modeliosoft.com		Didier Hochepot sales@modeliosoft.com	3.7.1	Modeliosoft provides 3 ready-to-use products adapted to 3 fields of application for: - Business Architect - System Architect - Software Developer	X	X	X
objectiF RPM	05.06.2018	microTOOL GmbH	https://www.microtool.de https://www.microtool.de/en/	https://www.microtool.de/produkte/objectif-rpm/ https://www.microtool.de/en/products/objectif-rpm/	info@microtool.de	4.3.0.0	Requirements Engineers, System Architects, Business Analysts, Test Managers,	2.2	1.5	
PragmaDev Studio	20.04.2018	PragmaDev	www.pragmadev.com	www.pragmadev.com/product	info@pragmadev.com	5.3	System Engineers, Specifiers, Designers, Testers.	2.x - SDL profile		In progress
PTC Integrity Modeler	03.05.2018	PTC, Inc.	www.ptc.com	https://www.ptc.com/en/products/plm/plm-products/integrity-modeler	Hedley Apperly	8,5	Systems and Software Engineers, Enterprise Architects, Product Line Engineers, Portfolio Managers	2.5.1	1,5	
Sinelabore	28.03.2018	Sinelabore Software	www.sinelabore.com		info@sinelabore.com	3.7.2.2	Embedded and Real Time Software Developers	depends on used modeling tool	depends on used modeling tool	-
UML Lab	17.04.2018	Yatta Solutions	https://www.yatta.de/	https://www.uml-lab.com		1.10.3	Architects and Developers working with both UML and source code	2.5		

Vom Wissen zum Können

Tool name [if applicable, alternate name]	Enterprise Architecture Frameworks	Other	Class diagram?	Block definition diagram?	Component diagram?	Composite structure diagram?	Internal block diagram?	Object diagram?	Package diagram?	Requirement diagram?	Parametric diagram	Profile diagram?	Deployment diagram?	Activity diagram?	Use case diagram?	Interaction overview diagram?	Communication diagram?	Sequence diagram?	Timing diagramm?	State machine diagram?	Other diagrams [please name propritary diagrams and their purpose]	Collaboration solution(s) [please own or 3rd-party solutions]	Document generation formats
Astah			x	x	x	x	x	x	x	x	x	-	x	x	x	-	x	x	-	x	GSN (Goal Structuring Notations) for generating Assurance case documentations.	Read-only merge features	xml, RTF, pdf, html, cs
Enterprise Architect [EA]	UDPM, Zachman, MoDAF, DoDAF, UAF, NAF (UAFP)	Archimate, IFML, DFD, DMN, GML, ArcGIS, MindMapping, EER, DDS, AUTOSAR (VFB), ...	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Relation Ship Matrix, Dashboards, Custom Diagrams, ...	Pro Cloud Server (own), LemonTree (3rd Party), VCS (e.g. SVN, …) [3rd Party]	html, xmi (xml), docx, xlsx, csv, pdf, joomla
Rhapsody	MODAF, DoDaF, UPDM,UAF	Action Langugae Semantics	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Traceability Tables and Matrices, dependency propagation, Customisable table and matrix views, Custom Views on diagrams	IBM RMM, GIT, SVN, Tortoise,	html, xml, doc, docx, xls, xlsx, csv, pdf,
MacA&D (Mac OS) WinA&D (Windows OS)			x	x	x	x	-	x	x	x	-	x	x	x	x	x	x	x	x	x	Task Diagram (threads of execution) System Diagram (processors, devices and interfaces) PERT charts (project management)		html, xml, (doc, docx indirectly through MS word) csv, pdf, jpg, gif, bmp
MagicDraw	NAF, UAF, DoDAF, UPDM	fUML, ALF	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	Tables, Relation maps, Dependency Matrices	Teamwork Server, Teamwork Cloud	html, doc, docx, xls, xlsx, ppt, pptx, rtf, odf, xml
MetaEdit+	ArchiMate 3.0.1	SDL, SA/SD, EAST-ADL	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x, fully customizable	collaborative simultanous model editing (cf Google docs), versioning with Git, SVN etc	html, xml, doc, rtf, csv, user defined
Modelio	MoDaF, DoDaF, NAF, UPDM, TOGAF, ArchiMate		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	- Modelio provides a set of dedicated graphical editors and matrices, as well as methodological, tooled support to build the models recommended by TOGAF. - ArchiMate diagrams	- Subversion for basic teamwork - dedicated server for models and projects governance and centralized administration	HTML, Microsoft Word (docx), Microsoft Excel (xslx), Open Office/LibreOffice (odt)
objectiF RPM			x	x			x		x	x				x	x					x	Goal diagram, system context diagram		doc, docx, xls, xlsx, pdf
PragmaDev Studio		SDL	x	x			x							x	x			x		x		Reqtify	html, rtf, pdf, sgml
PTC Integrity Modeler	MODAF, DoDAF, UPDM, UAF	OVM, Data Modeling, MARTE	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	(x)	x	Variation Diagram, General Graphics Diagram, Database Design Diagram, Reqs and Allocation Tables, Matrices, Custom Tables	Internal Solution for multi-User Access, User Control, Parallel Working, Branch&Merge, Change Tracking. LDAP-compatible Web-Access to the model information. OMG RAS-based Model-in-Model concept	html, xmi, docx, xlsx, bmp, png, jpeg
Sinelabore	-	-													x					x			xls
UML Lab			x				x						x									GIT,SVN	PNG, SVG, PDF; more on request

Vom Wissen zum Können

	Interoperability			Supporting processes			Tool customization		
Tool name [if applicable, alternate name]	Data exchange formats [e.g. OSLC, ReqIF, XMI]	IDE Integration [please name IDE solution]	Engineering tool integration [please name standard software solutions like Requirement Management, PDM, etc.]	Configuration & change management [please name relevant tool function, plugin or similar]	Safety & reliablity analysis [please name relevant standard, tool function, plugin or similar]	User interface modeling [UI mock-ups, plots, etc.]	Tool-API?	Tool bar/palette?	Tool menues?
Astah	XMI	None	JIRA, Confluence	SVN Integration Plugin	Astah GSN edition	None	x	x	x
Enterprise Architect [EA]	OSLC, XMI, CSV	Link to Eclipse, Visual Studio	Polarion, DOORS, Integrity, Jira, TFS, ServiceNow, WIRKE, …	Baselining in tool or LemonTree [3rd Party]	3rd party plugins	yes	x	x	x
Rhapsody	OSLC, XMI	Eclipse, MSVC 2008/10/12/15/17, support for Windriver Workbench, Greenhills Multi IDE, Gnat pro, Oracle Java, IBM JRE, Mathworks Simulink	Rational Team Concert, Rational Quality Manager, DOORS, DNG, MIDs, RELM, TestConductor, ATG, INCHRON,LDRA, Phoenix Integration, Simulation X, Medini Analyse, JIRA through RTC, Clearcase, RTI, DDS, Simulink and Matlab, Modelica	based on RTC or third party products such as SVN, GIT etc.	Integration to Medini Analyse and built Safety and reliability analysis profile	yes, also links to Altia	x	x	x
MacA&D (Mac OS) WinA&D (Windows OS)	XML, text import/export of diagrams, requirements and dictionary	Customizable Integration	Builtin Requirements Management	Builtin Revision Notes		Screen Models with Live Prototype	x	x	x
MagicDraw	OSCL, ReqIF, XMI	Eclipse	Polarion, DOORS, Jira, Teamcenter, HP Quality Center, BigLever, Pure::Variants.	Jira	FMECA according to IEC 60812:2006 standard, Hazard analysis according to the following medical standards: IEC 62304 ISO 14971:2007.	Yes	x	x	x
MetaEdit+	XMI, MXM, ReqIF, own	Visual Studio, Eclipse	Requirements engineering, test execution etc,	MetaEdit+ API supports both Jira/Git/etc	ISO26262, EAST-ADL	yes, user defined languages	X	X	X
Modelio	XMI, ReqIF, ArchiMate, BPMN	No strong integration with an IDE. Any IDE can be used with Modelio.	DOORS, HPQC, and any tool supporting ReqIF	- Subversion-based. - Workflow can be adapted to customers.	Not off the shelf. Modelio can be adapted to support safety and reliability analysis.	no	X Complete Java API	X	X
objectiF RPM	ReqIF, XMI		Jira				x	x	x
PragmaDev Studio	XML, PR, xLIA, IF, Fiacre		Reqtify	Customizable. Clear Case, CVS…		Yes	x		x
PTC Integrity Modeler	OSLC, XMI, ReqIF via RM-Integration (Integrity LM, DOORS)	built-in code editor for all supported languages plus integration in all IDEs via automatic code synchronization	Integrity Lifecycle Manager, Windchill, Thingworx, DOORS, DOORS NG, & others via OSLC	Internal Solution for multi-User Access, User Control, Parallel Working, Branch&Merge, Change Tracking. This can be also controlled externally, e.g. using SCC.	Safety, Risk & reliablity analysis using project-based UML Profiles	yes	x	x	x
Sinelabore	XMI			Any					
UML Lab	XMI,Ecore	Eclipse	On request	Git/SVN-Based			x	x	x

Vom Wissen zum Können

| Tool name [if applicable, alternate name] | Model execution | | | | UML | | | |
	Simulation / model execution [please name diagram kinds and technology]	Mathematical expressions calculation [is the tool capable to compute such expressions]	Equation solving [is the tool capable to solve mathematical equations]	Monitoring and logging of model parametes?	Code generation?	Customization of the code generator	Target languages of the code generator	Reverse engineering [Code to UML]
Astah	None	None	None	None	x	Yes	C, C++, Java as default, other languages are available with Plug-ins (free)	Yes
Enterprise Architect [EA]	All behavioral UML/SysML features, operations & function in C, C++, Java,.. & BPSIM	Complete algebra, DMN	Based on modelica integration	yes	x	yes	Action Script, C, C# (for both .NET 1.1 and .NET 2.0) C++ (standard, plus .NET managed C++ extensions) Delphi, Java (including Java 1.5, Aspects and Generics) PHP, Python, Visual Basic Visual Basic .NET and any custom language	structure
Rhapsody	All behavioral UML/SysML features, operations & function in C, C++, Java,.., FMI, FMU	Complete algebra	Integration to Mathworks Matlab and Maxima, also FMU integration to Modelica	yes	x	yes	C, C++, Java, Ada	Classes, methods, activities, state machines
MacA&D (Mac OS) WinA&D (Windows OS)	Causal Loop Diagrams with builtin simulation				x	yes	C, C++, Java, Objective-C, Swift, PHP, Xojo, Delphi, Ada, C#, SQL, Pascal, Basic, Fortran	Requires MacTranslator or WinTranslator (Structure Charts from C, Pascal, Basic, Fortran or PHP), (Class Diagrams from C++, C#, Java, Objective-C, Delphi, Ada, Xojo, Swift, PHP), (Data Models from SQL)
MagicDraw	Model interpretation (without code generation), mockups using Block, IBD, Activity, Statemachine, Parametrics. Co-simulation. Based on OMG fUML and W3C SCXML. Supported action languages: Javascript, Ruby, Groovy and Python are supported by default; other JSR223 compatible language implementations can be freely downloaded and plugged.	Complete algebra	Internal solver, Matlab, OpenModelica, Mathematica, Maple	Yes	x	Yes	C, C++, Java, C#, IDL	Classes, sequence diagrams
MetaEdit+	simulation / execution in 3rd party tools like Simulink, UPPAAL, SPIN, or customers own execution environments	internal math operation	internal math operations, integration with 3rd party tools	yes	X	Yes	any ascii, current cover Assembler, C, C++, C#, Java, Python, IEC 61131, SQL, Corba, Delphi, XML, JSON	User defined, available for classes, attributes, inheritance etc.
Modelio	Simulation definition (composite structure diagram) based on FMI (Functional Mock-up Interface)	Modelio can export data to Modelica and MathML.	Modelio can export data to Modelica and MathML.	Monitoring of FMI (Functional Mock-up Interface) simulation parameter	X	Yes	C++, Java, C#, SQL	Class diagrams (classes, operations, attributes, links, code, …)
objectiF RPM								
PragmaDev Studio	Native simulator (no code generation) based on SDL action language and semantic.	Yes	No	Yes	x	Yes	C, C++	
PTC Integrity Modeler	Early Validation of System Behavior for SysML State Machines annotated with Action Language; with Sequence Diagram support. Animation of state machines while simulating behavior described in state machines, operations etc. in C, C++, Java, VB, ASAL.	via integration with functional models	via integration with functional models	yes, e.g. in Excel	x	yes, our Model to Text transformation is also model-based, i.e. the generators are meta-generated from models.	C, C++, C#, Java, VB, Ada, SPARK Ada, IDL, SQL, ARINC653 out of the box. You can also add your own	Class Model, annotated with language-specific information in Profiles
Sinelabore	State Machine Diagrams			yes	x	yes	C, C++, Java, C#, Python	
UML Lab					x	yes, fully customizable, template-based (Xpand)	any; ships with Java and PHP support	Fully customizable, template-based; ships with structural round-trip (packages, classes, associations, methods) for Java and PHP

Vom Wissen zum Können

Tool name [if applicable, alternate name]	Operating systems	License			Evaluation license ?	
		License Model [free, single, floating]	License cost		Evaluation license ?	Evaluation license limitations
Astah	Windows, Mac OS, Linux	free, individual, organizational, academic individual, department-wide	free for students and $9.99 per month		x	50 days
Enterprise Architect [EA]	Windows and MAC, Linux based on WINE	single and floating available for Server Infrastructure subscription model	depends on license, special academic fees		x	30 days (can be extended on request)
Rhapsody	Win7, Win10, Linux RHEL, Windows Server 2012	trial, single, floating, token			x	60 days
MacA&D (Mac OS) WinA&D (Windows OS)	Win7, Win8, Win10, Mac OSX	Single User, 5-User Site, Unlimited User Site	Standard $395, Desktop $595, Developer $995 or Subscription Starting at $25/month		x	Limited Save Command
MagicDraw	All Java compatible	single, floating	depends on multiple factors. Provided upon request		x	on demand
MetaEdit+	Win7, Win10, Mac OSX, Linux	single, multi	starting 250€/month		x	30 days
Modelio	- Windows 7 SP1, Windows 8.1, Windows 10 or later - Redhat Enterprise Linux 6/7, Debian 7/8/9 and Ubuntu 14.04/16.04 LTS - Mac OS X 10.9/10.10/10.11	Open Source version	Free for education with the academic program For the commercial version, the cost depends on the features and type of license.		X	10 days. Feasible extension. No feature limitation.
objectiF RPM	Win7, Win8, Win10	floating			x	90 days
PragmaDev Studio	Windows, Mac OS X, Linux	Free, node-locked, floating.	3900€ for a permanent license or 170€ per month		x	Size of the model
PTC Integrity Modeler	Win 7, Win 10	floating, subscription	please contact PTC		x	30 days
Sinelabore	Win7, Win10, Mac OSX, Linux	single			x	number of states
UML Lab	Windows, Linux, OS X	single, floating	from 199€; free for education		x	30 days

Vom Wissen zum Können

	Miscellaneous
Tool name [if applicable, alternate name]	Please describe outstanding characteristics of your tool
Astah	Usability, Extensively, Abundant online contents, excellent customer support
Enterprise Architect [EA]	Enterprise Architect is a comprehensive UML analysis and design tool for UML, SysML, BPMN and many other technologies. Covering software development from requirements gathering through to the analysis stages, design models, testing and maintenance. EA outfits your entire team, including analysts, testers, project managers, quality control staff and deployment team, for a fraction of the cost of some competing products. EA is a multi-user, Windows-based, graphical tool designed to help you build robust and maintainable software. It also features flexible and high quality documentation output.
Rhapsody	Complete modelling environment from Enterprise Architecture down to SW code gneration. With complete set of OSLC integrations via RMM to requirements, test, config and change management.
MacA&D (Mac OS) WinA&D (Windows OS)	Scriptable Reports with full control over content and format and access to all requirement, dictionary and diagram data. Large team development features like Team Documents, Namespaces, Import/Export, Document Templates, Adhoc Reports and Extensive Customization
MagicDraw	Strict support of underlying UML/SysML/BPMN/UAF metamodel. Validation of model completeness and correctness. Outstanding usability based on major work scenarios, automation where possible. Customization of metamodel and UI, based on customer processes.
MetaEdit+	Support any modeling need and code generation target with domain-specific languages (or adapt OMG languages to your need)
Modelio	- The Modelio Constellation server enables you to easily share and re-use your models, and to establish the governance of your enterprise repository. - Requirement analysis: Requirements are an integral part of your models. They can be traced, linked to your models and used in impact analysis. - Multi-standard: Modelio integrates all the latest modeling standards and actively participates in the interoperability format used to guarantee the exchange of models between different tools. - Support & Consulting: Modeliosoft's international support team, its network of partners around the world and its consultants will help you make a real success of your project, including at the international level. SOFTEAM, Modeliosoft's parent company, has 600 architecture and development consultants, and 200 consultants in project management, modeling, methods and approaches. - The Open Source ecosystem: The presence of an active contributing community ensures zero editor "lock-in", and provides numerous developments and significant user feedback. The forum is a valuable way to share problems and solutions. Since 1990, the users of Objecteering and then Modelio have been ensured backward compatibility and been assisted in the update of their repositories. SOFTEAM ensures customer follow-up and solution sustainability which is unrivaled on the market.
objectiF RPM	traceability along the entire application life cycle (even to code),agile/hybrid planning, continuous testing
PragmaDev Studio	The tool includes a full testing environement: to check non regression on the model, or to verify an implementation is conform to the model.
PTC Integrity Modeler	Open and highly flexible implementation of UML-based modeling, true parallel working in one model, unique Model-in-model concept, Model-based Integration Hub using OSLC and HTML, Connected Systems and System-of-Systems Development by our Thingworx integration
Sinelabore	SinelaboreRT was built especially for embedded software developers. It focuses on just one task: Generation of readable and maintainable code from hierarchical UML state - and from activity diagrams. With its unique features the tool covers well the requirements of embedded real-time and low-power application developers. With its C++/Python/C# and Swift language backends is also a perfect tool for developers of server or desktop applications.
UML Lab	Agile reverse- and round-trip engineering using the same customizable code templates for generation and reverse engineering

Vom Wissen zum Können