



# MAENAD

Grant Agreement 260057



## **Model-based Analysis & Engineering of Novel Architectures for Dependable Electric Vehicles**

<b>Report type</b>	<b>Deliverable D4.1.1</b>
<b>Report name</b>	<b>EAST-ADL Language Specification</b>
<b>Dissemination level</b>	<b>PU</b>
<b>Status</b>	<b>Intermediate</b>
<b>Version number</b>	<b>2.1</b>
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**Revision chart and history log**

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<b>Version</b>	<b>Date</b>	<b>Reason</b>
1.0	2011-06-30	First release Reflecting Maenad Month 9
1.0.1	2011-08-30	Intermediate Version Reflecting Maenad Month 12
2.0	2012-06-30	Second release Reflecting Maenad Month 21
2.1	2012-08-31	Change list added.

<b>1</b>	<b>Summary</b>
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D4.1.1 is the EAST-ADL specification which covers the elements of the language. Language elements are shown in class diagrams according to purpose. They are also documented with a description and semantics and any attributes, associations and constraints.

This version of D4.1.1 is annotated EAST-ADL M2.1.10.20120630, i.e. the MAENAD proposal for version 2.1.10. See EAST-ADL-Specification\_M2.1.10.20120630.pdf for the actual specification.

**2 Versions**

The EAST-ADL specification from the previous ATESS2 project had the version number 2.1.8 and was released 2010-06-30, the specification has evolved during the MAENAD project as follows:

Date	Domain Model version	Note
2011-01-30	(M2.1.1) M2.1.9	
2011-06-30	M2.1.9.1	M9, should really be called 2.1.9.20110630
2011-08-30	M2.1.9.20110830	
2012-03-30	M2.1.10	Consolidation of descriptions
2012-06-15	M2.1.10.20120629	M21, no structural changes.

### 3 Changes in M2.1.9.1

M2.1.9.1	ATESST2_2.1.RC5	Change	Metaclass
TraceableSpecification (from Elements)	EAPackageableElement (from Elements)	Changed generalization	FunctionClientServerInterface (from FunctionModeling) «atpType»
wire : HardwareConnector [*]	No additional associations	Changed dependency to association	LogicalBus (from HardwareModeling) «atpStructuredElement»
	<b>Dependencies</b>	dito	
	wire : HardwareConnector [*]	dito	
	«instanceRef»	dito	
decisionModel : VehicleLevelBinding [*]	decisionModel : VehicleLevelConfigurationDecisionModel [*]	Changed name of associated class	Variability (from Variability)
<b>VehicleLevelBinding (from Variability)</b>	<b>VehicleLevelConfigurationDecisionModel (from Variability)</b>	Changed class name	VehicleLevelBinding (from Variability)
	relationship : RequirementsRelationship [*] {composite}	Removed association	RequirementsModel (from Requirements)
TraceableSpecification (from Elements)	EAPackageableElement (from Elements)	Changed generalization	Item (from Dependability)
max : Float [0..1]	max : Float [1]	Changed attribute multiplicity	EAFloat (from Datatypes)
min : Float [0..1]	min : Float [1]	Changed attribute multiplicity	EAFloat (from Datatypes)
max : int [0..1]	max : int [1]	Changed attribute multiplicity	EAIInteger (from Datatypes)
min : int [0..1]	min : int [1]	Changed attribute multiplicity	EAIInteger (from Datatypes)
	UserAttributeableElement (from UserAttributes)	Removed generalization	EAElement (from Elements) {abstract}

M2.1.9.1	ATESST2_2.1.RC5	Change	Metaclass
The realizedBy elements shall be on a lower abstraction level than the realized elements.	No additional constraints	Added constraint	Realization (from Elements)
The realizedBy or realized elements shall be structural or behavioural		Added constraint	Realization (from Elements)
<b>UserAttributeableElement (from UserAttributes)</b>	<b>UserAttributeableElement (from UserAttributes) {abstract}</b>	Class made concrete	UserAttributeableElement (from UserAttributes)
attributedElement : Identifiable [1]		Removed association	UserAttributeableElement (from UserAttributes)

4 Changes in M2.1.9.20110830			
M2.1.9.20110830	M2.1.9.1	Change	Metaclass
EAElement (from Elements)	None	Added generalization	AllocateableElement (from FunctionModeling) {abstract}
EAElement (from Elements)	None	Added generalization	AllocationTarget (from HardwareModeling) {abstract}
	<b>HardwarePinDirectionKind (from HardwareModeling) «enumeration»</b>	Removed class	HardwarePinDirectionKind (from HardwareModeling) «enumeration»
	<b>Generalizations</b>	dito	
	None	dito	
	<b>Enumeration Literals</b>	dito	
	in	dito	
	inout	dito	
	out	dito	
	<b>Associations</b>	dito	
	No additional associations	dito	
	<b>Constraints</b>	dito	
	No additional constraints	dito	
nonVolatileMemory : Integer [1]	nonVolatileMemory : int [1]	Changed integer type	Node (from HardwareModeling)
volatileMemory : Integer [0..1]	volatileMemory : int [0..1]	Changed integer type	Node (from HardwareModeling)
FormulaExpression (from FormulaLanguage)	FormulaExpression (from Elements)	Changed generalization	SelectionCriterion (from Variability)



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<b>M2.1.9.20110830</b>	<b>M2.1.9.1</b>	<b>Change</b>	<b>Metaclass</b>
EAElement (from Elements)	None	Added generalization	RedefinableElement (from UseCases) {abstract}
cseCodeFactor : Integer = 1 [1]	cseCodeFactor : int = 1 [1]	Changed integer type	TimeDuration (from Timing)
max : Integer [0..1]	max : int [0..1]	Changed integer type	EAIInteger (from Datatypes)
min : Integer [0..1]	min : int [0..1]	Changed integer type	EAIInteger (from Datatypes)
significantDigits : Integer [0..1]	significantDigits : int [0..1]	Changed integer type	RangeableValueType (from Datatypes)
	<b>FormulaExpression (from Elements) {abstract} «atpMixedString»</b>	Removed class	FormulaExpression (from Elements) {abstract} «atpMixedString»
	<b>Generalizations</b>	dito	
	Identifiable (from Identifiable)	dito	
	<b>Attributes</b>	dito	
	No additional attributes	dito	
	<b>Associations</b>	dito	
	No additional associations	dito	
	<b>Constraints</b>	dito	
	No additional constraints	dito	
The realizedBy or realized elements shall be structural or behavioral	The realizedBy or realized elements shall be structural or behavioural	Textual change	Realization (from Elements)
<b>ArchitecturalDescription (from Needs)</b>	<b>ArchitecturalDescription (from Needs) {abstract}</b>	Class made concrete	ArchitecturalDescription (from Needs)
<b>ArchitecturalModel (from Needs)</b>	<b>ArchitecturalModel (from Needs) {abstract}</b>	Class made concrete	ArchitecturalModel (from Needs)

M2.1.9.20110830	M2.1.9.1	Change	Metaclass
<b>Architecture (from Needs)</b>	<b>Architecture (from Needs)</b> <b>{abstract}</b>	Class made concrete	Architecture (from Needs)
EAElement (from Elements)	None	Added generalization	Concept (from Needs) {abstract}
<b>Mission (from Needs)</b> priority : Integer [1]	<b>Mission (from Needs) {abstract}</b> priority : int [1]	Class made concrete Changed integer type	Mission (from Needs) StakeholderNeed (from Needs)
<b>VehicleSystem (from Needs)</b>	<b>VehicleSystem (from Needs)</b> <b>{abstract}</b>	Class made concrete	VehicleSystem (from Needs)

## 5 Changes in M2.1.10

This release also included consolidated and updated documentation all over the language specification.

M2.1.10	M2.1.9.20110830	Change	Metaclass
technicalFeatureModel : FeatureModel [*] {composite}	technicalFeatureModel : FeatureModel [0..*] {composite}	Editorial change of multiplicity	VehicleLevel (from SystemModeling) «atpStructureElement»
	EAElement (from Elements)	Removed generalization	Feature (from FeatureModeling) «atpStructureElement»
childNode : FeatureTreeNode [*] {composite}	childNode : FeatureTreeNode [0..*] {composite}	Editorial change of multiplicity	Feature (from FeatureModeling) «atpStructureElement»
No additional attributes	complianceLevel : String [1]	Removed attribute	FeatureModel (from FeatureModeling) «atpStructureElement»
rootFeature : Feature [*] {composite}	rootFeature : Feature [0..*] {composite}	Editorial change of multiplicity	FeatureModel (from FeatureModeling) «atpStructureElement»
featureLink : FeatureLink [*] {composite}	featureLink : FeatureLink [0..*] {composite}	Editorial change of multiplicity	FeatureModel (from FeatureModeling) «atpStructureElement»
featureConstraint : FeatureConstraint [*] {composite}	featureConstraint : FeatureConstraint [0..*] {composite}	Editorial change of multiplicity	FeatureModel (from FeatureModeling) «atpStructureElement»
	[2] A LocalDeviceManager may only interface either Sensors or Actuators.	Removed constraint	LocalDeviceManager (from FunctionModeling)
[2] A LocalDeviceManager shall interface BSWFunctions and DesignFunctions.	[3] A LocalDeviceManager shall interface BSWFunctions and DesignFunctions.	Changed index of constraint	LocalDeviceManager (from FunctionModeling)

M2.1.10	M2.1.9.20110830	Change	Metaclass
	EAElement (from Elements)	Removed generalization	HardwareComponentPrototype (from HardwareModeling) «atpPrototype»
No additional attributes	resistance : Float [0..1]	Removed attribute	HardwareConnector (from HardwareModeling) «atpStructureElement»
	EAElement (from Elements)	Removed generalization	LogicalBus (from HardwareModeling) «atpStructuredElement»
SCILAB		Added enumeration literal	FunctionBehaviorKind (from Behavior) «enumeration»
variationGroup : VariationGroup [*] {composite}	variationGroup : VariationGroup [0..*] {composite}	Editorial change of multiplicity	ConfigurableContainer (from Variability)
criterion : String [0..1]	criterion : String [1]	Changed multiplicity of attribute	ConfigurationDecision (from Variability)
[1] Attribute "criterion" or association "selectionCriterion" (or both) must be defined.	No additional constraints	Added constraint	ConfigurationDecision (from Variability)
childEntry : ConfigurationDecisionModelEntry [*] {composite}	childEntry : ConfigurationDecisionModelEntry [0..*] {composite}	Editorial change of multiplicity	ConfigurationDecisionFolder (from Variability)
rootEntry : ConfigurationDecisionModelEntry [*] {composite}	rootEntry : ConfigurationDecisionModelEntry [0..*] {composite}	Editorial change of multiplicity	ConfigurationDecisionModel (from Variability) {abstract}
sourceVehicleFeatureModel : FeatureModel [*] {ordered}	sourceVehicleFeatureModel : FeatureModel [0..*] {ordered}	Editorial change of multiplicity	VehicleLevelBinding (from Variability)
targetFeatureModel : FeatureModel [*] {ordered}	targetFeatureModel : FeatureModel [0..*] {ordered}	Editorial change of multiplicity	VehicleLevelBinding (from Variability)
concreteVVCas : VVCas [*]	concreteVVCas : VVCas [0..*]	Editorial change of multiplicity	VVCas (from VerificationValidation)

<b>M2.1.10</b>	<b>M2.1.9.20110830</b>	<b>Change</b>	<b>Metaclass</b>
concreteVVProcedure : VVProcedure [*]	concreteVVProcedure : VVProcedure [0..*]	Editorial change of multiplicity	VVProcedure (from VerificationValidation)
element : Identifiable [*]	element : Identifiable [0..*]	Editorial change of multiplicity	VVTarget (from VerificationValidation)
rootRequirementContainer : RequirementsContainer [*] {ordered} {composite}	rootRequirementContainer : RequirementsContainer [0..*] {ordered} {composite}	Editorial change of multiplicity	RIFArea (from Interchange) {abstract}
[1] The direction of the nominal port must be 'out'.	[1] The direction of the nominal port must be out.	Editorial change	FailureOutPort (from ErrorModel)
[1] The direction of the nominal port must be 'in'.	[1] The direction of the nominal port must be in.	Editorial change	FaultInPort (from ErrorModel)
goalDecompositionStrategy : Warrant [*]	goalDecompositionStrategy : Warrant [0..*]	Editorial change of multiplicity	Claim (from SafetyCase)
supportedArgument : Warrant [*]	supportedArgument : Warrant [0..*]	Editorial change of multiplicity	Claim (from SafetyCase)
safetyRequirement : TraceableSpecification [*]	safetyRequirement : TraceableSpecification [0..*]	Editorial change of multiplicity	Claim (from SafetyCase)
safetyEvidence : Identifiable [*]	safetyEvidence : Identifiable [0..*]	Editorial change of multiplicity	Ground (from SafetyCase)
safetyCase : SafetyCase [*] {composite}	safetyCase : SafetyCase [0..*] {composite}	Editorial change of multiplicity	SafetyCase (from SafetyCase)
evidence : Ground [*]	evidence : Ground [0..*]	Editorial change of multiplicity	Warrant (from SafetyCase)
decomposedGoal : Claim [*]	decomposedGoal : Claim [0..*]	Editorial change of multiplicity	Warrant (from SafetyCase)
	description : String [0..1]	Removed attribute	ValueType (from Datatypes) {abstract}
semantics : String [1]		Added attribute	ValueType (from Datatypes) {abstract}
EAEElement (from Elements)	Identifiable (from Identifiable)	Changed generalization	EAPackage (from Elements)

<b>M2.1.10</b>	<b>M2.1.9.20110830</b>	<b>Change</b>	<b>Metaclass</b>
subPackage : EAPackage [*] {composite}	subPackage : EAPackage [0..*] {composite}	Editorial change of multiplicity	EAPackage (from Elements)
topLevelPackage : EAPackage [*] {composite}	topLevelPackage : EAPackage [0..*] {composite}	Editorial change of multiplicity	EAXML (from Elements)
uaType : UserAttributeElementType [*]	uaType : UserAttributeElementType [0..*]	Editorial change of multiplicity	UserAttributeableElement (from UserAttributes)
	description : String [0..1]	Removed attribute	UserAttributeDefinition (from UserAttributes)
	key : String [1]	Removed attribute	UserAttributeDefinition (from UserAttributes)
	key : String [1]	Removed attribute	UserAttributeValue (from UserAttributes)
semantics : String [0..1]		Added attribute	UserAttributeValue (from UserAttributes)
definition : UserAttributeDefinition [0..1]	No additional associations	Added association	UserAttributeValue (from UserAttributes)
isConceptFor : SystemModel [*]	isConceptFor : SystemModel [0..*]	Editorial change of multiplicity	ArchitecturalModel (from Needs)
problemStatement : ProblemStatement [*]	problemStatement : ProblemStatement [0..*]	Editorial change of multiplicity	BusinessOpportunity (from Needs)
productPositioning : ProductPositioning [*]	productPositioning : ProductPositioning [0..*]	Editorial change of multiplicity	BusinessOpportunity (from Needs)
constrainedMode : Mode [*]	constrainedMode : Mode [0..*]	Editorial change of multiplicity	BehaviorConstraint (from BehaviorConstraints) {abstract}
constrainedFunctionBehavior : FunctionBehavior [*]	constrainedFunctionBehavior : FunctionBehavior [0..*]	Editorial change of multiplicity	BehaviorConstraint (from BehaviorConstraints) {abstract}
constrainedFunctionTrigger : FunctionTrigger [*]	constrainedFunctionTrigger : FunctionTrigger [0..*]	Editorial change of multiplicity	BehaviorConstraint (from BehaviorConstraints) {abstract}

**6 Changes in M2.1.10.20120629**

Layout adapted and introductory texts explaining the document clarified. No structural changes in the metamodel.