INCOSE
International Council on Systems Engineering

Packaging the Model Transformation Examples

An Exercise in Organizing Diversity

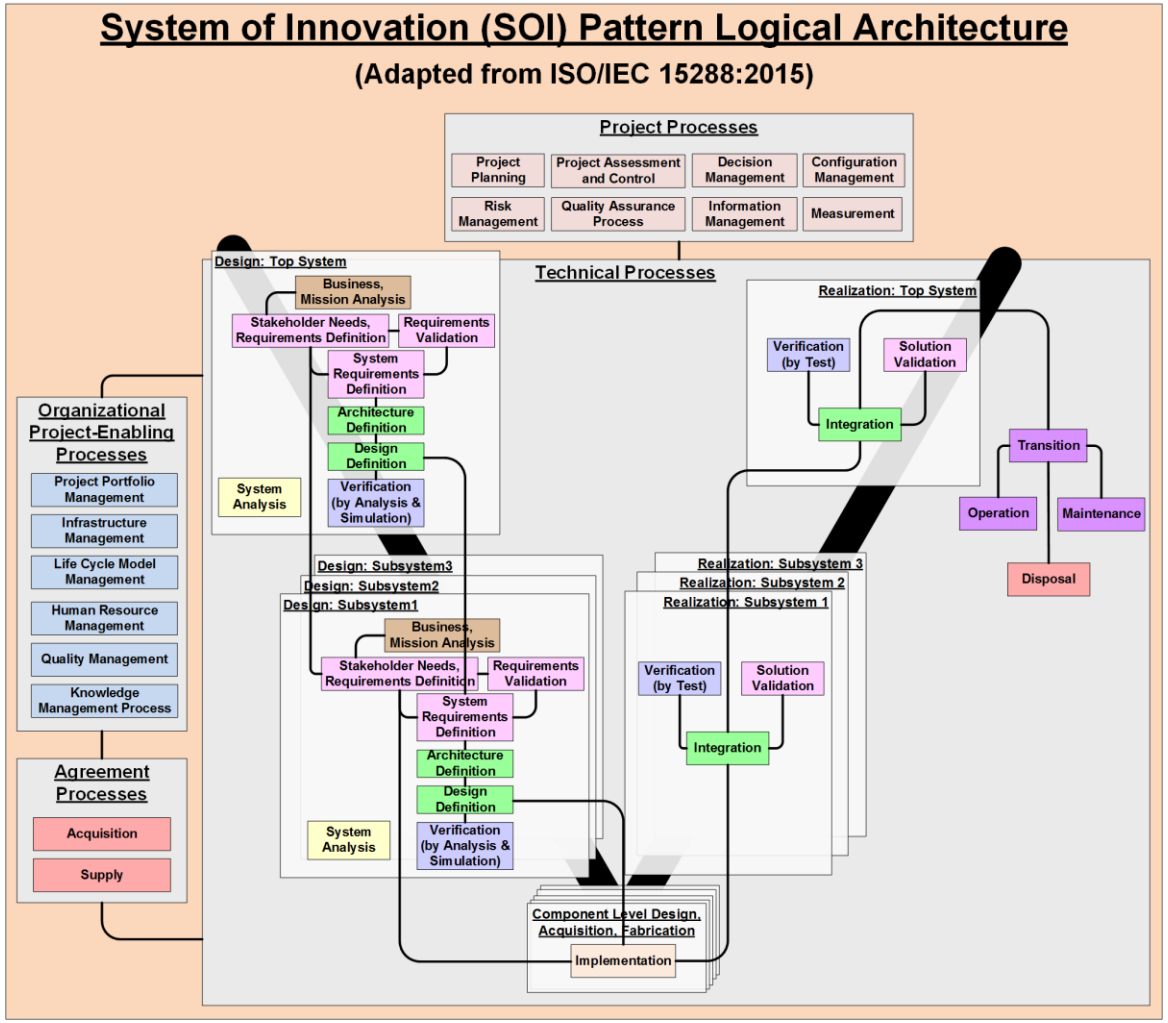
wds V1.3.1

Contents

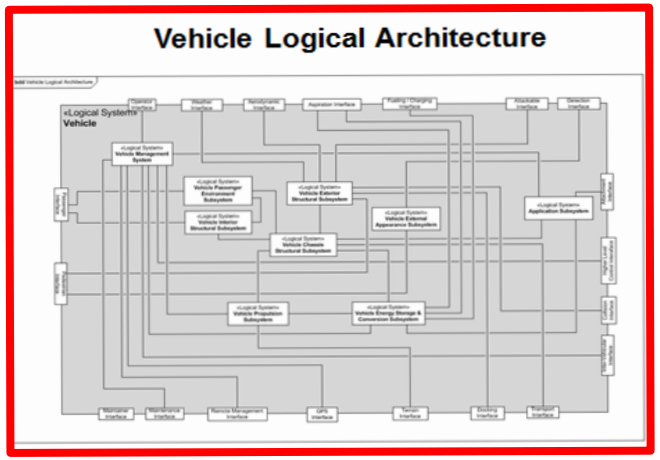
- Purpose of this material
- The challenge
- Proposed approach
- Example
- Next steps

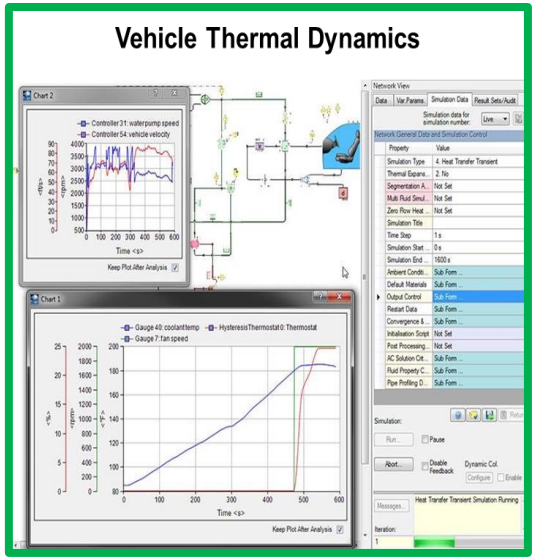
Purpose of this material

Summarize an approach to "packaging" a diverse set of MBSE examples being assembled by the INCOSE MBSE Transformation



The challenge





- The model examples being collected are very diverse in their content, style, purpose, nomenclature, and other aspects—they differ in many dimensions simultaneously.
- This is because of their different origins, purposes, illustrated concepts, domains, uses and users, and other aspects
- That diversity is in part positive, by representing a range of possible approaches to various aspects of MBSE—it can be informative
- But, that diversity can also make it harder for the intended audience to organize their impressions of what they are seeing, to understand the intentions of the individual examples, to recognize that some differences are domain-based, or less significant, etc.
- We don't want to "homogenize" the examples.
- So, how do we "organize their diversity"?

Proposed approach

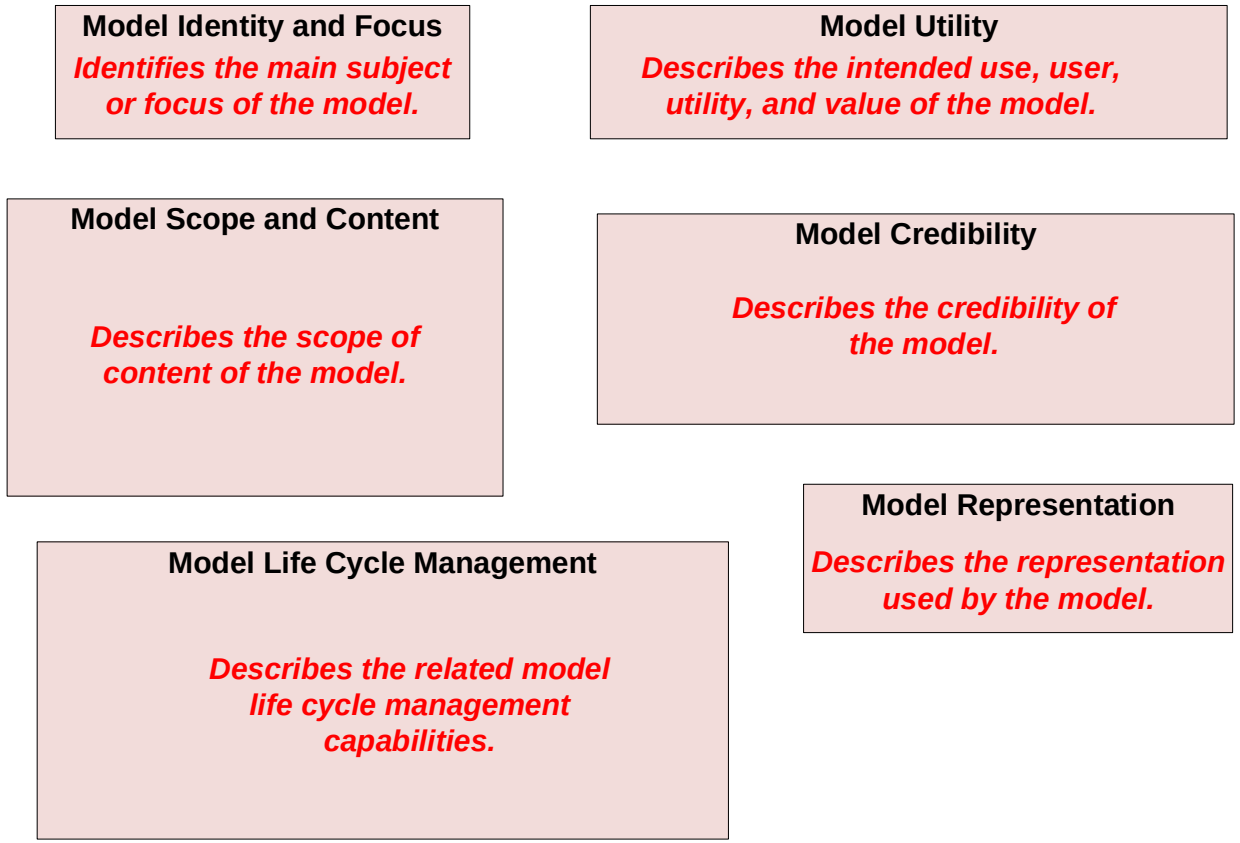
- Package each example in a “wrapper” of Model Metadata which is sufficiently broad to uniformly characterize them in their diversity.
- Use the INCOSE/ASME Model Stakeholder Features Pattern as that metadata wrapper—a metadata “signature” of each model, configured for each model.

Proposed approach

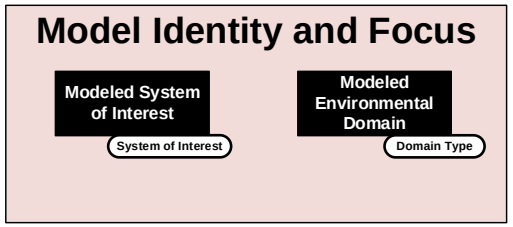
- Models exist for purposes (intended uses) and users
- Models themselves have stakeholders—those with an interest in the success of the model
- A summary description of a model can be given in language of generic Model Stakeholders, describing the model's domain, intended use (purpose) and users , subject system, representation type, related media, and other aspects, without getting into all the technical details of the model itself.
- In fact, without that description, one can usually not even find out the answers to those important questions just by inspecting the model—just as a Martian could not discover the intended use of an automobile by examining one.
- So, "metadata" about a model is like the Universal Product Code stamped on a food package—it is description of what is inside.

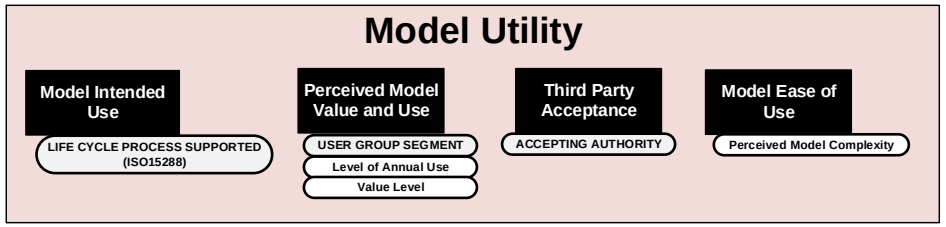
INCOSE/ASME Model Stakeholder Features Pattern

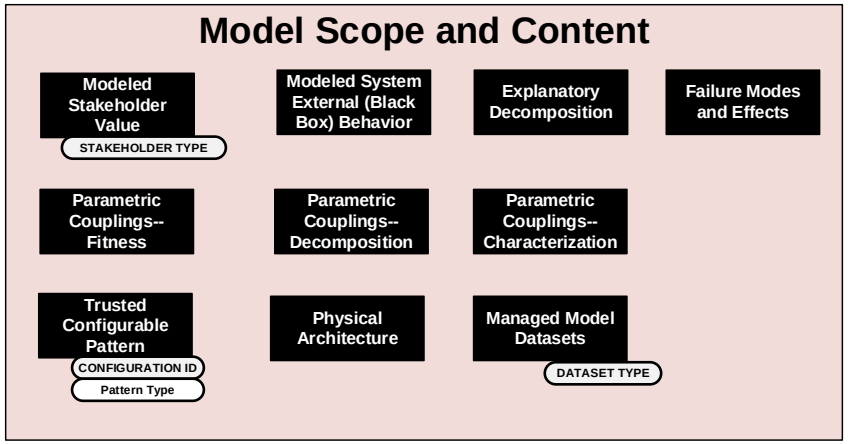
- Being created in the INCOSE supported ASME VV50 standards committee project, also in use in the INCOSE MB Transformation Project Products:
  - Metadata, in the form of a model itself, instead of a bar code, describing “what is in the package” (the model being described by the metadata)
  - 29 Model Features, spread across 6 Feature Groups:

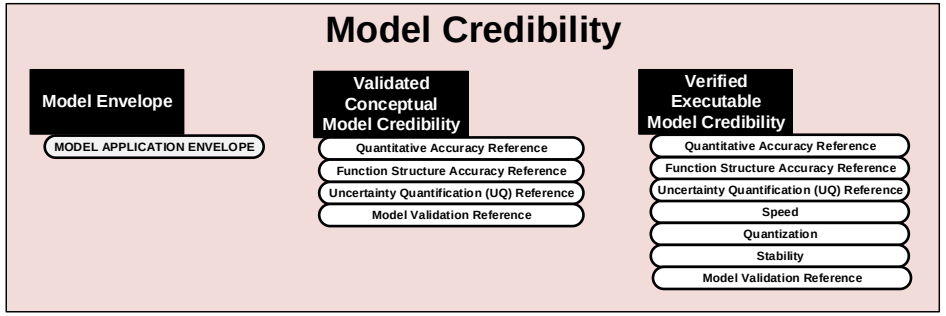


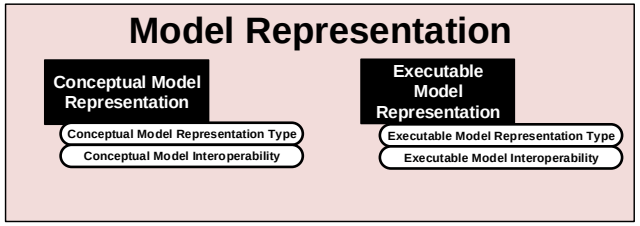
INCOSE/ASME Model Stakeholder Features Pattern

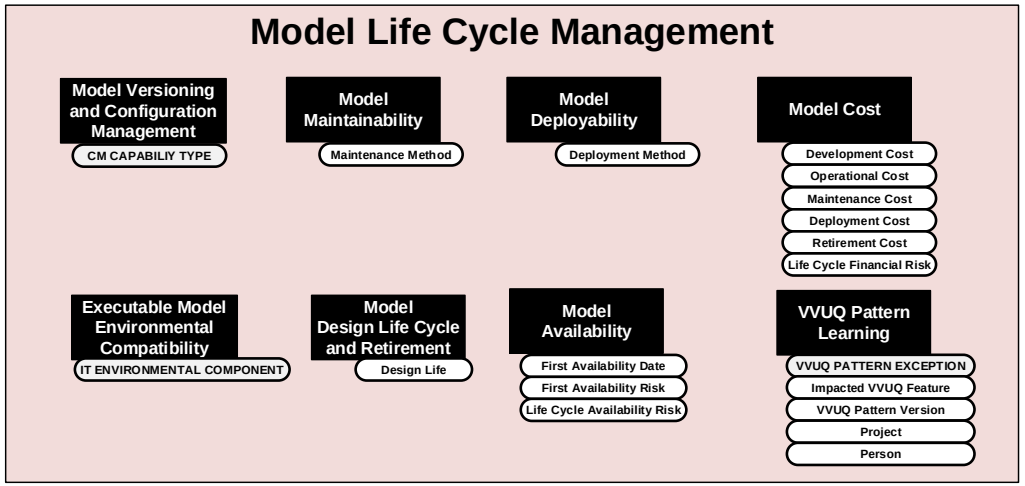




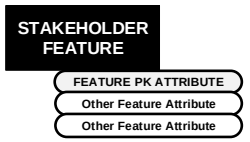




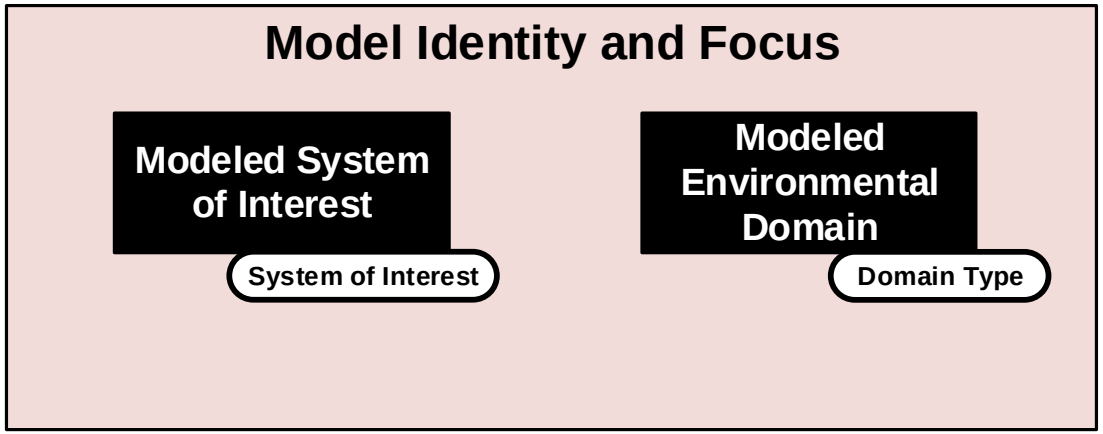




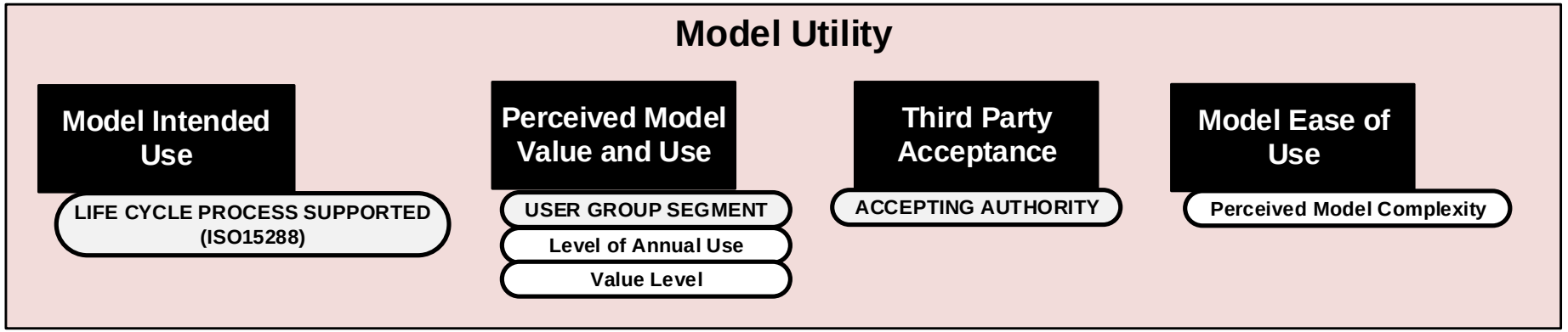
Legend:



Stakeholder Feature Model for Computational Models		
Version: 1.5.4	Date: 31 Aug 2017	Drawn By: B Schindel



Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Feature Stakeholder							Model Type	
					Model User	Model Developer	Model Maintainer	Mdl Deployer-Distributor	Model Use Supporter	Regulatory Authority	Mdl Investor-Owner	Physics Based	Data Driven
Identifies the main subject or focus of the model													
Model Identity and Focus	Modeled System of Interest	Identifies the type of system this model describes.	System of Interest	Name of system of interest, or class of systems of interest	X					X	X	X	X
	Modeled Environmental Domain	Identifies the type of external environmental domain(s) that this model includes.	Domain Type(s)	Name(s) of modeled domains (manufacturing, distribution, use, etc.)	X					X	X	X	X



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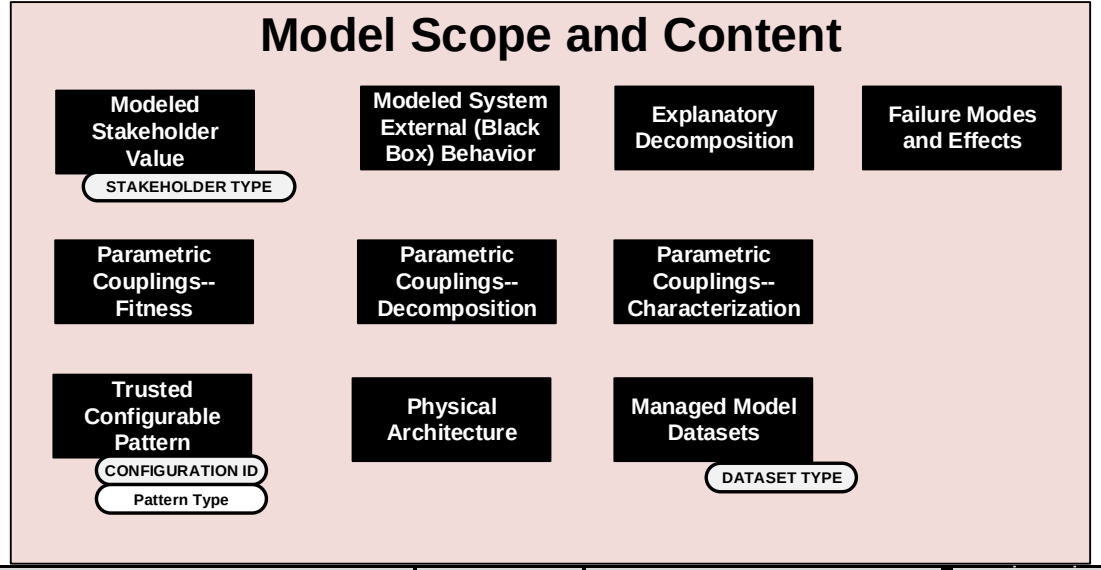
Describes the intended use, utility, and value of the model													
Model Utility	Model Intended Use	The intended purpose(s) or use(s) of the model.	Life Cycle Process Supported	The intended life cycle management process to be supported by the model, from the ISO15288 process list. More than one value may be listed.	**X**					**X**	**X**	X	X
	Perceived Model Value and Use	The relative level of value ascribed to the model, by those who use it for its stated purpose.	User Group Segment	The identify of using group segment (multiple)	**X**					**X**	**X**	X	X
			Level of Annual Use	The relative level of annual use by the segment	**X**					**X**	**X**	X	X
			Value Level	The value class associated with the model by that segment	**X**					**X**	**X**	X	X
	Third Party Acceptance	The degree to which the model is accepted as authoritative, by third party regulators, customers, supply chains, and other entities, for its stated purpose.	Accepting Authority	The identity (may be multiple) of regulators, agencies, customers, supply chains, accepting the model	**X**					**X**	**X**	X	X
	Model Ease of Use	The perceived ease with which the model can be used, as experienced by its intended users	Perceived Model Complexity	High, Medium Low	**X**					**X**		X	X



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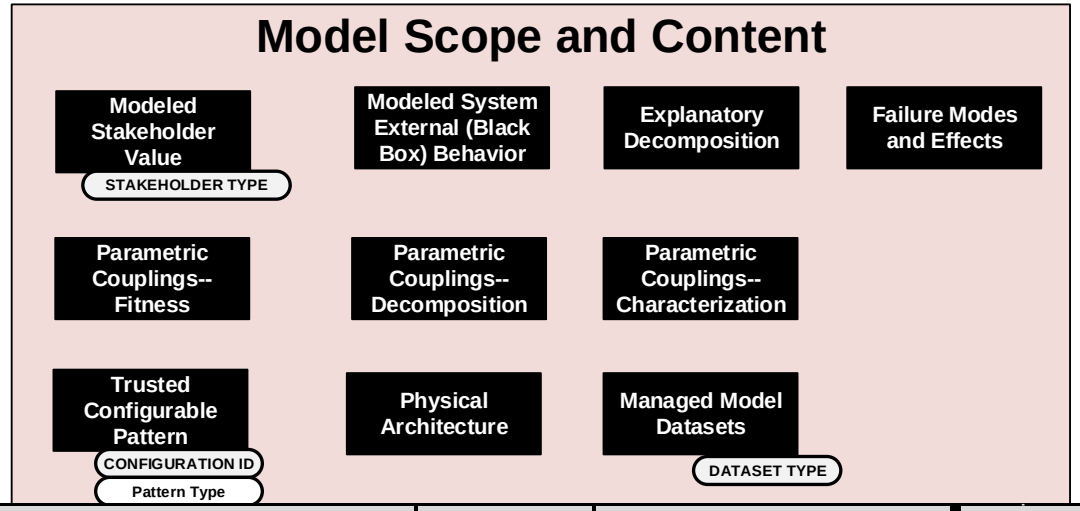
Describes the scope of content of the model													
Model Scope of Content	Modeled Stakeholder Value	The capability of the model to describe fitness or value of the System of Interest, by identifying its stakeholders and modeling the related Stakeholder Features.	Stakeholder Type	Classes of covered stakeholders (may be multiple)	X					X	X	X	X
	Modeled System External (Black Box) Behavior	The capability of the model to represent the objective external ("black box") technical behavior of the system, through significant interactions with its environment, based on modeled input-output exchanges through external interfaces, quantified by technical performance measures, and varying behavioral modes.			X					X		X	X
	Explanatory Decomposition	The capability of the model to represent the decomposition of its external technical behavior, as explanatory internal ("white box") internal interactions of decomposed roles, further quantified by internal technical performance measures, and varying internal behavioral modes.			X					X		X	
	Physical Architecture	The capabiliy of the model to represent the physical architecture of the system of interest. This includes identification of its major physical components and their architectural relationships.			X					X		X	



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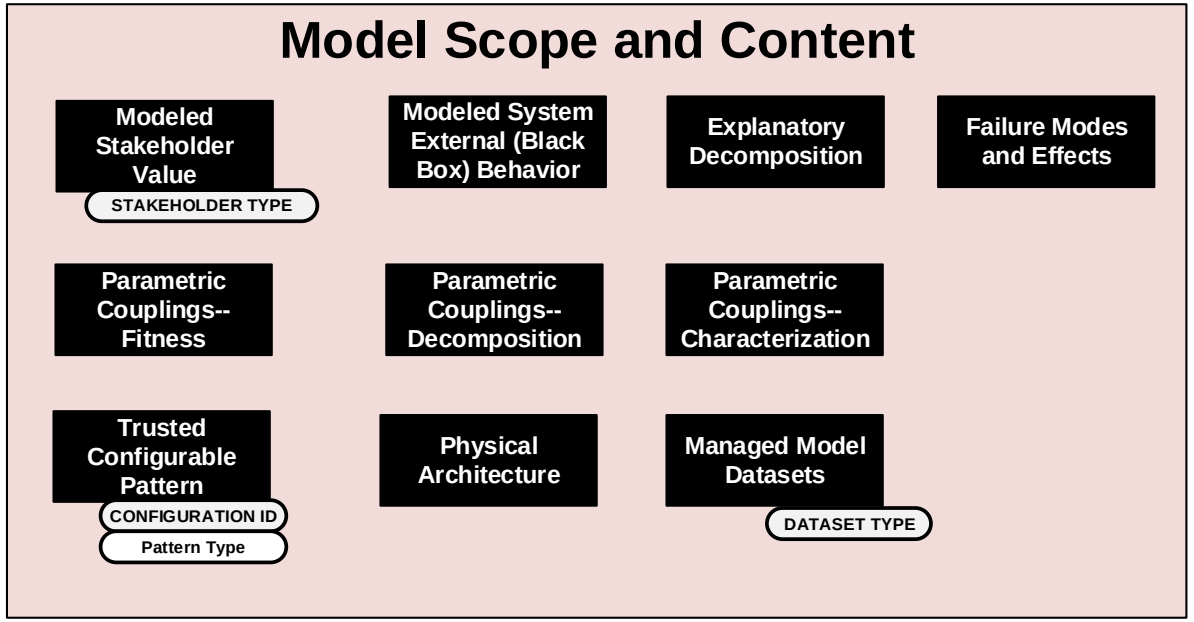
Describes the scope of content of the model													
	Parametric Couplings--Fitness	The capability of the model to represent quantitative (parametric) couplings between stakeholder-valued measures of effectiveness and objective external black box behavior performance measures.			**X**					**X**		X	X
	Parametric Couplings--Decomposition	The capability of the model to represent quantitative (parametric) couplings between objective external black box behavior variables and objective internal white box behavior variables.			**X**					**X**		X	X
	Parametric Couplings--Characterization	The capability of the model to represent quantitative (parametric) couplings between objective behavior variables and physical identity (material of construction, part or model number).			**X**					**X**		X	
	Managed Model Datasets	The capability of the model to include managed datasets for use as inputs, parametric characterizations, or outputs	Dataset Type	The type(s) of data sets (may be multiple)	**X**		**X**			**X**		X	X
	Trusted Configurable Pattern	The capability of the model to serve as a configurable pattern, representing different modeled system configurations across a common domain, spreading the cost of establishing trusted model frameworks across a community of applications and configurations.	Configuration ID	A specific system of interest configuration within the family that the pattern framework can represent.	**X**		**X**			**X**	**X**	X	X
			Pattern ID	The identifier of the trusted configurable pattern.	**X**		**X**			**X**	**X**	X	X

Model Scope and Content



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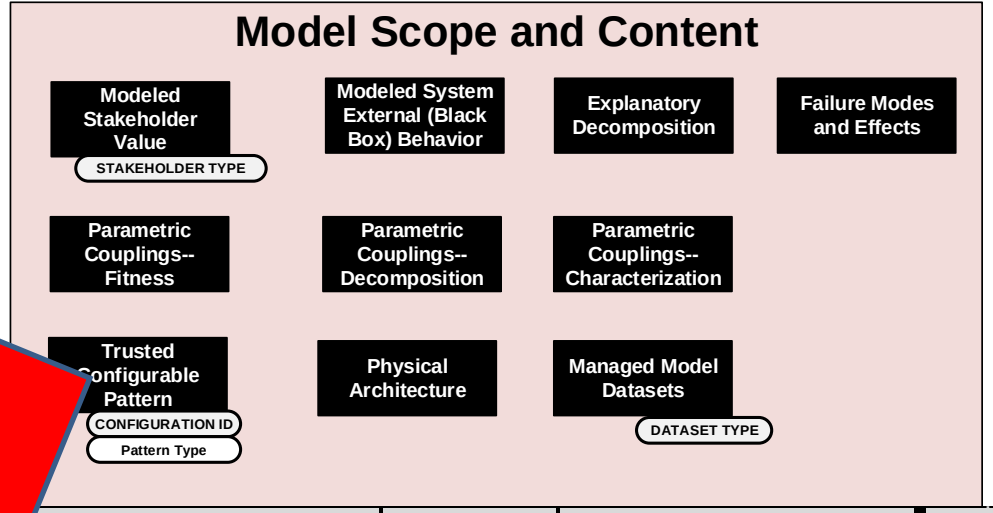
Describes the scope of content of the model													
Model Scope of Content	Failure Modes and Effects	The capability of the model to include identification and analysis of system failure modes, their impact effects, causes, and liklihoods of occurrence.			X					X	X	X	



Of special importance to the economics of trust and VVUQ

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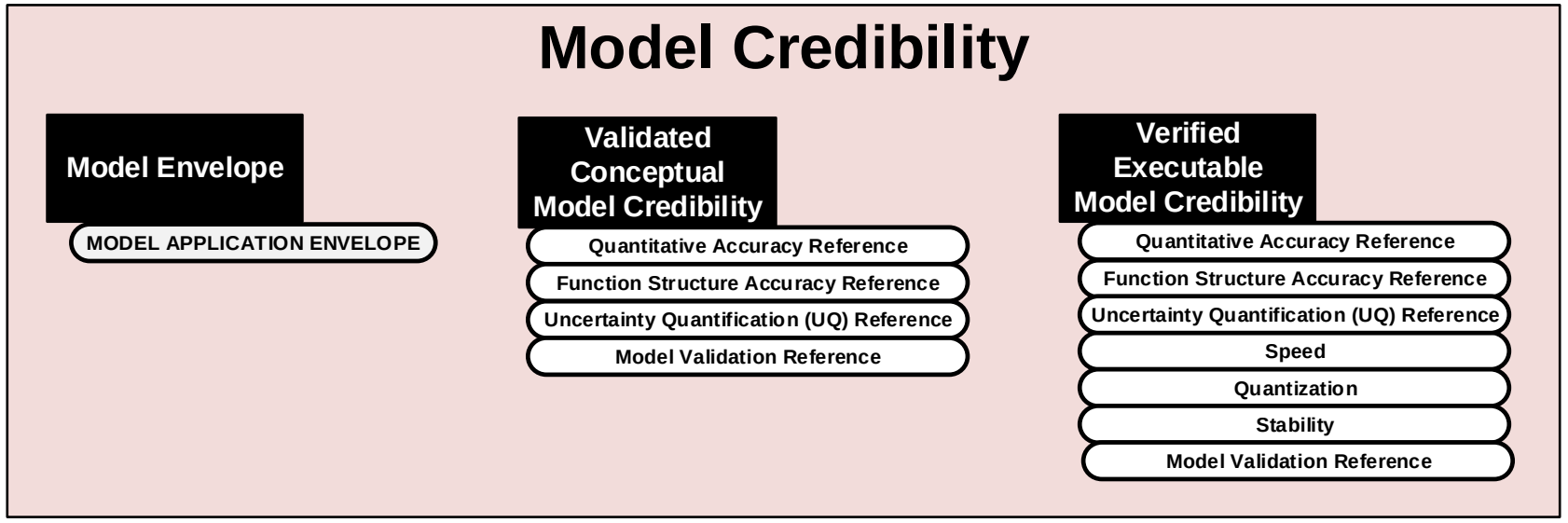
Describes the scope of content of the model													
	Parametric Couplings-- Fitness	The capability of the model to represent quantitative (parametric) couplings between stakeholder-valued measures of effectiveness and objective external black box behavior performance measures.			X					X		X	X
	Parametric Couplings-- Decomposition	The capability of the model to represent quantitative (parametric) couplings between objective external black box behavior variables and objective internal white box behavior variables.			X					X		X	X
	Parametric Couplings-- Characterization	The capability of the model to represent quantitative (parametric) couplings between objective behavior variables and physical identity (material of construction, part or model number).			X					X		X	
	Managed Model Datasets	The capability of the model to include managed datasets for use as inputs, parametric characterizations, or outputs	Dataset Type	The type(s) of data sets (may be multiple)	X		X			X		X	X
	Trusted Configurable Pattern	The capability of the model to serve as a configurable pattern, representing different modeled system configurations across a common domain, spreading the cost of establishing trusted model frameworks across a community of applications and configurations.	Configuration ID	A specific system of interest configuration within the family that the pattern framework can represent.	X		X			X	X	X	X
			Pattern ID	The identifier of the trusted configurable pattern.	X		X			X	X	X	X



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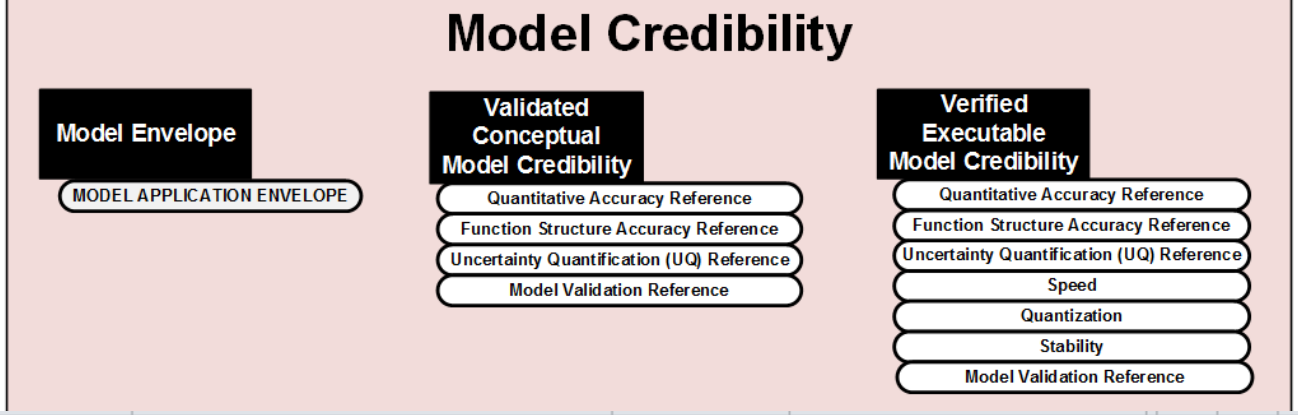
					Model User	Model Developer	Model Maintainer	Mdl Deployer–	Model Use Supporter	Regulatory Authority	Mdl Investor–	Physics Based	Data Driven
Describes the credibility of the model													
	Model Envelope	The capability of the model to meet its Model Credibility requirements over a stated range (envelope) of dynamical inputs, outputs, and parameter values.	Model Application Envelope	The range over which the model is intended for use.	X		X			X	X	X	X
	Validated Conceptual Model Credibility	The validated capability of the conceptual portion of the model to represent the System of Interest, with acceptable Credibility.	Quantitative Accuracy Reference	The specification reference describing the quantitative accuracy of the conceptual model compared to the system of interest.	X					X	X	X	X
			Function Structure Accuracy Reference	The specification reference describing the structural (presence or absence of behaviors) accuracy of the conceptual model compared to the system of interest.	X		X			X	X	X	X
			Uncertainty Quantification (UQ) Reference	The specification reference describing the degree of uncertainty of the Credibility of the conceptual model to the system of	X		X			X	X	X	X
			Model Validation Reference	The reference documenting the validation of the conceptual model's Credibility to the system of	X		X			X	X	X	X



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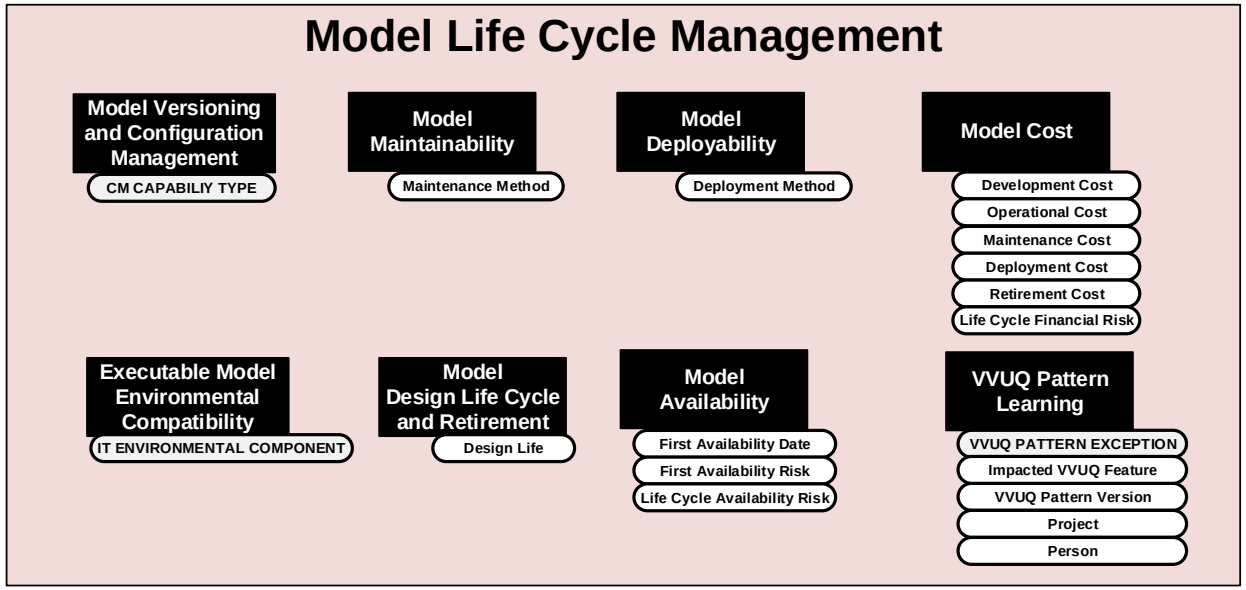
					Model User	Model Developer	Model Maintainer	Mdl Deployer–	Model Use Supporter	Regulatory Authority	Mdl Investor–	Physics Based	Data Driven
Model Credibility	Verified Executable Model Credibility	The verified capability of the executable portion of the model to represent the System of Interest, with acceptable Credibility.	Quantitative Accuracy Reference	The specification reference describing the quantitative accuracy of the executable model to the conceptual model.	X		X			X	X	X	X
			Structural Accuracy Reference	The specification reference describing the structural (presence or absence of elements) accuracy of the executable model to the conceptual model.	X		X			X	X	X	X
			Uncertainty Quantification (UQ) Reference	The specification reference describing the degree of uncertainty of the Credibility of the executable model to the conceptual model	X		X			X		X	X
			Speed	The specification reference describing the execution run time (speed) for the executable model.	X		X			X	X	X	X
			Quantization	The specification reference describing the quantization error of the executabl e model.	X		X			X	X	X	X
			Stability	The specification reference describing the level of stability of the accuracy and uncertainty of the executable model error characteristics.	X		X			X	X	X	X
			Model Validation Reference	The reference documenting the verification of the executable model's Credibility to the conceptual model.	X		X			X	X	X	X



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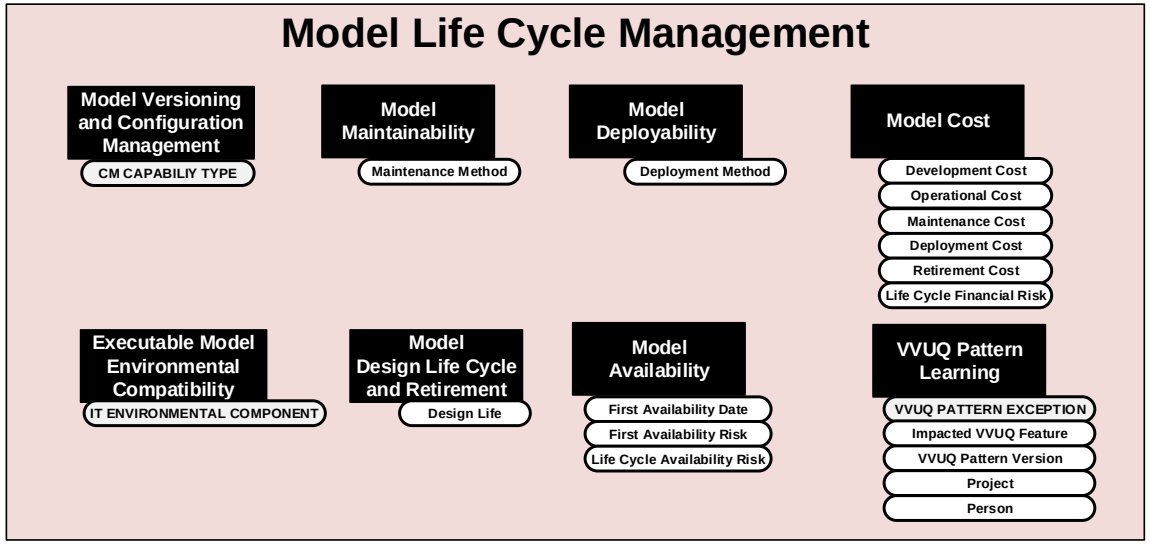
					Model User	Model Developer	Model Maintainer	Mdl Deployer-Distributor	Model Use Supporter	Regulatory Authority	Mdl Investor-Owner	Physics Based	Data Driven
Describes related model life cycle management capabilities													
Model Life Cycle Management	Model Versioning and Configuration Management	The capability of the model to provide for version and configuration management.	CM Capability Type	The type(s) of CM capabilities included (may be multiple)	X		X			X		X	X
	Executable Model Environmental Compatibility	The capability of the model to be compatibly supported by specified information technology environment(s), indicating compatibility, portability, and interoperability.	IT Environmental Component	The type(s) of IT environments or standards supported	X		X			X		X	X
	Model Design Life and Retirement	The capability of the model to be sustained over an indicated design life, and retired on a planned basis.	Design Life	The planned retirement date	X		X			X		X	X
	Model Maintainability	The relative ease with which the model can be maintained over its intended life cycle and use, based on capable maintainers, availability of effective model documentation, and degree of complexity of the model	Maintenance Method	The type of maintenance methodology used to maintain the model's capability and availability for the intended purposes over the intended life cycle.	X		X			X	X	X	X
	Model Deployability	The capability of the model to support deployment into service on behalf of intended users, in its original or subsequent updated versions	Deployment Method	The type of method used to deploy (possibly in repeating cycles) the model into its intended use environment.	X			X			X	X	X



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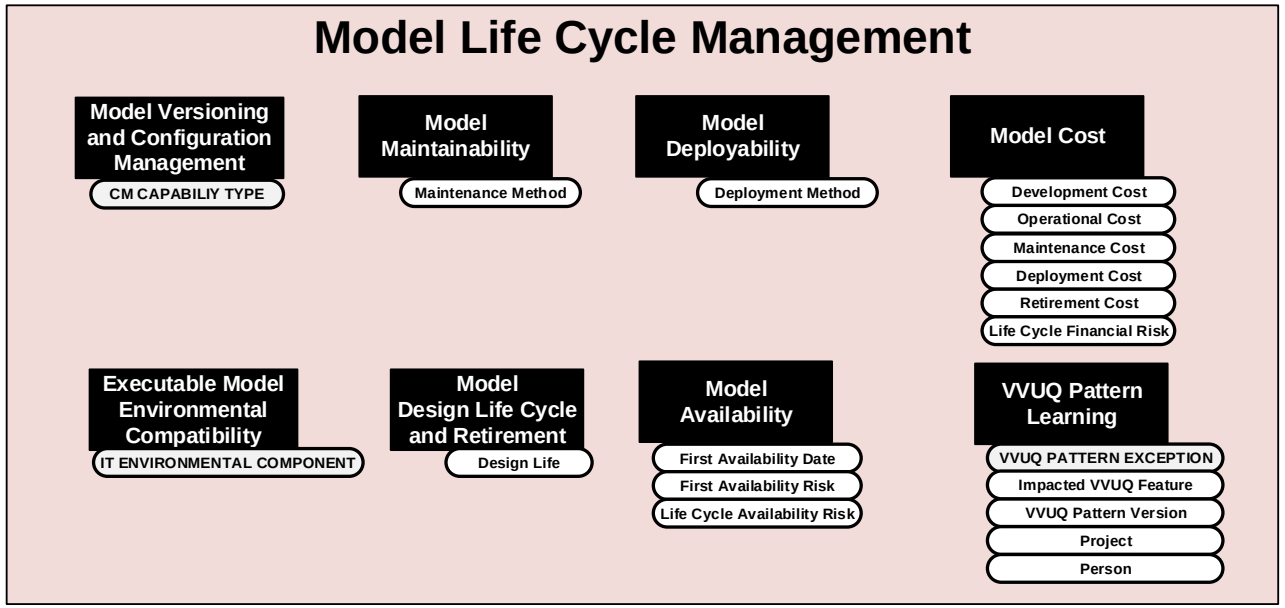
Describes related model life cycle management capabilities													
Model Life Cycle Management	Model Cost	The financial cost of the model, including development, operating, and maintenance cost	Development Cost	The cost to develop the model, including its validation and verification, to its first availability for service date		X					X	X	X
			Operational Cost	The cost to execute and otherwise operate the model, in standardized execution load units	X						X	X	X
			Maintenance Cost	The cost to maintain the model			X				X	X	X
			Deployment Cost	The cost to deploy, and redeploy updates, per cycle				X			X	X	X
			Retirement Cost	The cost to retire the model from service, in a planned fashion	X						X	X	X
			Life Cycle Financial Risk	Risk to the overall life cycle cost of the model							X	X	X
	Model Availability	The degree and timing of availability of the model for its intended use, including date of its first availability and the degree of ongoing availability thereafter.	First Availability Date	Date when version will first be available	X						X	X	X
			First Availability Risk	Risk to the scheduled date of first availability	X						X	X	X
			Life Cycle Availability Risk	Risk to ongoing availability after introduction	X						X	X	X



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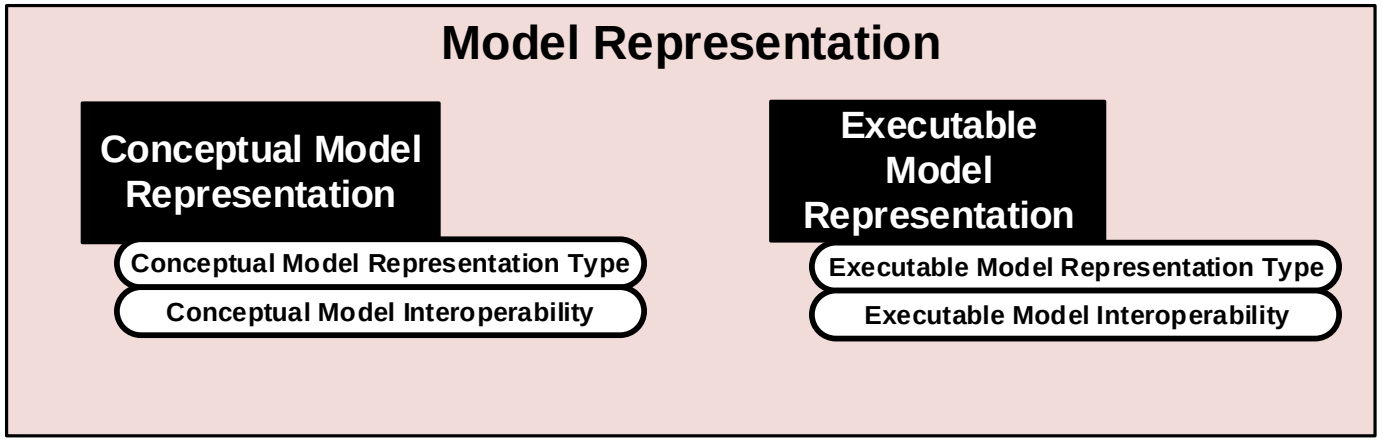
	VVUQ Pattern Learning	The ability to accumulate new discoveries about model-based methods into the VVUQ Pattern, as it is applied over model life cycles. These discoveries are exceptions to the existing VVUQ Pattern, and candidates for inclusion into future versions of that pattern.	VVUQ Pattern Exception	A summary of the exception noted to the current VVUQ Pattern (may be multiple exceptions)		X					X	X	X
			Impacted VVUQ Feature	The impacted existing, modified, or additional feature of the VVUQ Pattern.		X					X	X	X
			VVUQ Pattern Version	The version of the VVUQ Pattern in current use before change.		X					X	X	X
			Project	Identifies the project in which the exception was noted		X					X	X	X
			Person	Identifies the person describing the exception		X					X	X	X



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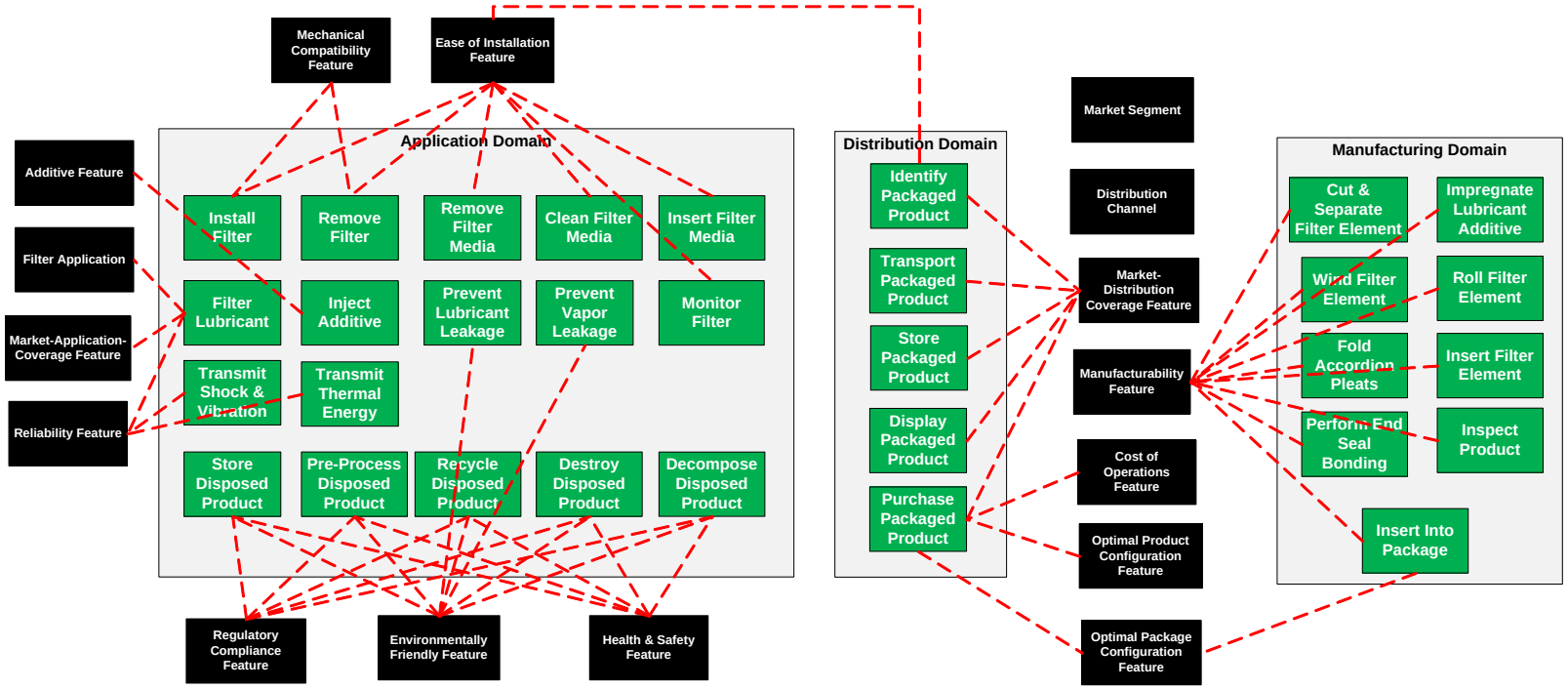
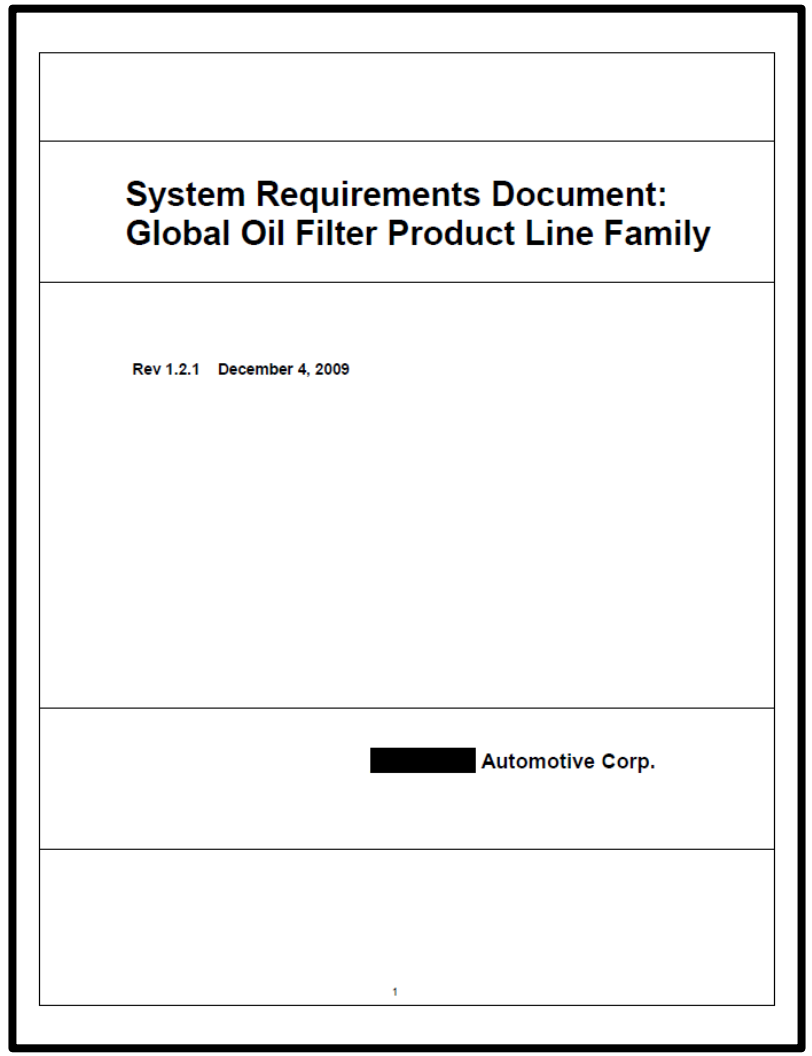
Identifies the type of representation used by the model													
Model Representation	Conceptual Model Representation	The capability of the conceptual portion of the model to represent the system of interest, using a specific type of representation.	Conceptual Model Representation Type	The type of conceptual modeling language or metamodel used.	X		X			X		X	X
			Conceptual Model Interoperability	The degree of interoperability of the conceptual model, for exchange with other environments	X		X			X		X	X
	Executable Model Representation	The capability of the executable portion of the model to represent the system of interest, using a specific type of representation	Executable Model Representation Type	The type of executable modeling language or metamodel used.	X		X			X		X	X
			Executable Model Interoperability	The degree of interoperability of the executable model, for exchange with other environments	X		X			X		X	X

Example

- Chosen example: An MBSE representation used for Stakeholder Requirements Definition and System Requirements Analysis
- For a configurable global product line (family) of lubricant filtration systems





System Requirements Document:
Global Oil Filter Product Line Family

Rev 1.2.1 December 4, 2009

[redacted] Automotive Corp.

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Example (continued)

(to be filled in with configured Model Stakeholder Feature metadata)

G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form: Model 1	Model 2
Identifies the main subject or focus of the model						
Model Identity and Focus	Modeled System of Interest	Identifies the type of system this model describes.	System of Interest	Name of system of interest, or class of systems of interest	*Global Oil Filter Product Line Family*	
	Modeled Environmental Domain	Identifies the type of external environmental domain(s) that this model includes.	Domain Type(s)	Name(s) of modeled domains (manufacturing, distribution, use, etc.)	*Oil Filter Application Operation & Maintenance Domain; Oil Filter Global Distribution Domain; Oil Filter Global Manufacturing Domain*	
Describes the scope of content of the model						
Model Scope of Content	Modeled Stakeholder Value	The capability of the model to describe fitness or value of the System of Interest, by identifying its stakeholders and modeling the related Stakeholder Features.	Stakeholder Type	Classes of covered stakeholders (may be multiple)	*Machine Operator, Machine Maintainer, Enterprise Shareholder, Product Distribution Channel, Machine Owner, Machine Supplier, Regional Community*	
	Modeled System External (Black Box) Behavior	The capability of the model to represent the objective external ("black box") technical behavior of the system, through significant interactions with its environment, based on modeled input-output exchanges through external interfaces, quantified by technical performance measures, and varying behavioral modes.			*NOT POPULATED*	
	Explanatory Decomposition	The capability of the model to represent the decomposition of its external technical behavior, as explanatory internal ("white box") internal interactions of decomposed roles, further			*NOT POPULATED*	

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G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form	
					Model 1	Model 2
	Explanatory Decomposition	The capability of the model to represent the decomposition of its external technical behavior, as explanatory internal ("white box") internal interactions of decomposed roles, further quantified by internal technical performance measures, and varying internal behavioral modes.			NOT POPULATED	
	Physical Architecture	The capabiliy of the model to represent the physical architecture of the system of interest. This includes identification of its major physical components and their architectural relationships.			NOT POPULATED	
	Parametric Couplings--Fitness	The capability of the model to represent quantitative (parametric) couplings between stakeholder-valued measures of effectiveness and objective external black box behavior performance measures.			NOT POPULATED	
	Parametric Couplings--Decomposition	The capability of the model to represent quantitative (parametric) couplings between objective external black box behavior variables and objective internal white box behavior variables.			NOT POPULATED	
	Parametric	The capability of the model to			NOT POPULATED	

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G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form: Model 1	Model 2
	Managed Model Datasets	The capability of the model to include managed datasets for use as inputs, parametric characterizations, or outputs	Dataset Type	The type(s) of data sets (may be multiple)	*Oil Filter End User & Machine Population Global Dataset 4; Oil Filter Global Distributors Dataset 13A; Oil Filter Global Manufacturing Dataset 8*	
	Trusted Configurable Pattern	The capability of the model to serve as a configurable pattern, representing different modeled system configurations across a common domain, spreading the cost of establishing trusted model frameworks across a community of applications and configurations.	Configuration ID	A specific system of interest configuration within the family that the pattern framework can represent.	*Oil Filter Configuration 165R*	
			Pattern ID	The identifier of the trusted configurable pattern.	*Global Oil Filter Family Pattern 1.3.5*	
	Failure Modes and Effects	The capability of the model to include identification and analysis of system failure modes, their impact effects, causes, and liklihoods of occurrence.			*NOT POPULATED*	
Describes the credibility of the model						
Model Credibility	Model Envelope	The capability of the model to meet its Model Credibility requirements over a stated range (envelope) of dynamical inputs, outputs, and parameter values.	Model Application Envelope	The range over which the model is intended for use.	*Oil Filter Service Envelope Family 6*	
	Validated Conceptual Model Credibility	The validated capability of the conceptual portion of the model to represent the System of Interest, with acceptable Credibility.	Quantitative Accuracy Reference	The specification reference describing the quantitative accuracy of the conceptual model compared to the system of interest.		
			Function	The specification		

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G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form: Model 1	Model 2
	Validated Conceptual Model Credibility	The validated capability of the conceptual portion of the model to represent the System of Interest, with acceptable Credibility.	Quantitative Accuracy Reference	The specification reference describing the quantitative accuracy of the conceptual model compared to the system of interest.		
			Function Structure Accuracy Reference	The specification reference describing the structural (presence or absence of behaviors) accuracy of the conceptual model compared to the system of interest.		
			Uncertainty Quantification (UQ) Reference	The specification reference describing the degree of uncertainty of the Credibility of the conceptual model to the system of interest.	Oil Filter Model VVUQ Reference 4C	
			Model Validation Reference	The reference documenting the validation of the conceptual model's Credibility to the system of interest.		
	Verified Executable Model Credibility	The verified capability of the executable portion of the model to represent the System of Interest, with acceptable Credibility.	Quantitative Accuracy Reference	The specification reference describing the quantitative accuracy of the executable model to the conceptual model		

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G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form: Model 1	Model 2
	Verified Executable Model Credibility	The verified capability of the executable portion of the model to represent the System of Interest, with acceptable Credibility.	Quantitative Accuracy Reference	The specification reference describing the quantitative accuracy of the executable model to the conceptual model.		
			Structural Accuracy Reference	The specification reference describing the structural (presence or absence of elements) accuracy of the executable model to the conceptual model.	*Oil Filter Model VVUQ Reference 4C*	
			Uncertainty Quantification (UQ) Reference	The specification reference describing the degree of uncertainty of the Credibility of the	*Oil Filter Model VVUQ Reference 4C*	
			Speed	The specification reference describing the execution run time (speed) for the executable model.		
			Quantization	The specification reference describing the quantization error of the executabl e model.		
			Stability	The specification reference describing the level of stability of the accuracy and uncertainty of the executable model		

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G1 | Model Features Pattern -- Configuration Planning Form

	A	B	C	D	E	F	G	H	I	J	K
1							Model Features Pattern -- Configuration Planning Form				
2	**Feature Group**	**Feature Name**	**Feature Definition**	**Feature Attribute**	**Attribute Definition**		**Model 1**	**Model 2**			
31	**Identifies the type of representation used by the model**										
32	Model Representation	Conceptual Model Representation	The capability of the conceptual portion of the model to represent the system of interest, using a specific type of representation.	Conceptual Model Representation Type	The type of conceptual modeling language or metamodel used.		*SysML*				
33				Conceptual Model Interoperability	The degree of interoperability of the conceptual model, for exchange with other environments		*XMI Non-Graphical Content Interchance*				
34		Executable Model Representation	The capability of the executable portion of the model to represent the system of interest, using a specific type of representation	Executable Model Representation Type	The type of executable modeling language or metamodel used.		*MATLAB*				
35				Executable Model Interoperability	The degree of interoperability of the executable model, for exchange with other environments		*FMI 1.0*				
36	**Describes the intended use, utility, and value of the model**										
37	Model Utility	Model Intended Use	The intended purpose(s) or use(s) of the model.	Life Cycle Process Supported	The intended life cycle management process to be supported by the model, from the ISO15288 process list. More than one value may be listed.		*Stakeholder Needs and Requirements Definition Process--ISO15288*				
38		Perceived Model Value and Use	The relative level of value ascribed to the model, by those who use it for its stated purpose.	User Group Segment	The identify of using group segment (multiple)		*Product Manager*				
				Level of	The relative level of		*High*				

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G1 | Model Features Pattern -- Configuration Planning Form

	A	B	C	D	E	F	G	H	I	J	K
1							Model Features Pattern -- Configuration Planning Form				
2	**Feature Group**	**Feature Name**	**Feature Definition**	**Feature Attribute**	**Attribute Definition**		**Model 1**	**Model 2**			
36	**Describes the intended use, utility, and value of the model**										
37	Model Utility	Model Intended Use	The intended purpose(s) or use(s) of the model.	Life Cycle Process Supported	The intended life cycle management process to be supported by the model, from the ISO15288 process list. More than one value may be listed.		*Stakeholder Needs and Requirements Definition Process--ISO15288*				
38		Perceived Model Value and Use	The relative level of value ascribed to the model, by those who use it for its stated purpose.	User Group Segment	The identify of using group segment (multiple)		*Product Manager*				
39				Level of Annual Use	The relative level of annual use by the segment		*High*				
40				Value Level	The value class associated with the model by that segment		*Essential*				
41		Third Party Acceptance	The degree to which the model is accepted as authoritative, by third party regulators, customers, supply chains, and other entities, for its stated purpose.	Accepting Authority	The identity (may be multiple) of regulators, agencies, customers, supply chains, accepting the model		*Internal Executive Management, US FTC, Distribution Channel Management*				
42		Model Ease of Use	The perceived ease with which the model can be used, as experienced by its intended users	Perceived Model Complexity	High, Medium Low		*Low Complexity*				
43	**Describes related model life cycle management capabilities**										
44	Model Life Cycle Management	Model Versioning and Configuration Management	The capability of the model to provide for version and configuration management.	CM Capability Type	The type(s) of CM capabilities included (may be multiple)		*Version Management*				

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G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form: Model 1	Model 2
Describes related model life cycle management capabilities						
Model Life Cycle Management	Model Versioning and Configuration Management	The capability of the model to provide for version and configuration management.	CM Capability Type	The type(s) of CM capabilities included (may be multiple)	*Version Management*	
	Executable Model Environmental Compatibility	The capability of the model to be compatibly supported by specified information technology environment(s), indicating compatibility, portability, and interoperability.	IT Environmental Component	The type(s) of IT environments or standards supported	*SysML 1.0 Toolset*	
	Model Design Life and Retirement	The capability of the model to be sustained over an indicated design life, and retired on a planned basis.	Design Life	The planned retirement date	*31-Dec-30*	
	Model Maintainability	The relative ease with which the model can be maintained over its intended life cycle and use, based on capable maintainers, availability of effective model documentation, and degree of complexity of the model	Maintenance Method	The type of maintenance methodology used to maintain the model's capability and availability for the intended purposes over the intended life cycle.	*Quarterly Review Against Market Inputs*	
	Model Deployability	The capability of the model to support deployment into service on behalf of intended users, in its original or subsequent updated versions	Deployment Method	The type of method used to deploy (possibly in repeating cycles) the model into its intended use environment.	*Fixed Views Deployment--View Set 12*	
	Model Cost	The financial cost of the model, including development, operating, and maintenance cost	Development Cost	The cost to develop the model, including its validation and verification,	*2 staff months instantiation; 3 staff months VVUQ*	

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G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form: Model 1	Model 2
	Model Cost	The financial cost of the model, including development, operating, and maintenance cost	Development Cost	The cost to develop the model, including its validation and verification, to its first availability for service date	*2 staff months instantiation; 3 staff months VVUQ*	
			Operational Cost	The cost to execute and otherwise operate the model, in standardized execution load units		
			Maintenance Cost	The cost to maintain the model	*2 staff months annually*	
			Deployment Cost	The cost to deploy, and redeploy updates, per cycle	*1.2 staff months annually*	
			Retirement Cost	The cost to retire the model from service, in a planned fashion		
			Life Cycle Financial Risk	Risk to the overall life cycle cost of the model		
	Model Availability	The degree and timing of availability of the model for its intended use, including date of its first availability and the degree of ongoing availability thereafter.	First Availability Date	Date when version will first be available	*1-Jan-19*	
			First Availability Risk	Risk to the scheduled date of first availability		
			Life Cycle Availability Risk	Risk to ongoing availability after introduction		

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G1 | Model Features Pattern -- Configuration Planning Form

Feature Group	Feature Name	Feature Definition	Feature Attribute	Attribute Definition	Model Features Pattern -- Configuration Planning Form: Model 1	Model 2
	VVUQ Pattern Learning	The ability to accumulate new discoveries about model-based methods into the VVUQ Pattern, as it is applied over model life cycles. These discoveries are exceptions to the existing VVUQ Pattern, and candidates for inclusion into future versions of that pattern.	VVUQ Pattern Exception	A summary of the exception noted to the current VVUQ Pattern (may be multiple exceptions)	*Early Market Calibration Stage*	
			Impacted VVUQ Feature	The impacted existing, modified, or additional feature of the VVUQ Pattern.	*Validated Conceptual Model Credibility*	
			VVUQ Pattern Version	The version of the VVUQ Pattern in current use before change.	*V1.1.3*	
			Project	Identifies the project in which the exception was noted	*Market Penetration Planning Project*	
			Person	Identifies the person describing the exception	*Robert Handlebar*	

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Next steps

- Complete the example
- Try out on other submitted examples
- Show to other team members for their use on other examples
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