

Systems Engineering Research Center (SERC)

Collaboration in an Authoritative Source of Truth Environment using OpenMBEE

By:

Benjamin Kruse, Sc.D.

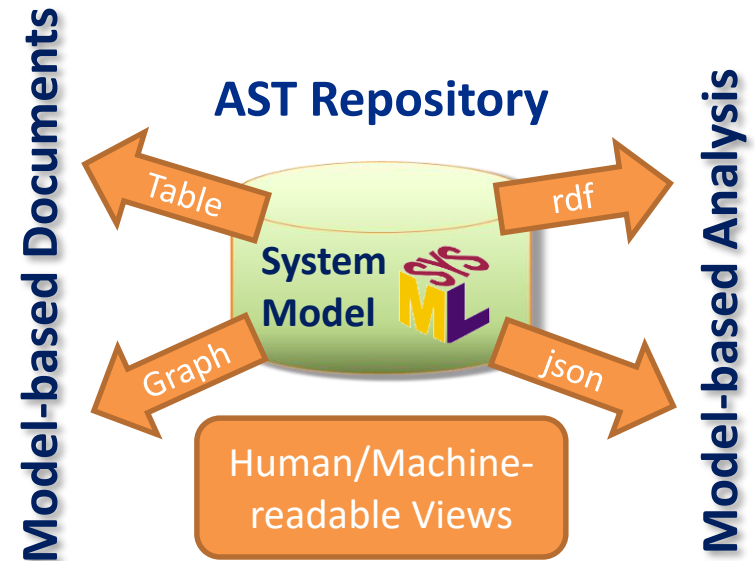
Mary A. Bone, Ph.D.

Mark Blackburn, Ph.D.

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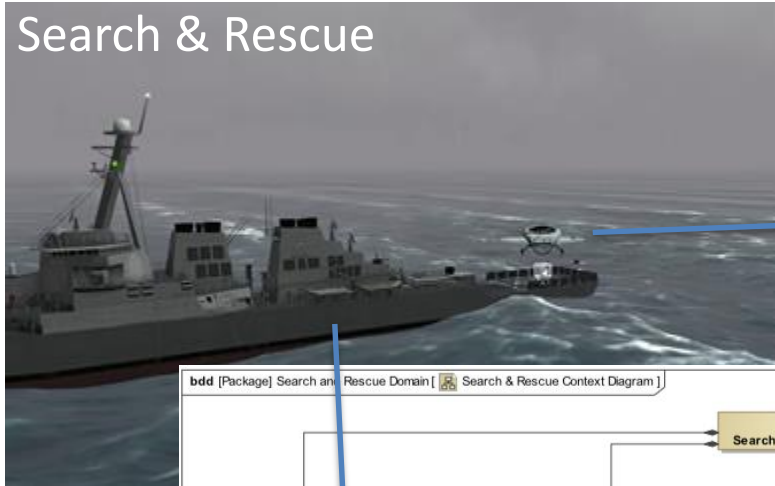
- Authoritative Source of Truth & Surrogate Pilot
- OpenMBEE: Lessons Learned
 - Model Development Kit (MDK) & DocGen
 - Model Management System (MMS)
 - View Editor
- Project Usage & Management
- Summary

- Authoritative Source of Truth (AST)
 - To provide consistent data in the format necessary for the given task
 - Implemented by **OpenMBEE** = Open Model Based Engineering Environment, developed by NASA/JPL
- Surrogate Pilot
 - Execution of NAVAIR's Systems Engineering Transformation (SET) Framework
 - To simulate collaboration in an AST
 - To support new operational paradigm between government and industry
 - By elimination of paper artifacts and large-scale design reviews in favor of continuous insight/oversight via the digital collaborative environment

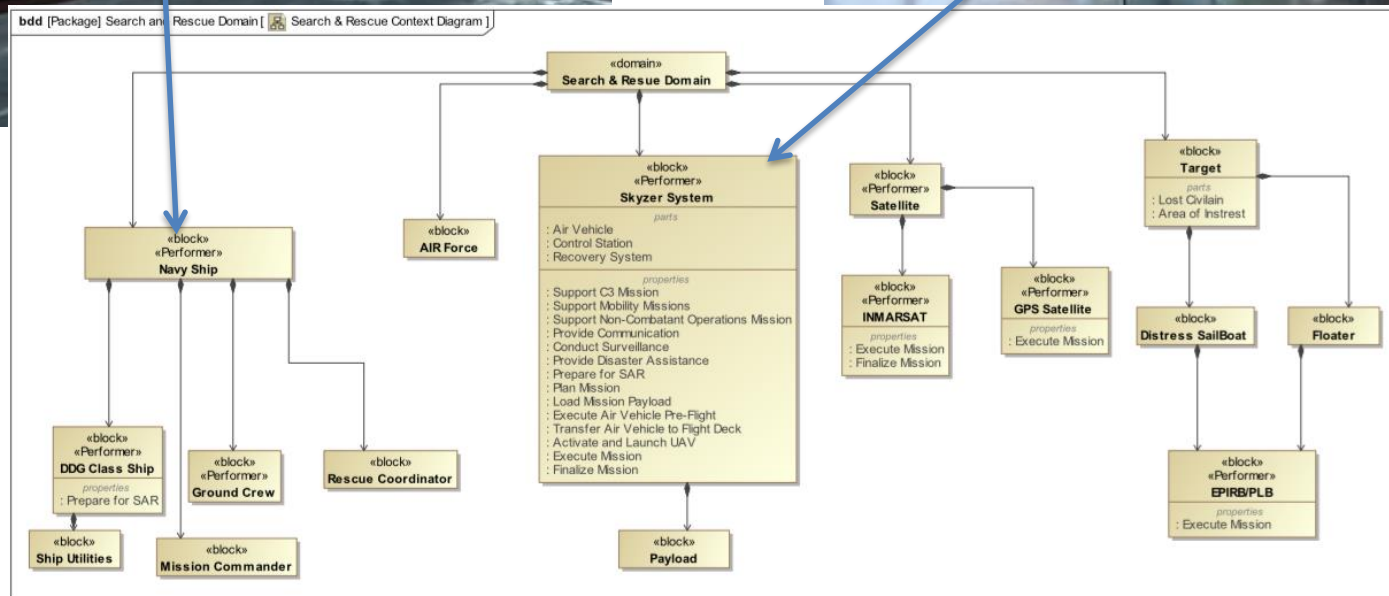


Surrogate Pilot Scenario: Skyzer UAS

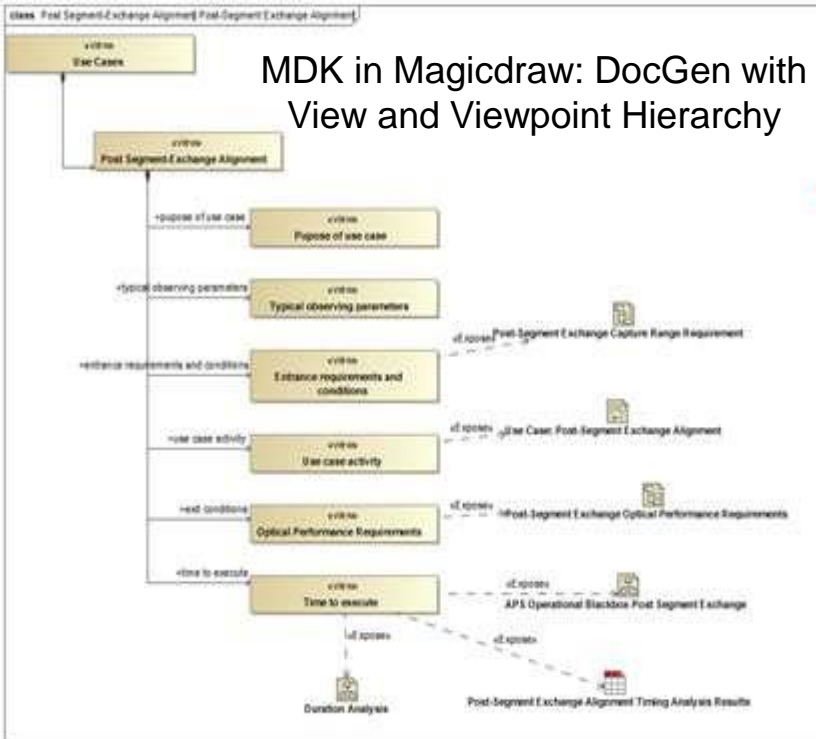
Graphical CONOPS Scenario:
Search & Rescue



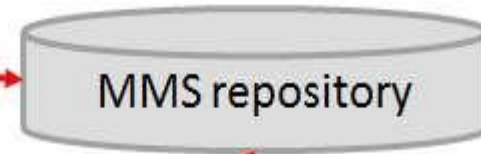
Airfoil designation for a similar Bell tilt-rotor
(BA609)



Skyzer System & Mission Models developed using SysML



Model Management System (MMS)




View Editor: Provides Rich Web Interface

The screenshot shows a web browser displaying a document titled '2.1.6 Time to execute'. The document contains text and a table of timing analysis results. The table is titled 'Post-Segment Exchange Alignment Timing Analysis Results' and shows various activities and their durations. Below the table, there is a diagram showing the relationship between different use cases and their requirements.

Visualization in View Editor



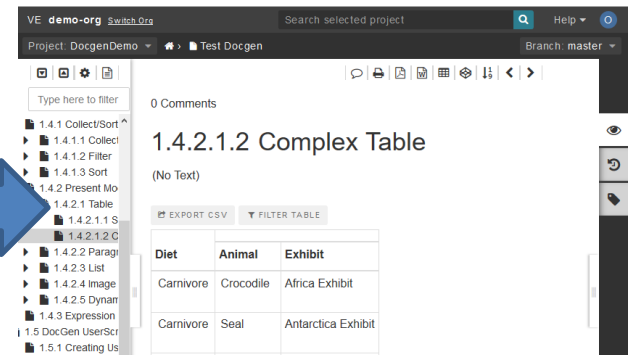
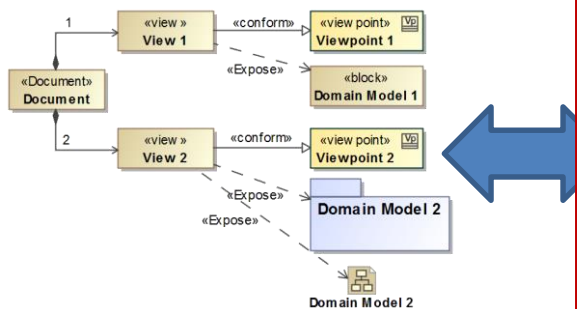
- What is MDK?

- Plugin for Magicdraw, to support building system assemblies through modeling augmentation and validation, enable syncing with MMS and using the DocGen language for model-based document creation using views and viewpoints

- Content

- Systems Reasoner
- MMS Sync
- DocGen

MDK: View and Viewpoint Hierarchy

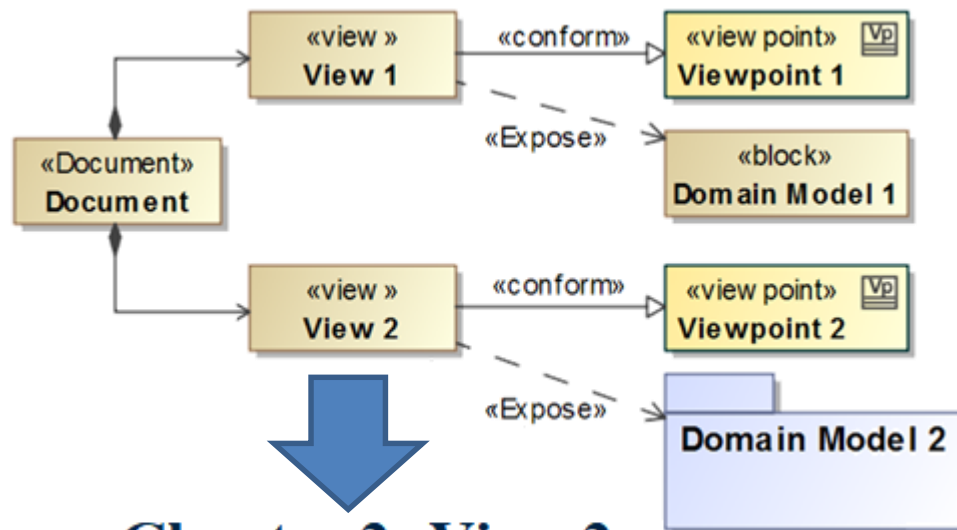


View Editor: Provides Rich Web Interface

- DocGen

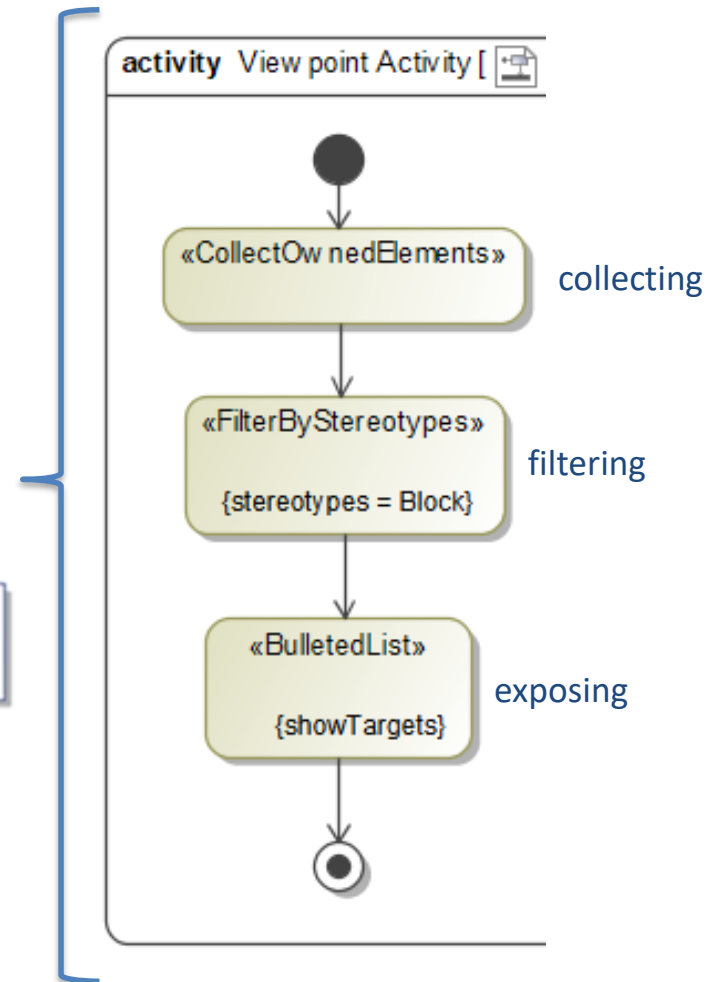
— For model-based document creation based on Views and Viewpoints

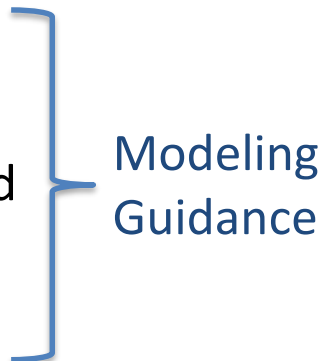
- To generate views for View Editor or pdfs
- To guide modeling and development



Chapter 2: View 2

- Block 1
- Block 2
- Block 3



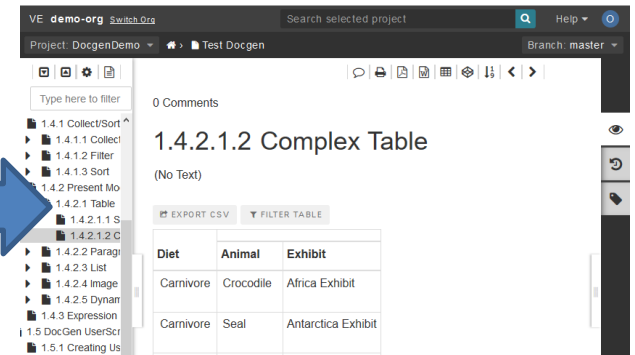
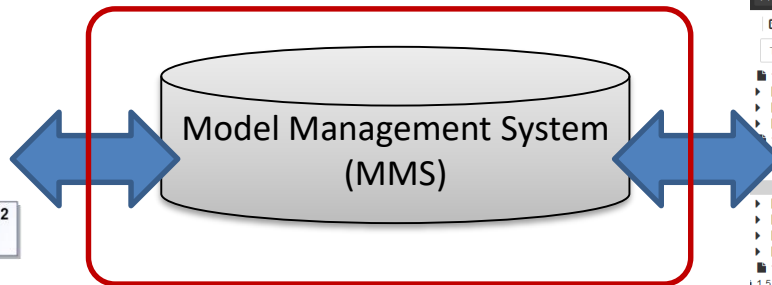
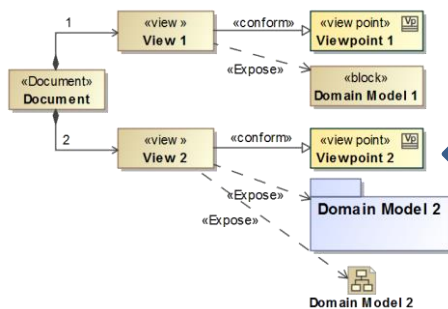
- Viewpoint Modeling
 - Most viewpoint needs covered by the provided activity diagram elements and some OCL¹ constraints
 - Difficult access on tagged values of custom stereotypes (e.g. for filtering)
 - Viewpoint Library
 - Providing standardized viewpoints to quickly create consistent results
 - Few modelers need to create or know how to create viewpoints
 - Allowing pre-planned view hierarchies to define document structure and type of content prior to modeling
 - Included warning messages if no suitable elements are found
 - Requiring some modeling considerations to consistently find correct model elements to be exposed
- 
- Modeling Guidance

1) OCL = Object Constraint Language

- Using a consistent model structure to allow model elements to be found by viewpoints
- Separate model content suited to be exposed and model content that should not get exposed
 - By using separate workspace package
 - By removing empty diagrams and unused model elements
- Keeping document creation in mind while modeling
 - Limiting the size of diagrams and tables, to be printable
 - Element (e.g. diagram) documentation to be used in documents

- What is MMS?
 - A version control system for structured data, including versioning, workflow management, and controlled access through RESTful web services
 - Used as central data hub to facilitate multi-tool and multi-repository integration across engineering, computing, and management disciplines
- To store SysML model data
 - Capturing all model elements (e.g. classes, instances, relations, but not: diagram layout), including their change history and views for View Editor

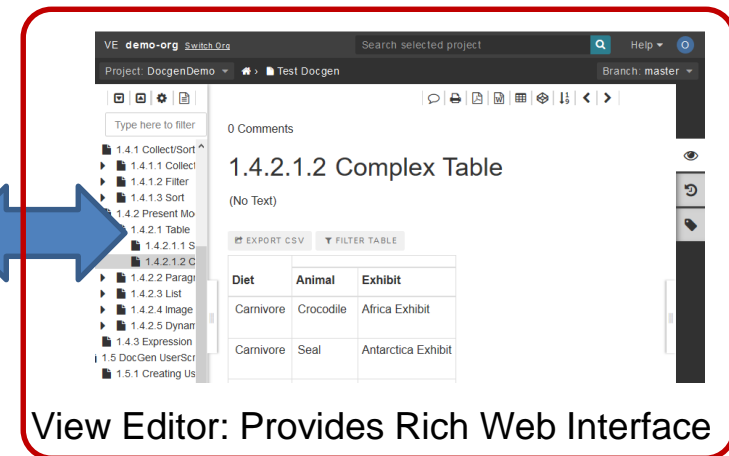
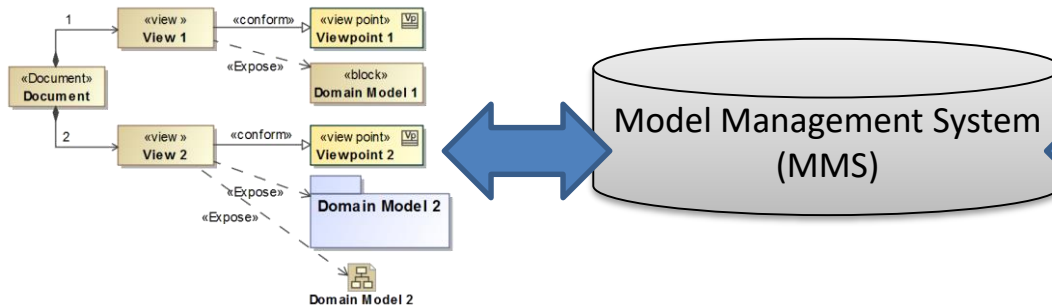
MDK: View and Viewpoint Hierarchy



View Editor: Provides Rich Web Interface

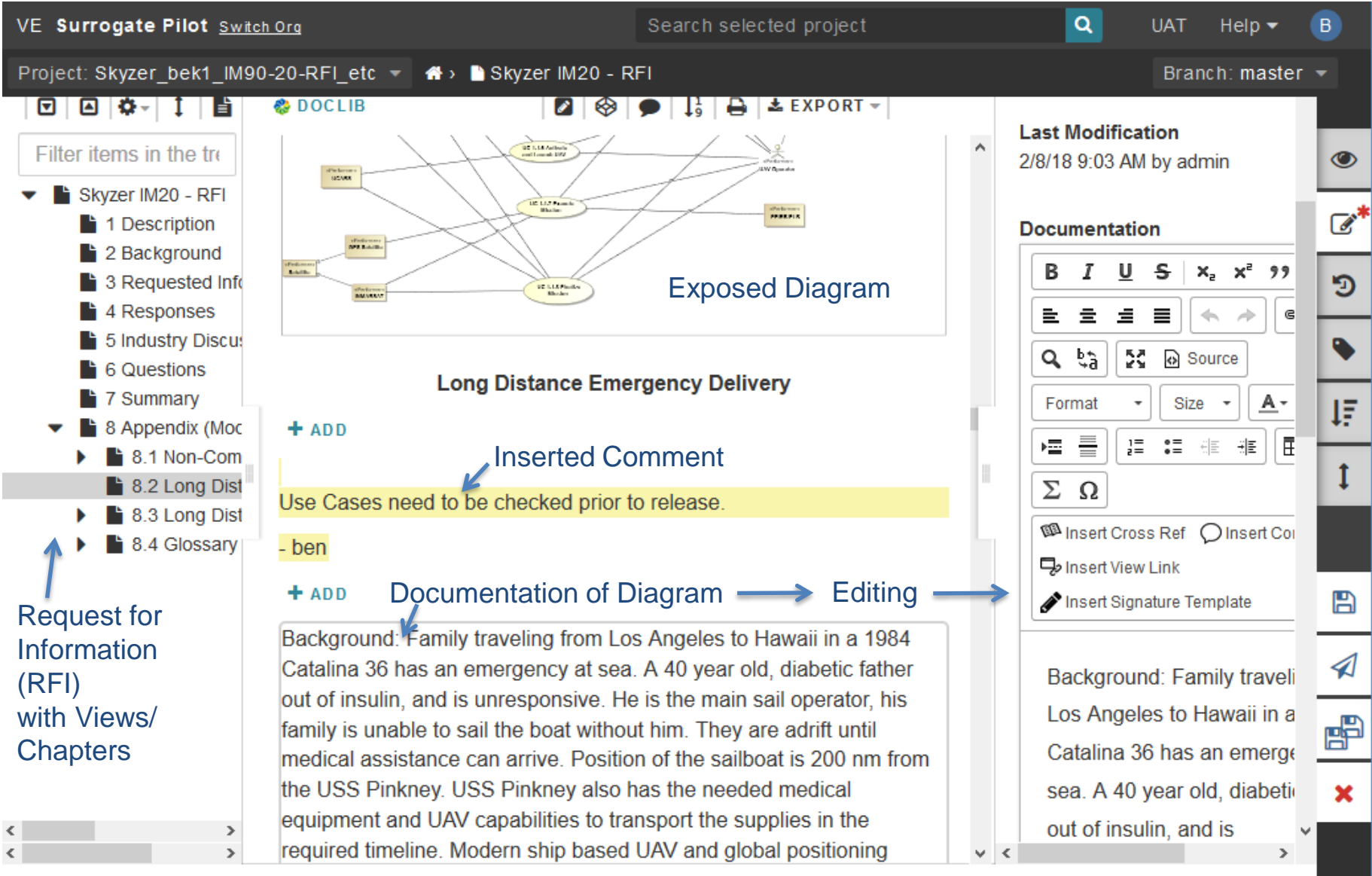
- What is the View Editor?
 - A web app to provide consistent data from SysML models, to allow interaction with model elements without having to use the case tool
 - By utilizing exposed data from DocGen views and viewpoints through view instances and model elements on MMS
- To improve communication with non-modelers via live data in stakeholder-specific documents from the AST

MDK: View and Viewpoint Hierarchy



View Editor: Provides Rich Web Interface

View Editor: Commenting & Editing



VE **Surrogate Pilot** [Switch Org](#) Search selected project Q UAT Help B

Project: Skyzer_bek1_IM90-20-RFI_etc Home Skyzer IM20 - RFI Branch: master

Filter items in the tree

- Skyzer IM20 - RFI
 - 1 Description
 - 2 Background
 - 3 Requested Information
 - 4 Responses
 - 5 Industry Discussion
 - 6 Questions
 - 7 Summary
 - 8 Appendix (Mockup)
 - 8.1 Non-Compliance
 - 8.2 Long Distance Emergency Delivery
 - 8.3 Long Distance Emergency Delivery
 - 8.4 Glossary

Exposed Diagram

Long Distance Emergency Delivery

+ ADD **Inserted Comment**
 Use Cases need to be checked prior to release.

- ben

+ ADD **Documentation of Diagram** → **Editing** →

Background: Family traveling from Los Angeles to Hawaii in a 1984 Catalina 36 has an emergency at sea. A 40 year old, diabetic father out of insulin, and is unresponsive. He is the main sail operator, his family is unable to sail the boat without him. They are adrift until medical assistance can arrive. Position of the sailboat is 200 nm from the USS Pinkney. USS Pinkney also has the needed medical equipment and UAV capabilities to transport the supplies in the required timeline. Modern ship based UAV and global positioning

Last Modification
 2/8/18 9:03 AM by admin

Documentation

B I U S x₂ x² "

Format Size A-

Insert Cross Ref Insert Comment Insert View Link Insert Signature Template

Background: Family traveling from Los Angeles to Hawaii in a 1984 Catalina 36 has an emergency at sea. A 40 year old, diabetic father out of insulin, and is

Request for Information (RFI) with Views/ Chapters

View Editor: History Comparison

VE **Surrogate Pilot** [Switch Org](#) Search selected project UAT Help B

Project: Skyzer_mab1_SOW Skyzer SOW Branch: master

Filter items in the tree

- Skyzer SOW
 - 1 Section C - SOW

Statement of Work (SOW), Section C

Government Computer Models

- Skyzer IM20 Mission Model (v.15) with Views in IM90-20 model (v.29)
- Skyzer IM30 System Model with own Views (v.39) and Views in IM90-30 model (v.35)
- Skyzer IM30 Evaluation Model with own Views (v.35) and Views in IM90-30 model (v.35)

Used tools:

- Magicdraw 18.5 SP3 or Cameo System Modeler 18.5 SP3
- MDK plugin v. 3.3.6
- MMS v.3.2.2
- View Editor v.3.2.1
- Teamwork Cloud 18.5 SP

3. Requirements

3.1 General

The work required by this contract shall be performed in accordance with System Requirements contained in Skyzer System Model (SM) and this Statement of Work (SOW). The contractor shall design, develop, fabricate, test and deploy the complete Skyzer Maritime SAR system in accordance with the detailed tasking in paragraph 3.2 [Detail Tasks](#) below. All contract activities are to be completed within 48 months after contract award.

Cross-Reference to following View/Chapter

ELEMENT HISTORY

Compare versions

Base: Don - 6/27/18 10:25 PM on Tag: RFP

Compare: ben - 8/1/18 10:42 AM on Branch: master

Comparison towards read-only RFP Tag

Government Computer Mo

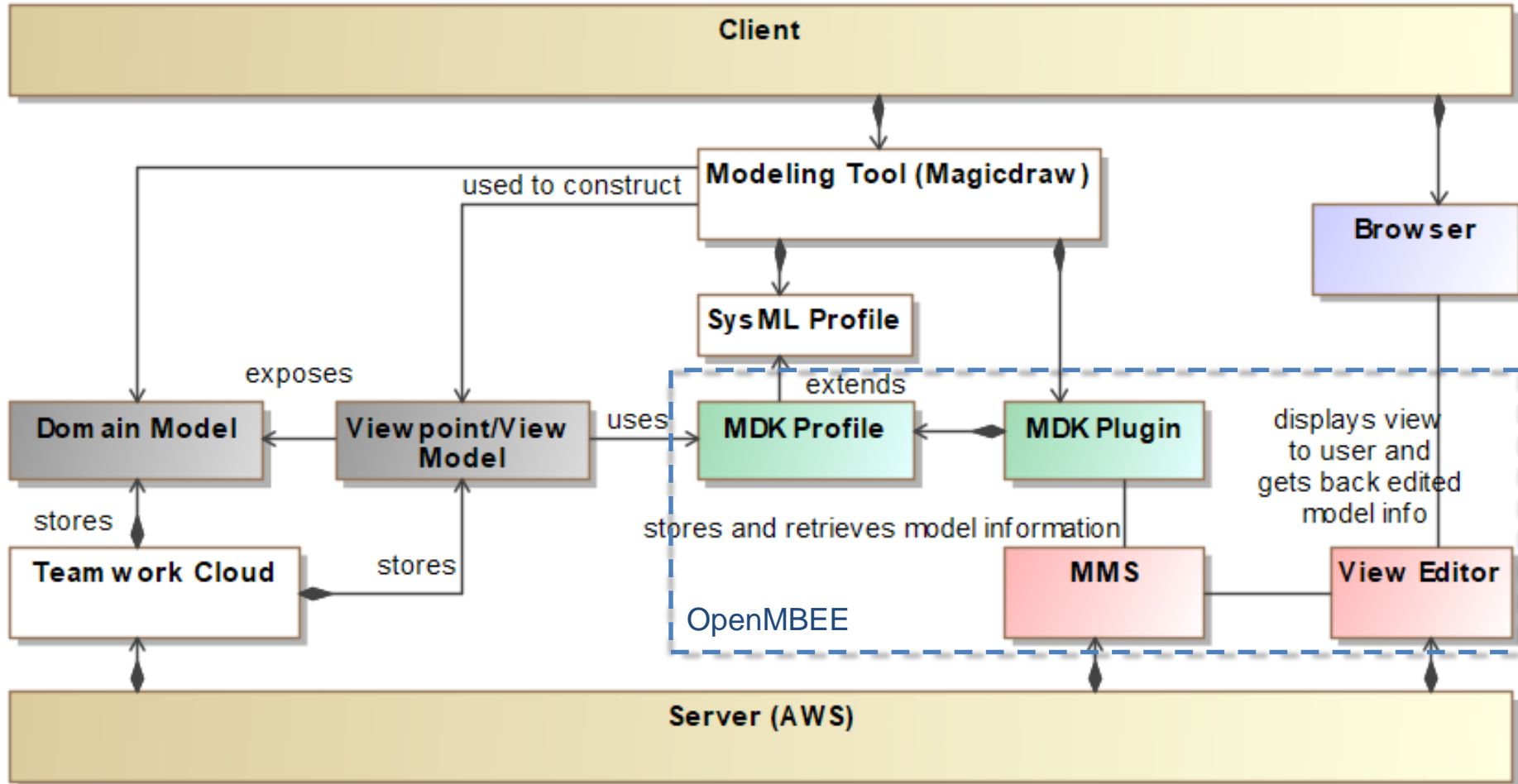
Documentation

2.4 Government Computer Models; Skyzer IM20 Mission Model (v.15) with Views in IM90-20 model (v.29); Skyzer IM30 System Model with own Views (with v.39) and Views in IM90-30 model (v.35); Skyzer IM30

- View Editor editing capability
 - Addition of presentation elements (e.g. text, images, videos) and comments
 - Editing names, values and documentation of SysML model elements
 - Limited creation of new model elements
 - Instead possible to adapt placeholder elements
- Traceability
 - Searching and cross-referencing of any other elements in MMS
- Creation of read-only Tags in the View Editor
 - E.g. to capture official RFI and RFP releases
 - TWC branches committed from SysML modeling tool

- Model-based document generation from AST
 - Access on consistent AST data without modeling tool or SysML knowledge
 - Enabling transition from document-based to model-based development
 - Enabling fast and useful design iterations
 - Glossary feature of modeling tool to define terms in MMS/View Editor
 - Flexible application of model-based document generation
 - Content created in SysML tool (e.g. textual SOW or System Model) as well as in the View Editor (e.g. most of RFI)
 - Include domain experts & stakeholders to define relevant views/documents
 - Model-generated reports supporting program leadership decisions by providing only relevant information to stakeholders
 - Only modelers will likely know/understand entire model

- OpenMBEE Implementation in Docker on AWS:

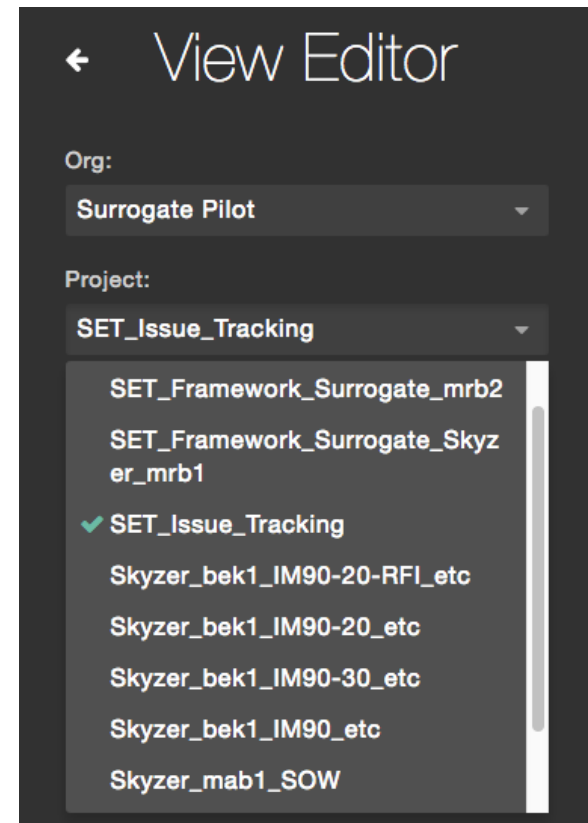


- Project Usage Mechanism

- For project modularization to separate distinct parts of the system
 - E.g. internal Evaluation Model separate from provided System Model
- Allowing traceability linkages
 - E.g. System Model using Mission Model to trace mission requirements to system model elements
- To reuse model libraries (e.g. viewpoints)
 - While hiding used profiles in separate MMS Org

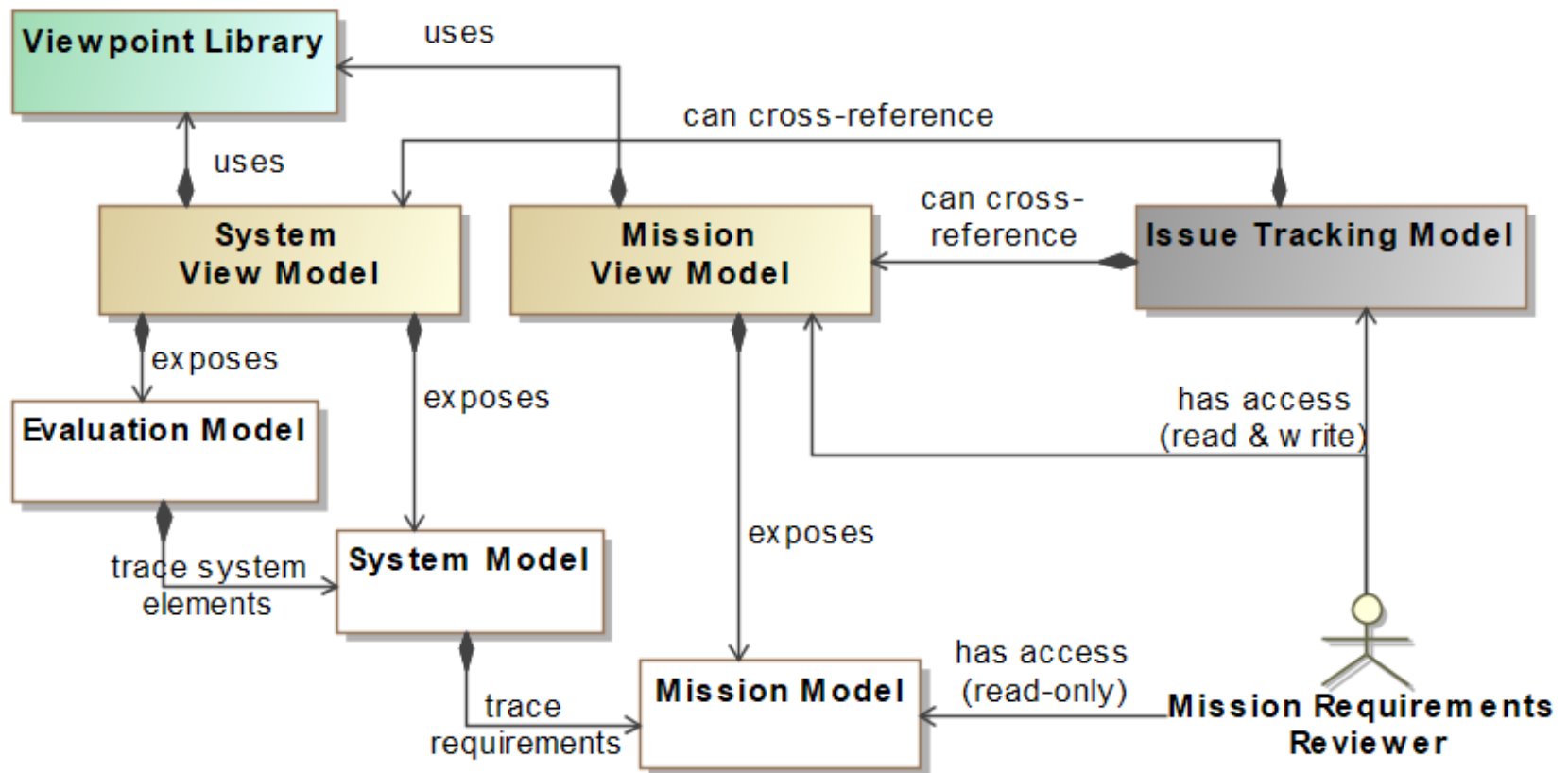
- Issue Tracking in the View Editor

- Issues captured in the View Editor and saved in MMS as AST
- Allows to cross-reference model elements from used projects
 - E.g. directly using comments in other documents as issues



Project Usage & User Permissions: Example

- Editing & commenting in the Mission View Model, without permission to directly change exposed requirements from Mission Model
- Creating issues in Issue Tracking Model, e.g. using prior comments



Composition \triangleq Project Usage

- Promising application of OpenMBEE as an AST environment
 - Technically feasible to develop everything as a model
 - Project usage for modularization, reuse, partitioning, traceability and user access
 - Quick and consistent model-based document generation through DocGen & Viewpoint Library
 - Enabling fast and useful design iterations
 - View Editor offering views on consistent data from MMS as AST
 - Improved communication between modelers, experts and other stakeholders
 - Included issue tracking with AST access
- Future Work
 - Model-centric source selection for RFP response including traceability towards non-SysML data, e.g. multi-physics simulations
 - Adoption of GitFlow¹ workflow to define and standardize model branching
 - Addition of ontological reasoning on AST data

1) <https://www.atlassian.com/git/tutorials/comparing-workflows/gitflow-workflow>

- OpenMBEE <http://www.openmbee.org/>
 - GitHub: <https://github.com/Open-MBEE>
 - OpenMBEE Public Server Information:
<https://github.com/Open-MBEE/open-mbee.github.io/wiki/OpenMBEE-public-server-information>
 - Google Group: <https://groups.google.com/d/forum/openmbee/>
- Surrogate Pilot
 - Apan SET Surrogate Pilot Group:
<https://community.apan.org/wg/navair-set/set-surrogate-pilot/>
 - View Editor: <http://ime.sercuarc.org/alfresco/mmsapp/mms.html>
(Login instructions available on Apan)

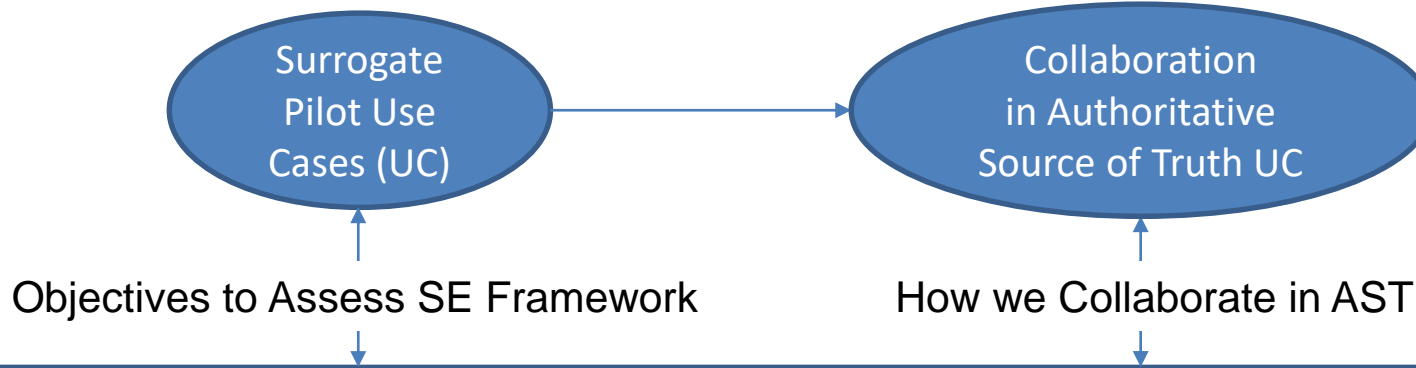
- Blackburn, M., et al.: *Transforming Systems Engineering through Model-Centric Engineering*. Stevens Institute of Technology, Systems Engineering Research Center, 2018. # SERC-2018-TR-103.
- Delp, C., et al.: *Model Based Document and Report Generation for Systems Engineering*, in *Aerospace Conference*. 2013, IEEE.
- Department of Defense: *Digital Engineering Strategy*. Office of the Deputy Assistant Secretary of Defense for Systems Engineering, 2018. www.acq.osd.mil/se
- Zimmerman, P., T. Gilbert, and F. Salvatore: *Digital Engineering Transformation across the Department of Defense*. The Journal of Defense Modeling and Simulation, 2017.
doi: 10.1177/1548512917747050



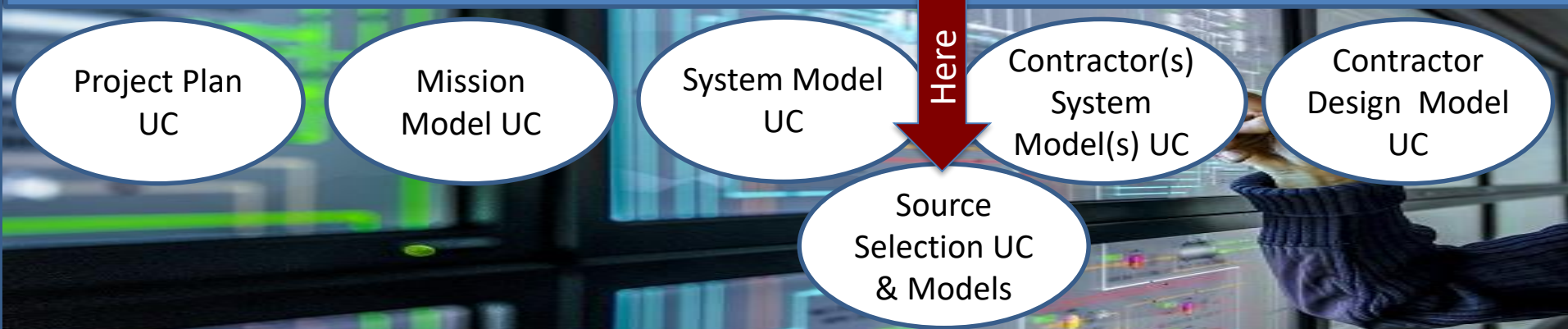
Thank you!

Dr. Benjamin Kruse
Research Assistant Professor
School of Systems & Enterprises
Systems Engineering Research Center
Stevens Institute of Technology

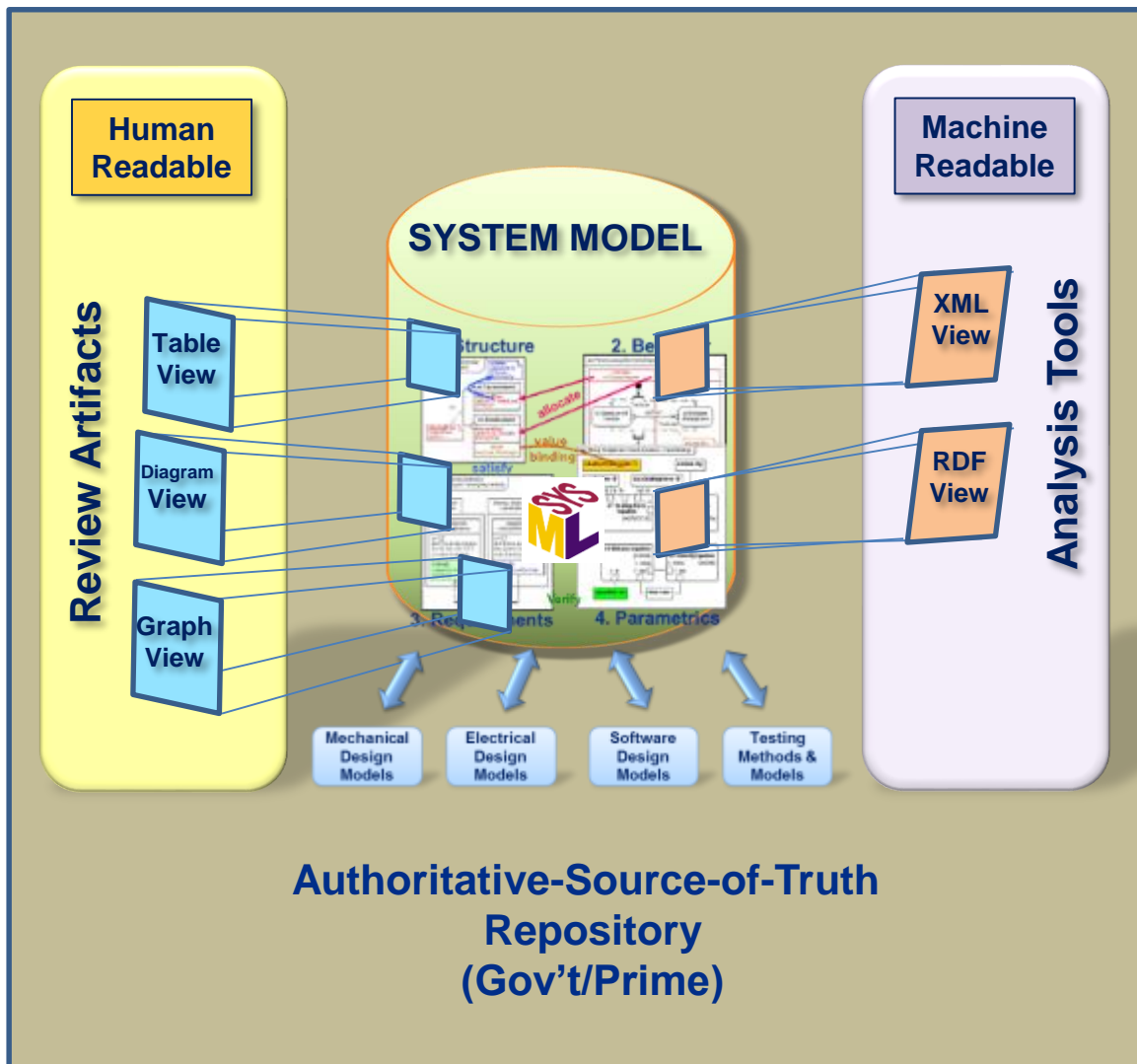
Use Cases for Surrogate Pilot



Surrogate Pilot using Authoritative Source of Truth (AST)



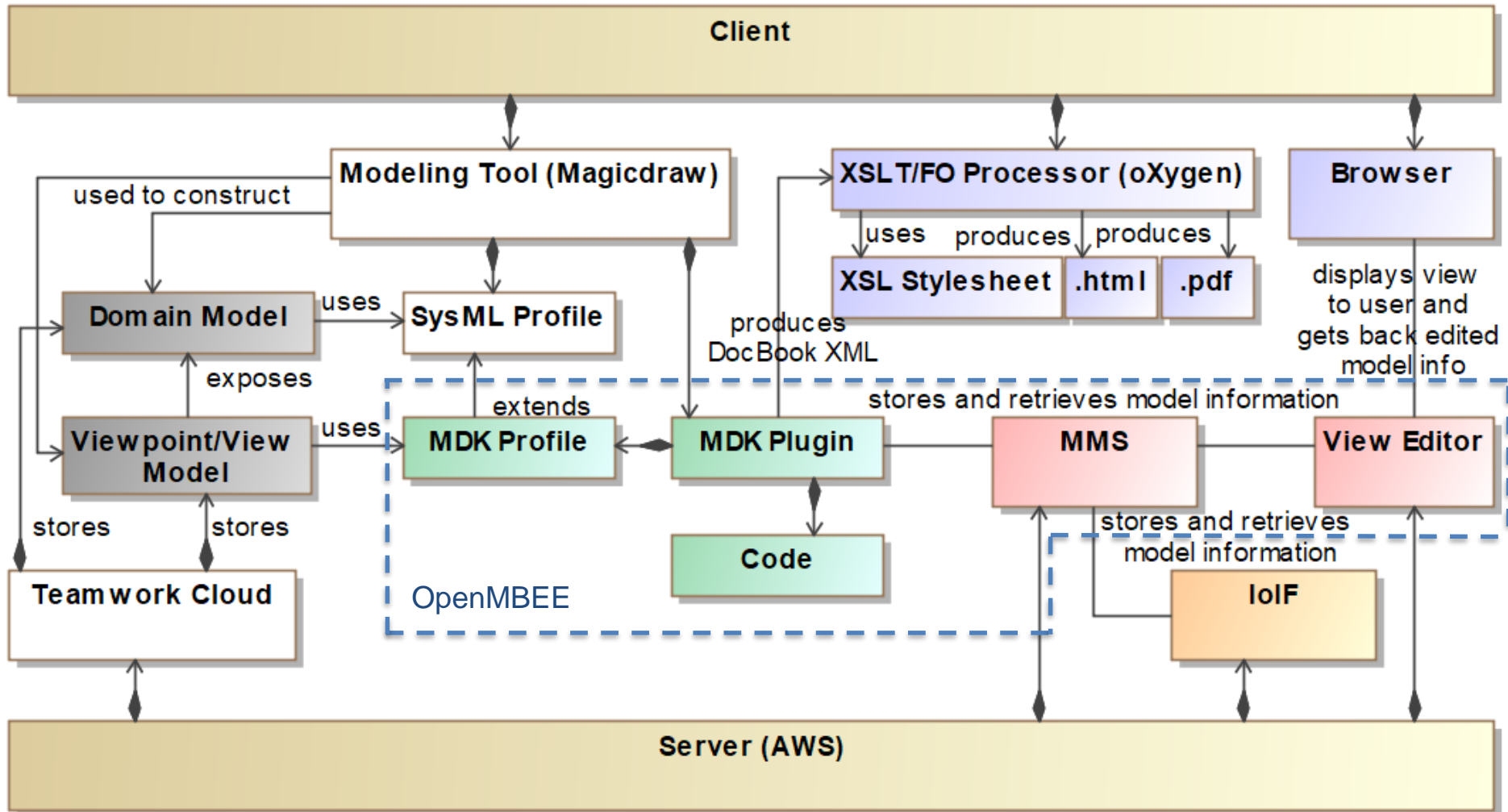
Single Authoritative Source of Truth



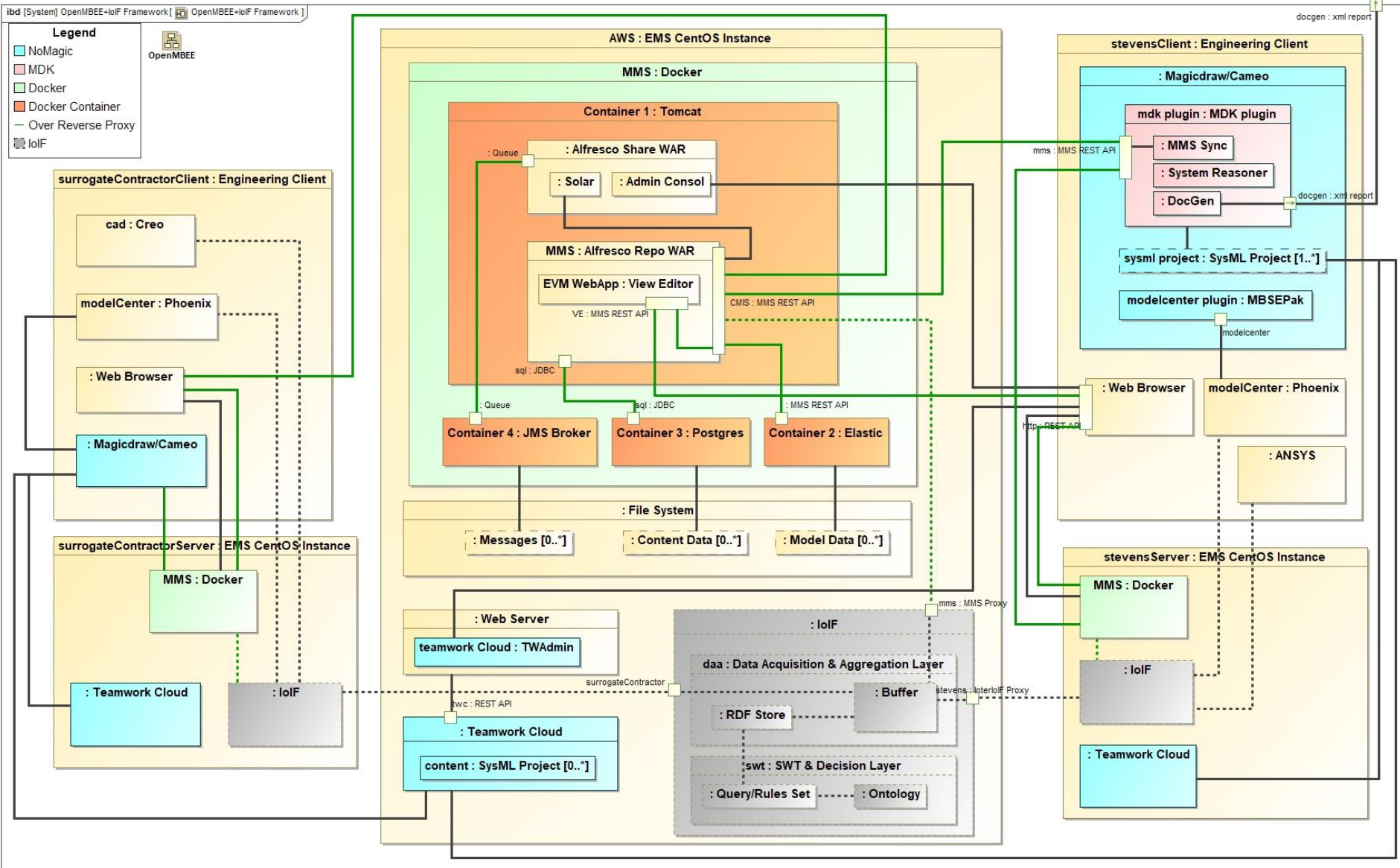
The entire set of models and tools is held in a single repository and becomes the Single-Source-of-Truth for the duration of system development

- Ability to *interrogate the design information* and extract data into the format necessary for the given task
 - Leverages *formalism*
 - Transformation rules are *reusable*
 - Provides *machine and human readable formats*
- Leverage the model by reviewing *the model itself*
- Stakeholders *focus on the views of the system model* that address their concerns

- OpenMBEE Implementation in Docker on AWS:



OpenMBEE + IoIF Implementation

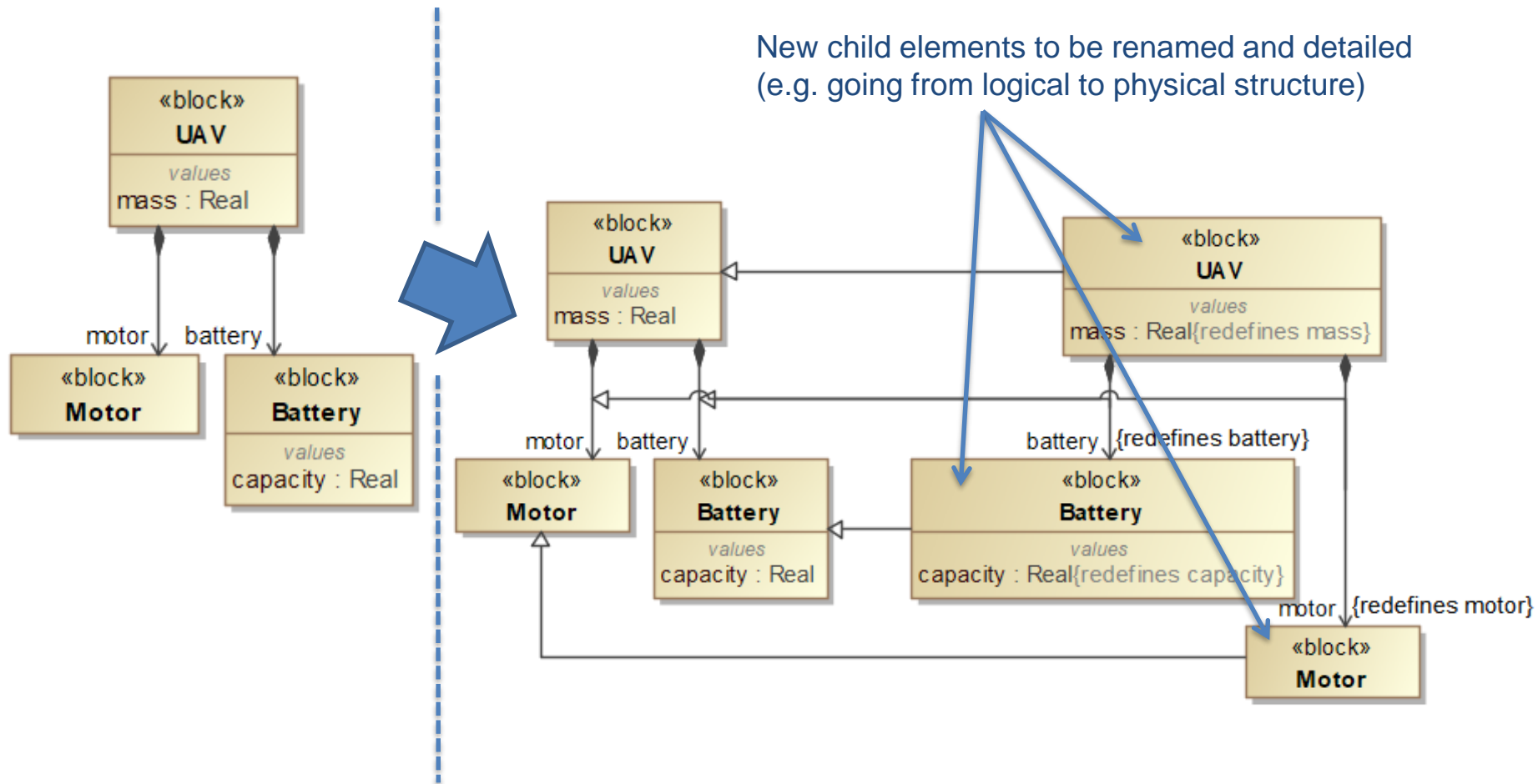


- Purpose: Support building system assemblies in SysML
 - Augmented creation of child elements from imported CSV tables
 - Augmented creation of specialization trees
 - Including propagation and redefinition of properties
 - Aspect creation to avoid over-use of stereotypes with tagged values
 - Model validation

Systems Reasoner	>	Validate
MMS	>	Import from CSV
Refactor With ID	>	Specialize Structure
Specification	Enter	Specialize Structure Recursively
Symbol Properties	Alt+Enter	Specialize Recursively & Individually
Element Group	>	Add & Realize Aspect(s)
Create Diagram		Create Instance

MDK: System Reasoner Example

- “Specialize Structure Recursively”: modeling support to create sub-elements together with redefined properties and interrelations

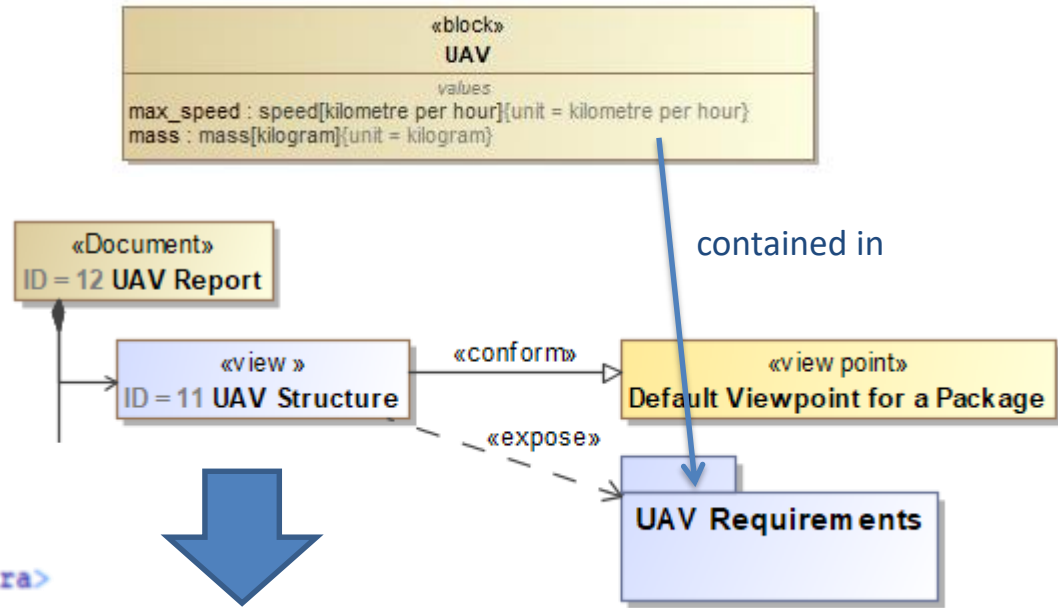


- Model: UAV block
- View Hierarchy:
- Result:
 - XML file:

```

<tbody>
  <row>
    <entry><para>UAV</para>
    </entry>
    <entry><para>The unmanned air vehicle (UAV) has to navigate without a human
      pilot on board.</para>
    </entry>
  </row>
</tbody>

```



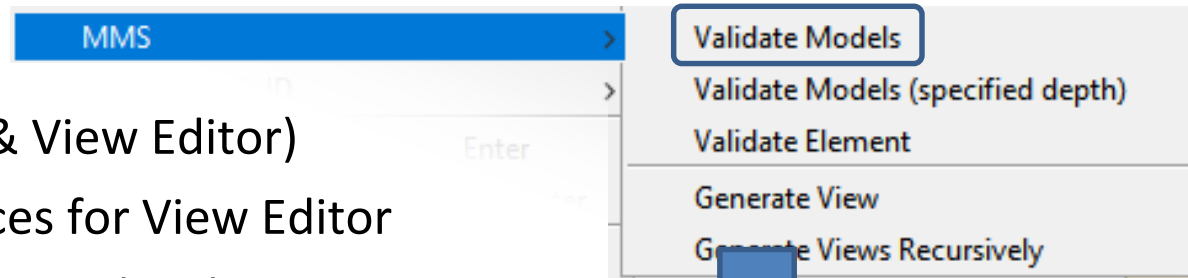
- Converted PDF:

Table 1.1. UAV Structure

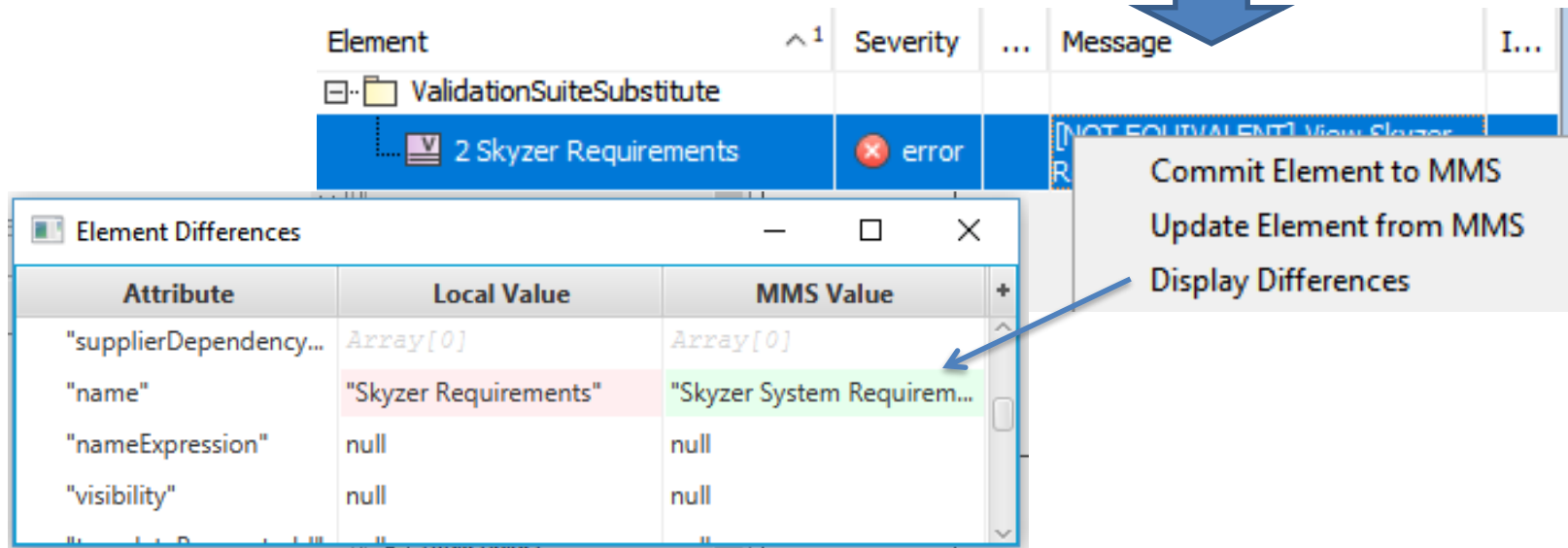
Model Element	Documentation
UAV	The unmanned air vehicle (UAV) has to navigate without a human pilot on board.

- MMS Sync

- Purpose: Link to MMS (& View Editor)
- Generating View instances for View Editor
- Model validation on element level
- Committing and receiving changes



--- Start Element Validation Summary ---
 20 elements are missing in client.
 0 elements are missing on MMS.
 8 elements are not equivalent between client and MMS.
 --- End Element Validation Summary ---



The screenshot shows an error message in a table and a dialog box titled 'Element Differences'.

Element	Severity	Message
ValidationSuiteSubstitute		
2 Skyzer Requirements	error	[NOT EQUIVALENT] View Skyzer...

Attribute	Local Value	MMS Value
"supplierDependency..."	Array[0]	Array[0]
"name"	"Skyzer Requirements"	"Skyzer System Requirem..."
"nameExpression"	null	null
"visibility"	null	null

A blue arrow points from the 'Element Differences' dialog box to the 'Commit Element to MMS' option in a context menu.

- For View Editor images and user access management:

The screenshot displays the Alfresco Repository Browser interface. The top navigation bar includes links for Home, My Files, Shared Files, Sites, Tasks, People, Repository, Admin Tools, and Administrator, along with a search bar. The main content area shows a breadcrumb path: Repository > Sites > 8da32e1d-cc16-44c6-833c-39d4ea287103. Below this, a list of folders is shown:

- documentLibrary (Modified 4 days ago by Administrator, No Description, No Tags)
- Skyzer_bek1_IM90_etc (PROJECT-57dde080-3487-48da-a206-f01d584e0feb) (Modified 4 days ago by Administrator, No Description, No Tags)
- SET_Framework_Surrogate_mrb2 (PROJECT-837de740-7ac3-46de-9edc-8ddd1c4f830a) (Modified 4 days ago by Administrator, No Description, No Tags)

A left sidebar shows a tree view of the repository structure, with the 'Sites' folder highlighted and an arrow pointing to it. A context menu is open over the 'Skyzer_bek1_IM90_etc' folder, showing options such as 'Download as Zip', 'View Details', 'Edit Properties', 'More...', 'Copy to...', 'Move to...', 'Manage Rules', 'Delete Folder', and 'Manage Permissions'. An arrow points to the 'Manage Permissions' option in the context menu. Another arrow points to the 'Project' label in the folder name.

View Editor: Cross-referenced Glossary Term

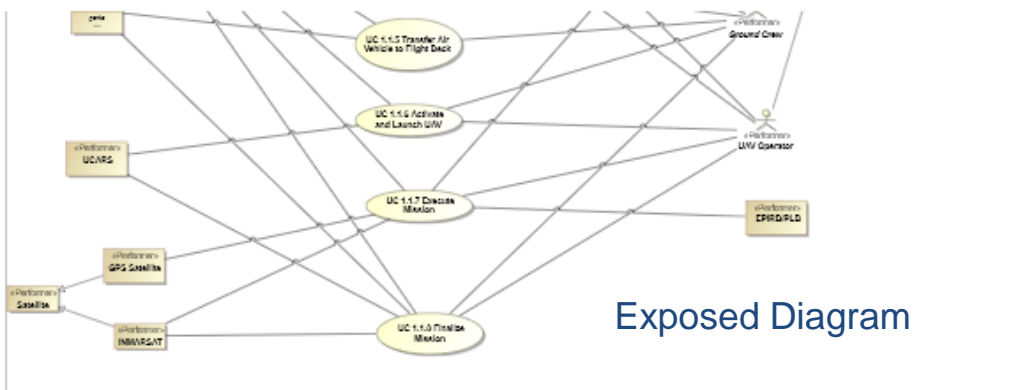
VE **Surrogate Pilot** [Switch Org](#) Search selected project UAT Help B

Project: Skyzer_bek1_IM90-20-RFI_etc Skyzer IM20 - RFI Branch: master

Filter items in the tree

- Skyzer IM20 - RFI
 - 1 Description
 - 2 Background
 - 3 Requested Information
 - 4 Responses
 - 5 Industry Discussion
 - 6 Questions
 - 7 Summary
 - 8 Appendix (Mode)
 - 8.1 Non-Comb
 - 8.2 Long Distance Emergency Delivery
 - 8.3 Long Distance Emergency Delivery
 - 8.4 Glossary

Exposed Diagram



Long Distance Emergency Delivery

Use Cases need to be checked prior to release. **Cross-Reference to UAV term**

- ben **Documentation of Diagram**

Background: Family traveling from Los Angeles to Hawaii in a 1984 Catalina 36 has an emergency at sea. A 40 year old, diabetic father out of insulin, and is unresponsive. He is the main sail operator, his family is unable to sail the boat without him. They are adrift until medical assistance can arrive. Position of the sailboat is 200 nm from the USS Pinkney. USS Pinkney also has the needed medical equipment and **UAV** capabilities to transport the supplies in the required timeline. Modern ship based **UAV** and global positioning technology has the potential to make the transportation of emergency supplies easier and with

PREVIEW ELEMENT

Edits (1):

UAV

Last Modification
2/8/18 9:03 AM by admin

Documentation `</>`
Unmanned Air Vehicle


Type
Class

Metatypes
Term

Location
/Skyzer_nkr1_IM20_etc
/Skyzer IM20/Skyzer

Request for Information (RFI) with Views/Chapters

View Editor: Model-based Issue Tracking

VE **Surrogate Pilot** [Switch Org](#) Search selected project UAT Help 

Project: SET_Issue_Tracking SET_Issue_Tracking Branch: master

Filter items in the tree

- SET_Issue_Tracking
 - 1 Issue Tracking Guide
 - 2 SET Project Issues
 - 3 Skyzer Model Issue**
 - 4 Altair SET Issues
 - 5 Collaborative Envir
 - 6 OpenMBEE Issues

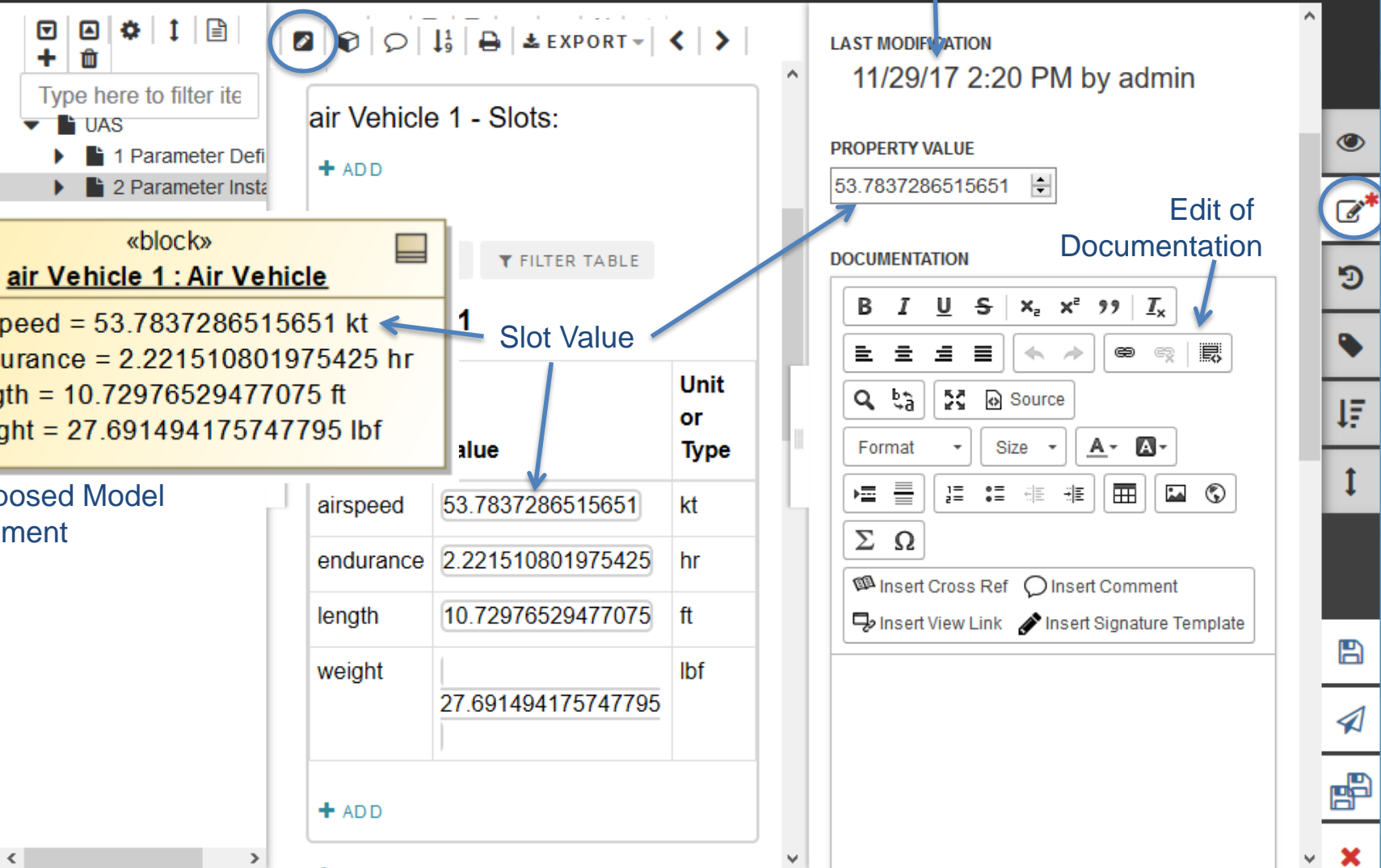
3 Skyzer Model Issues Cross-Reference to other Issue

Last Modified: 9/4/18 4:04 PM by ben

<p>Creating of evaluation model</p>	open	<p>In response to the Need parametrics in model issue, the proposal is to create a separate evaluation model that could take inputs from the various contractor-created models and output a summary comparison of the contractor design versus the constraining requirements.</p>	Anqi	Med	Update: 6/27/2018 - let's see if the model works for Altair and then close.
<p>Create Modeling Guidelines for Surrogate Pilot</p>	open	<p>There have been a few discussions about guidelines, such as: table modularizations, how to defined a KPP, formatting diagrams, etc. We ask the function lead about those guidelines and/or create our own specific to the Surrogate Pilot.</p>	Modelers	Med	An example discussed today includes formatting cross reference tables, unviewable diagrams, and how to do KPPs. This can be done after RFP

Issue Elements or Referenced Comments from other Document

View Editor: Editing Exposed Data



The screenshot displays the 'View Editor' interface for editing exposed data. The main content area shows a table for 'air Vehicle 1 - Slots' with columns for 'value' and 'Unit or Type'. The 'air speed' value is highlighted with a blue box and labeled 'Slot Value'. A yellow callout box on the left, titled 'air Vehicle 1 : Air Vehicle', lists the parameters: airspeed = 53.7837286515651 kt, endurance = 2.221510801975425 hr, length = 10.72976529477075 ft, and weight = 27.691494175747795 lbf. A blue arrow points from the 'air speed' value in the table to the 'air speed' parameter in the callout box. The right sidebar shows the 'LAST MODIFICATION' (11/29/17 2:20 PM by admin) and 'PROPERTY VALUE' (53.7837286515651) fields. Below these is a 'DOCUMENTATION' section with a rich text editor. A blue arrow points from the 'Edit of Documentation' label to the rich text editor. The top toolbar includes a search filter, a 'Type here to filter it' input, and an 'EXPORT' button. The bottom toolbar includes a 'Type here to filter it' input, a 'UAS' dropdown, and '1 Parameter Defi' and '2 Parameter Insta' options. A vertical toolbar on the right side contains various icons for editing and navigation.

Exposed Model Element

	value	Unit or Type
air speed	53.7837286515651	kt
endurance	2.221510801975425	hr
length	10.72976529477075	ft
weight	27.691494175747795	lbf

Slot Value

air speed = 53.7837286515651 kt
 endurance = 2.221510801975425 hr
 length = 10.72976529477075 ft
 weight = 27.691494175747795 lbf

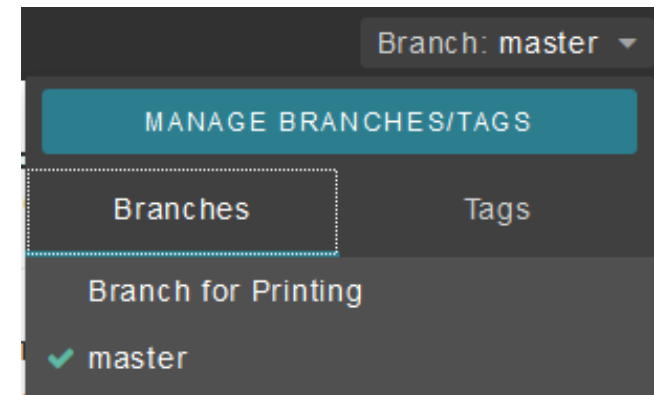
Last Modification
 11/29/17 2:20 PM by admin

PROPERTY VALUE
 53.7837286515651

Edit of Documentation

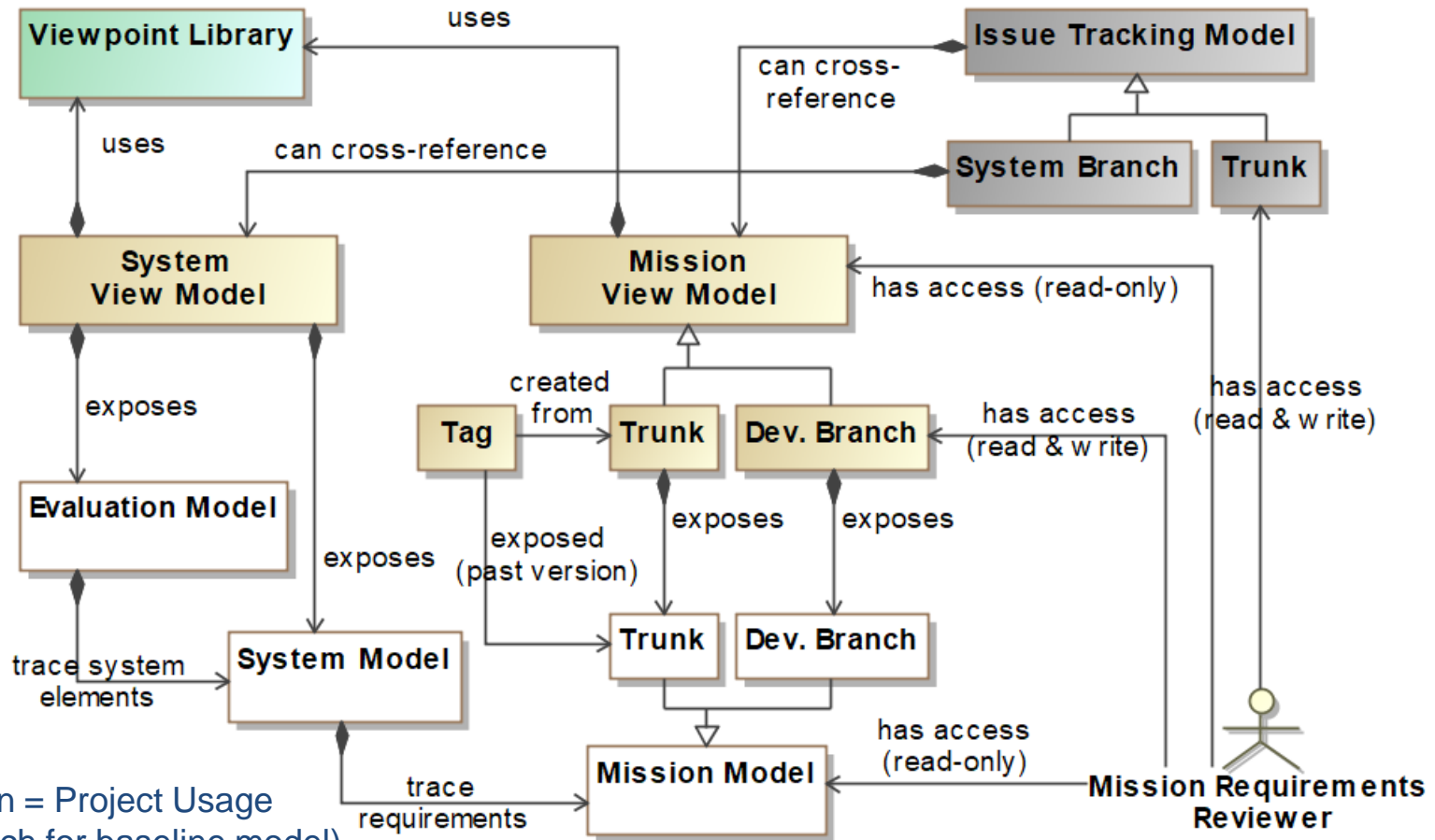
- Branches/Tasks (similar to GitHub branches)
 - To create a separate workspace built by copying data at a specified time (any following changes do not affect the "master" branch)
 - Able to merge with TWC Branches of the same name
 - Merging only if created in Cameo! Or merging of single elements through comparison
 - New branches still include added presentation elements from View Editor
- Tags (sets of permanently saved read-only data with a timestamp)
 - To create "snapshots" of all the data on View Editor at specified times, e.g. for reviews
- Manage Branches/Tags
 - To Create, Delete & Switch between
 - Deleted branches leave data in Alfresco & cannot be recreated from Cameo

Tags are read only: Switch to a branch to edit



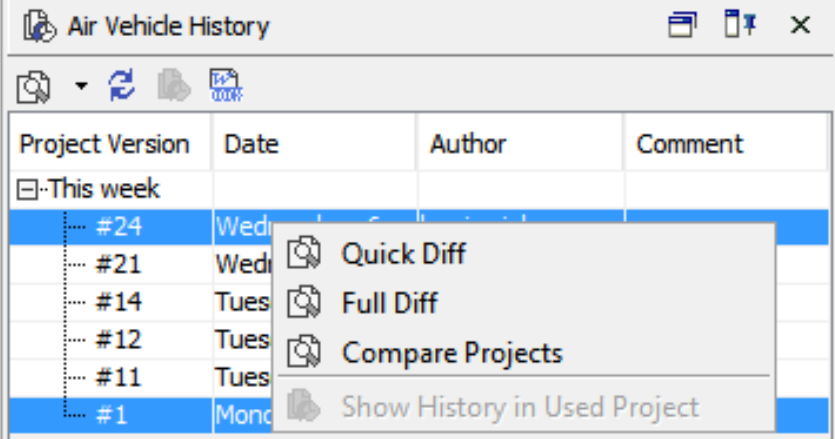
Project Usage & User Permissions: Example

- Permissions to edit/comment in the Development Branch of the Mission View Model, without being able to directly change requirements in Mission Model
- Addition of comments as issues in Issue Tracking Model Trunk branch
- No access on any System Model and Evaluation Model related information



Composition = Project Usage
(Trunk branch for baseline model)

- What is Teamwork Cloud?
 - Server to work on the same Magicdraw/Cameo projects and merge the concurrent work of all modelers together
- Collaboration Features
 - Editing server projects locally and commit changes/receive updates
 - Locking elements for edit, to prevent simultaneous changes by other users
 - Project and Element History (including comparison between two versions)
 - Branching and Merging projects



The screenshot shows a window titled "Air Vehicle History" with a table of project versions. A context menu is open over the row for version #24, showing options: "Quick Diff", "Full Diff", "Compare Projects", and "Show History in Used Project".

Project Version	Date	Author	Comment
This week			
#24	Wed		
#21	Wed		
#14	Tues		
#12	Tues		
#11	Tues		
#1	Mon		

MMS

- Purpose: A central **structured data hub** for multi-tool, multi-repository, and multi-discipline integration
- Storing:
 - All **model elements** of a project, including their change history; view instances and tags for VE
 - **Non-Magicdraw data**
- Interfaces:
 - **RESTful web services**
 - Login through Magicdraw, VE and Alfresco (for user/model mgmt)

TWC

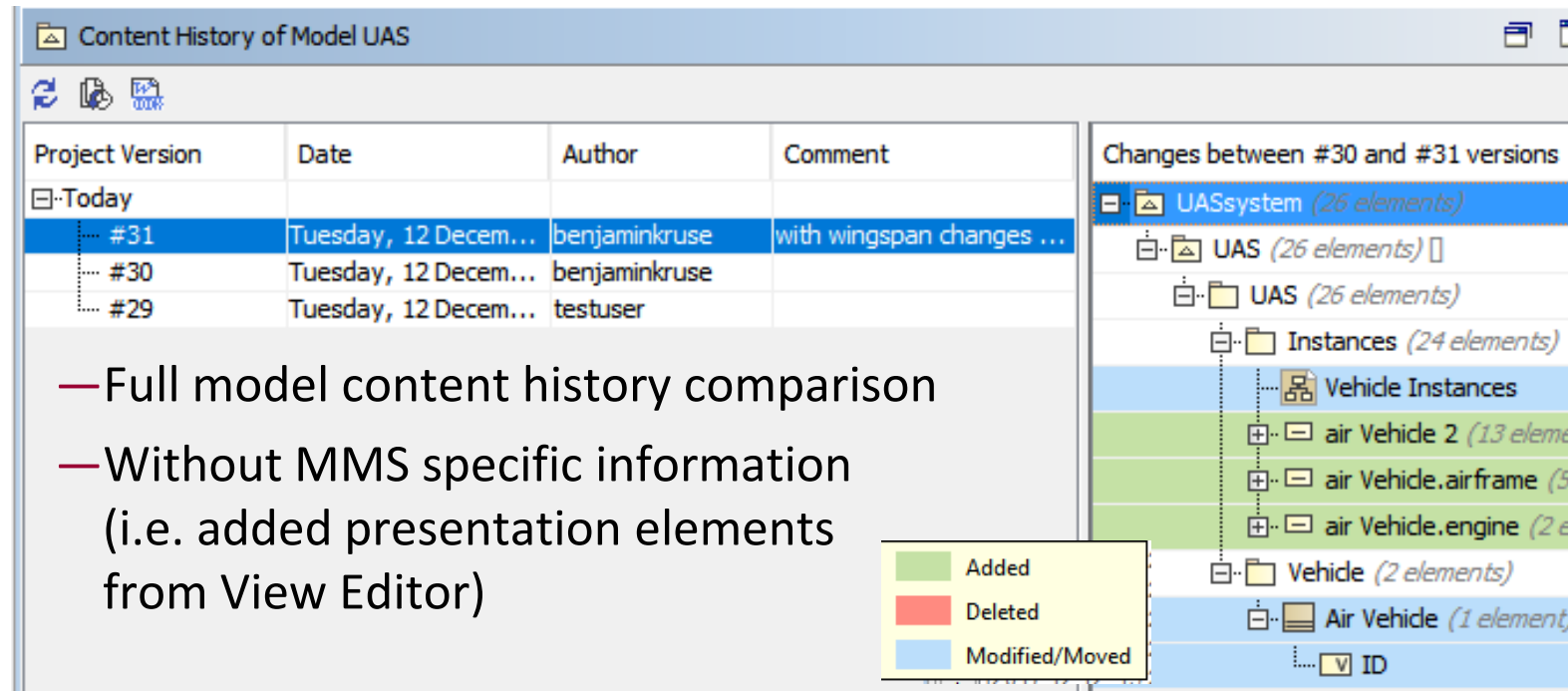
- Purpose: Concurrent & distributed **Magicdraw modeling**, including **versioning** and **branches**
- Storing:
 - **Magicdraw projects**, including their branches, model versions and element history (e.g. for merging branches)
 - (Collaborator data stored separately)
- Interfaces:
 - REST API (by NoMagic)
 - Login through Magicdraw and Admin Console (& Alfresco for Collaborator)

View Editor vs. TWC: History Comparison

- View Editor: For quick checks with limited scope
 - History of single elements only
 - Including all added presentation elements
 - (Model validation in Cameo: open model vs. current state in MMS)
- TWC: For broad-scale merging of heavily changed models

Documentation

AnThis Air Vehicle is a man-made object that propels itself through the air. It is the main mobile part of the UAS **as defined**.



The screenshot shows the 'Content History of Model UAS' window. On the left is a table with the following data:

Project Version	Date	Author	Comment
Today			
#31	Tuesday, 12 Decem...	benjaminkruse	with wingspan changes ...
#30	Tuesday, 12 Decem...	benjaminkruse	
#29	Tuesday, 12 Decem...	testuser	

On the right is a tree view titled 'Changes between #30 and #31 versions'. The tree structure is as follows:

- UASsystem (26 elements)
 - UAS (26 elements) []
 - UAS (26 elements)
 - Instances (24 elements)
 - Vehicle Instances
 - air Vehicle 2 (13 elements) [Added]
 - air Vehicle.airframe (5 elements) [Added]
 - air Vehicle.engine (2 elements) [Added]
 - Vehicle (2 elements)
 - Air Vehicle (1 element) [Modified/Moved]
 - ID [Modified/Moved]

A legend at the bottom indicates:

- Green: Added
- Red: Deleted
- Blue: Modified/Moved

- Full model content history comparison
- Without MMS specific information (i.e. added presentation elements from View Editor)