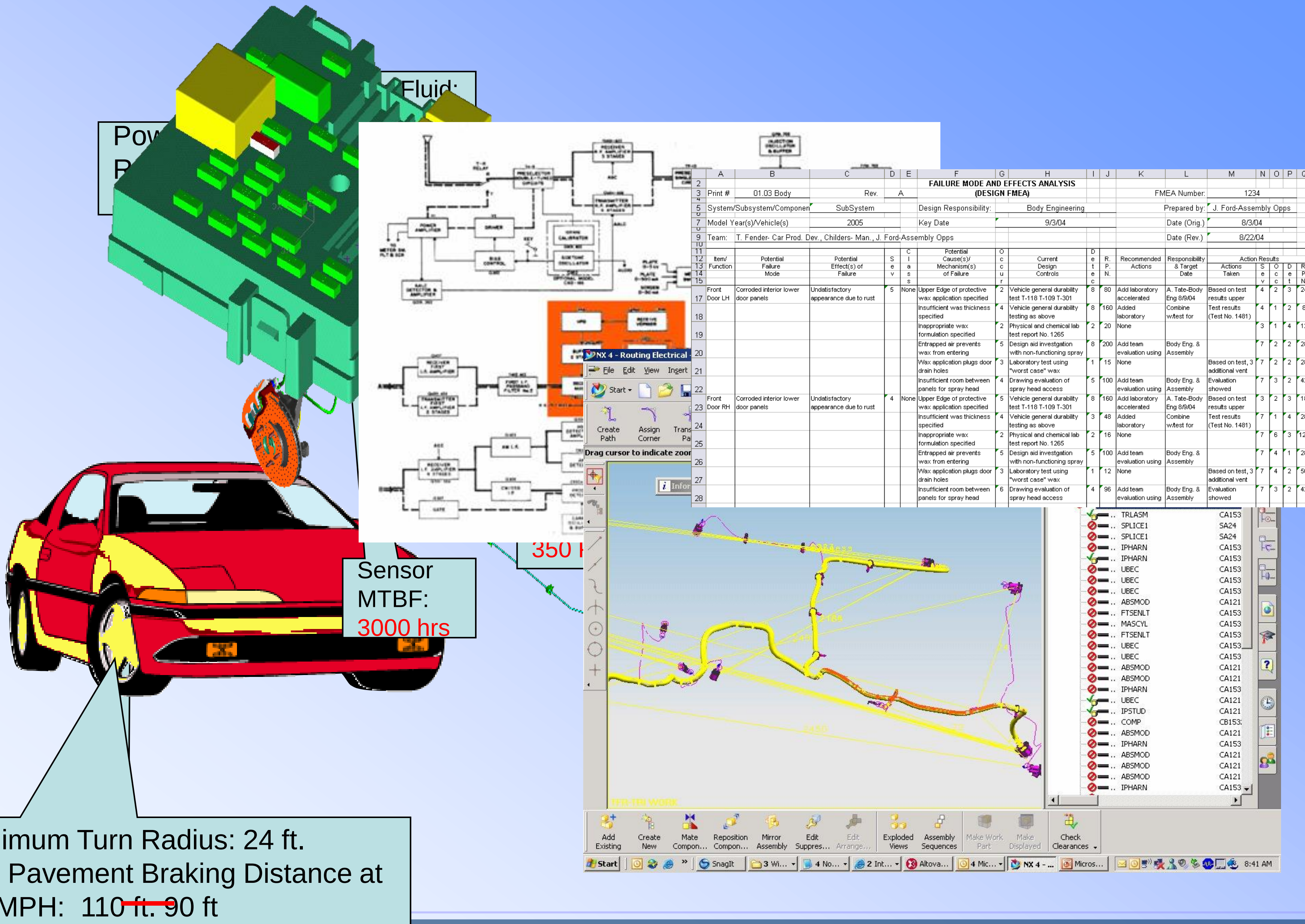
PTC® PRODUCT & SERVICE ADVANTAGE®

Standards, Tools and Technologies for Enabling MBSE Throughout the Systems Lifecycle

Matthew Hause
PTC Engineering Fellow, GTM Technical Specialist

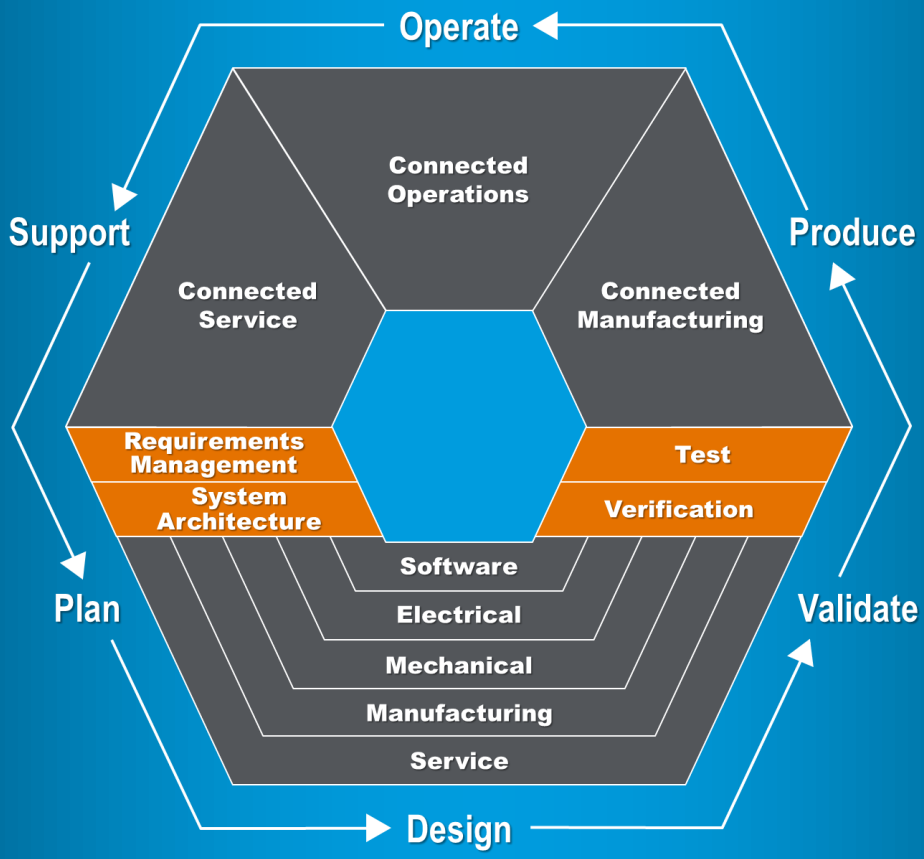
Integrated Systems Engineering Vision



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
2						FAILURE MODE AND EFFECTS ANALYSIS											
3	Print #	01.03 Body	Rev.	A		(DESIGN FMEA)						FMEA Number:	1234				
5	System/Subsystem/Componen	SubSystem				Design Responsibility:		Body Engineering				Prepared by:	J. Ford-Assembly Opps				
7	Model Year(s)/Vehicle(s)	2005				Key Date		9/3/04				Date (Orig.)	8/3/04				
9	Team:	T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps										Date (Rev.)	8/22/04				
11–15	Item/ Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Design Controls	Detec	R. P. N.	Recommended Actions	Responsibility & Target Date	Action Results: Actions Taken	Sev	Occ	Det	R. P. N.
17	Front Door LH	Corroded interior lower door panels	Undatisfactory appearance due to rust	5	None	Upper Edge of protective wax application specified	2	Vehicle general durability test T-118 T-109 T-301	8	80	Add laboratory accelerated	A. Tate-Body Eng 8/9/04	Based on test results upper	4	2	3	24
18						Insufficient was thickness specified	4	Vehicle general durability testing as above	8	160	Added laboratory	Combine w/test for	Test results (Test No. 1481)	4	1	2	8
19						Inappropriate wax formulation specified	2	Physical and chemical lab test report No. 1265	2	20	None			3	1	4	12
20						Entrapped air prevents wax from entering	5	Design aid investgation with non-functioning spray	8	200	Add team evaluation using	Body Eng. & Assembly		7	2	2	28
21						Wax application plugs door drain holes	3	Laboratory test using "worst case" wax	1	15	None		Based on test, 3 additional vent	7	2	2	28
22						Insufficient room between panels for spray head	4	Drawing evaluation of spray head access	5	100	Add team evaluation using	Body Eng. & Assembly	Evaluation showed	7	3	2	42
23	Front Door RH	Corroded interior lower door panels	Undatisfactory appearance due to rust	4	None	Upper Edge of protective wax application specified	5	Vehicle general durability test T-118 T-109 T-301	8	160	Add laboratory accelerated	A. Tate-Body Eng 8/9/04	Based on test results upper	3	2	3	18
24						Insufficient was thickness specified	4	Vehicle general durability testing as above	3	48	Added laboratory	Combine w/test for	Test results (Test No. 1481)	7	1	4	28
25						Inappropriate wax formulation specified	2	Physical and chemical lab test report No. 1265	2	16	None			7	6	3	126
26						Entrapped air prevents wax from entering	5	Design aid investgation with non-functioning spray	5	100	Add team evaluation using	Body Eng. & Assembly		7	4	1	28
27						Wax application plugs door drain holes	3	Laboratory test using "worst case" wax	1	12	None		Based on test, 3 additional vent	7	4	2	56
28						Insufficient room between panels for spray head	6	Drawing evaluation of spray head access	4	96	Add team evaluation using	Body Eng. & Assembly	Evaluation showed	7	3	2	42

Systems Engineering is…

A **holistic**, **multi-disciplinary** and collaborative approach to designing and maintaining **complex** systems.



THINGS are Changing

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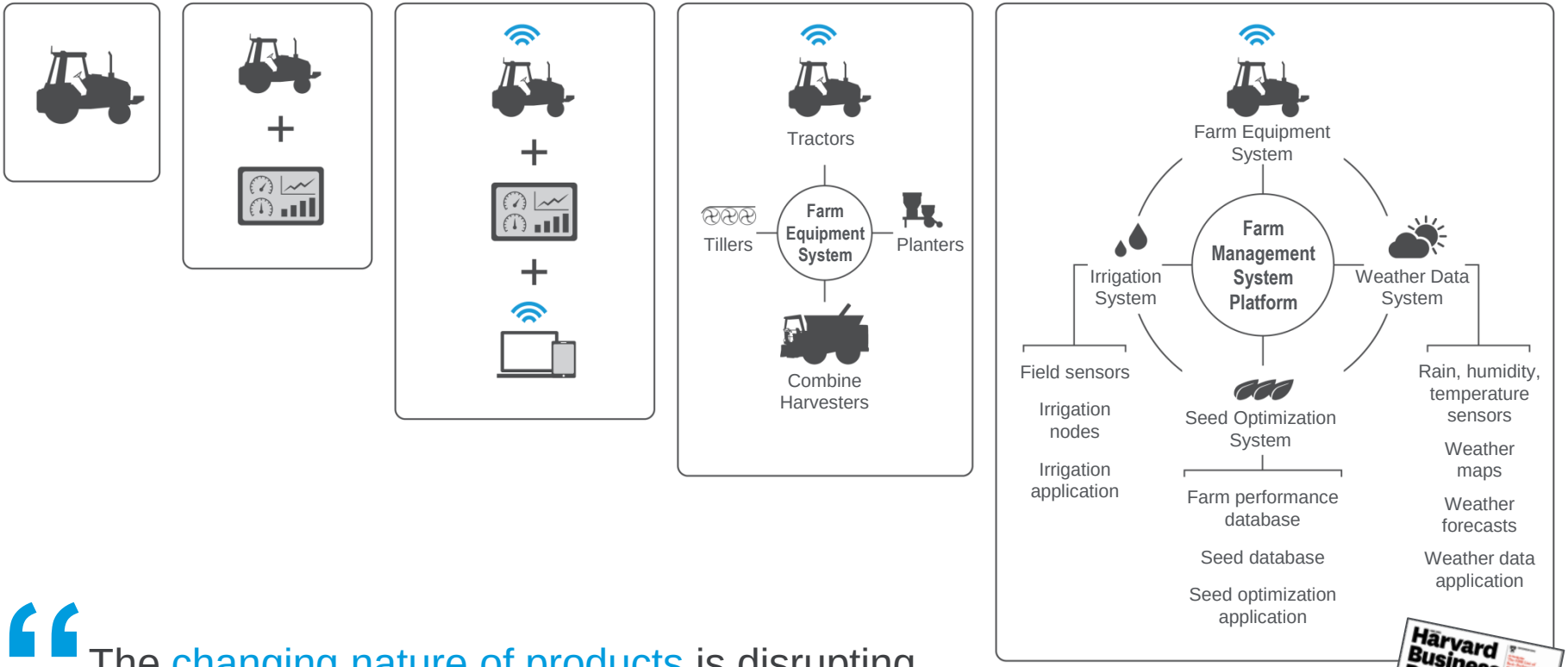
Product → **Smart Product** → **Smart, Connected Product** → **Product System** → **System Of Systems**



> “The changing nature of products is disrupting value chains, forcing companies to rethink and retool nearly everything they do internally.”

Model-Based Engineering

INCOSE
International Council on Systems Engineering

PTC®

- Model-based Systems Engineering (MBSE) is the formalized application of modeling to support system requirements, design, analysis, verification, and validation activities beginning in the conceptual design phase and continuing through-out development and later lifecycle phases." (INCOSE, 2007).
- Modeling is at the heart of all aspects of the development effort
  - Covers the complete product and project lifecycle
  - Has a direct effect on any generated artifacts.
  - MBE encompasses architecture, systems and software development.

Changes in Systems Engineering Practice

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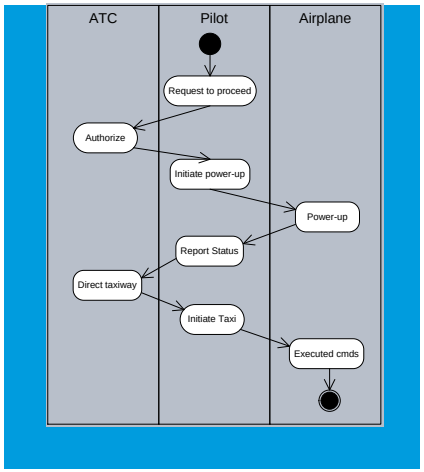
Change from Document centric to Model centric

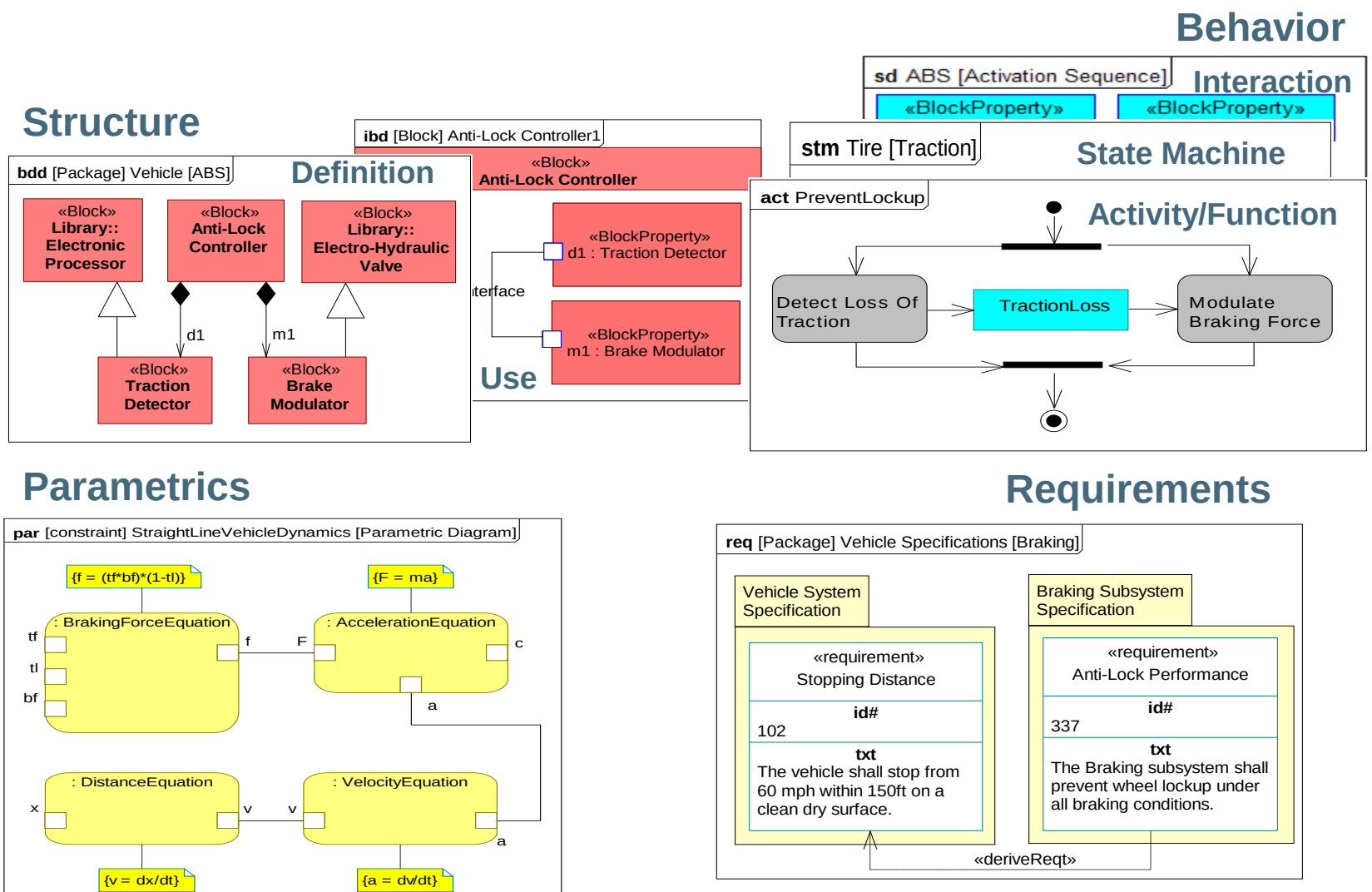
Requirement Specifications
Interface Definitions
System Architecture
System Functionality
Trade-off Analysis
Test Specifications
Etc.



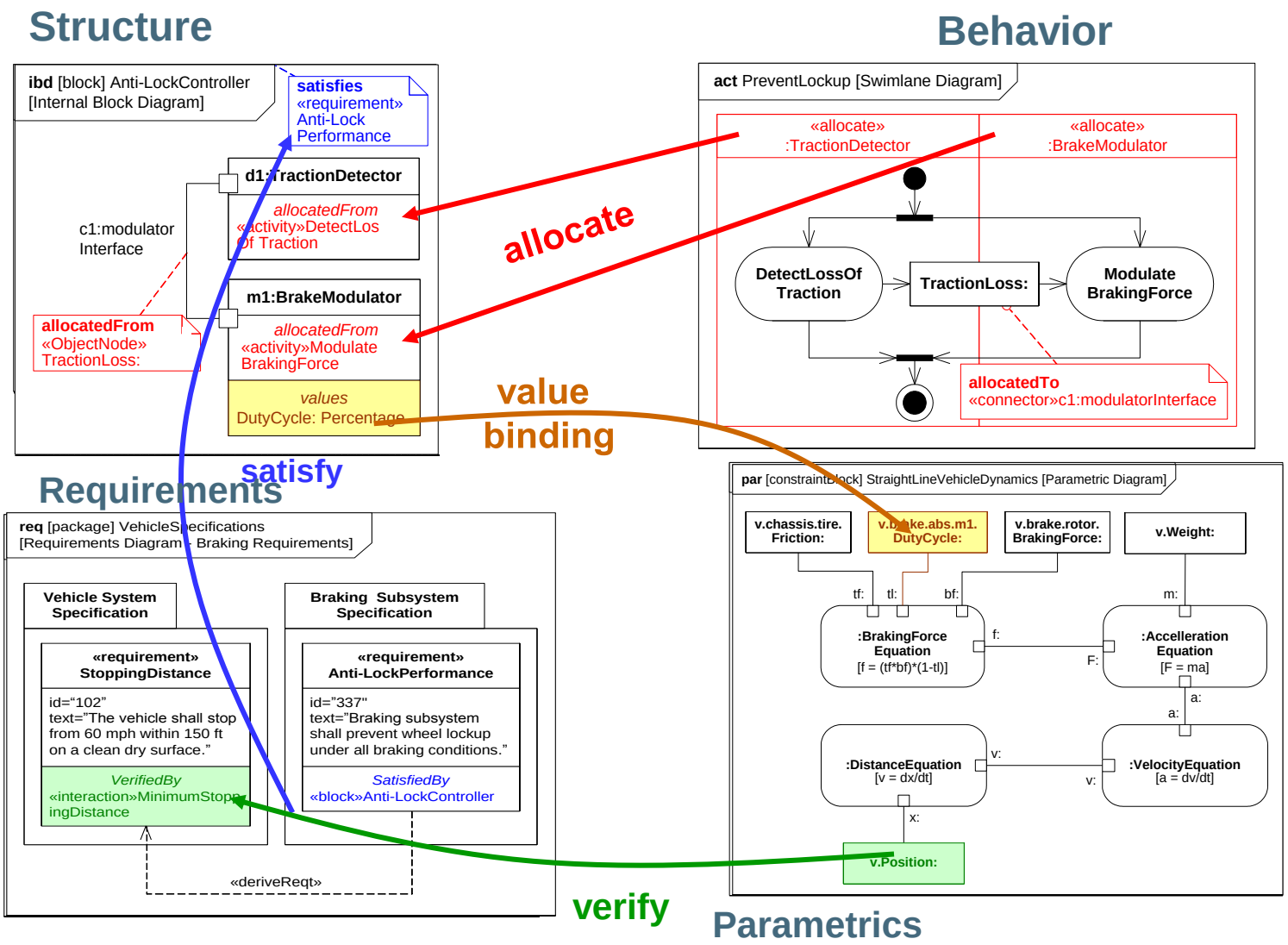
Old Approach

New Approach

The Four Pillars of SysML



Cross Connecting Model Elements



Problem Statement for Traffic Management System

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- 1. General Background

  The city of Autoville has just elected a new city council with a mandate to reduce traffic on the highways and thoroughfares. After receiving a grant of $200M from the federal government, they have decided to acquire a traffic management system to help them identify areas and times of high traffic density so they can take measures to alleviate the effects of it. The city of Autoville has 100 miles of highway with 10 interchanges and 300 miles of thoroughfares with 100 major intersections. Systems will include controlled parking facilities, availability monitoring and dissemination, emergency management, traffic control and prediction, and support for electric vehicles.

Requirements

- The requirements specified by the management are:
  - The system shall identify traffic levels on all highways and thoroughfares.
  - The system shall provide traffic data for intervals not greater than 1 mile for highways and ¼ mile for thoroughfares.
  - The system shall provide traffic data that is no more than 5 minutes old.
  - The system shall record traffic data for 30 days.
  - The system shall provide a 24-hour centralized control room capable of being manned by no more than 2 persons at any time.
  - The system shall provide live video surveillance of major highways to a centralized control room.
  - The system shall automatically report major traffic-causing incidents to the control room within 10 minutes.

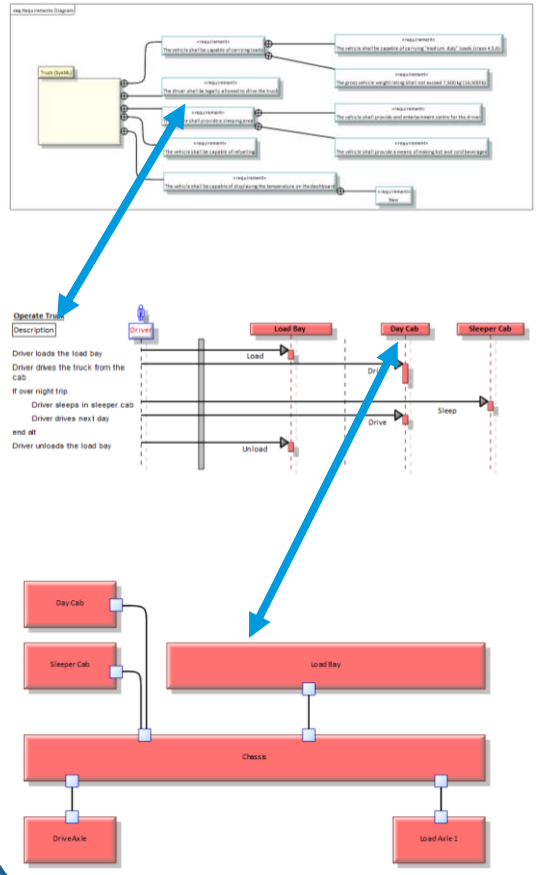
Requirements

- The requirements specified by the management are:
  - The system shall estimate total delay time per accident.
  - The system shall record length of backup per accident.
  - The system shall estimate time to clear accident and resume normal flow.
  - The system shall provide user-defined reports to support future highway and thoroughfare planning and construction.
  - The system shall have an operational life of not less than 10 years.
  - The development cost of the system shall not exceed $100M.
  - The operations and maintenance cost of the system shall not exceed $10M per year.
  - The system shall be operational by Dec 30th, 2012.

PTC Integrity Modeler – LC Manager Integration

Modeler Release 8.2

PTC Integrity™ Modeler™



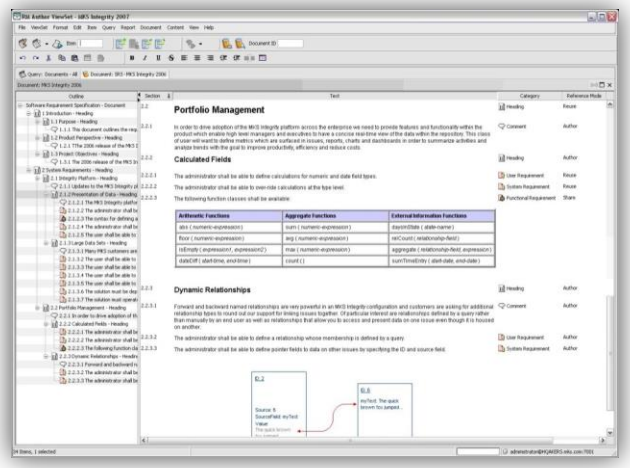
PTC Integrity Lifecycle Manager Synchronizer

Requirements

Additional Model Elements

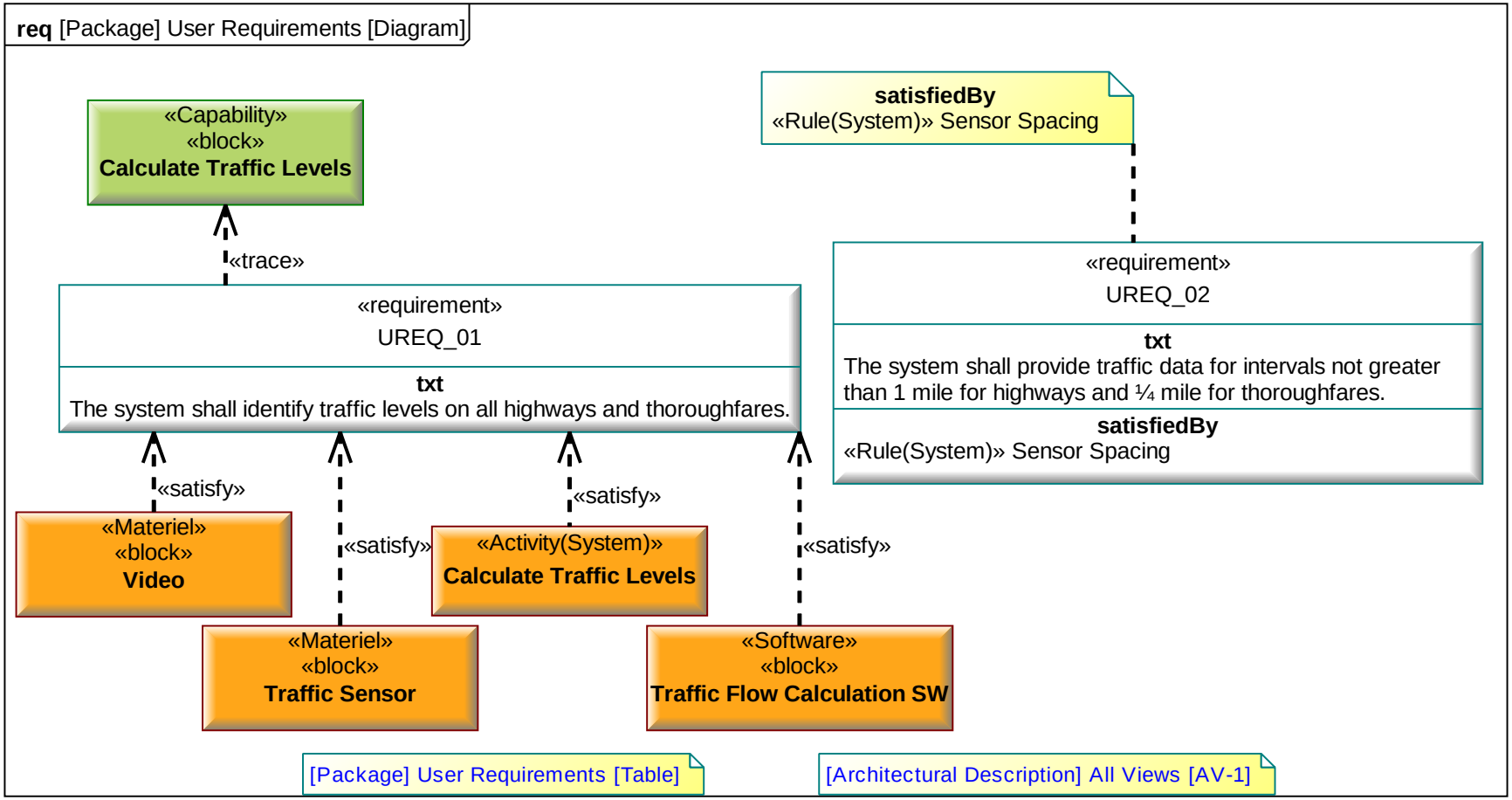
Model Trace Links

PTC Integrity Lifecycle Manager



Note: this is not a purchasable line item and is included with Modeler

SysML Requirements Diagram



Requirements Traceability Table

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A	B	C	D	E	F
[Package] User Requirements [Table]					
	Name	**Txt**	**Rationale**	**Satisfied By**	**Traces To**
	UREQ_01	The system shall identify traffic levels on all highways and thoroughfares.		«Software» Traffic Flow Calculation SW (Autoville Traffic Management Architecture::System Views::Resources::Software) «Materiel» Video (Autoville Traffic Management Architecture::System Views::Resources::Materiel) «Materiel» Traffic Sensor (Autoville Traffic Management Architecture::System Views::Resources::Materiel) «Activity(System)» Calculate Traffic Levels (Autoville Traffic Management Architecture::System Views::System Activities::System Software Activities)	«Capability» Calculate Traffic Levels (Autoville Traffic Management Architecture::Enterprise Views::Capabilities)
	UREQ_02	The system shall provide traffic data for intervals not greater than 1 mile for highways and ¼ mile for thoroughfares.		«Rule(System)» Sensor Spacing (Autoville Traffic Management Architecture::System Views::Resources::Materiel::Traffic Sensor)	
	UREQ_03	The system shall provide traffic data that is no more than 5 minutes old.		«Rule(System)» Update Rate (Autoville Traffic Management Architecture::System Views::Resources::Materiel::Traffic Sensor) «Rule(System)» Traffic Data Update Interval (Autoville Traffic Management Architecture::System Views::System Activities::System Software Activities::Send Traffic Report)	
	UREQ_04	The system shall record traffic data for 30 days.		«Software» Traffic Data Archive SW (Autoville Traffic Management Architecture::System Views::Resources::Software) «Rule(System)» Traffic Data Archive Capacity (Autoville Traffic Management Architecture::System Views::Resources::Software::Traffic Data Archive SW)	

AV-1 Project Overview

[Architectural Description] All... | [Package] User Requirements [...

Architecture Project Identification

Name:
Autoville Traffic Management Architecture

Architect:
Matthew Hause: Traffic Management Architect

Developing Organization:
Autoville TD

Assumptions & Constraints:
TBD

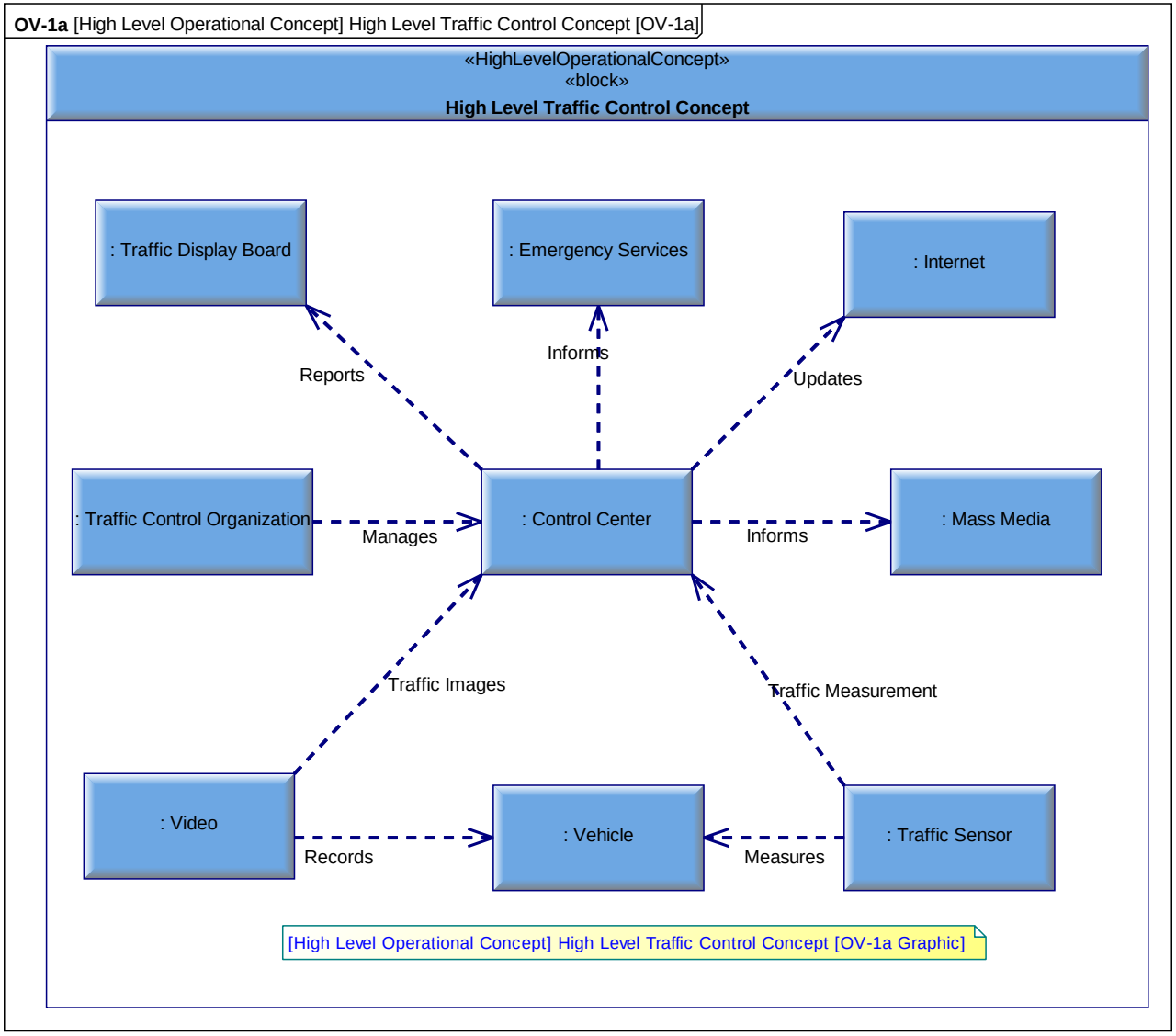
Approval Authority:
Marty Mayor: City Mayor

Date Completed:
TBD

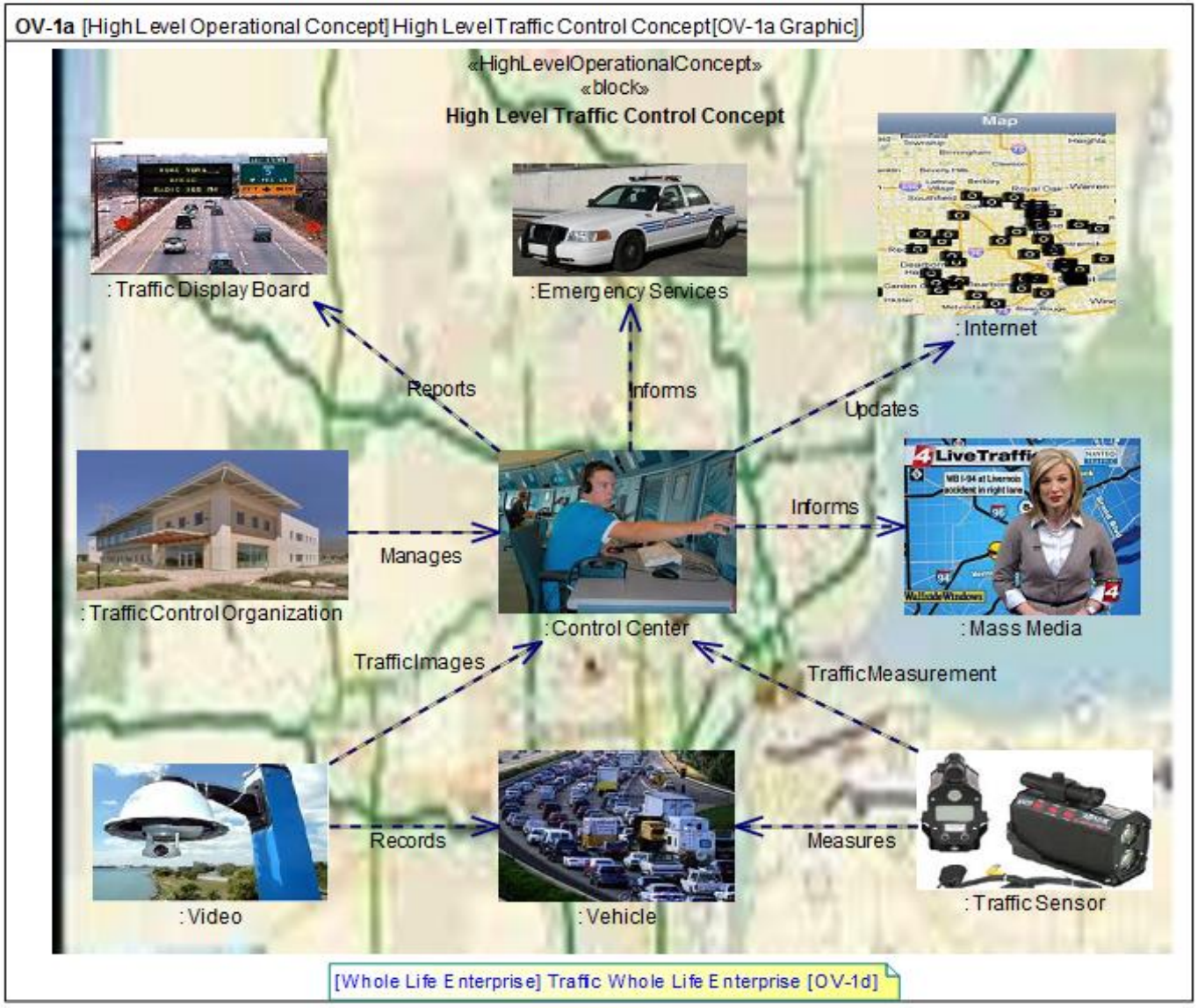
Scope

Views & Products Developed:
[Architectural Description] All Views [AV-1], [Architectural Description] Enterprise [CV-1], [Architectural Description] Capabilities [CV-2], [Architectural Description] Capabilities [CV-2 Resources], [Architectural Description] Capabilities [CV-3], [Capability] Traffic Management [CV-4], [Architectural Description] Operational Activities [CV-6], [High Level Operational Concept] High Level Traffic Control Concept [OV-1a], [High Level Operational Concept] High Level Traffic Control Concept [OV-1a Graphic], [Architectural Description] Operational Concept [OV-1b], [Whole Life Enterprise] Traffic Whole Life Enterprise [OV-1d], [Performer] Autoville Context [OV-2], [Architectural Description] Operational Nodes [OV-3], [Architectural Description] Typical Organizations [OV-4 Typical], [Architectural Description] Actual Organizations [OV-4 Actual], [Activity (Operational)] Manage Traffic [OV-5b], [Performer] Autoville Traffic Context [OV-6b], [Logical Data Model] Traffic Data [DIV-2], [Architectural Description] Project Definition [PV-1], [Architectural Description] Actual Projects [PV-1], [Architectural Description] Actual Projects [PV-2], [System] Traffic Context [SV-1], [System] Control Room [Sv-1], [System] Control System [SV-2], [Architectural Description] Resources [SV-3], [Architectural Description] System Activities [SV-4], [Architectural Description] System Activities [SV-4], [Architectural Description] Resources [SV-6], [System] Control Room [SV-6], [Architectural Description] System Views [SV-8], [Architectural Description] Competencies [SV-9], [Internal Data Model] Traffic Data Model [DIV-3]

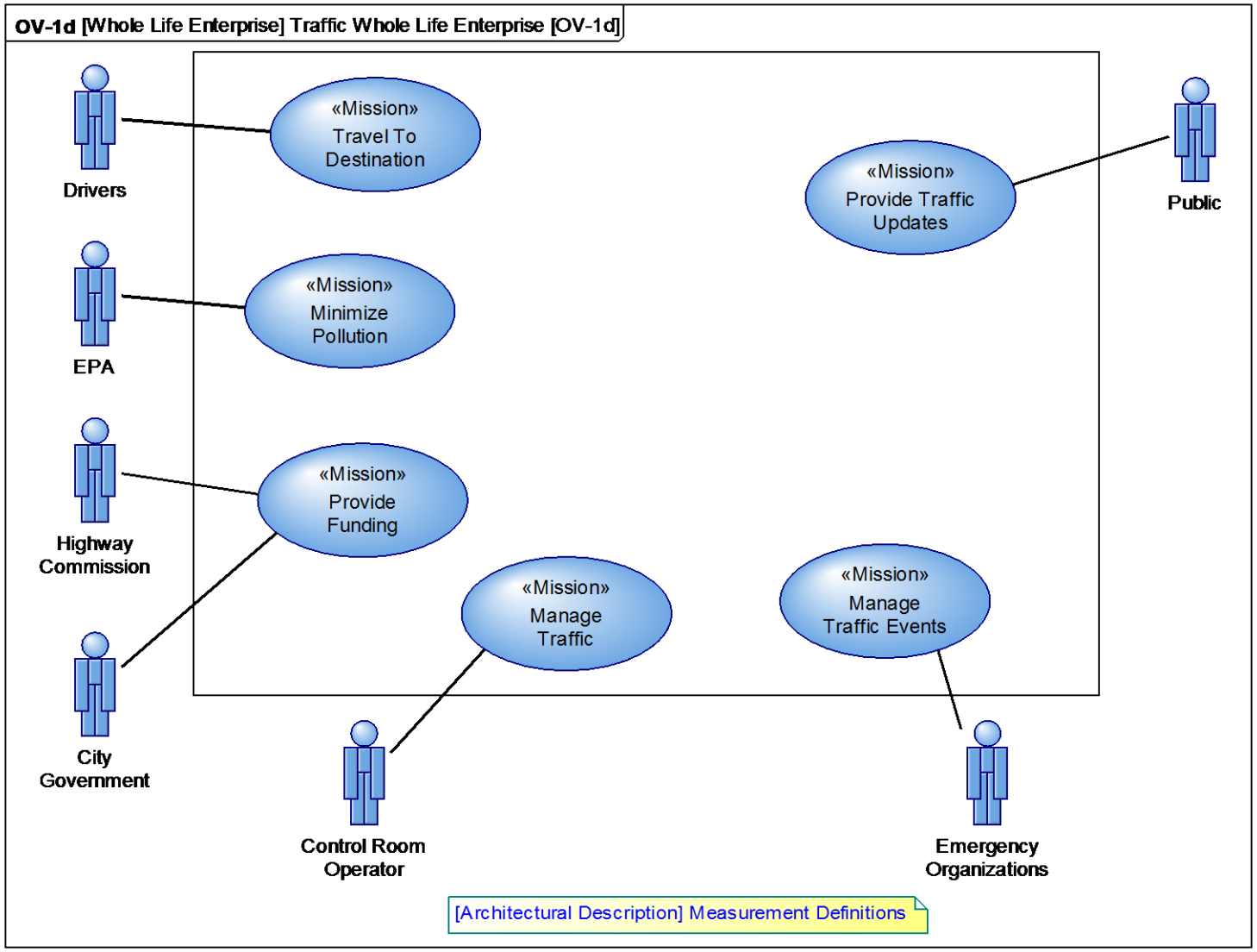
Operational Concept with Boxes



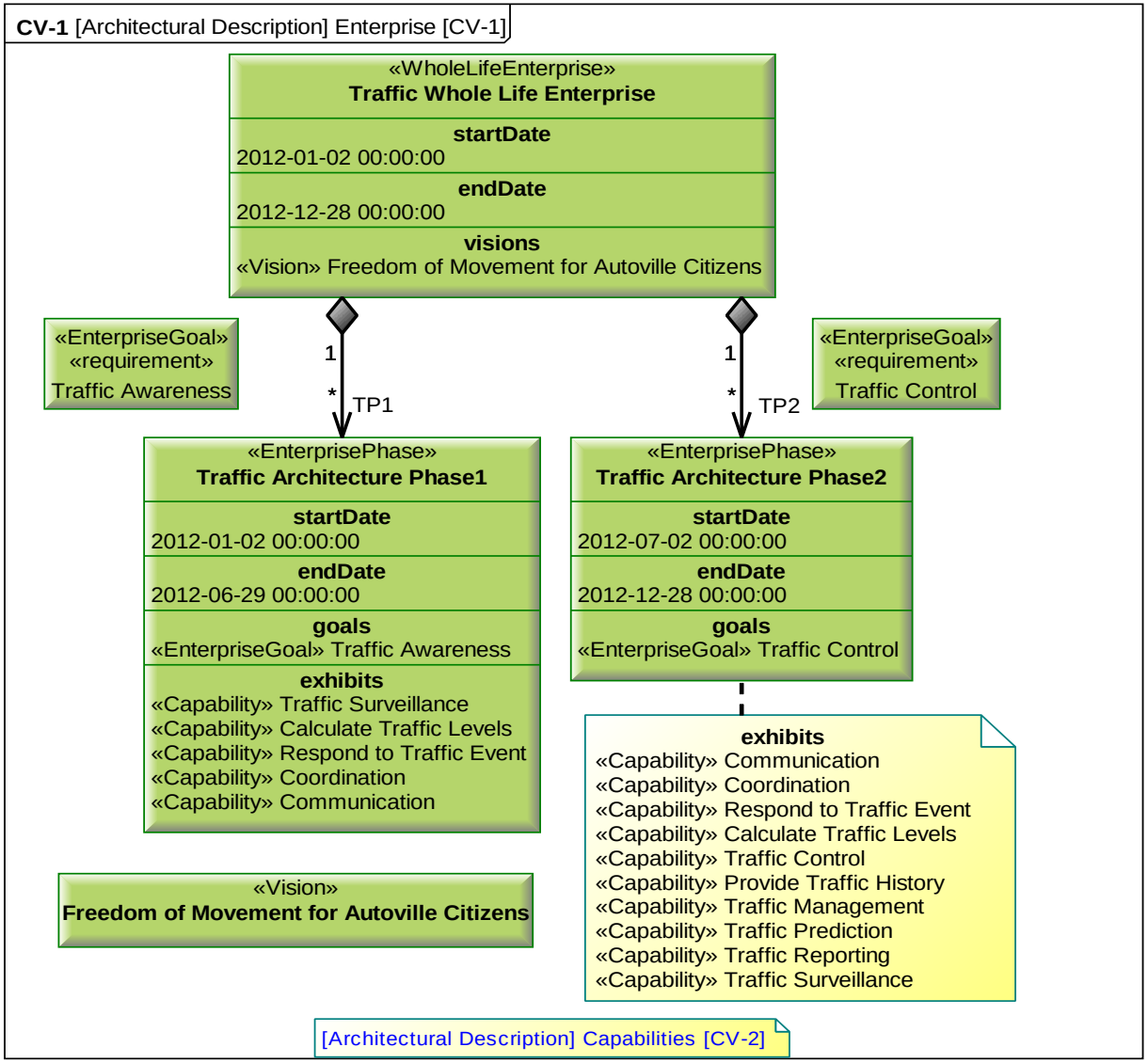
Operational Concept with Graphics



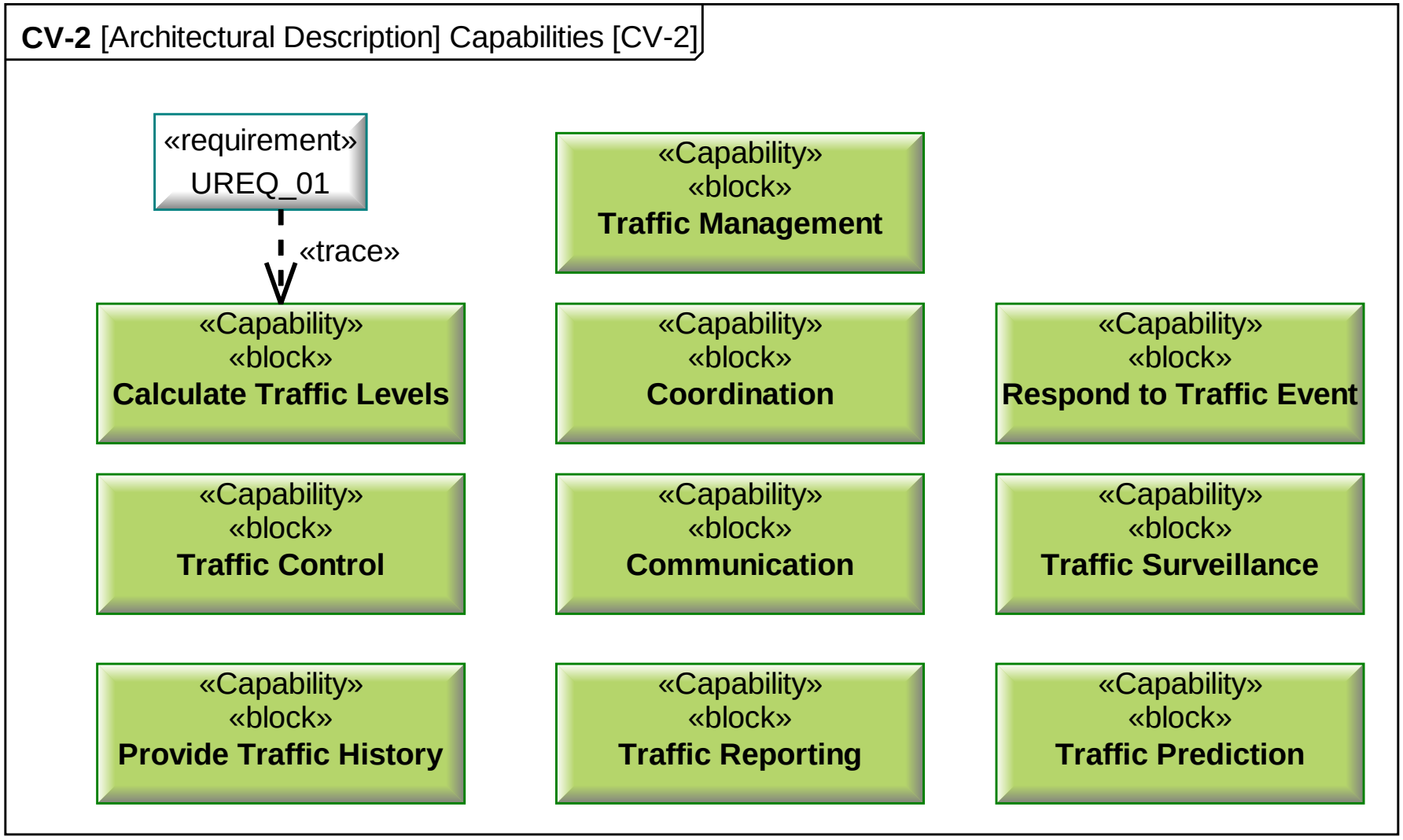
Traffic Management Use Cases and Stakeholders



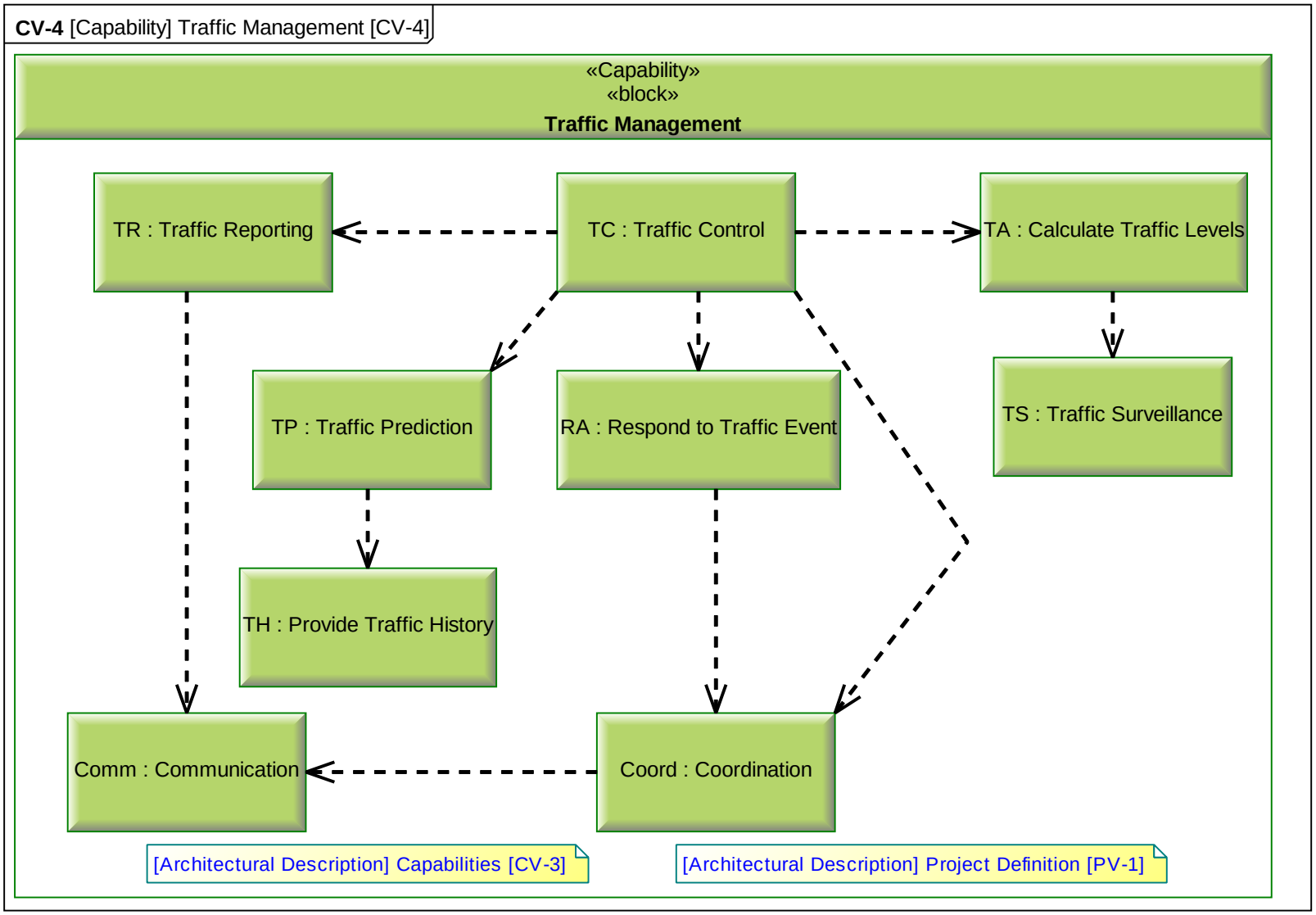
CV-1 Enterprise Overview



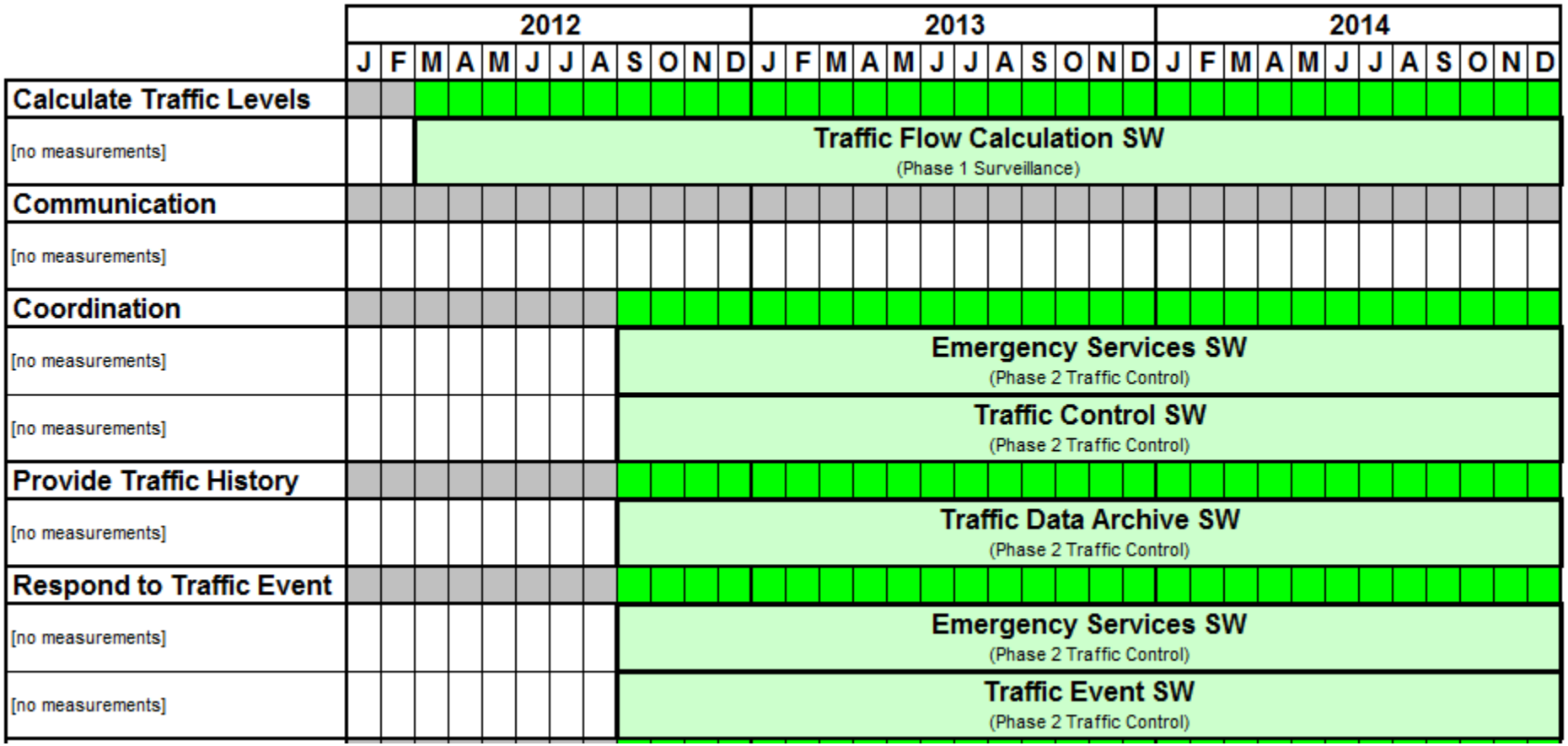
CV-2 Capability Taxonomy



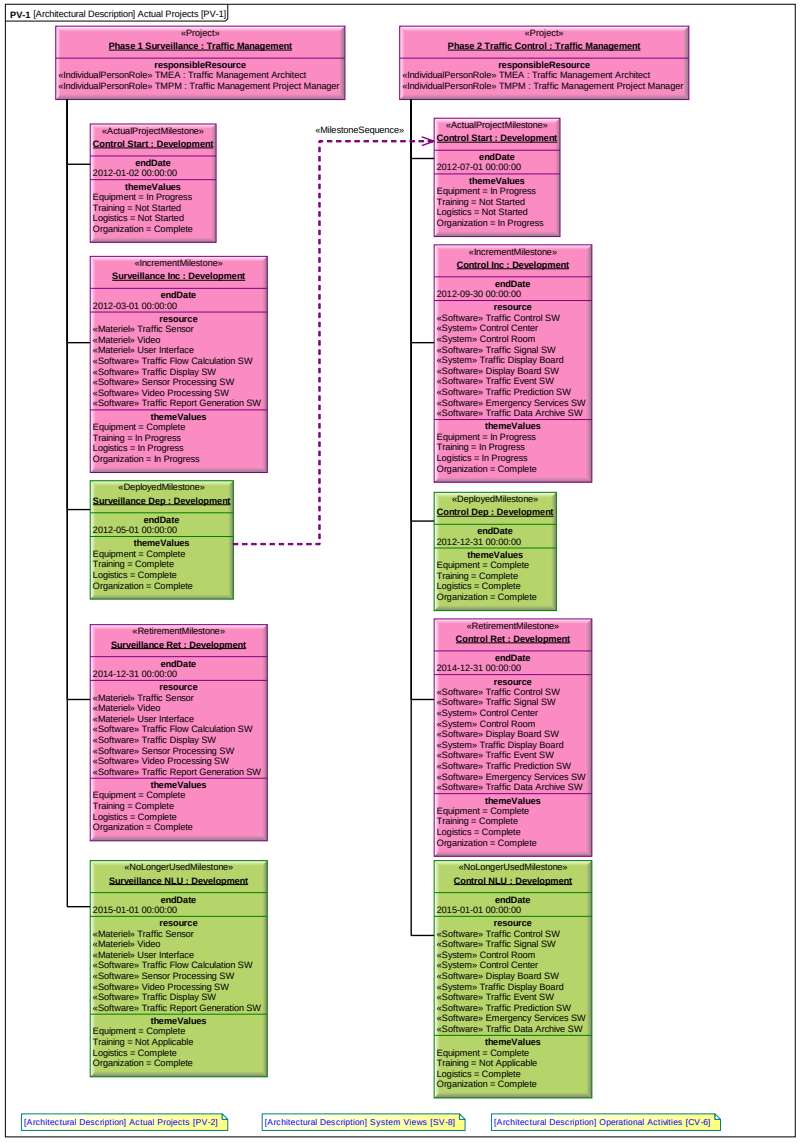
CV-4 Capability Dependencies



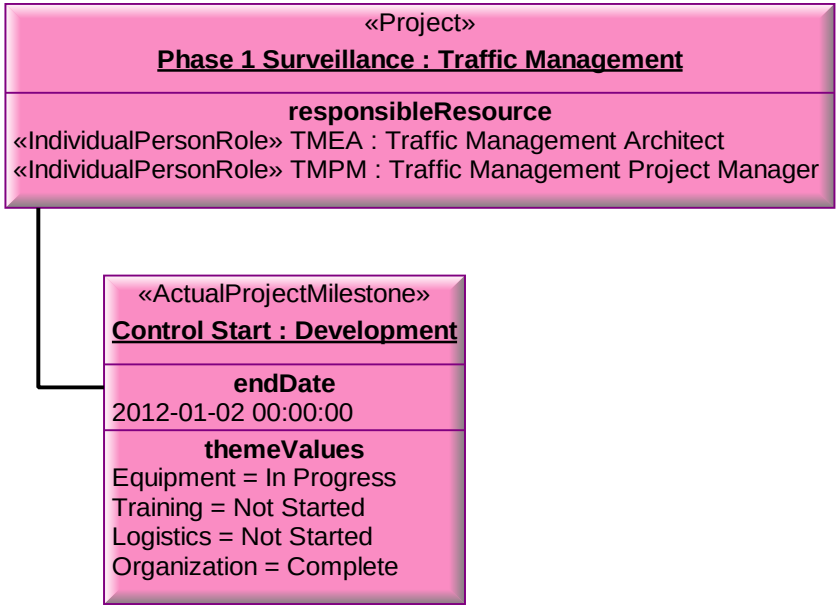
CV-3 Capability Phasing and System Deployment

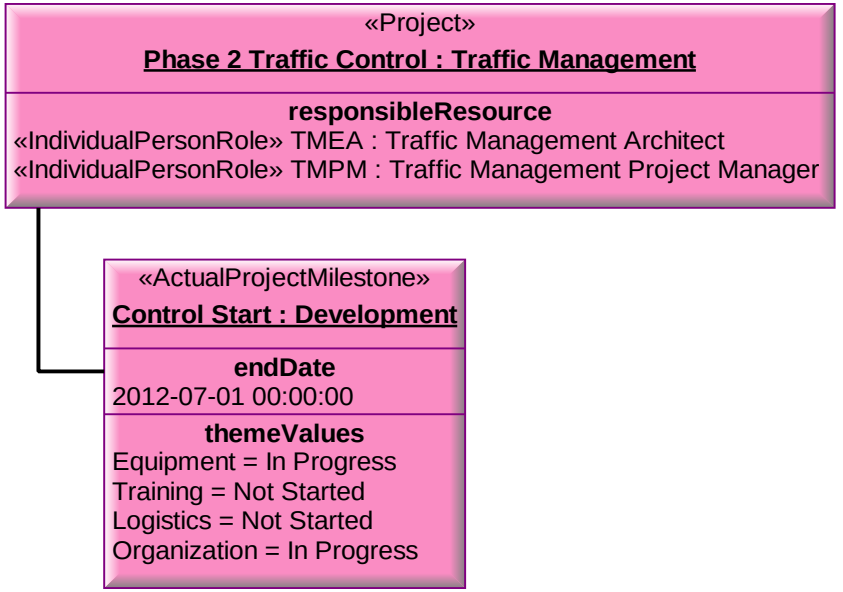


PV-1 Actual Projects

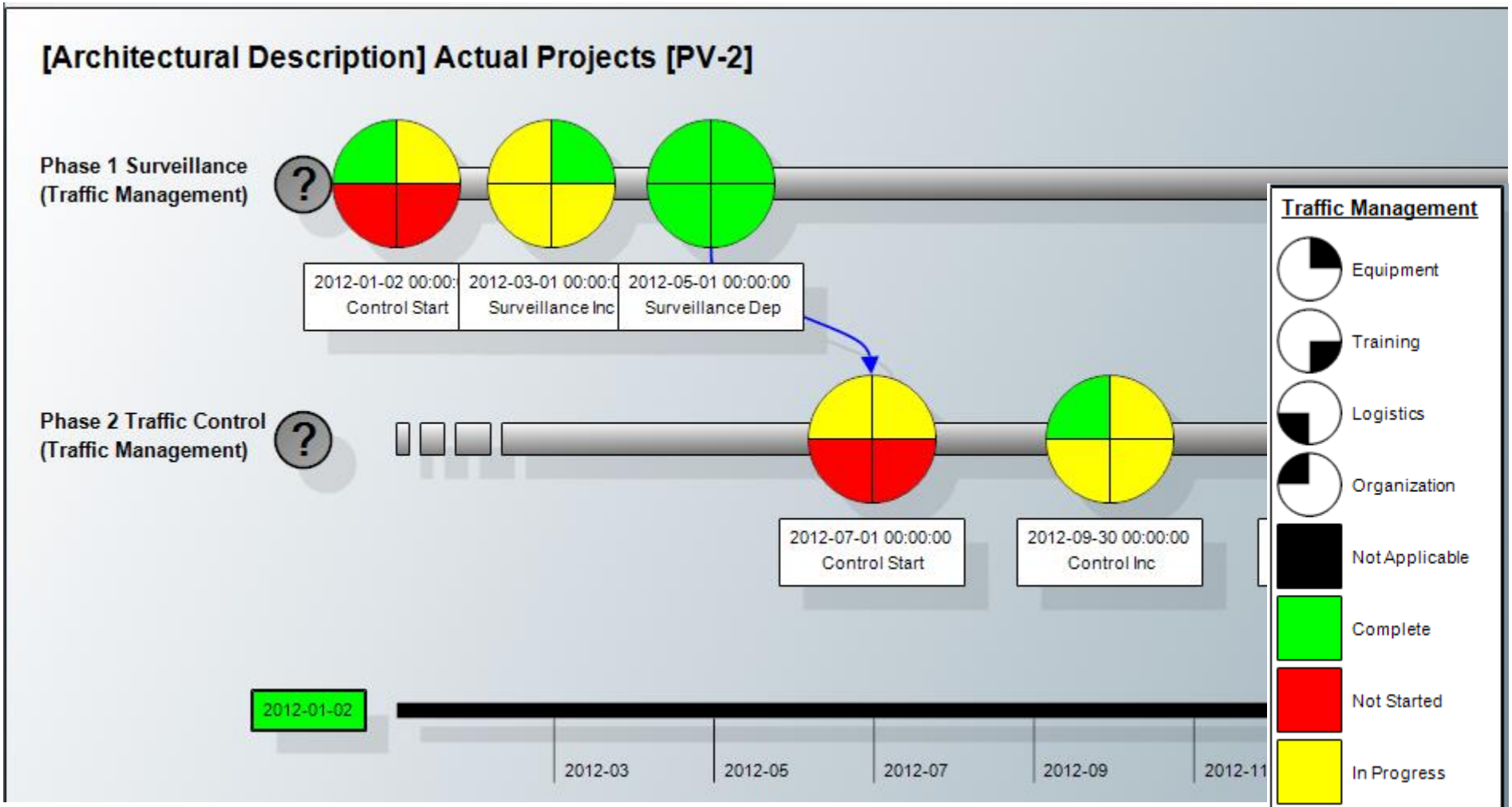


PV-1 Actual Project – Detail

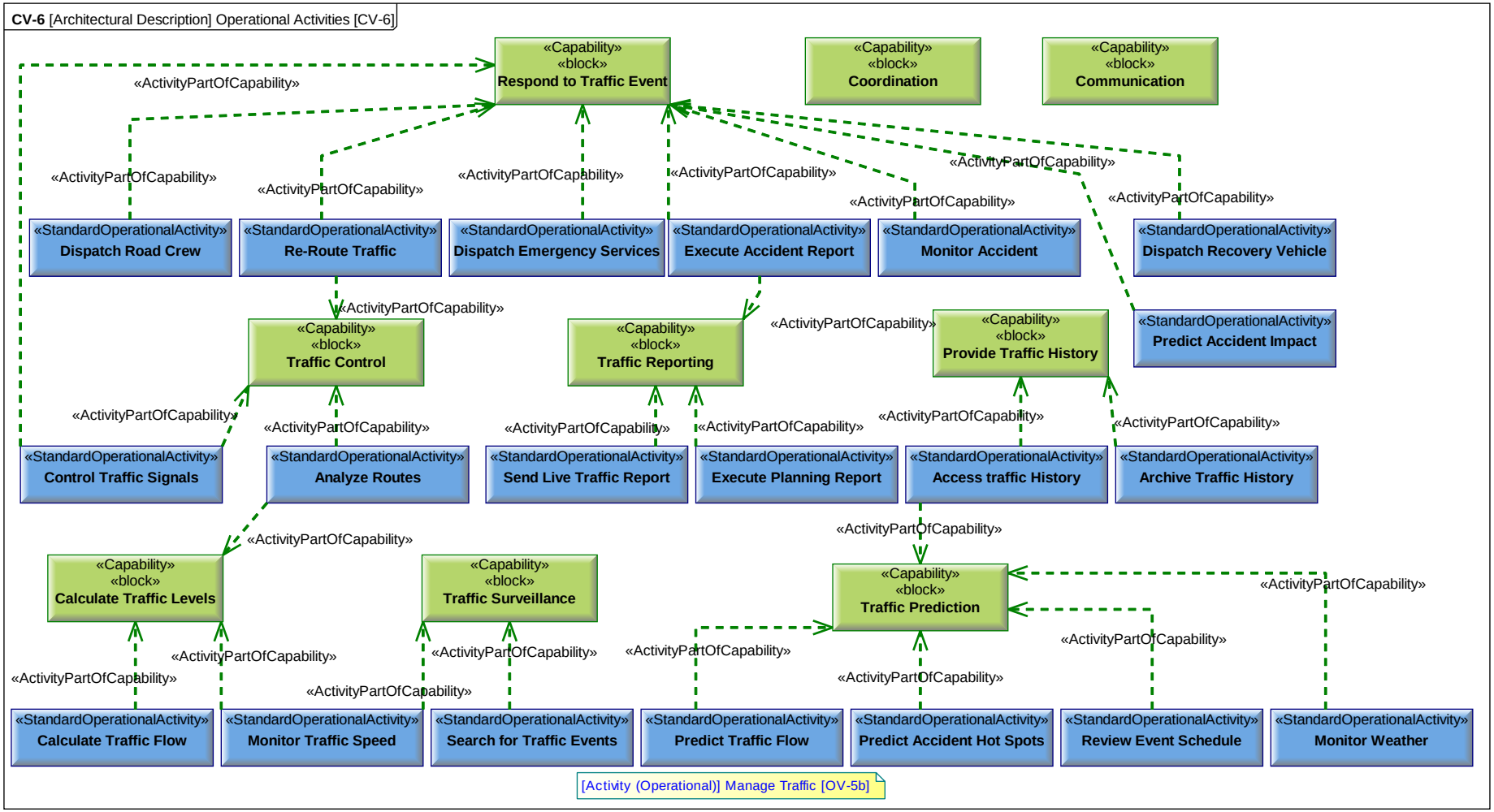




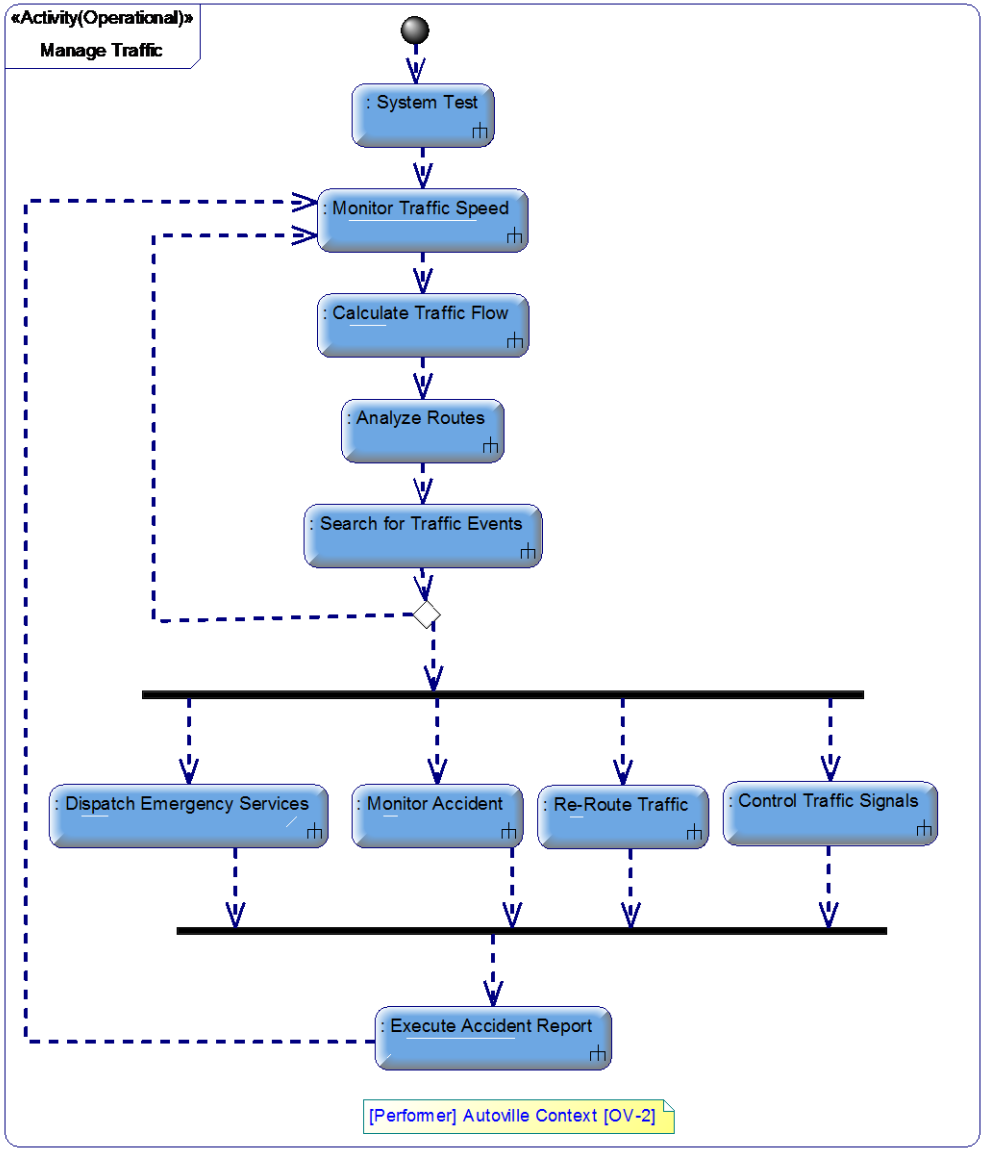
PV-2 Actual Project Timeline



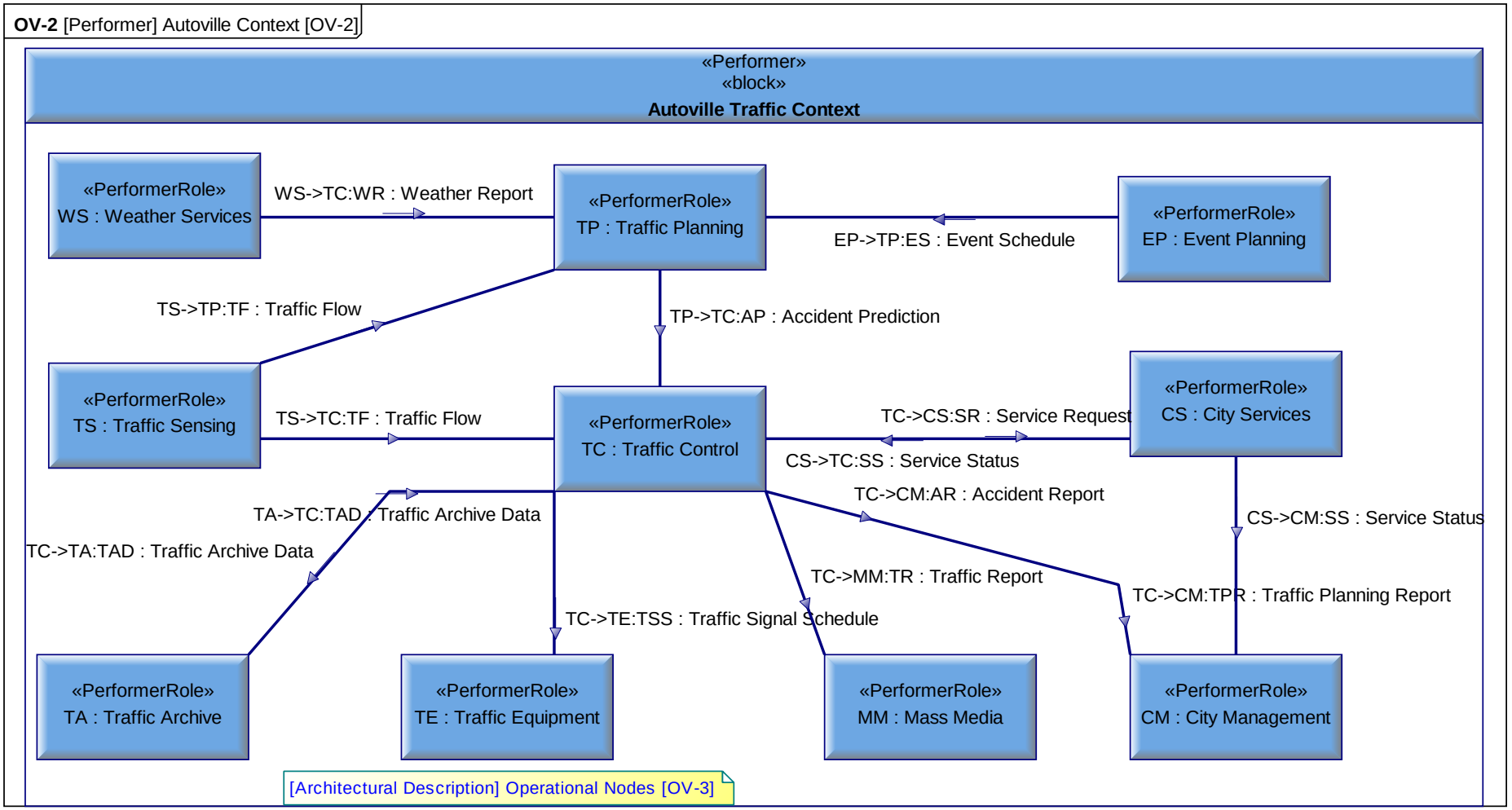
Capability to Activity Mapping



Manage Traffic Activity Sequence



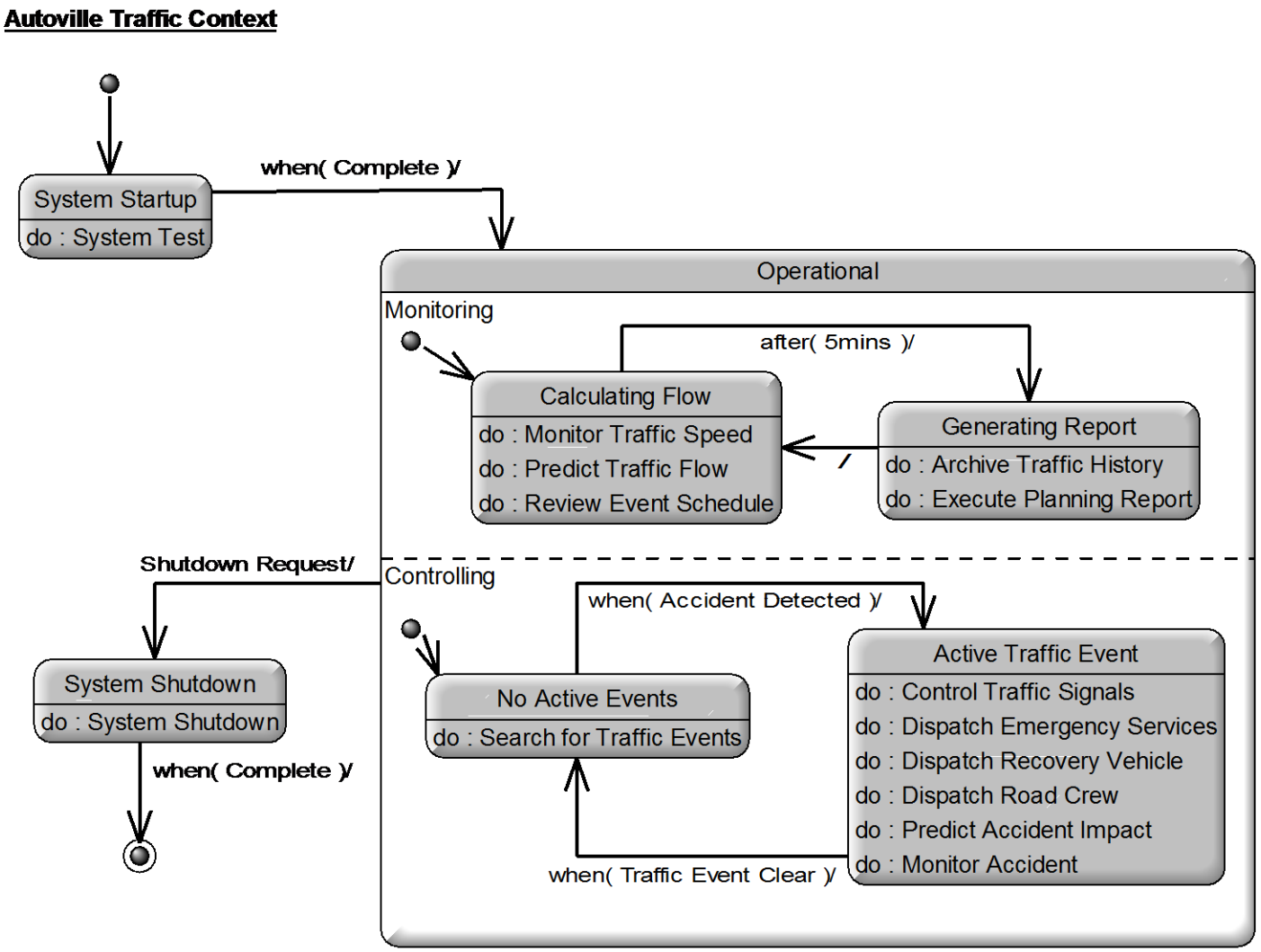
Operational Structure



Interaction Summary (ICD)

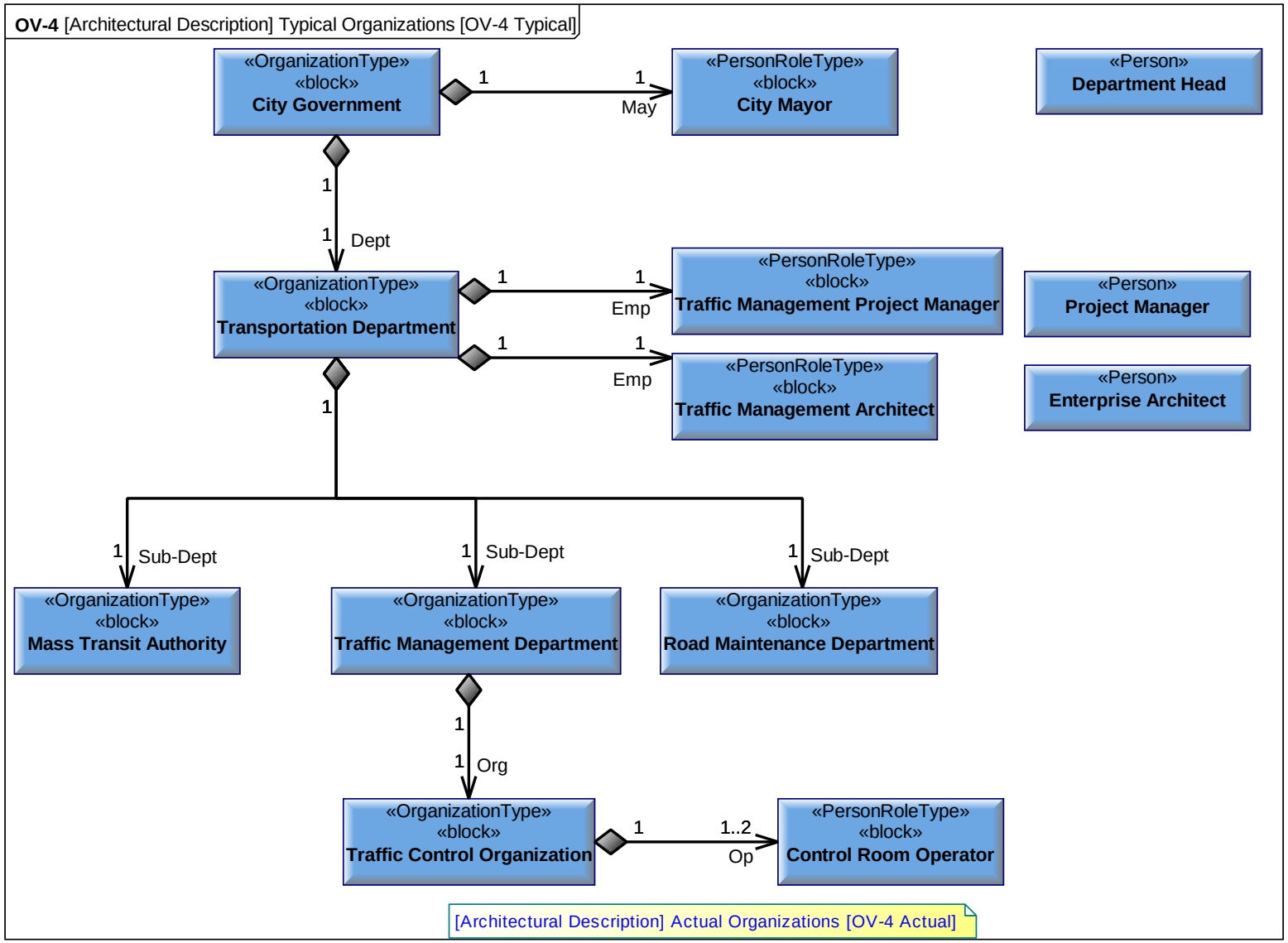
Information Exchange		Producer		Needline	Consumer	
Name	Conveyed	Perfomer	Activity (Operational)	Name	Perfomer	Activity (Operational)
CS->CM:SS	«Information Element» Service Status	«Performer» City Services		CS - CM	«Performer» City Management	
CS->TC:SS	«Information Element» Service Status	«Performer» City Services		CS - TC	«Performer» Traffic Control	
EP->TP:ES	«Information Element» Event Schedule	«Performer» Event Planning		EP - TP	«Performer» Traffic Planning	
TA->TC:TAD	«Information Element» Traffic Archive Data	«Performer» Traffic Archive		TA - TC	«Performer» Traffic Control	
TC->CM:AR	«Information Element» Accident Report	«Performer» Traffic Control		CM - TC	«Performer» City Management	
TC->CM:TPR	«Information Element» Traffic Planning Report	«Performer» Traffic Control		CM - TC	«Performer» City Management	
TC->CS:SR	«Information Element» Service Request	«Performer» Traffic Control		CS - TC	«Performer» City Services	
TC->MM:TR	«Information Element» Traffic Report	«Performer» Traffic Control		TC - M	«Performer» Mass Media	
TC->TA:TAD	«Information Element» Traffic Archive Data	«Performer» Traffic Control		TA - TC	«Performer» Traffic Archive	
TC->TE:TSS	«Information Element» Traffic Signal Schedule	«Performer» Traffic Control		TC - TE	«Performer» Traffic Equipment	
TP->TC:AP	«Information Element» Accident Prediction	«Performer» Traffic Planning		TP - TC	«Performer» Traffic Control	
TS->TC:TF	«Information Element» Traffic Flow	«Performer» Traffic Sensing		TS - TC	«Performer» Traffic Control	
TS->TP:TF	«Information Element» Traffic Flow	«Performer» Traffic Sensing		TP - TS	«Performer» Traffic Planning	
WS->TC:WR	«Information Element» Weather Report	«Performer» Weather Services		WS - TP	«Performer» Traffic Planning	

Operational Modes

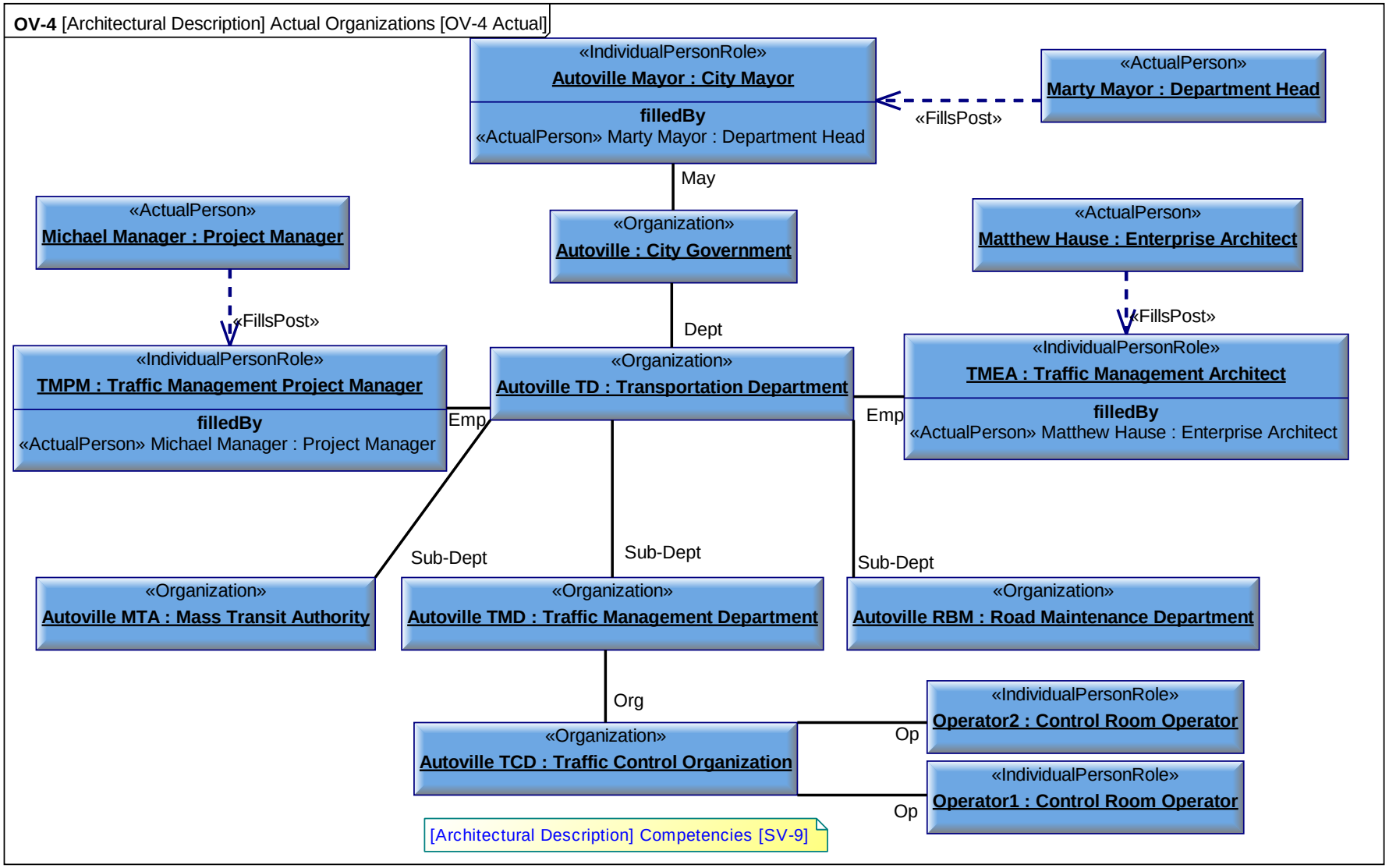


[Architectural Description] Typical Organizations [OV-4 Typical]

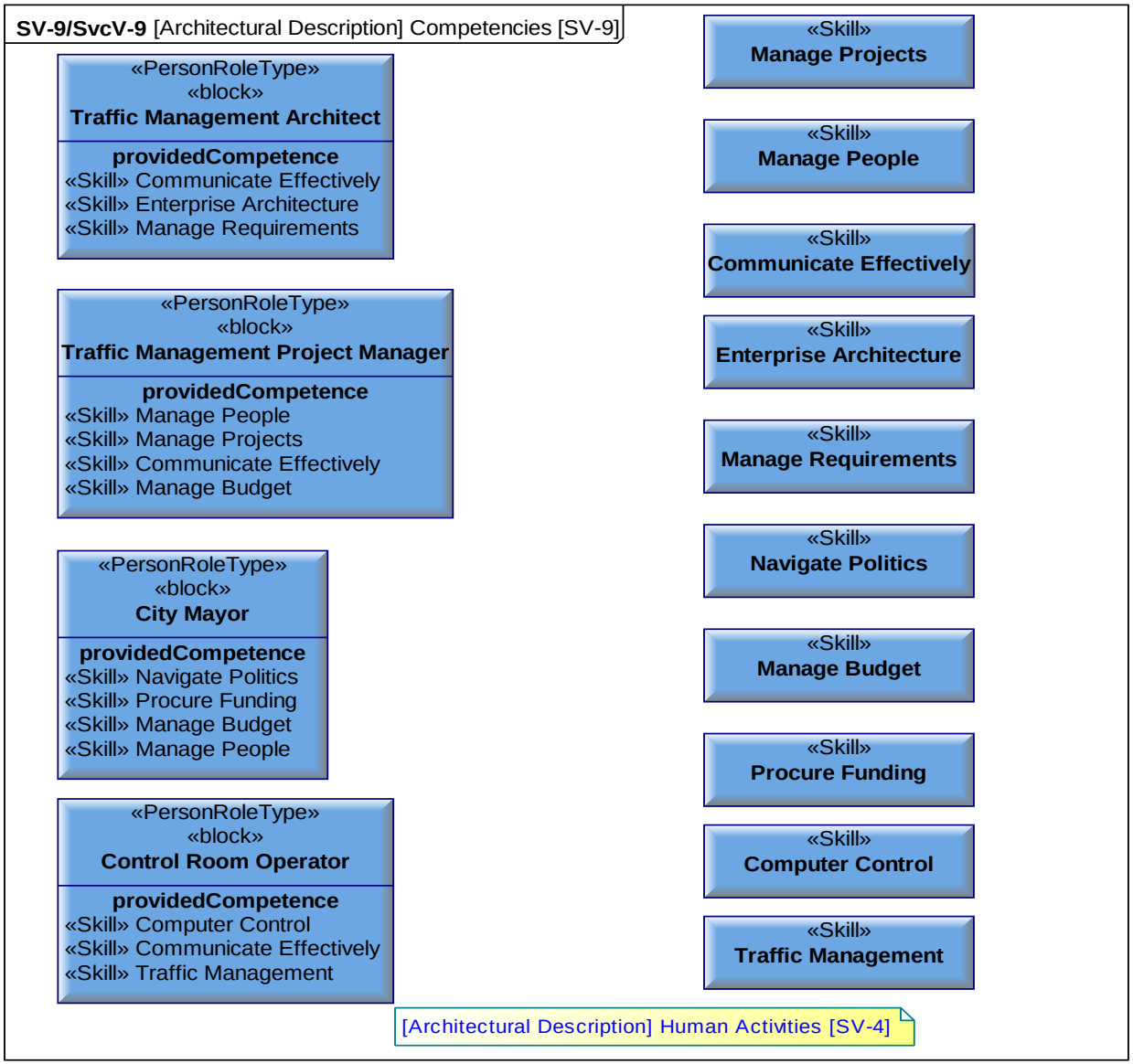
OV-4 Organizational Template



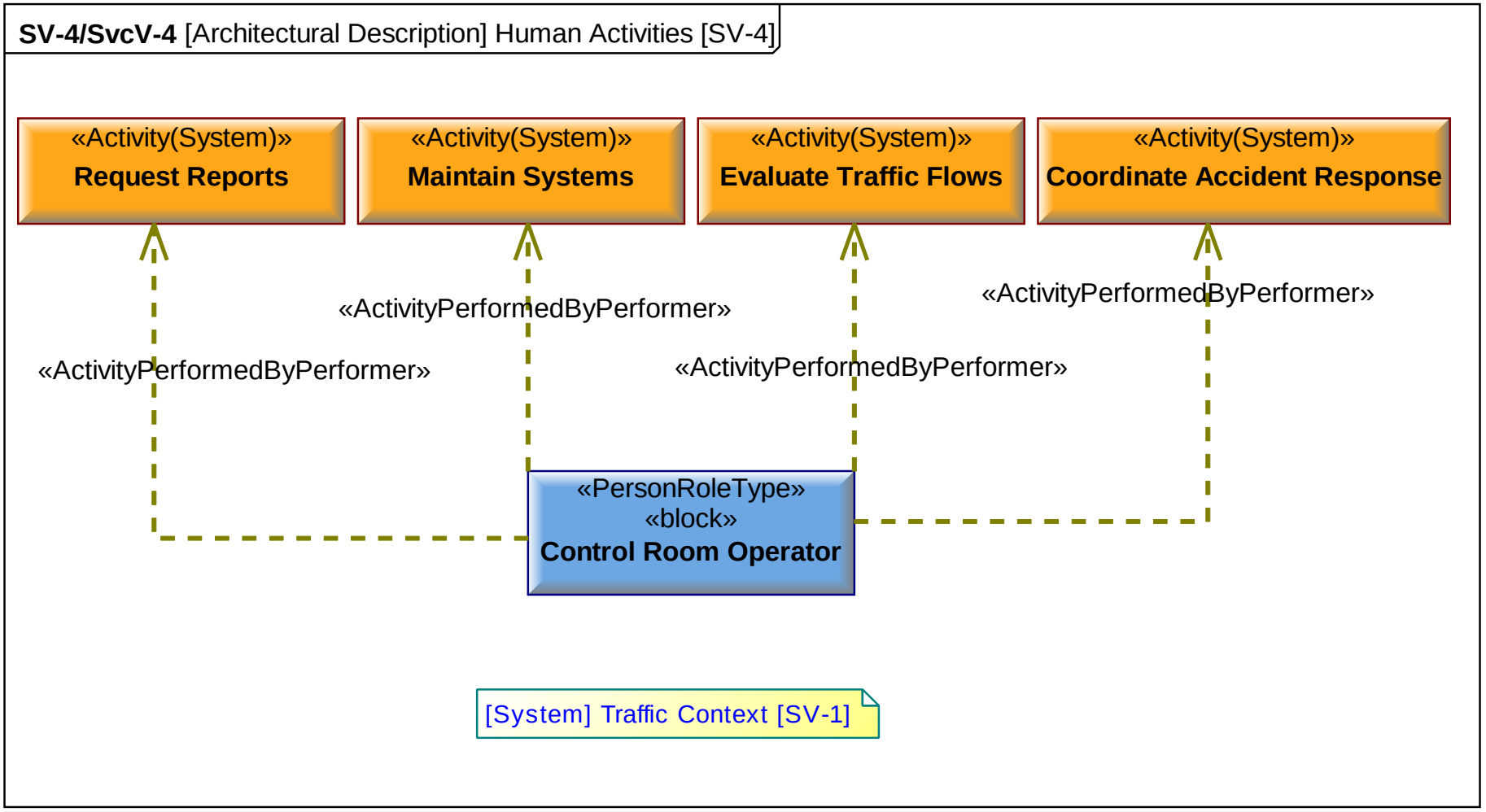
OV-4 Actual Organizations



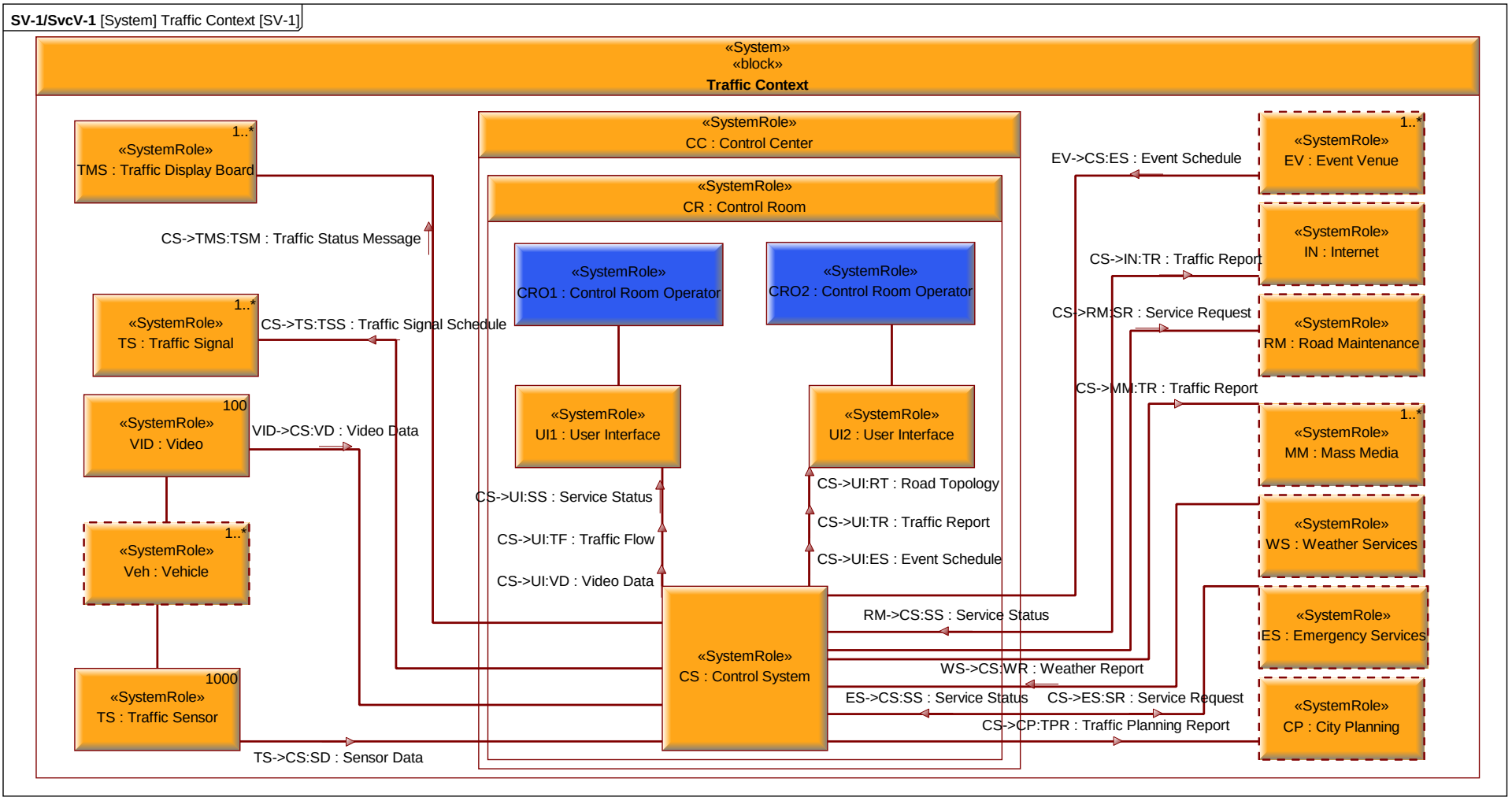
SV-9 Personnel Competencies



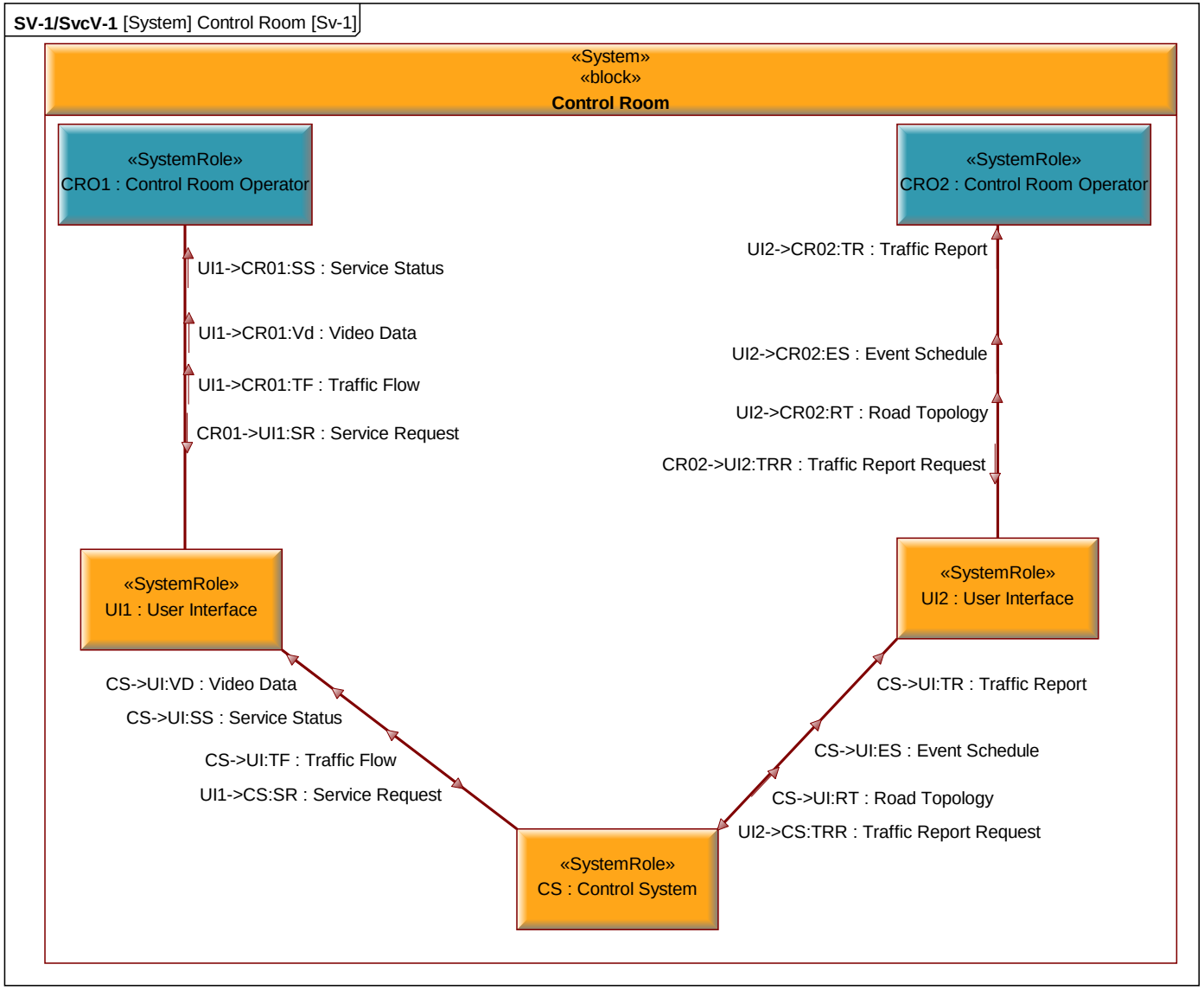
SV-4 Operator Activities



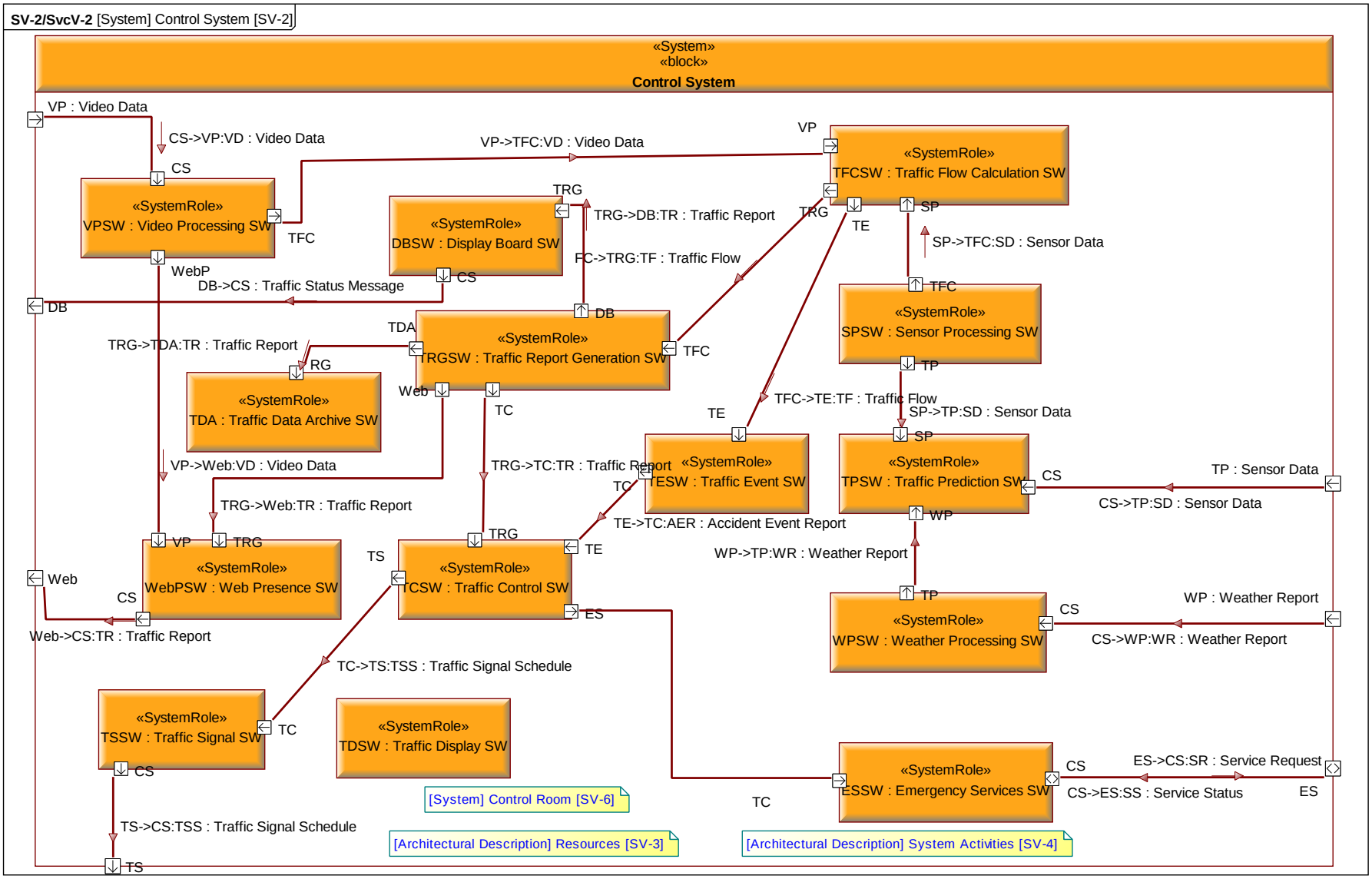
Traffic Management Systems



SV-1 Control Room Detail



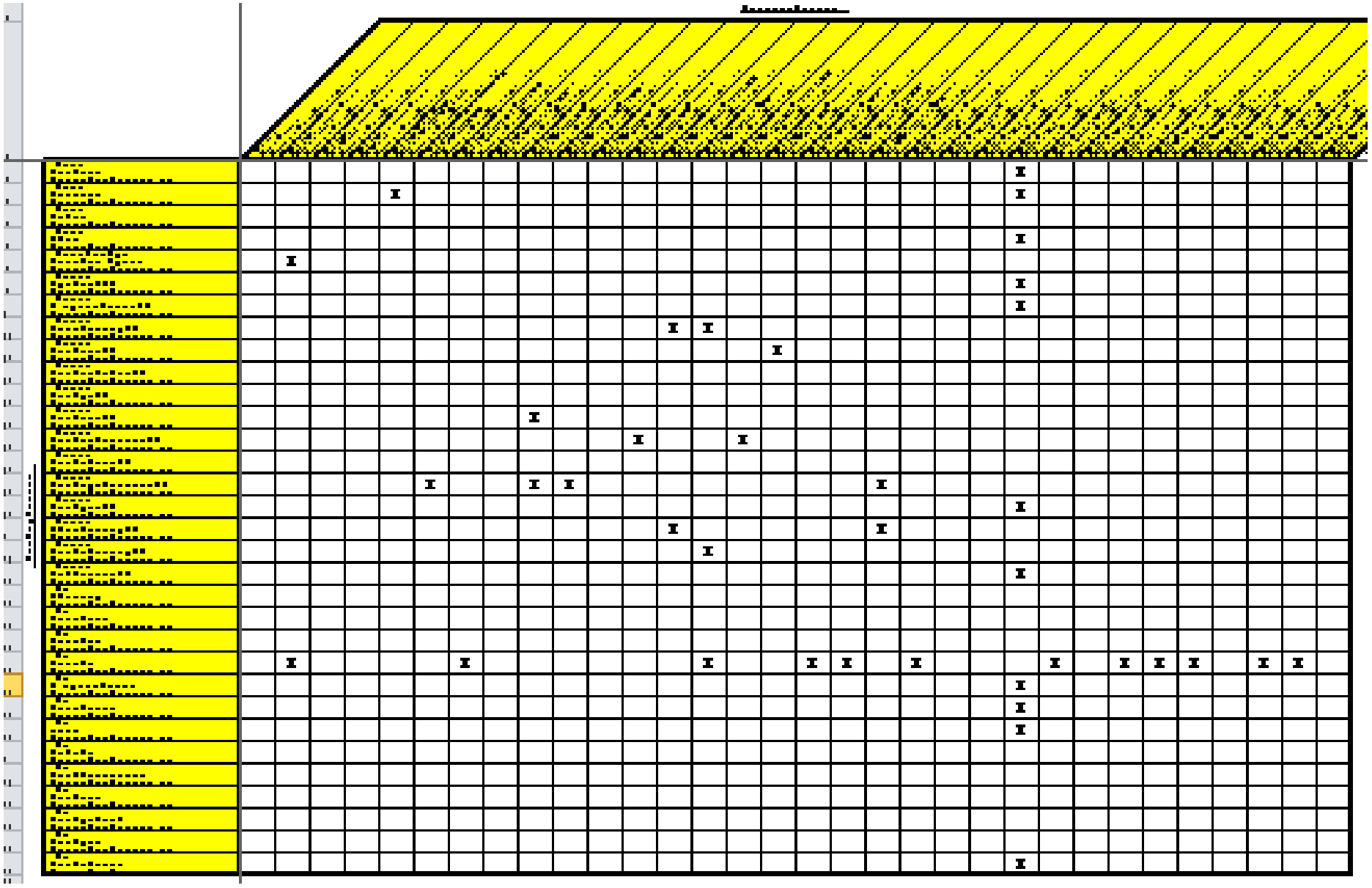
Software Interfaces and Interactions



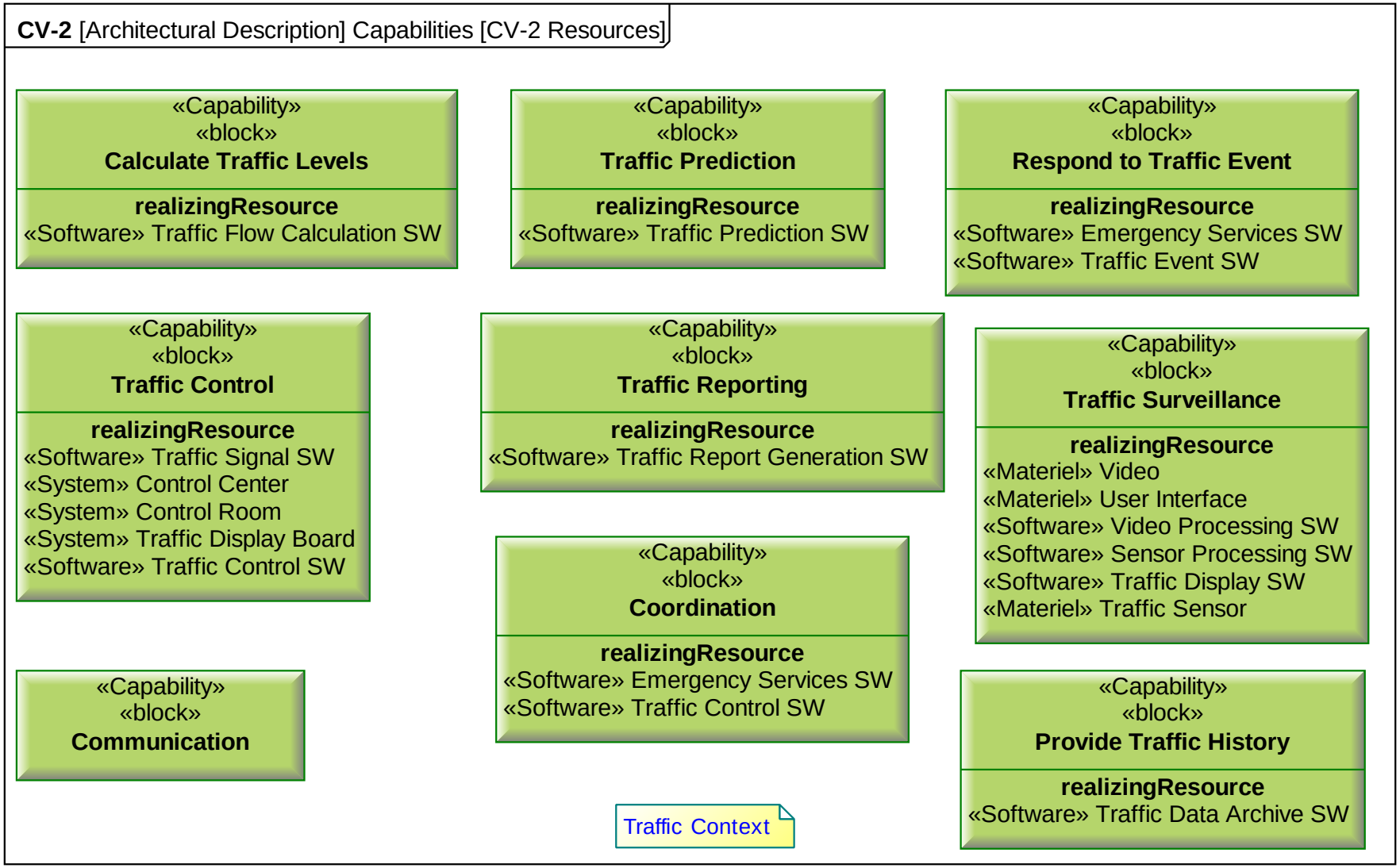
SV-6 System Interaction Summary

Resource Interaction		Producer		Connector /		Consumer	
Name	Conveyed	Resource	Activity (System)	Name	Protocol	Resource	Activity (System)
CR01->UI1:SR	«Data» Service Request	«Person Role Type» Control Room Operator		UI1 - CRO1		«Materiel» User Interface	
CR02->UI2:TRR	«Data» Traffic Report Request	«Person Role Type» Control Room Operator		CRO2 - UI2		«Materiel» User Interface	
CS->ES:SS	«Data» Service Status	«System» Control System		ES - CS		«Software» Emergency Services SW	
CS->TP:SD	«Data» Sensor Data	«System» Control System		TP - CS		«Software» Traffic Prediction SW	
CS->UI:ES	«Data» Event Schedule	«System» Control System		UI2 - CS		«Materiel» User Interface	
CS->UI:RT	«Data» Road Topology	«System» Control System		UI2 - CS		«Materiel» User Interface	
CS->UI:SS	«Data» Service Status	«System» Control System		CS - UI1		«Materiel» User Interface	
CS->UI:TF	«Data» Traffic Flow	«System» Control System		CS - UI1		«Materiel» User Interface	
CS->UI:TR	«Data» Traffic Report	«System» Control System		UI2 - CS		«Materiel» User Interface	
CS->UI:VD	«Data» Video Data	«System» Control System		CS - UI1		«Materiel» User Interface	
CS->VP:VD	«Data» Video Data	«System» Control System		VP - CS		«Software» Video Processing SW	
CS->WP:WR	«Data» Weather Report	«System» Control System		WP - CS		«Software» Weather Processing SW	

System Connection Matrix – N^2



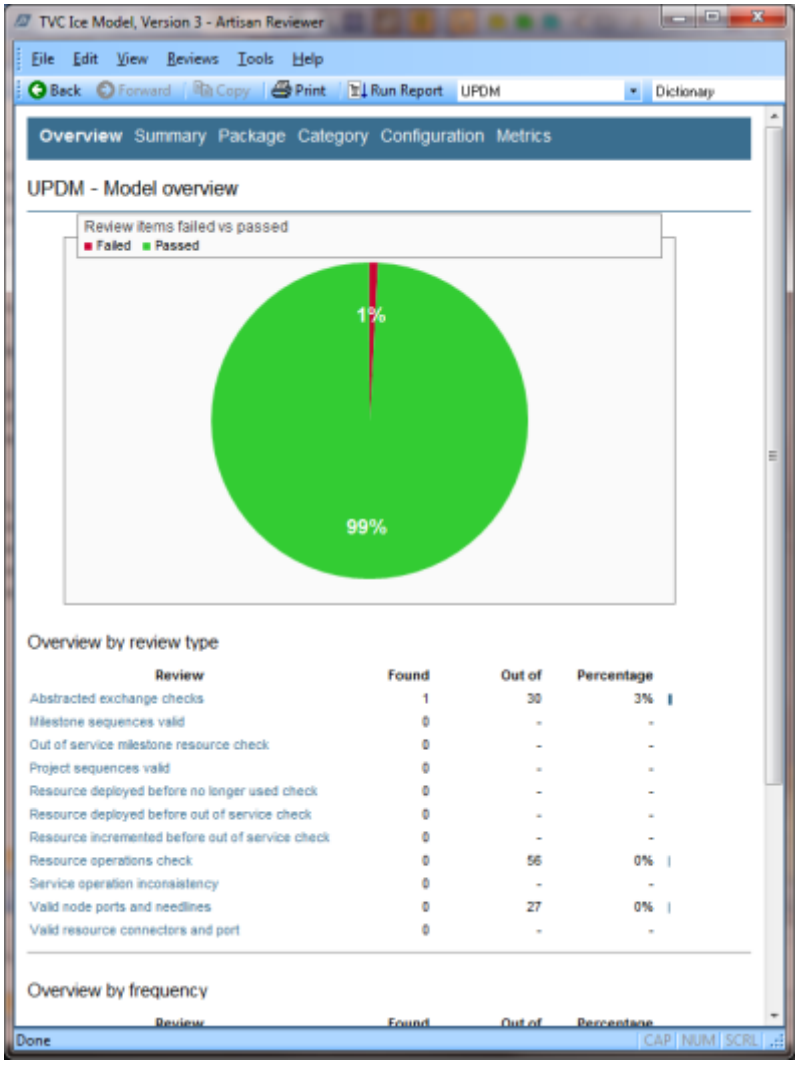
Capability Taxonomy with Implementing Resources

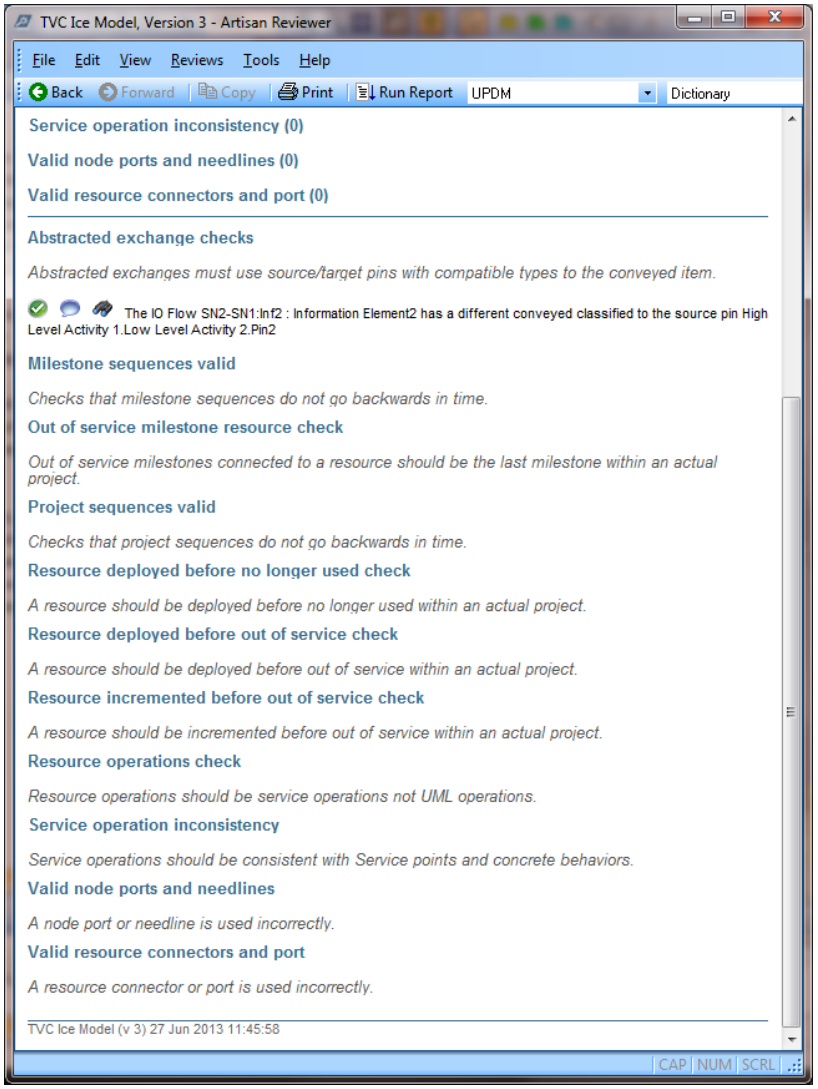


Summary of System Costs

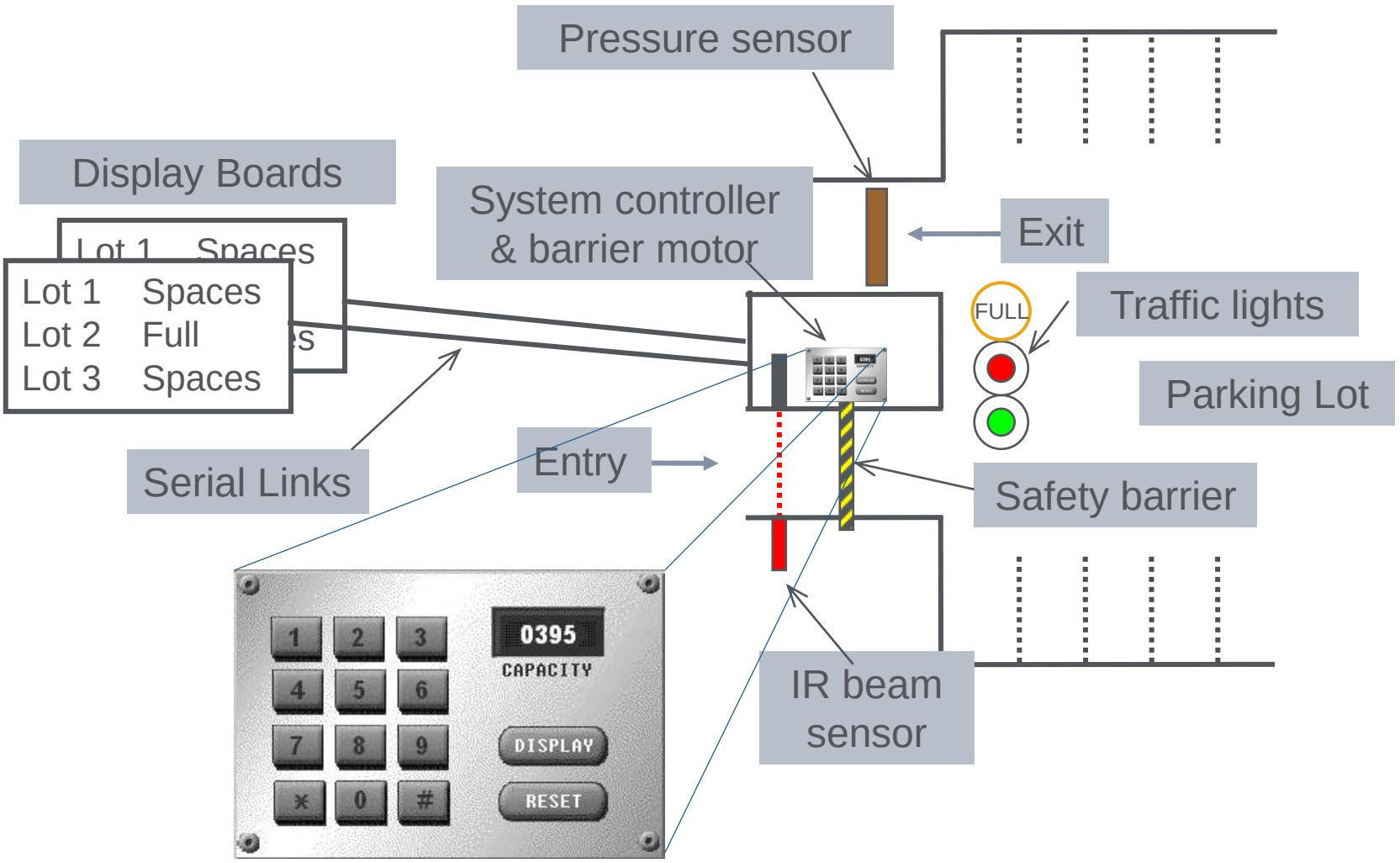
	A	B	C	D	E	F	G
1	Name	Quantity	Cost (in USD)				
2			Estimate	No Margin	Margin (%)	With Margin	Budget
3	Traffic Context (Autoville Traffic Management Architecture::System View	n/a	50000000	51799000	12.00%	58014880	600000000
4	Control Center (Autoville Traffic Management Architecture::System Vie	1	1000000	1649000	20.00%	1978800	1300000
5	Control Room (Autoville Traffic Management Architecture::System Vie	1	0	649000	10.06%	714300	782000
6	Control Room Operator (Autoville Traffic Management Architecture::	2	0	0	0.00%	0	0
7	Control System (Autoville Traffic Management Architecture::System	1	0	645000	10.06%	709900	777000
8	Display Board SW (Autoville Traffic Management Architecture::Syst	1	10000	10000	10.00%	11000	12000
9	Emergency Services SW (Autoville Traffic Management Architecture	1	15000	15000	10.00%	16500	20000
10	Sensor Processing SW (Autoville Traffic Management Architecture::	1	100000	100000	10.00%	110000	150000
11	Traffic Control SW (Autoville Traffic Management Architecture::Syst	1	100000	100000	10.00%	110000	120000
12	Traffic Data Archive SW (Autoville Traffic Management Architecture	1	10000	10000	10.00%	11000	15000
13	Traffic Display SW (Autoville Traffic Management Architecture::Syst	1	100000	100000	10.00%	110000	110000
14	Traffic Event SW (Autoville Traffic Management Architecture::Syste	1	120000	120000	10.00%	132000	130000
15	Traffic Flow Calculation SW (Autoville Traffic Management Architec	1	50000	50000	10.00%	55000	60000
16	Traffic Prediction SW (Autoville Traffic Management Architecture::S	1	0	0	0.00%	0	0
17	Traffic Report Generation SW (Autoville Traffic Management Archit	1	20000	20000	12.00%	22400	25000
18	Traffic Signal SW (Autoville Traffic Management Architecture::Syste	1	20000	20000	10.00%	22000	25000
19	Video Processing SW (Autoville Traffic Management Architecture::S	1	100000	100000	10.00%	110000	110000
20	Web Presence SW (Autoville Traffic Management Architecture::Syst	1	0	0	0.00%	0	0
21	Weather Processing SW (Autoville Traffic Management Architecture	1	0	0	0.00%	0	0
22	User Interface (Autoville Traffic Management Architecture::System V	2	2000	4000	10.00%	4400	5000
23	City Planning (Autoville Traffic Management Architecture::System View	1	0	0	0.00%	0	0
24	Emergency Services (Autoville Traffic Management Architecture::Syster	1	0	0	0.00%	0	0
25	Event Venue (Autoville Traffic Management Architecture::System View	1	0	0	0.00%	0	0
26	Internet (Autoville Traffic Management Architecture::System Views::Re	1	0	0	0.00%	0	0
27	Mass Media (Autoville Traffic Management Architecture::System Views	1	0	0	0.00%	0	0
28	Road Maintenance (Autoville Traffic Management Architecture::System	1	0	0	0.00%	0	0

Review generation of Model checks

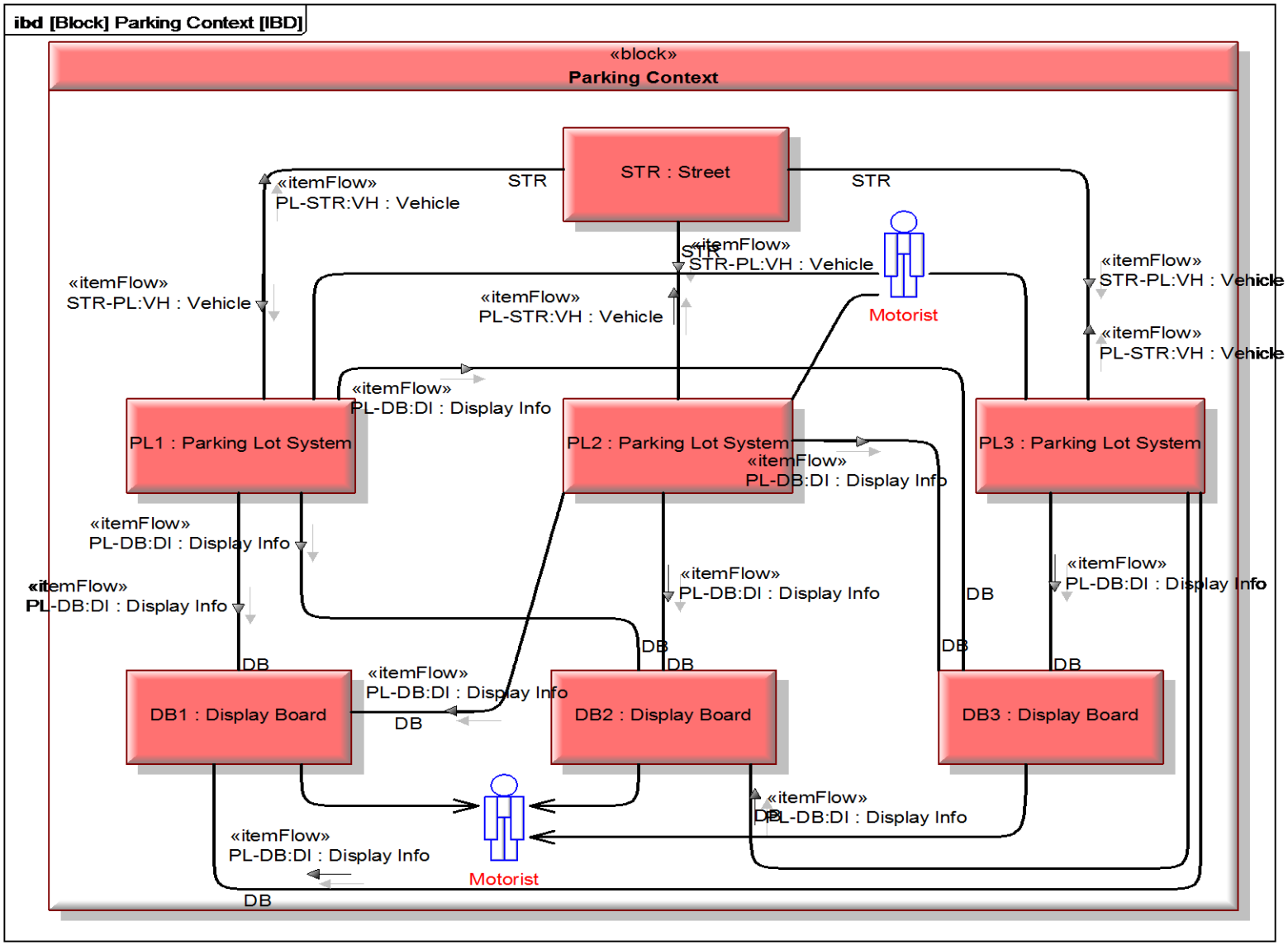




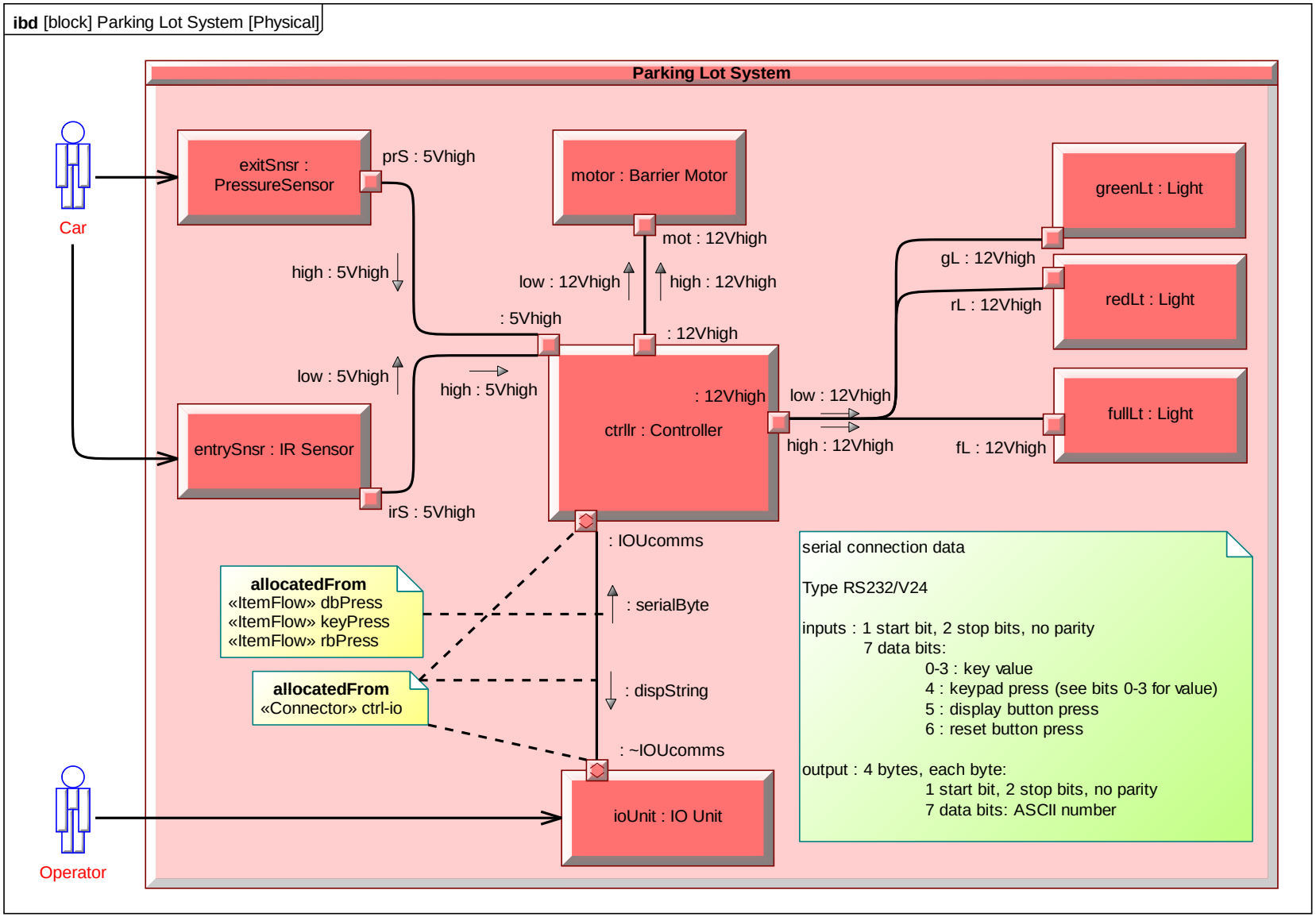
Parking Lot System With Charging Stations



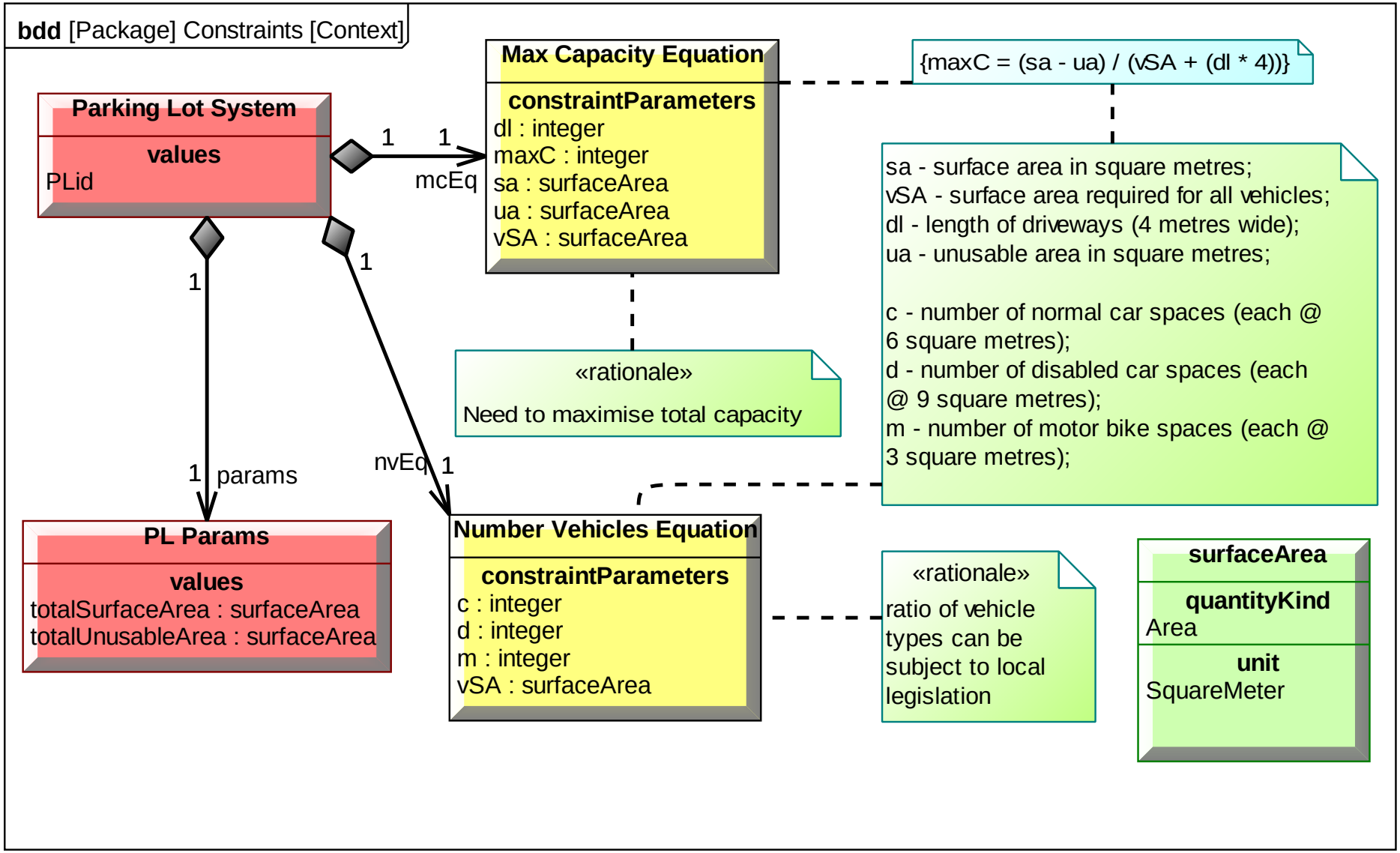
Parking Control Context



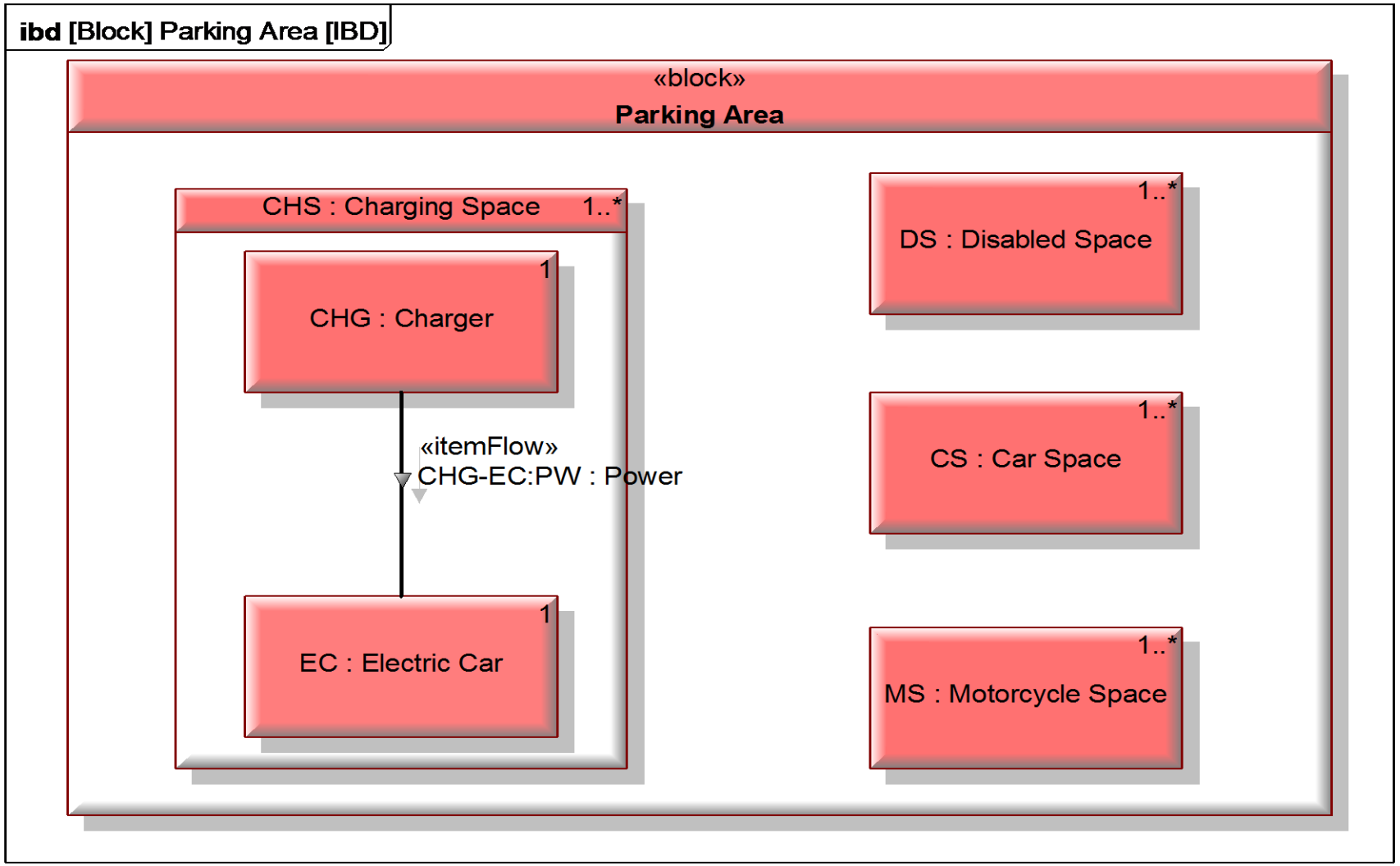
Parking Lot System Model



Example - Parametrics Context



Parking Area with Charging Space



ThingWorx Platform

IoT Platform

Connectivity
Connectivity and Device Management

Device Cloud
Private Device Cloud

Application Enablement
Application Enablement Platform

Composer
Rapid Application Development and Graphical User Interface Builder

Federated Deployments
Deploy how you like

Marketplace
Smart Extensions and Applications

Cassandra
Big data for operational data

ColdLight
Machine learning and predictive analytics

Predictive Analytics COLDLIGHT A PTC Business

Augmented Reality*

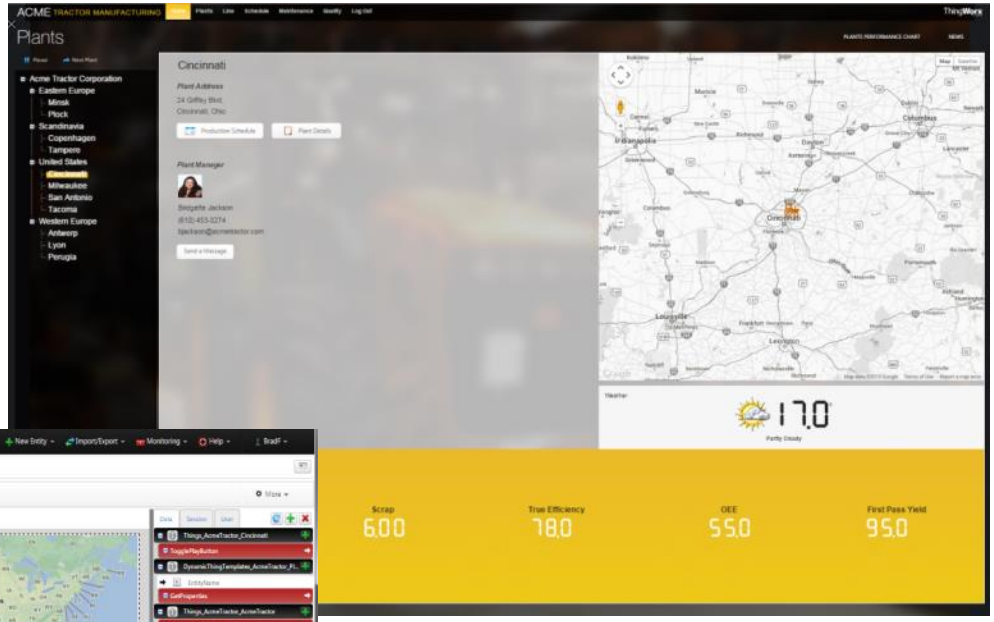
*Beta

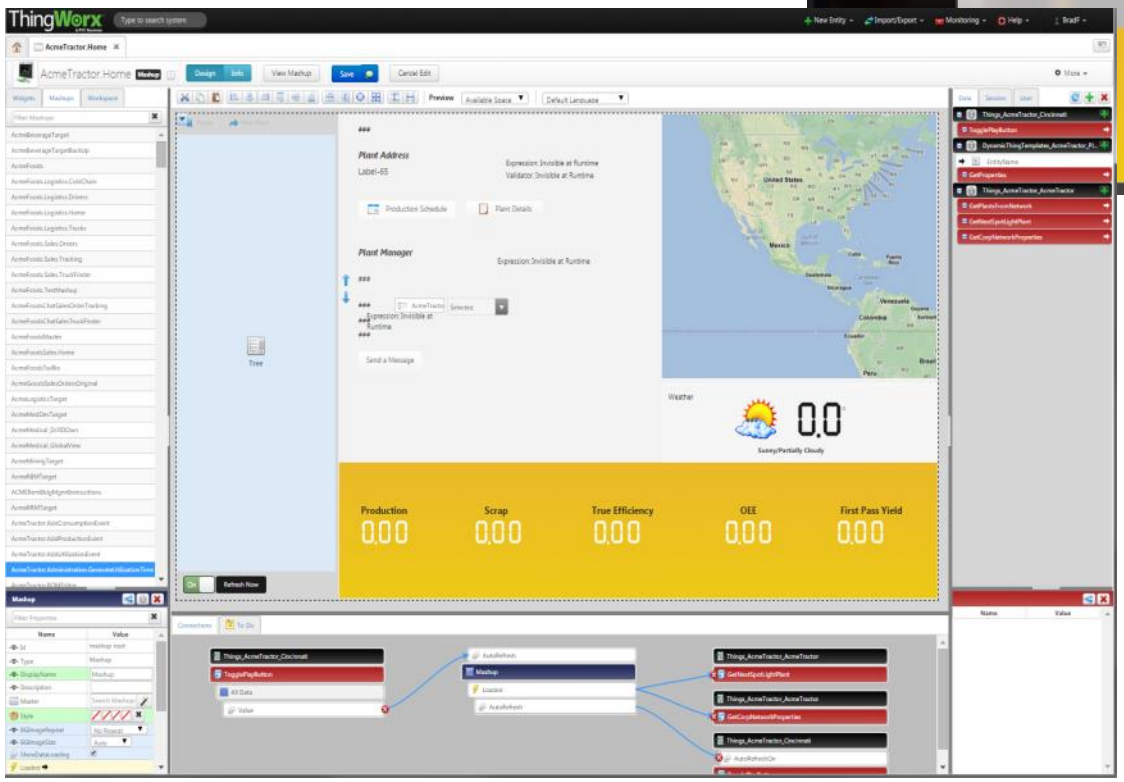
Digital Twin*

*Beta

ThingWorx Composer –Rapid Application Development

- Customer Portals
  - Mashup of Data Sources
- Mobile Applications
  - Smartphone and Tablet Applications to enhance Product Experience
- New Internal Applications
  - Field Service Applications

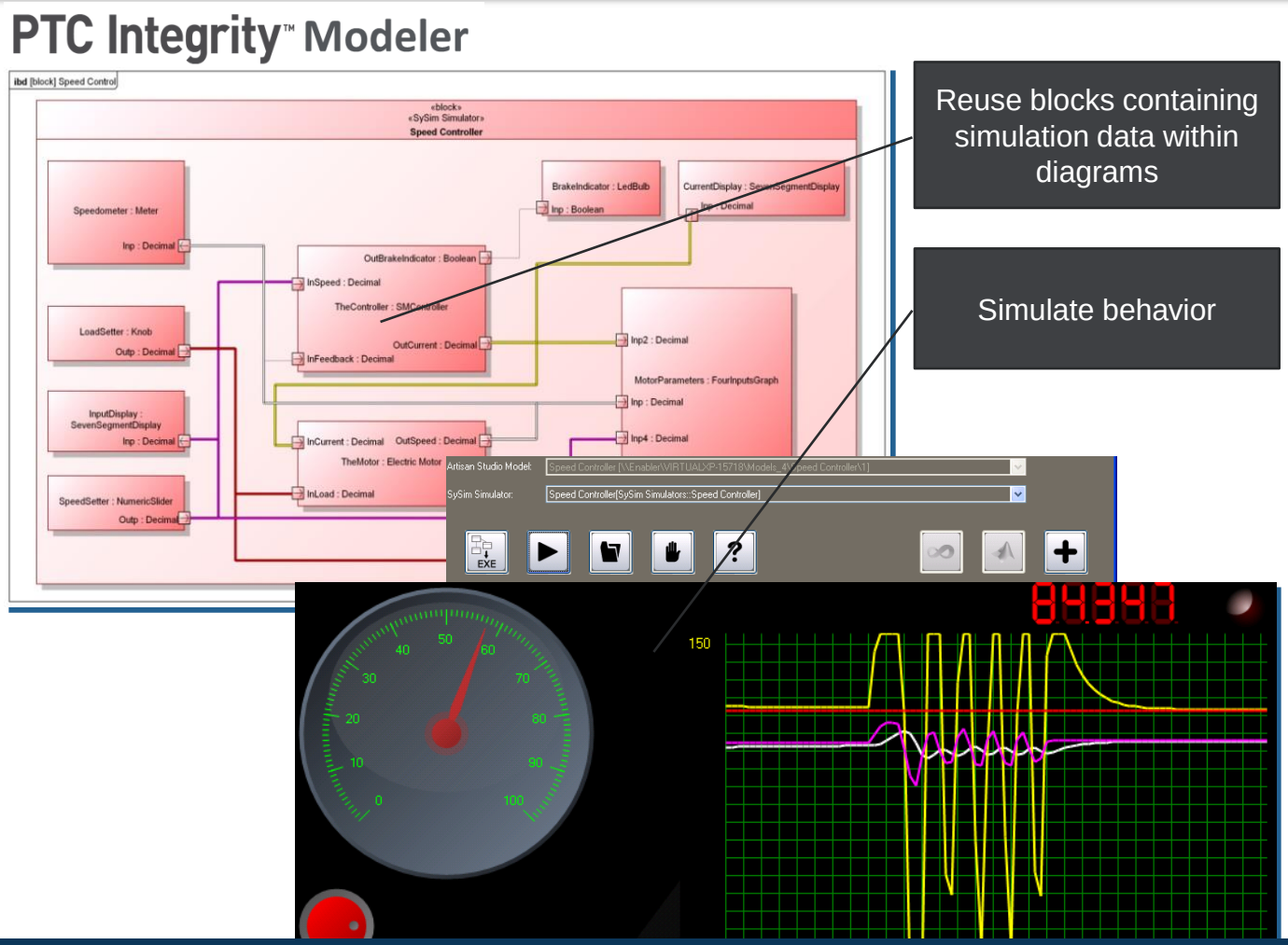




System Model Simulation

CAPABILITIES

- Simulate SysML model visually
- Store simulation information within system model blocks
- Drag and Play Simulation
- Connect to third-party simulators (MATLAB Simulink™, etc.)



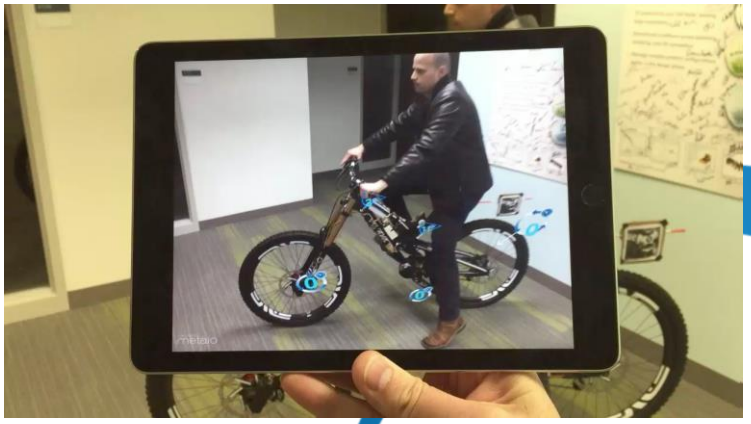
BENEFITS

- Validate complex behavior early
- Project cost reduction
- Reduce design walkthrough efforts
- Reduce design errors

Bridging the Digital and Physical Worlds

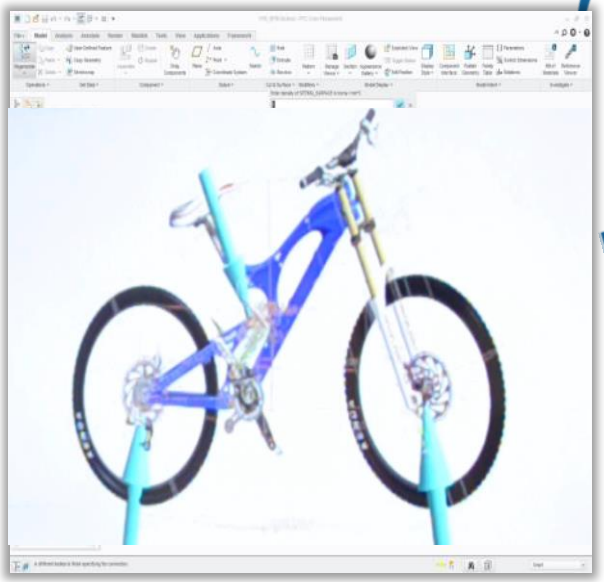
PTC®

Augmented Reality



Physical

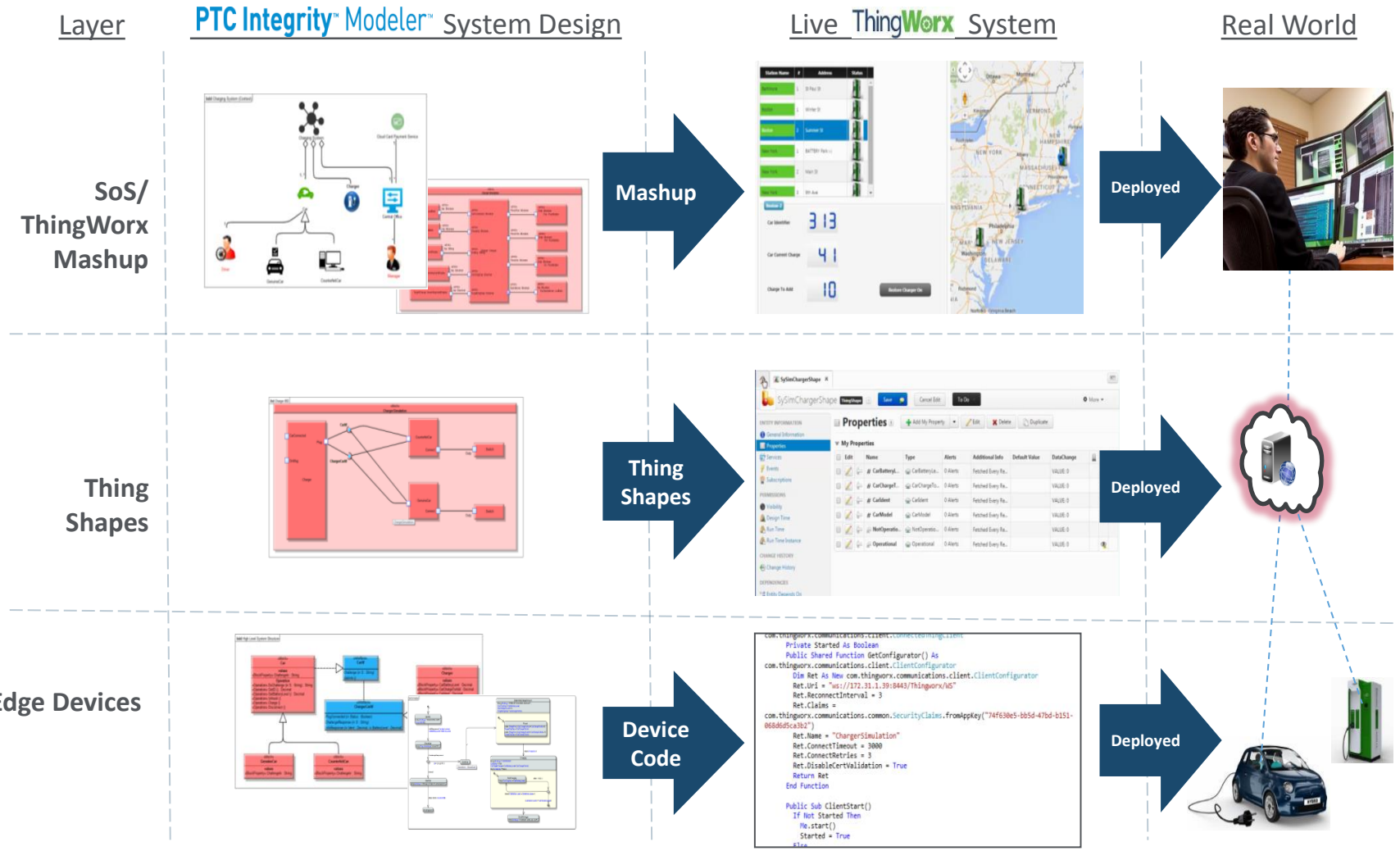
Digital Twin



ThingWorx
A PTC Business

Connected Product Dashboard

PTC Integrity Modeler – Automated ThingWorx Code Generation



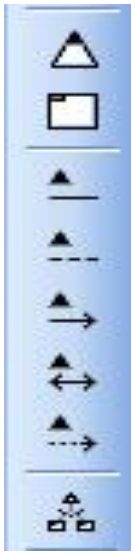
Prototype driving requirements for Integrity Modeler 8.3

Demo

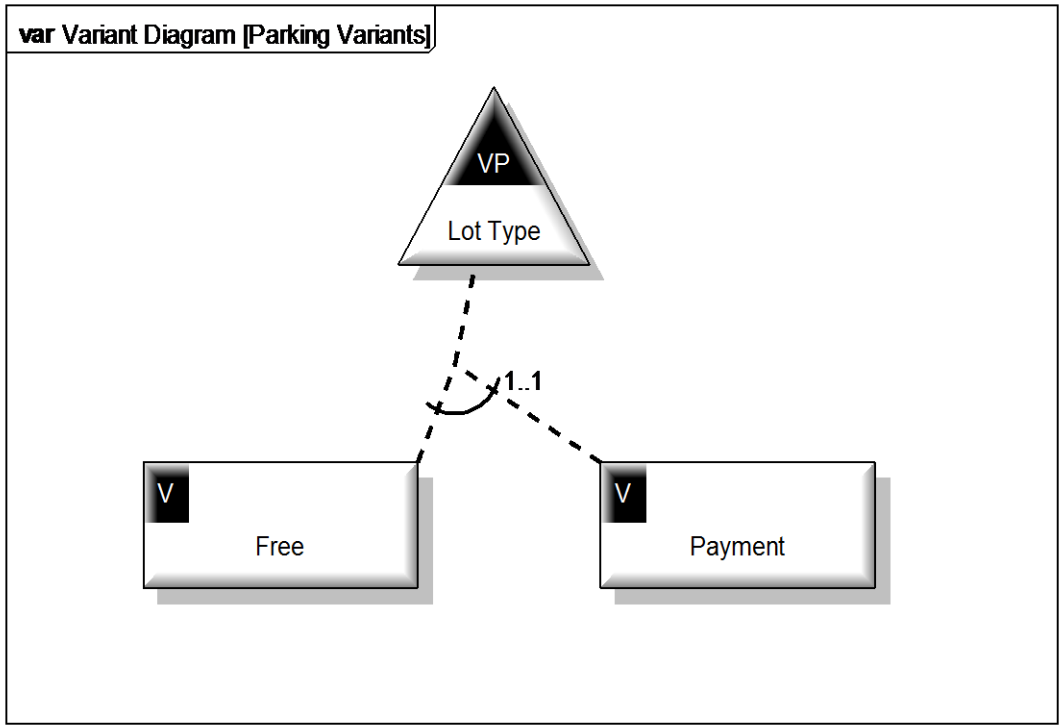
Product Line Engineering

Variant Modeling

- Variant Diagram
  - Variation on all Diagrams
  - Simple Notation



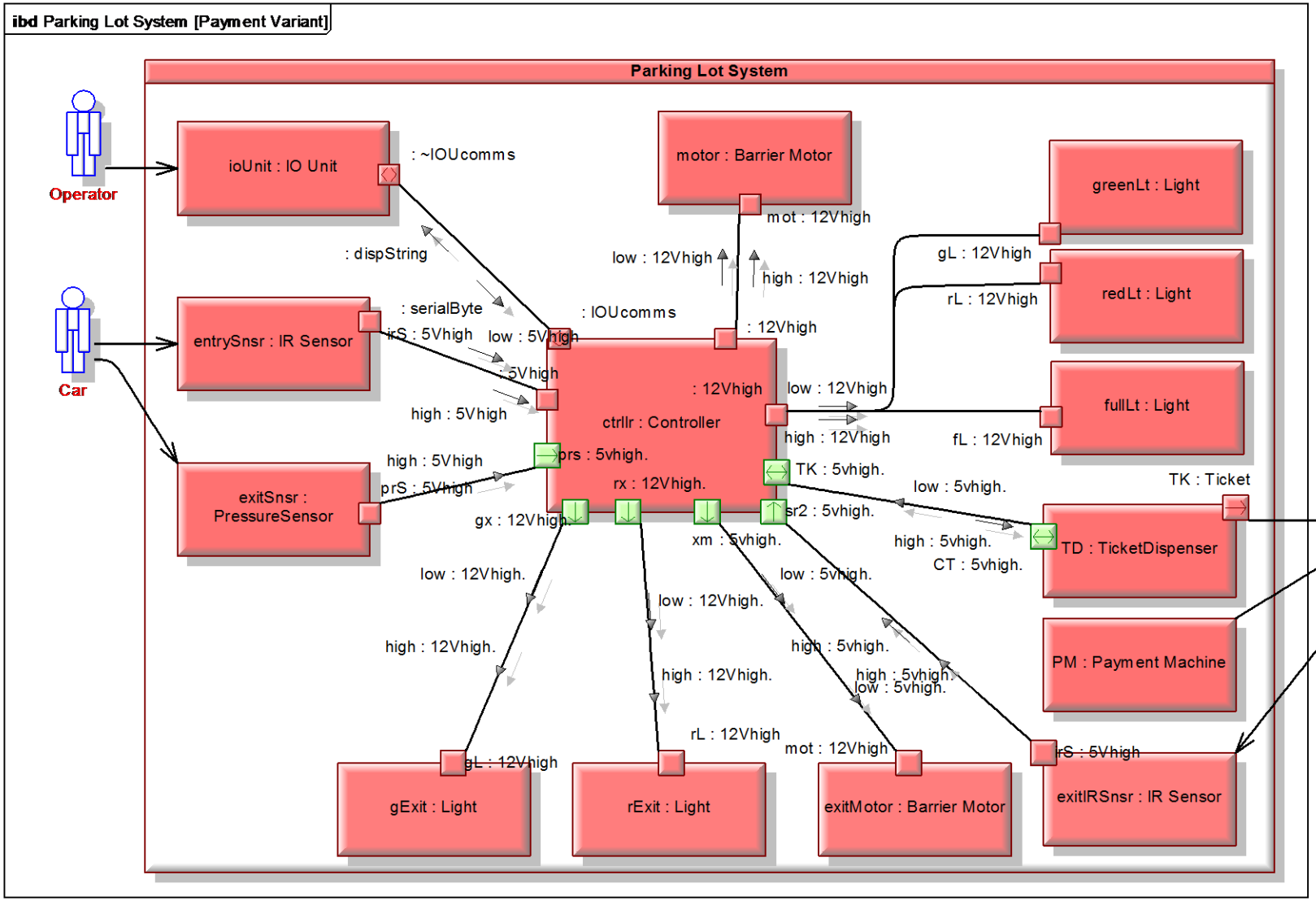
Variation Point
Variant
Variability Dependency
Mandatory/Optional
Requires Dependency
Excludes Dependency
Artifact Dependency
Alternate Choice



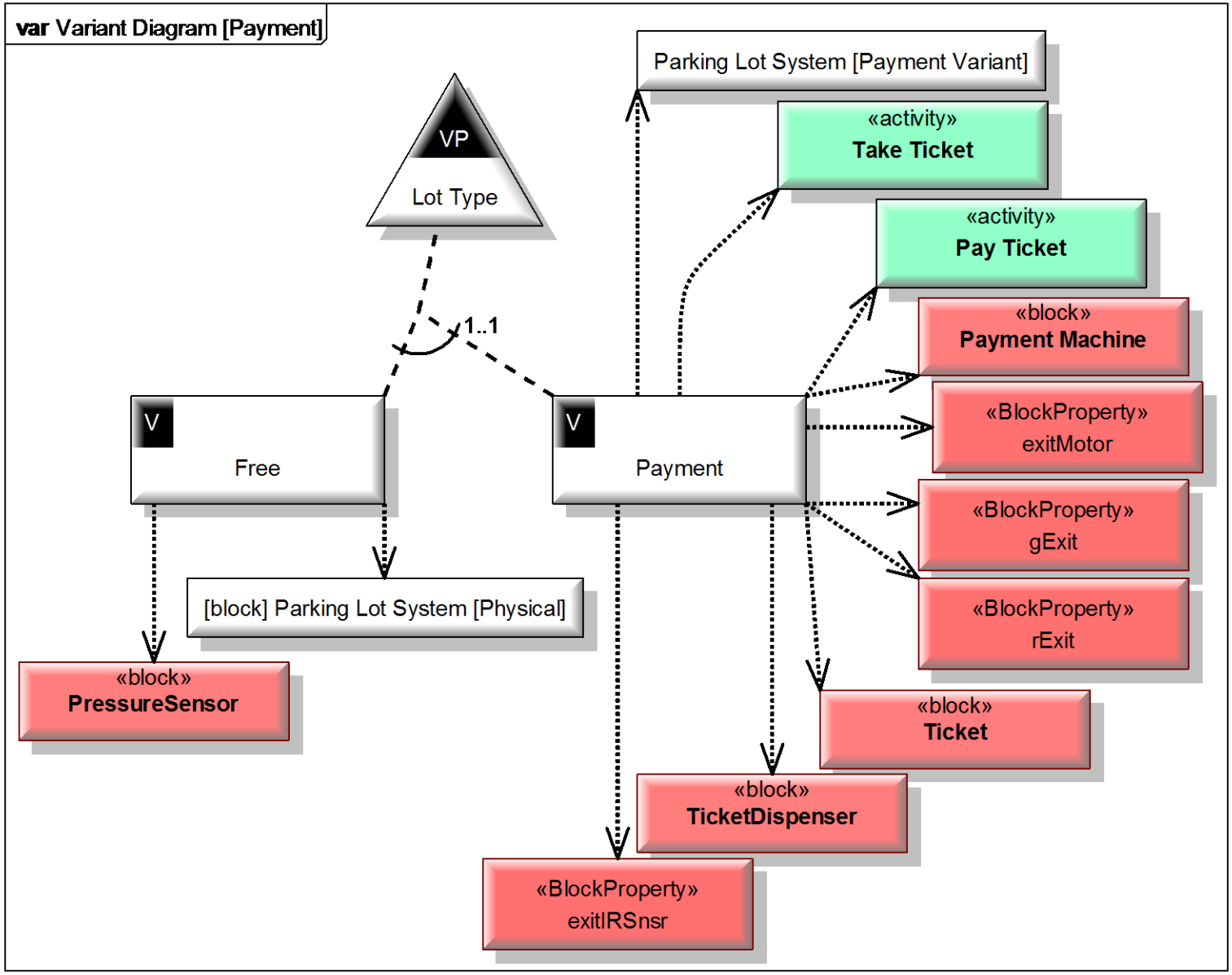
OVM

PALUNO, The Ruhr Institute of Software Technology
Software Product Line Engineering (Pohl et al - Springer 2005)

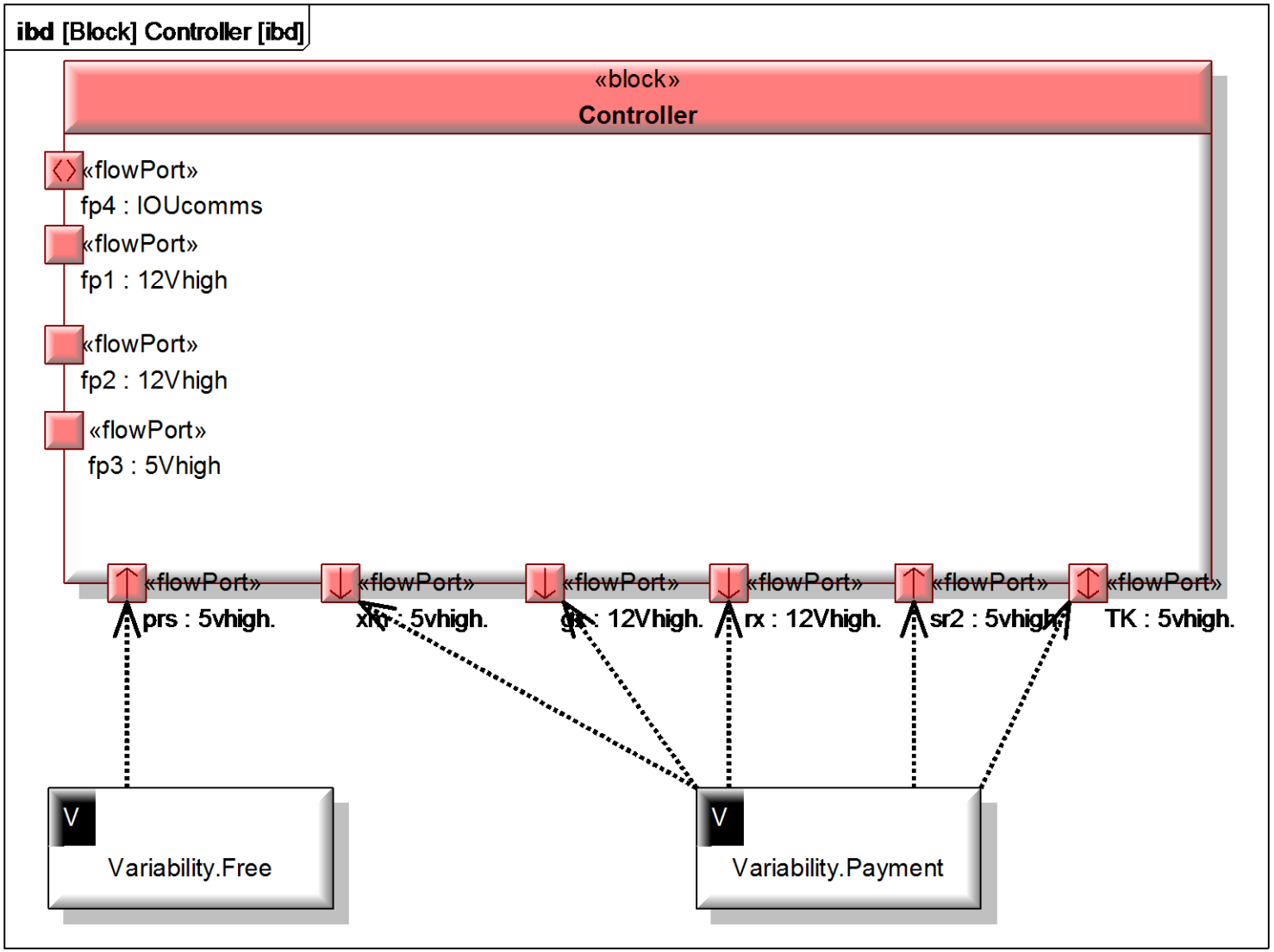
Payment System



Variants with Model Elements



Interface Variants

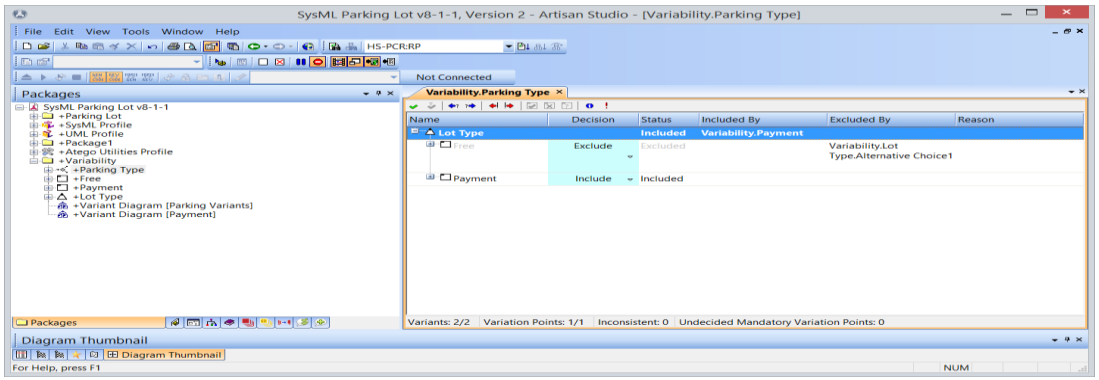


Variant Selection

- Variant Selector
  - Browser User Interface
  - External Variation Points Only
  - Jump to Next Decision/Problem
  - Progress Bar

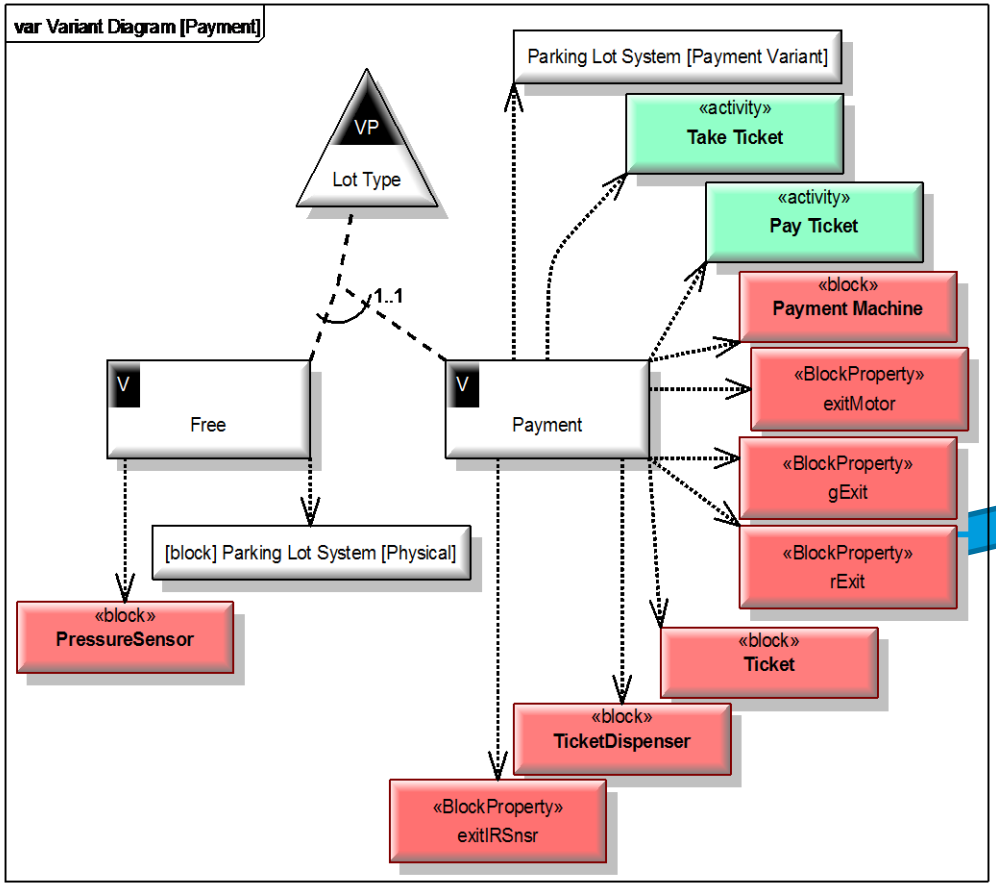
- Decision Set Editor
  - Variant Debug
  - External & Internal
    - Variation Points
  - Jump to Next Decision/Problem

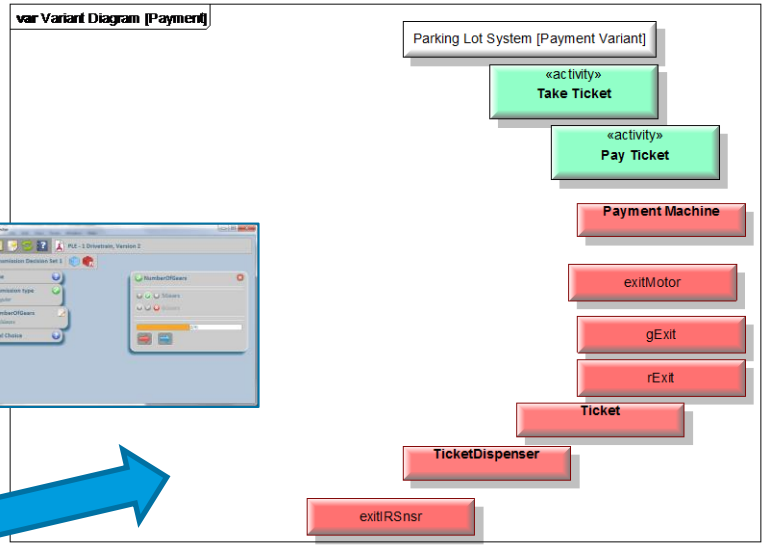
■ Both Edit the Same Decision Sets

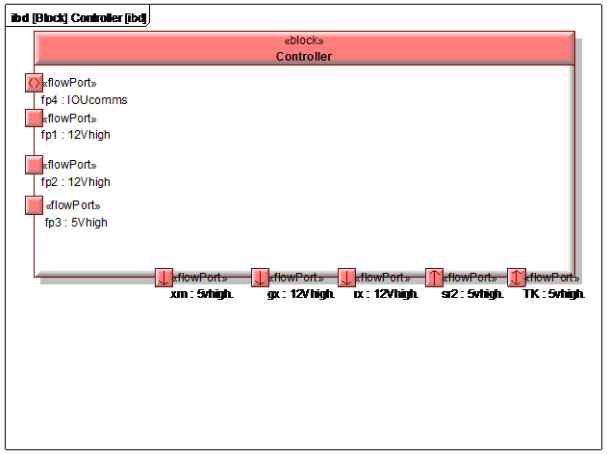


Model-Based Product Line Engineering

- Create Product Model – Including Super-model and Asset Variation

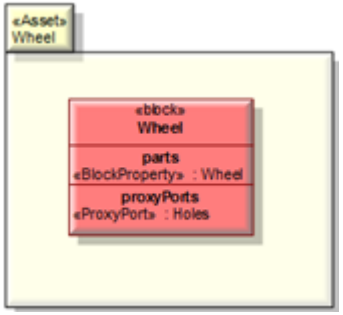






OMG Reusable Asset Specification (RAS)

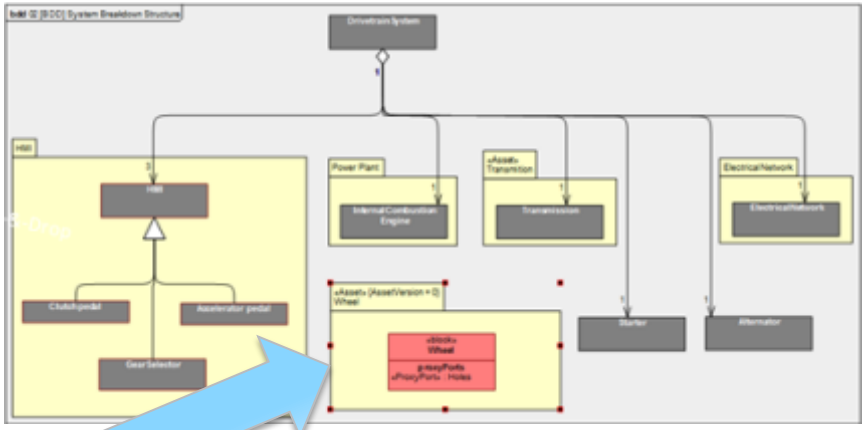
- Modular Design is an approach which segments the design of whole systems into linked, manageable and reusable sub-system designs



Module

Module (Asset) Library

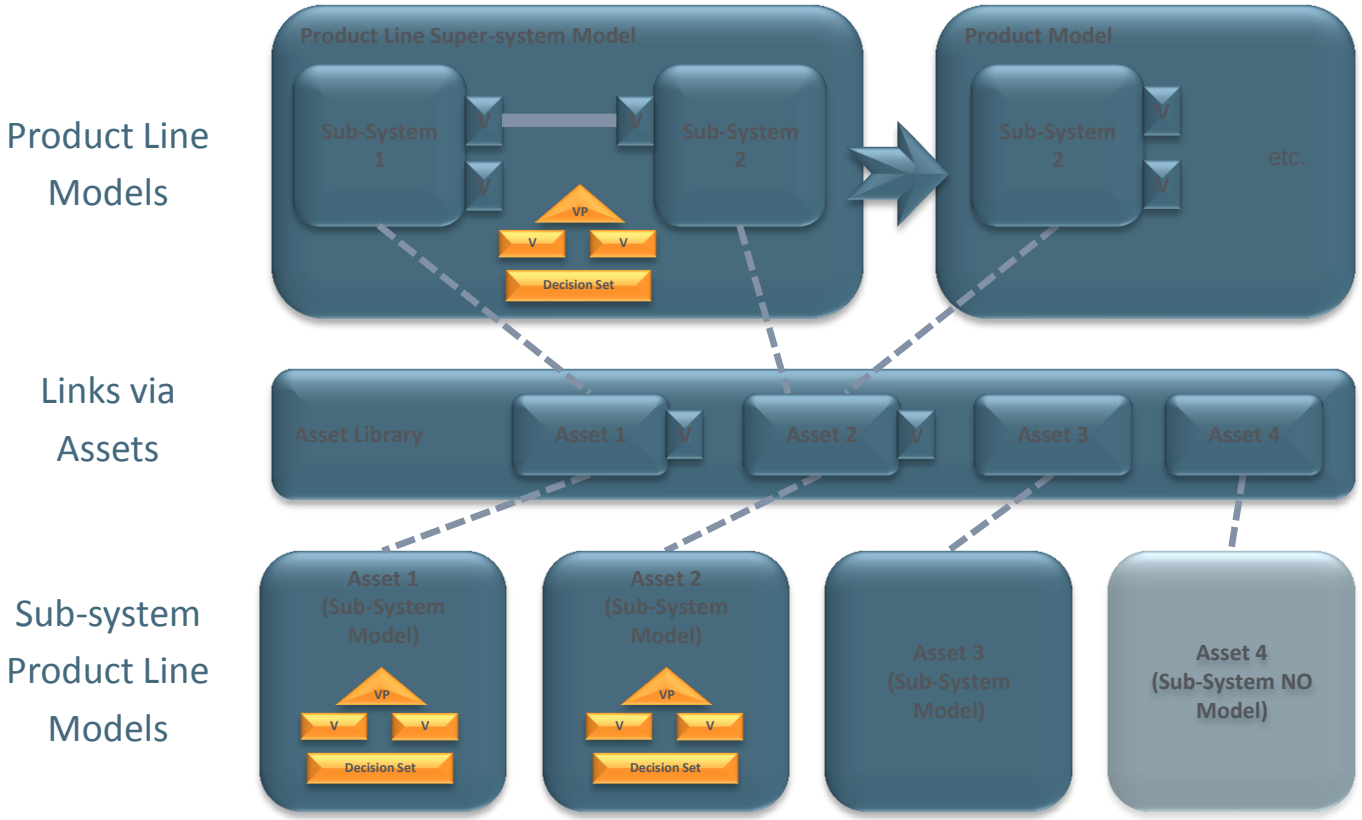
System Model



Expand product offering while reducing costs

Model- Based Product Line Engineering

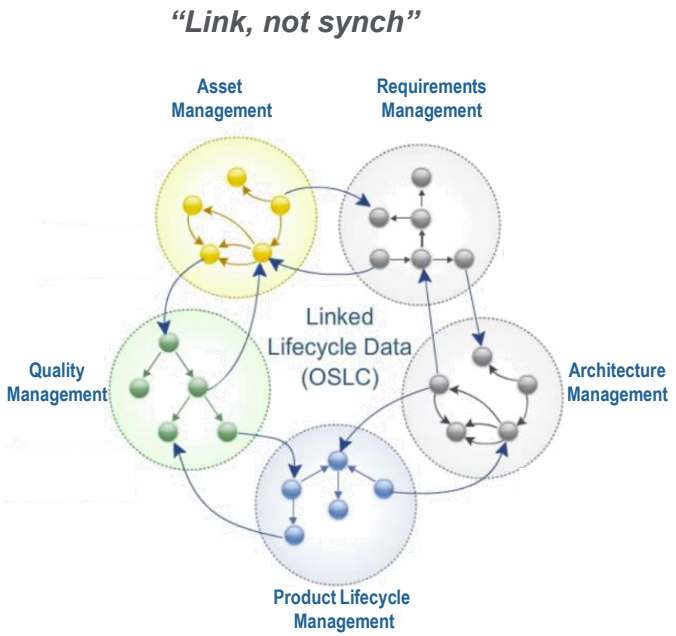
- Integrated MBSE, Modular Design & Variability Modeling = Model-based Product Line Engineering



Open Services for Lifecycle Collaboration

PTC will utilize OSLC as a foundational layer to satisfy key customer use cases – extended as needed to deliver more robust interoperability.

- Standards-based
  - Extends the value of ALM investments
  - RESTful Web Services architecture
  - PTC co-chairs OSLC Core group – ensuring our customers' needs are represented
- Designed for maintainability
  - Source application owns both data and UX
  - No data transformations, replication or synchronization
- Open / extensible
  - Enables use cases for cross-vendor interoperability
  - Supports N:N relationships – ideal for selective data sharing across supply chain

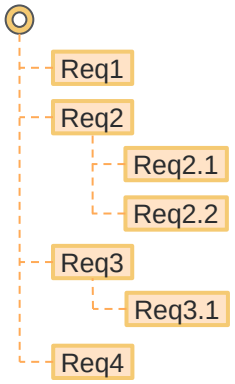


Create/Update Configurable Product Structure from System BOM

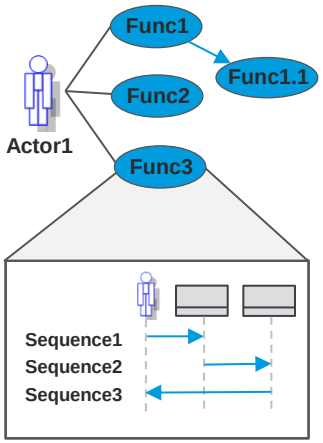
PTC Integrity™ Modeler

PTC Windchill

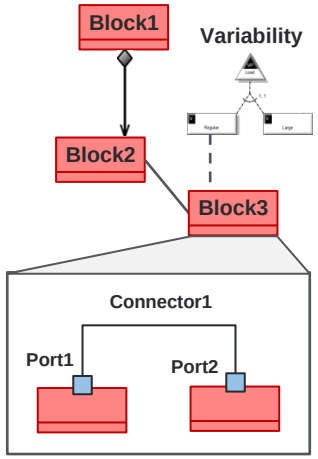
Requirements Model



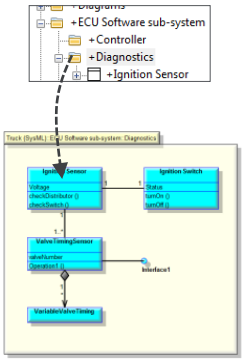
Functional Model



System BOM



Class Model (Software Designs)



Create/update Configurable Modules, Parts, Options, Choices and Variant Specifications from System BOM

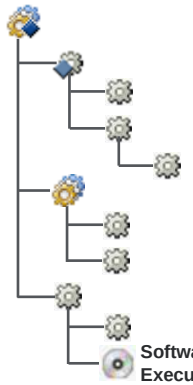
Option	Choices
Bucket	625
	725
	823
Emission	IT4
	IT5
Load Size	3T
	5T
Region	NA
	EU
	Asia

If Load Size=3T Then Bucket = 625 or 725

If Region=EU Then Emission≠IT4

Option	Choices	Product Models: Asia Small	EU Medium	NA Large
Bucket	625	X		
	725		X	
	823			X
Emission	IT4	X	X	
	IT5			X
Region	NA			X
	EU		X	
	Asia	X		

Configurable Product Structure (eBOM)



Parts, End Items, Configurable Modules

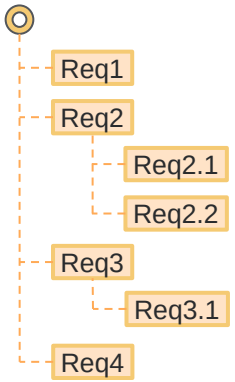
Software Executables

Create/Update System BOM from Configurable Product Structure

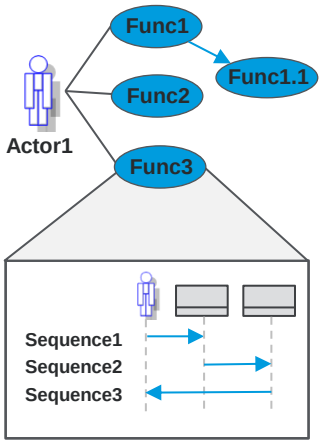
PTC Integrity™ Modeler

PTC Windchill

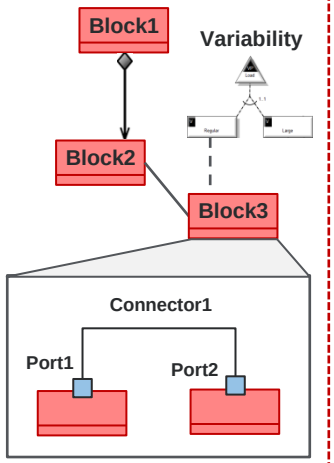
Requirements Model



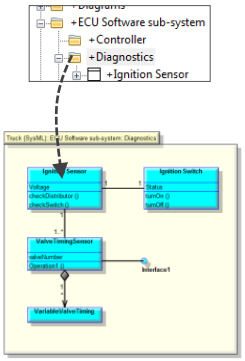
Functional Model



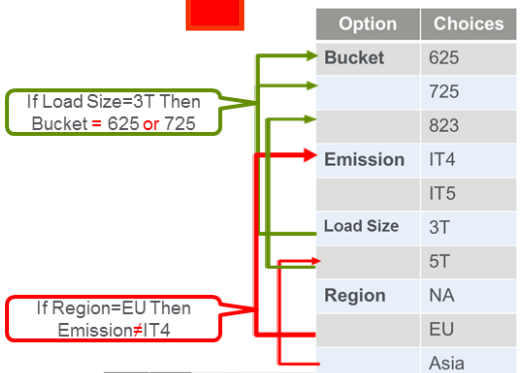
System BOM

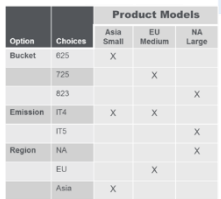


Class Model (Software Designs)

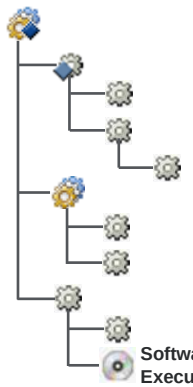


Create/update System Blocks, Associations, Variation points and Decision Sets from Configurable Product Structure





Configurable Product Structure (eBOM)

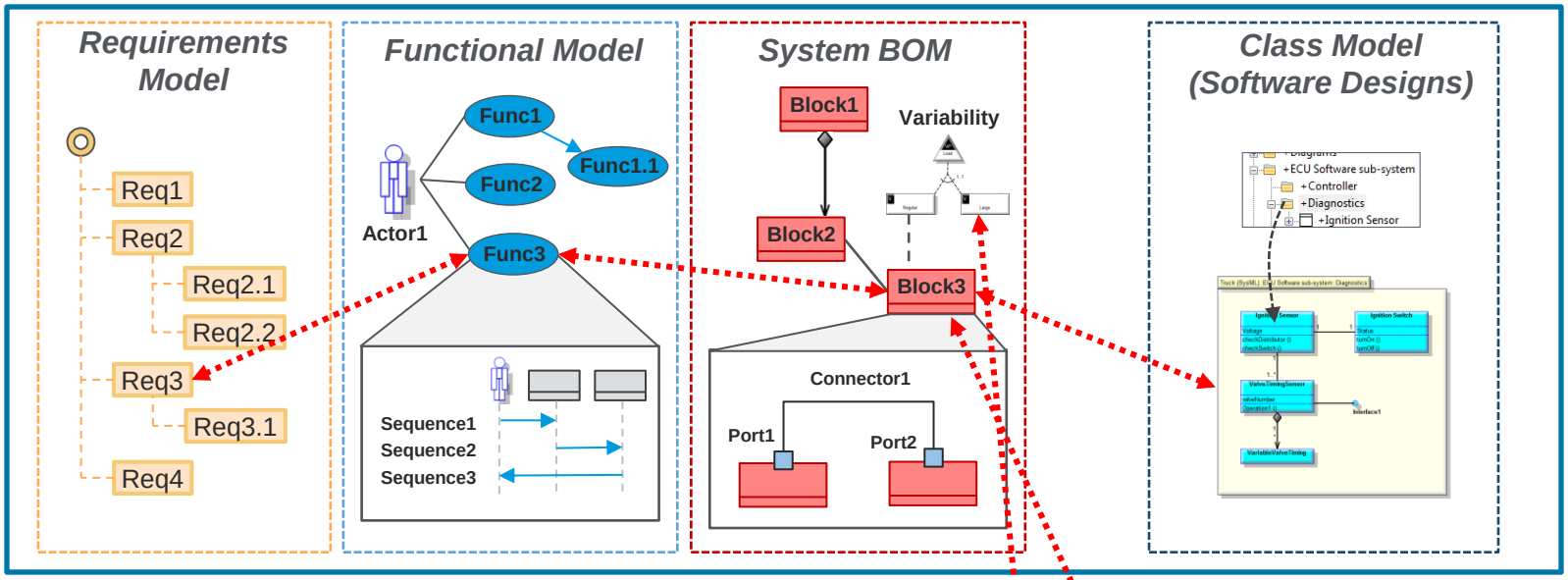


Candidate Use Case
Lifecycle Traceability

PTC

PTC Integrity™ Modeler

PTC Windchill



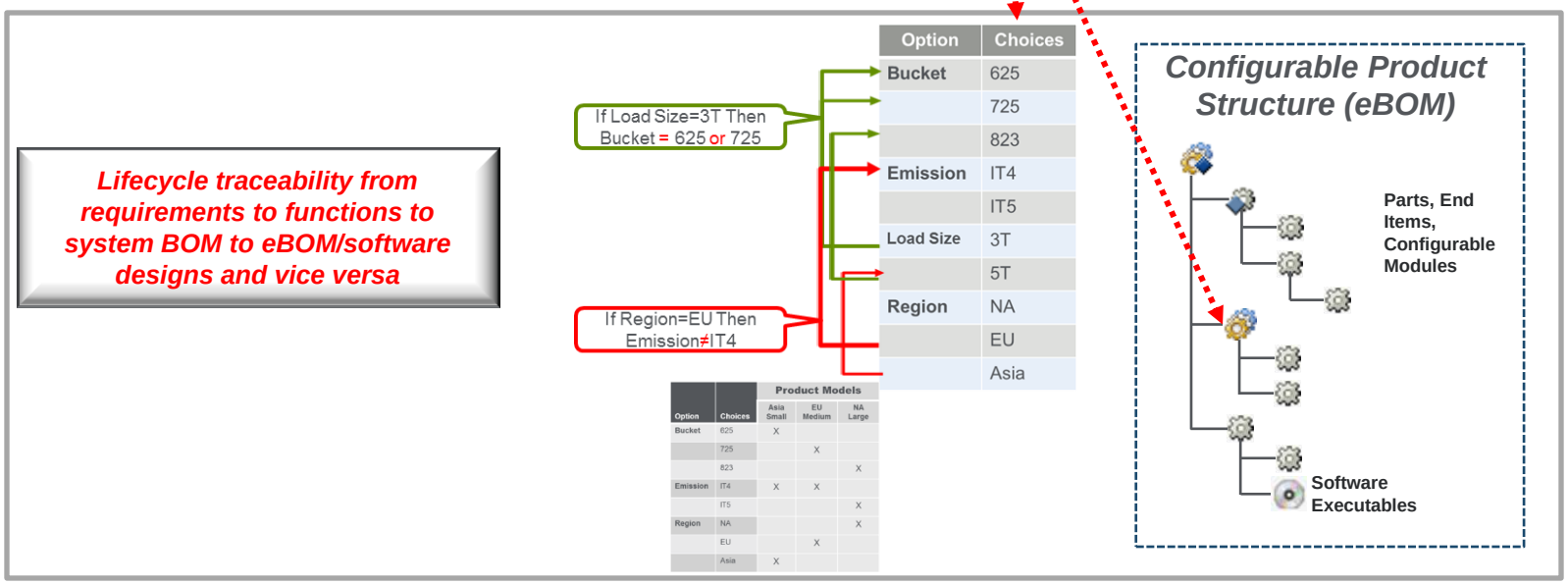
Lifecycle traceability from requirements to functions to system BOM to eBOM/software designs and vice versa

If Load Size=3T Then Bucket = 625 or 725

If Region=EU Then Emission≠IT4

Option	Choices
Bucket	625
	725
	823
Emission	IT4
	IT5
Load Size	3T
	5T
Region	NA
	EU
	Asia

Option	Choices	Product Models: Asia Small	EU Medium	NA Large
Bucket	625	X		
	725		X	
	823			X
Emission	IT4	X	X	
	IT5			X
Region	NA			X
	EU		X	
	Asia	X		

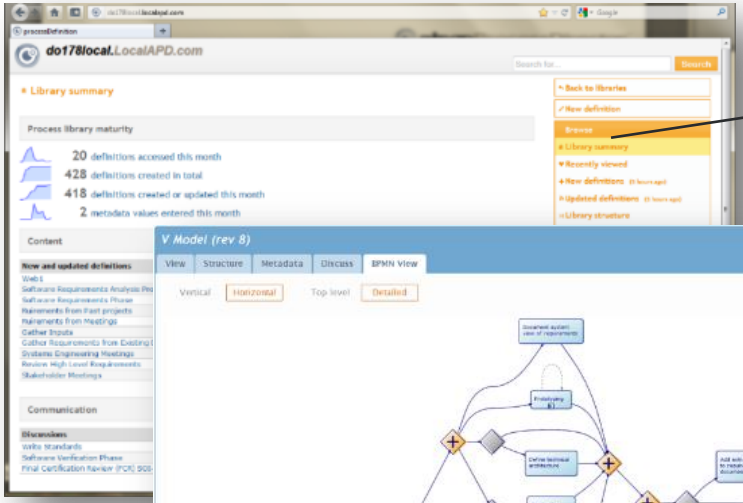


Process Authoring and Deployment

CAPABILITIES

- Define and document processes and procedures
- Tailor process definitions for specific programs
- Deploy standard processes to teams with To Do dashboards
- Generate project plans

Establish, measure, manage and improve your organization's operational, engineering and development processes

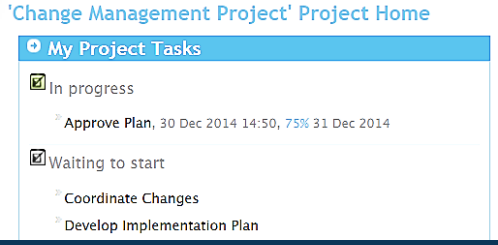


Web based authoring environment

Auto generated BPM views of process

Project tailoring during project initialization

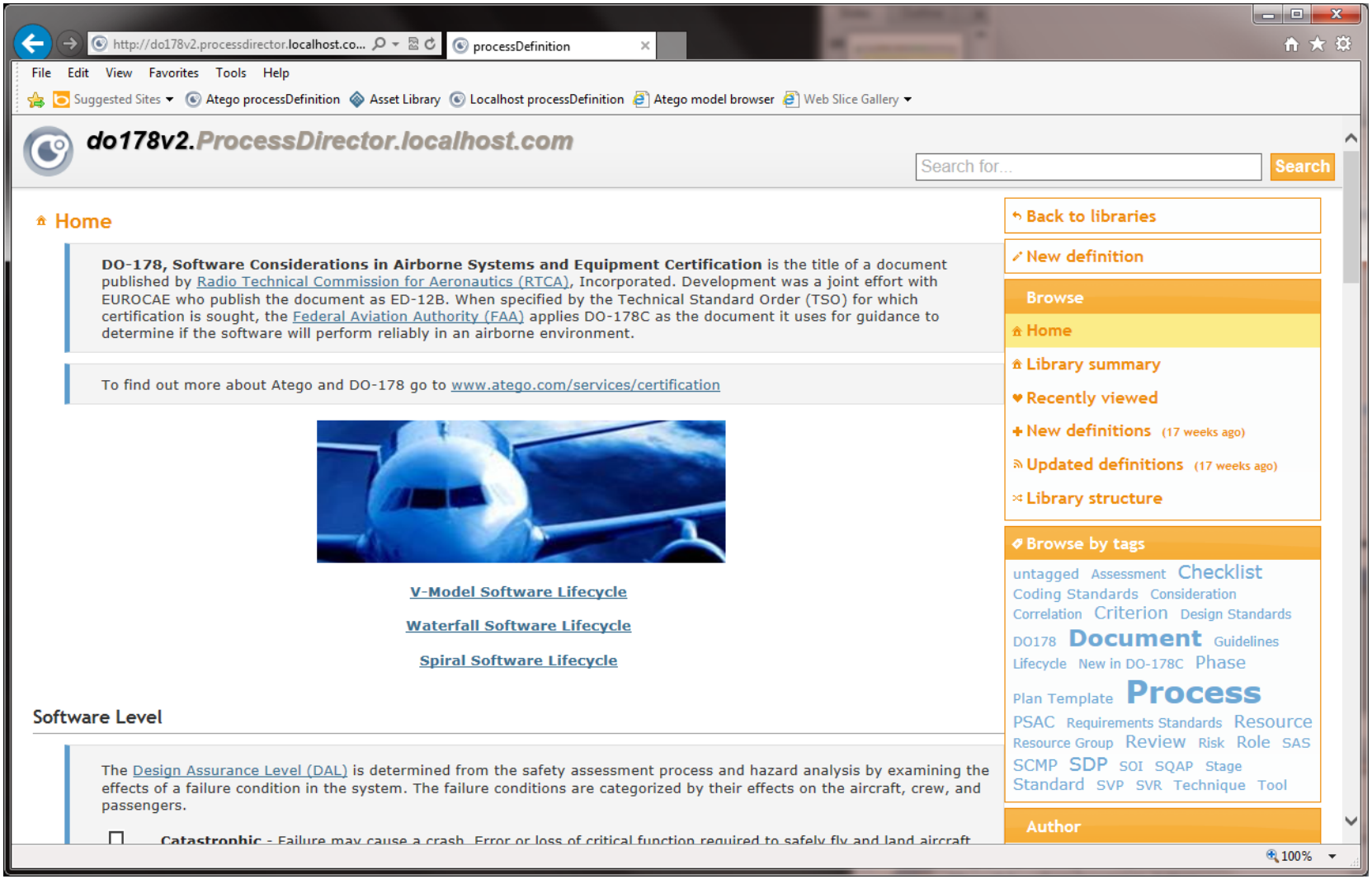
To Do dashboards



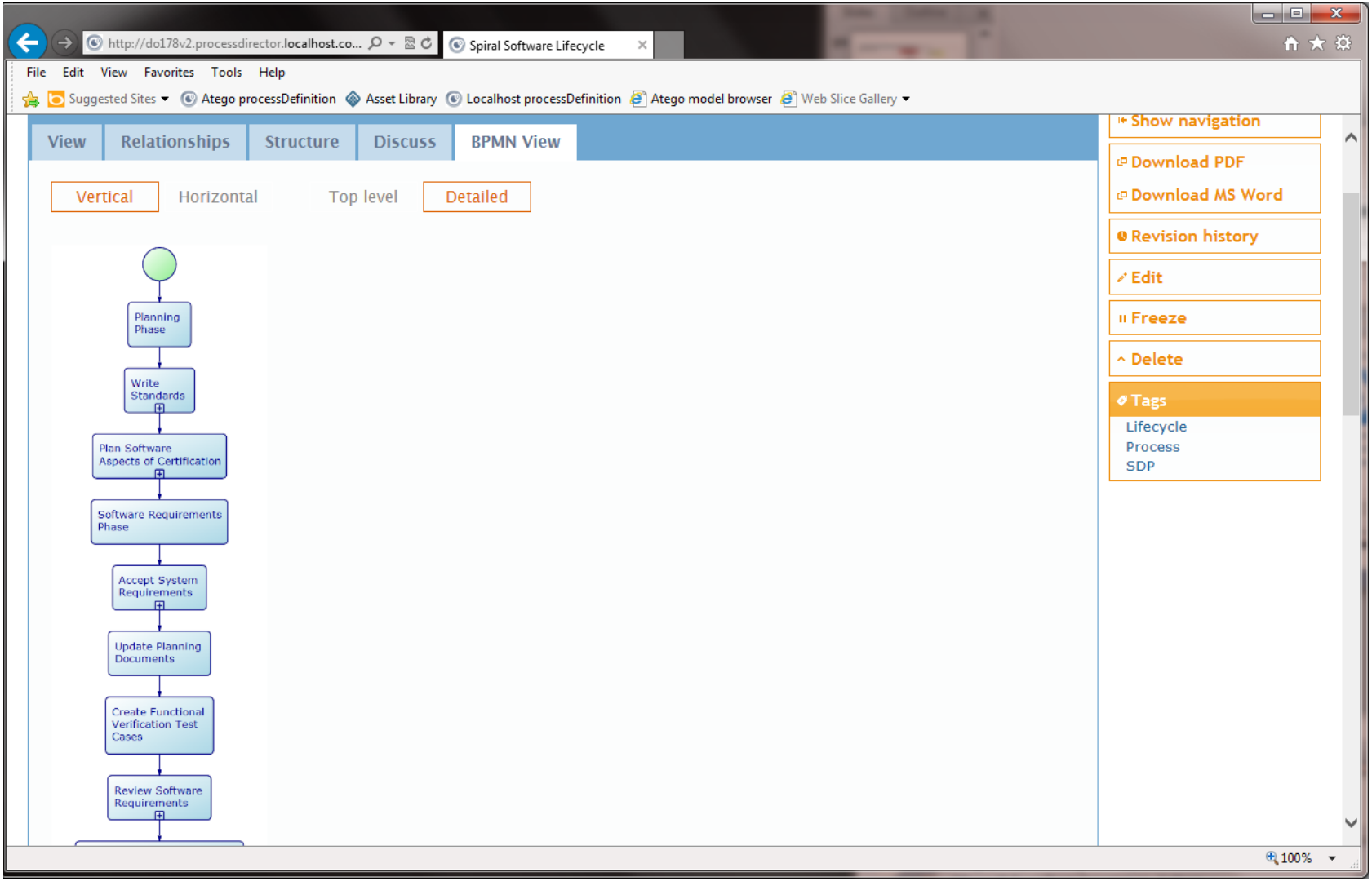
BENEFITS

- Merge Industry Best Practices and your Experience to improve Quality
- Demonstrate adherence to safety/regulatory compliance
- Reduce Costs of Process Definition and Rollout

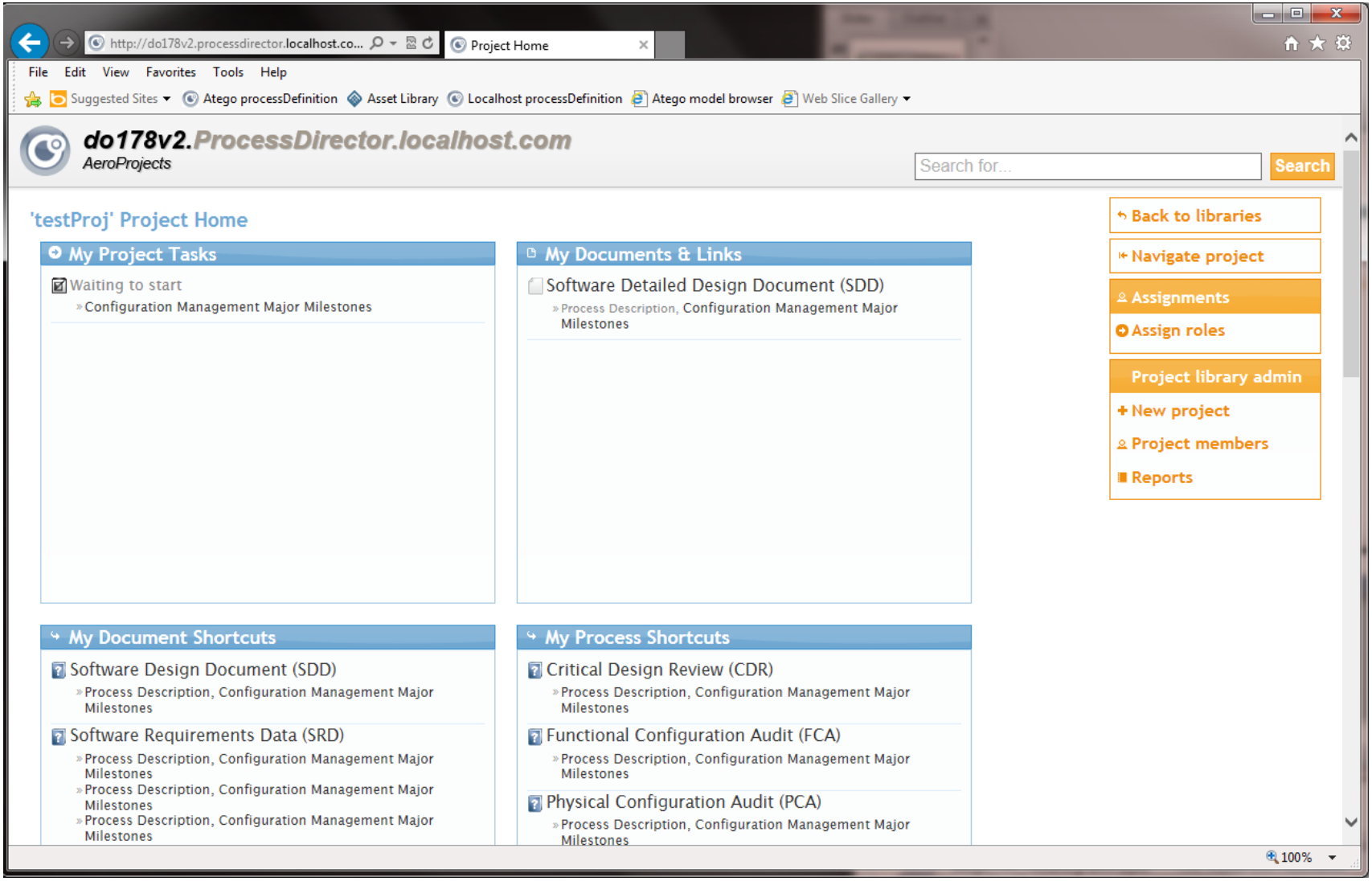
Process Library



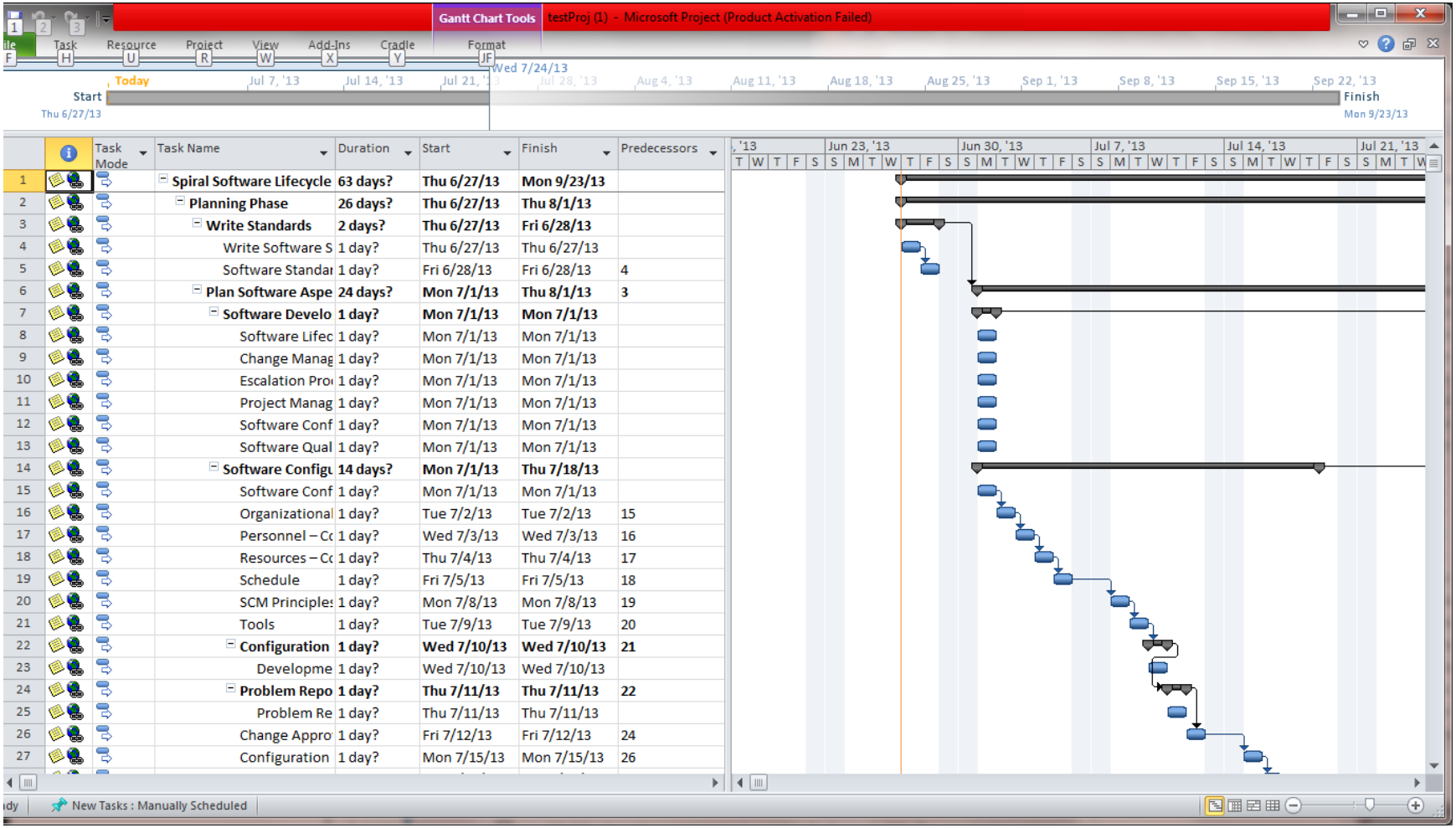
Process BPMN view of steps



Project Dashboard

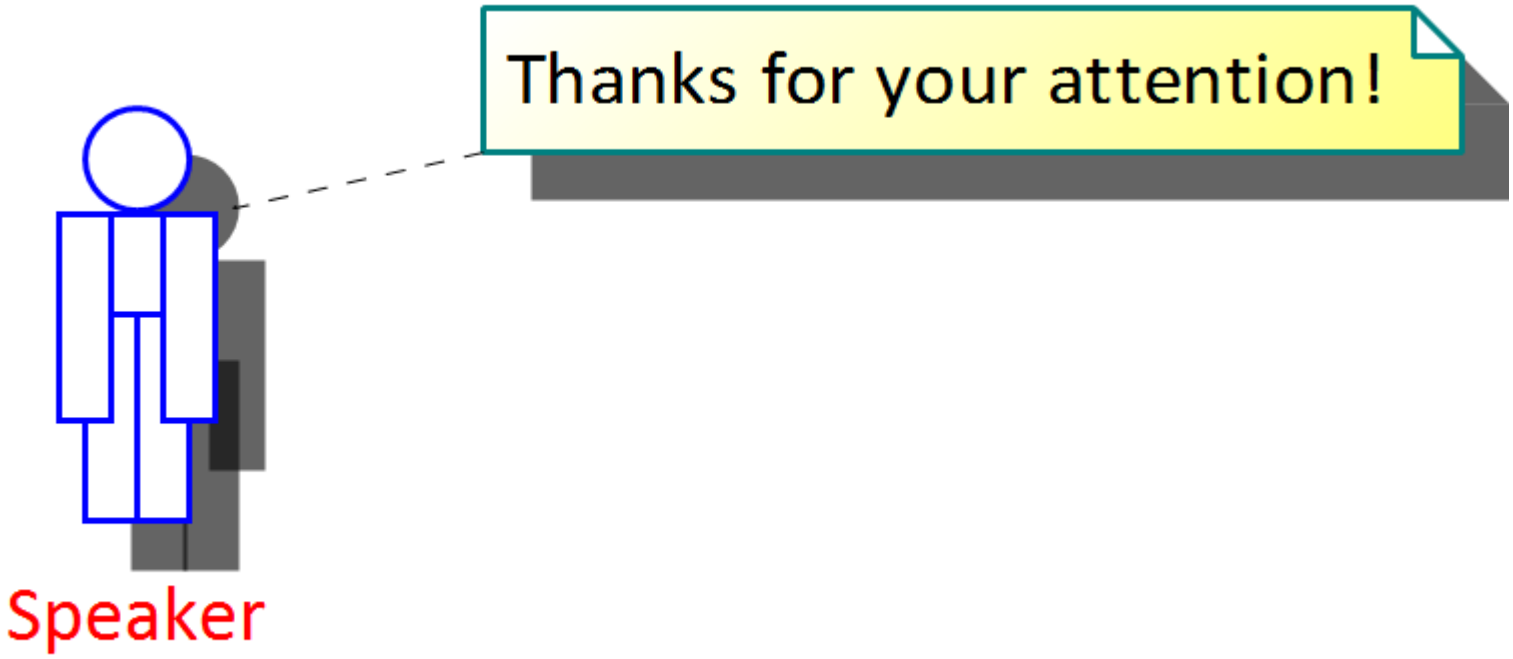


Schedule generation of Project from defined Process



	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		**Spiral Software Lifecycle**	**63 days?**	**Thu 6/27/13**	**Mon 9/23/13**	
2		**Planning Phase**	**26 days?**	**Thu 6/27/13**	**Thu 8/1/13**	
3		**Write Standards**	**2 days?**	**Thu 6/27/13**	**Fri 6/28/13**	
4		Write Software S	1 day?	Thu 6/27/13	Thu 6/27/13	
5		Software Standar	1 day?	Fri 6/28/13	Fri 6/28/13	4
6		**Plan Software Aspe**	**24 days?**	**Mon 7/1/13**	**Thu 8/1/13**	**3**
7		**Software Develo**	**1 day?**	**Mon 7/1/13**	**Mon 7/1/13**	
8		Software Lifec	1 day?	Mon 7/1/13	Mon 7/1/13	
9		Change Manag	1 day?	Mon 7/1/13	Mon 7/1/13	
10		Escalation Proc	1 day?	Mon 7/1/13	Mon 7/1/13	
11		Project Manag	1 day?	Mon 7/1/13	Mon 7/1/13	
12		Software Conf	1 day?	Mon 7/1/13	Mon 7/1/13	
13		Software Qual	1 day?	Mon 7/1/13	Mon 7/1/13	
14		**Software Configu**	**14 days?**	**Mon 7/1/13**	**Thu 7/18/13**	
15		Software Conf	1 day?	Mon 7/1/13	Mon 7/1/13	
16		Organizational	1 day?	Tue 7/2/13	Tue 7/2/13	15
17		Personnel – Cc	1 day?	Wed 7/3/13	Wed 7/3/13	16
18		Resources – Cc	1 day?	Thu 7/4/13	Thu 7/4/13	17
19		Schedule	1 day?	Fri 7/5/13	Fri 7/5/13	18
20		SCM Principles	1 day?	Mon 7/8/13	Mon 7/8/13	19
21		Tools	1 day?	Tue 7/9/13	Tue 7/9/13	20
22		**Configuration**	**1 day?**	**Wed 7/10/13**	**Wed 7/10/13**	**21**
23		Developme	1 day?	Wed 7/10/13	Wed 7/10/13	
24		**Problem Repo**	**1 day?**	**Thu 7/11/13**	**Thu 7/11/13**	**22**
25		Problem Re	1 day?	Thu 7/11/13	Thu 7/11/13	
26		Change Appro	1 day?	Fri 7/12/13	Fri 7/12/13	24
27		Configuration	1 day?	Mon 7/15/13	Mon 7/15/13	26

Questions and Answers



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