Pasadena Testbed Preliminary Analysis Plan

Project Status Meeting

Washington D.C. March 24th, 2014

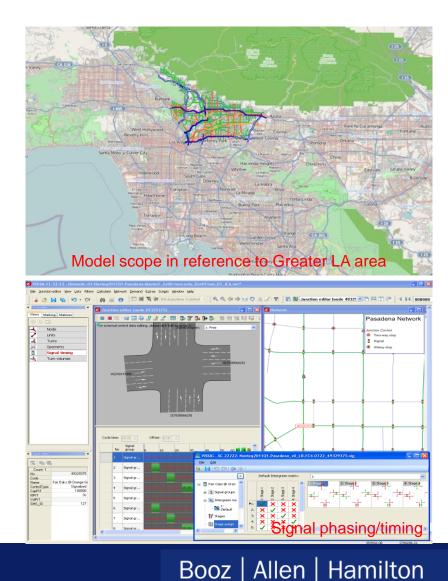
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Pasadena Model Environment

- Multi-resolution model development process
- Geographical scope: Pasadena and surrounding area

Network

- NAVTEQ 2011Q1 navigation
- NAVTEQ Traffic Patterns link speed profiles by day of week
- Detailed lane topology
- Junction geometry/control
- Ready for Vissim export





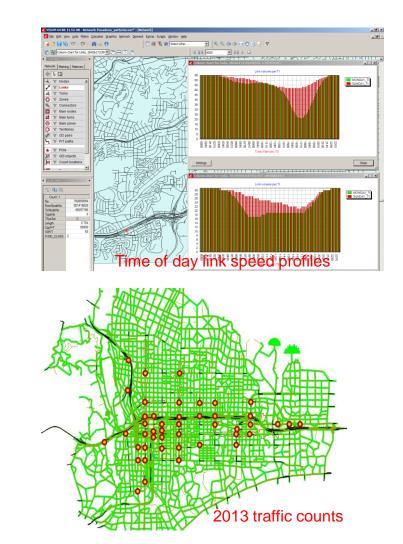
Pasadena Model Environment

Visum Dynamic User Equilibrium (DUE) assignment module

- Multi-class assignment
- Analytical DTA model on link flows

Spatial and temporal scope

- Weekday AM 3 hours (6-9)
- Weekday PM 4 hours (3-7)
- "Cross-walk" to travel demand model (TransCAD)
 - Zoning/connectors
 - SOV/HOV by segments, e.g. HBW/HBO/NHB, etc. (12 segments)
- Up to date calibration data
 - 2013 traffic counts
 - Corridor travel times





Pasadena Model Architecture

Vissim for <u>any</u> sub-area of city model

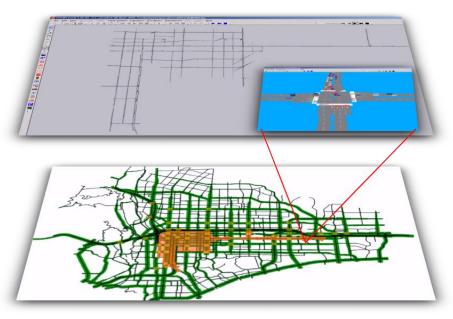
- Arterial traffic
- SCATSim adaptive control (existing)
- Light rail
- Bus transit
- Freeways (incl. ramp meters)

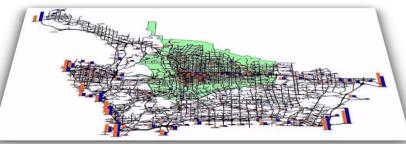
City of Pasadena 3-step model

- Trip generation and distribution
- DTA
- Control + geometry details
- GTFS transit data

Regional travel model

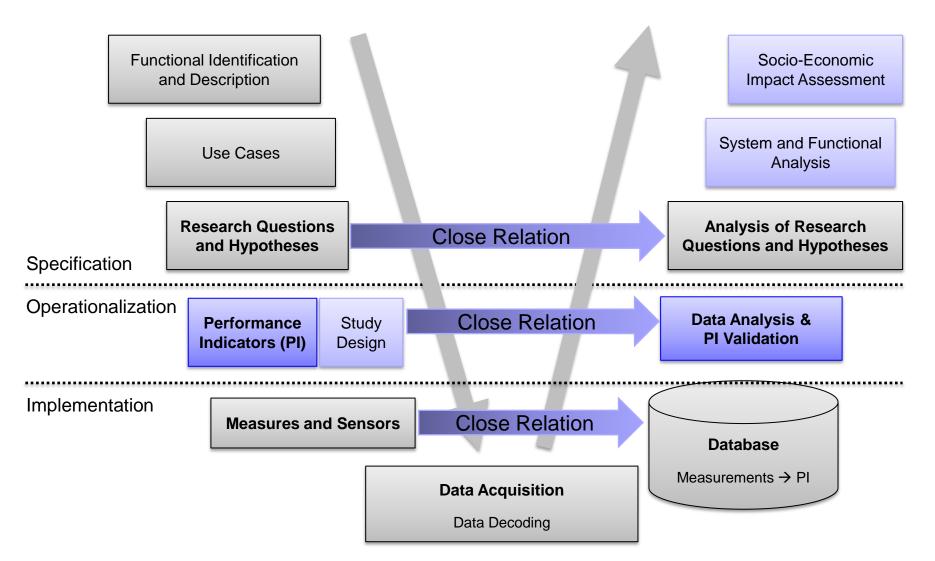
- 24/7 demand data (from cell phone data)







Analysis Goals and Objectives





Research Questions – Synergies and Conflicts

- Are ATDM strategies more beneficial when implemented in isolation or in combination (e.g., combinations of ATM, ADM, or APM strategies)?
 - The Pasadena testbed will allow for the simulation analysis of any combination of ATDM strategies.
- Which ATDM strategy or combinations of strategies yield the most benefits for specific operational conditions?
 - The Pasadena testbed will allow for testing of specific ATDM combinations under any of the four assumed operational conditions.
- What ATDM strategies or combinations of strategies conflict with each other?
 - Through the evaluation of different ATDM strategy combinations, any potential conflicts of strategies with each other will be identified.



Research Questions – Prediction Accuracy

- Which ATDM strategy or combination of strategies will benefit the most through increased prediction accuracy and under what operational conditions?
 - Analyzing specific ATDM combinations under any of the four assumed operational conditions with different levels of prediction accuracy will help answer this research question.
- Are all forms of prediction equally valuable, i.e., which attributes of prediction quality are critical (e.g., length of prediction horizon, prediction accuracy, prediction speed, and geographic area covered by prediction) for each ATDM strategy?
 - The Pasadena testbed will allow for testing each specific ATDM strategy under various forms of prediction performance.



Research Questions – Active Management or Latency

- Are the investments made to enable more active control cost-effective?
 - The Pasadena testbed will provide performance measures that will allow for answering this research question.
- Which ATDM strategy or combinations of strategies will be most benefited through reduced latency and under what operational conditions?
 - Analyzing specific ATDM combinations under any of the four assumed operational conditions with different levels of latency will help answer this research question.



Research Questions – Op. Cond., Modes, Facility Types

- Which ATDM strategy or combinations of strategies will be most beneficial for certain modes and under what operational conditions?
 - The Pasadena testbed will provide performance measures by traveler type that will allow for answering this research question.
- Which ATDM strategy or combinations of strategies will be most beneficial for certain facility types (freeway, transit, arterial) and under what operational conditions?
 - The Pasadena testbed will provide performance measures by traveler type that will allow for answering this research question.
- Which ATDM strategy or combinations of strategies will have the most benefits for individual facilities versus system-wide deployment versus region-wide deployment and under what operational conditions?
 - This research question will be difficult to answer as most ATDM strategies will have to be "virtually deployed" on a subset of all possible locations. For example, adaptive signal control will be modeled at the corridor in downtown Pasadena where it is currently deployed in the field, but an expansion of that system may not be possible.



Research Questions – Prediction, Latency, and Coverage

- What is the tradeoff between improved prediction accuracy and reduced latency with existing communications for maximum benefits?
 - The Pasadena testbed will allow for testing scenarios that will provide answers to this research question.
- What is the tradeoff between prediction accuracy and geographic coverage of ATDM deployment for maximum benefits?
 - The Pasadena testbed will allow for testing scenarios that will provide answers to this research question.
- What is the tradeoff between reduced latency (with existing communications) and geographic coverage for maximum benefits?
 - The Pasadena testbed will allow for testing scenarios that will provide answers to this research question.
- What will be the impact of increased prediction accuracy, more active management, and improved robust behavioral predictions on mobility, safety, and environmental benefits?
 - With the exception of safety benefits, the Pasadena testbed will allow for testing scenarios that will
 provide answers to this research question.
- What is the tradeoff between coverage costs and benefits?
 - The Pasadena testbed will provide performance measures that will allow for answering this research question.



Research Questions – CV Technology and Prediction

- Are there forms of prediction that can only be effective when coupled with new forms of data, such as connected vehicle data?
 - The Pasadena testbed would allow for testing the effectiveness of different forms of prediction methods if they are supplied to the modeling team. The current assumption is that the testbed will only include one prediction method. However, this method can be configured for various levels of accuracy, coverage, quality, etc.



Research Questions – ST and LT Behaviors

- Which ATDM strategy or combinations of strategies will have the most impact in influencing short-term behaviors versus long term behaviors and under what operational conditions?
 - The Pasadena testbed will NOT provide performance measures that will allow for answering this research question.
- Which ATDM strategy or combinations of strategies will yield most benefits through changes in short-term behaviors versus long-term behaviors and under what operational conditions?
 - The Pasadena testbed will NOT provide performance measures that will allow for answering this research question.



Analysis Hypotheses

- ATDM strategies are most effective if deployed in combinations and not in isolation.
- ATDM strategies yield benefits under all operational conditions.
- There are no ATDM strategies that conflict with each other.
- All ATDM strategies relying on prediction benefit from increased prediction accuracy under all operational conditions.
- ATDM strategies benefit the most from increased prediction accuracy and geographic coverage.
- The investments to enable more active control are very cost-effective.
- ATDM strategies affecting facility and lane choice and operation benefit the most from reduced latency; however, this applies to all operational conditions.



Analysis Hypotheses

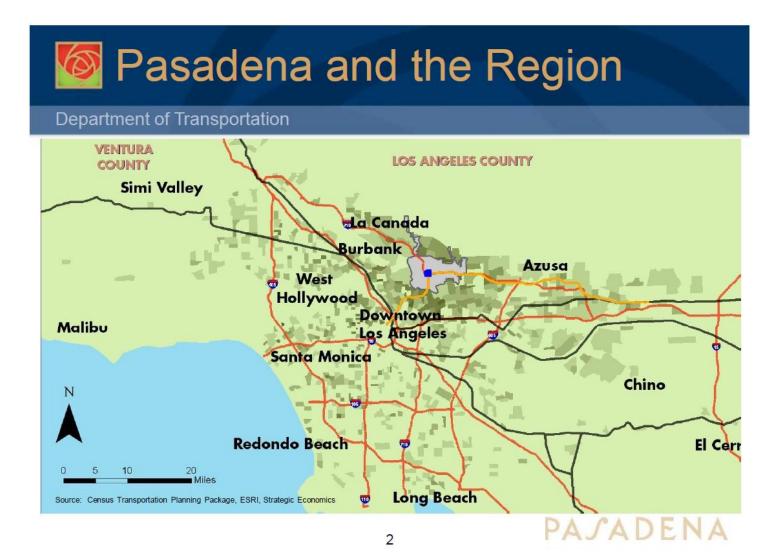
- ATDM strategies are most effective for the modes and facilities they are designed for; i.e., ATM and APM for traffic and ADM for transit. However, secondary cross-benefits between the modes and their respective ATDM strategies can be measured as well.
- The ideal situation is to achieve perfect prediction accuracy without any latency for the entire region. However, as this is not possible, there are minimum requirements for accuracy, latency and geographic coverage that need to be fulfilled in order not to render ATDM strategies ineffective.
- Mobility and environmental benefits will increase with increased prediction accuracy, more active management, and improved robust behavioral predictions
- Increased coverage increases ATDM benefits, but also cost. There is a level of coverage that will provide the highest value by maximizing the benefit/cost ratio.



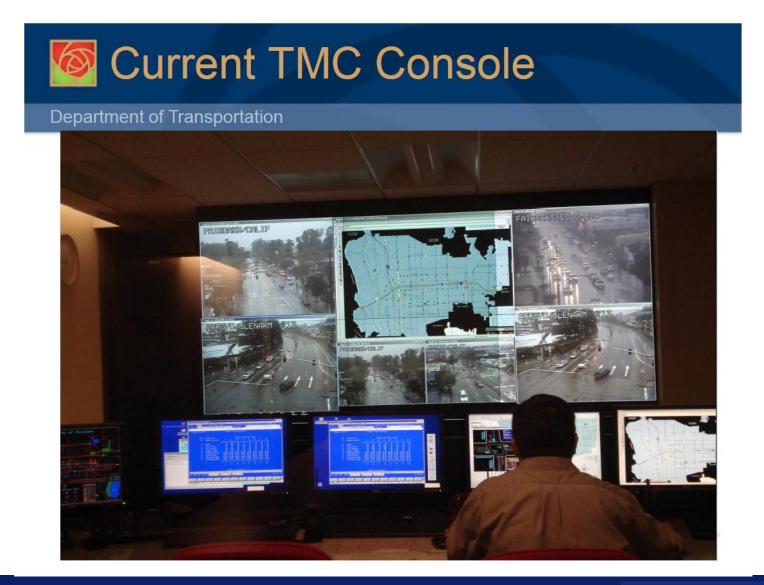
ANALYSIS SCENARIOS

















- 4 Central Traffic Control Systems (all on the IEN)
- 31 CCTV Cameras
- 5 Fixed CMS (6 legacy CMS no longer operational)

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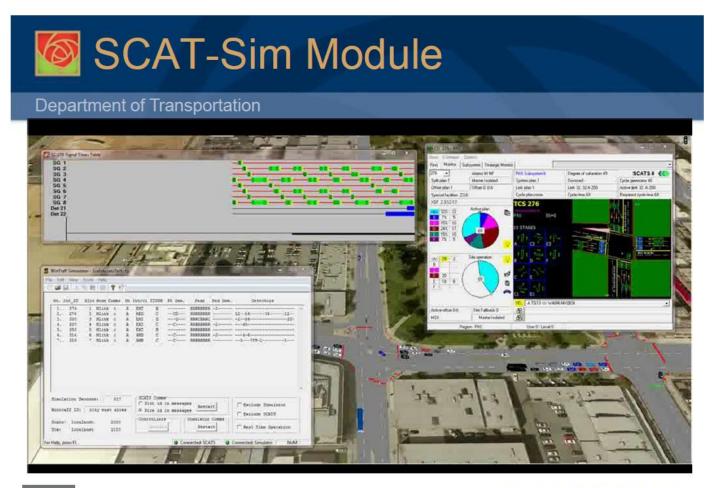
- SMART Signal Pilot
- Transit Vehicle Arrival Information System
- Bluetooth Pilot
- SCATS Adaptive System on Fair Oaks Ave
- Video Detection (65 intersections)
- System Detection (80 intersections)





SCATS				
Department of Tra	nsportation			
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Department of Transportation

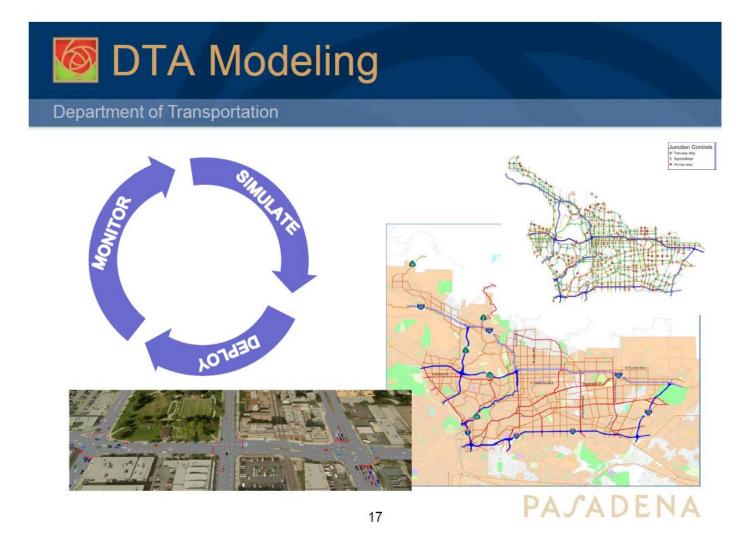
- Transit Arrival Information System
 - > Displays at stops, IVR, Web-based
 - > Real-time bus position
 - > On-time performance data by stop
- Parking Guidance System
 - > Real-time off-street parking availability
 - > Integrate with wayfinding signage
 - > Provide dynamic guidance
- Emergency Vehicle Preemption



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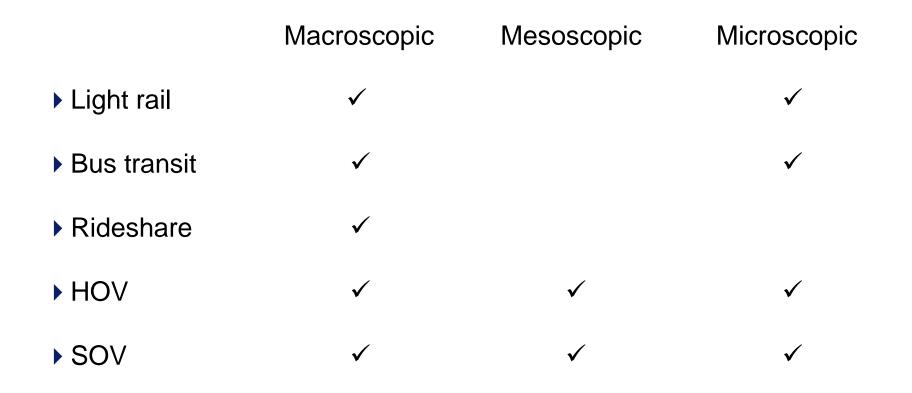


Type of Travelers

- Transit riders
- Rideshare participants
- HOV passengers
- Passenger car drivers



Vehicle Modes







Active Traffic Management: Dynamic Shoulder Lanes

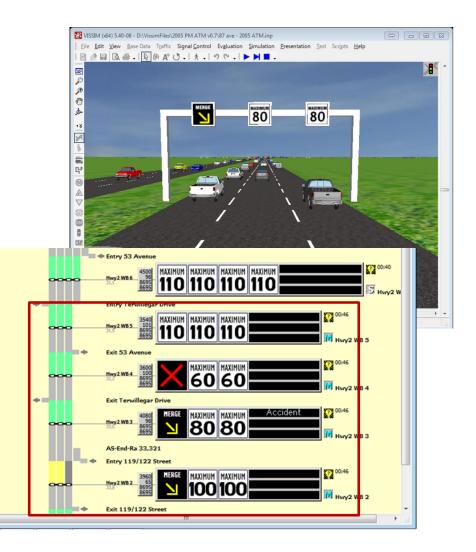
- Algorithms and models used
 - Shoulder lane utilization based on predicted traffic conditions
- Input data required
 - Analysis scenario
 - Predicted traffic conditions
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Minor





Active Traffic Management: Dynamic Lane Use Control

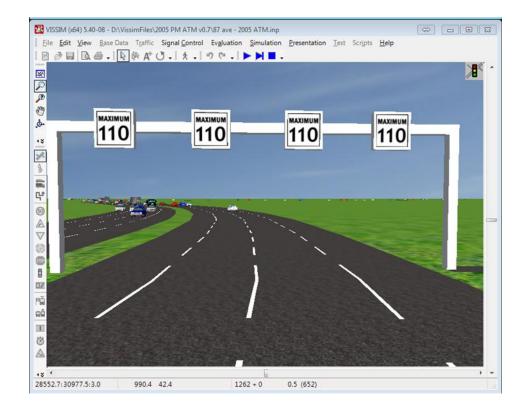
- Algorithms and models used
 - Lane utilization based on predicted traffic conditions
- Input data required
 - Analysis scenario
 - Predicted traffic conditions
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Minor





Active Traffic Management: Dynamic Speed Limits

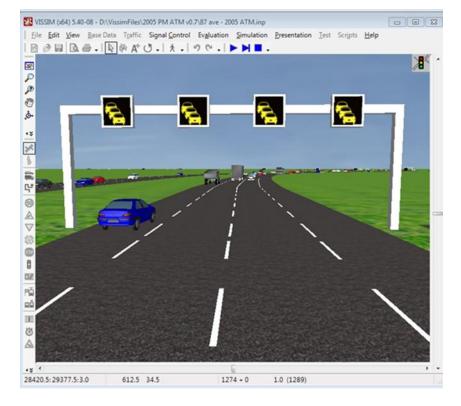
- Algorithms and models used
 - Speed limits based on traffic conditions
- Input data required
 - Analysis scenario
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Minor





Active Traffic Management: Queue Warning

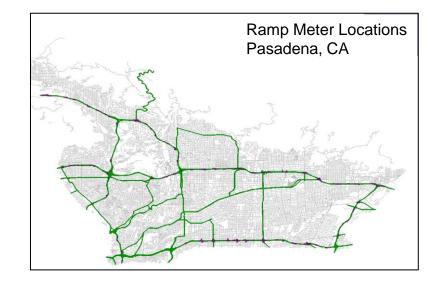
- Algorithms and models used
 - Queue warning based on traffic conditions
 - Effect on microsimulation model unclear
- Input data required
 - Analysis scenario
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Minor





Active Traffic Management: Adaptive Ramp Metering

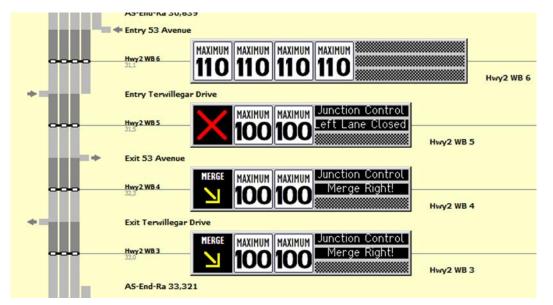
- Algorithms and models used
 - ALINEA
 - Ramp metering rates based on predicted traffic conditions
- Input data required
 - Analysis scenario
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Minor, if using ALINEA, otherwise Medium





Active Traffic Management: Dynamic Junction/ Merge Control

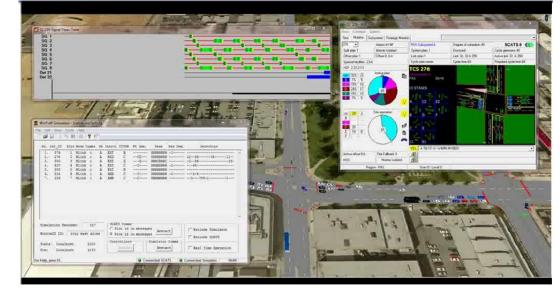
- Algorithms and models used
 - Freeway junction lane allocation based on predicted traffic conditions
- Input data required
 - Analysis scenario
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Minor





Active Traffic Management: Adaptive Signal Control

- Algorithms and models used
 - SCATS
- Input data required
 - Analysis scenario
- Tools used to model strategy
 - Vissim
 - SCATSim
- Development effort and risk
 - Minor



Existing Pasadena Vissim/SCATSim model



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Active Traffic Management: Transit Signal Priority

- Algorithms and models used
 - TSP as embedded in D4 2070 signal controller firmware
- Input data required
 - Analysis scenario
- Tools used to model strategy
 - Vissim
 - D4 SIL (equivalent to Vissim's RBC controller)
- Development effort and risk
 - Minor





Active Traffic Management: Dynamic Lane Reversal

- Algorithms and models used
 - Dynamic lane reversal based on predicted traffic conditions
- Input data required
 - Analysis scenario
 - Predicted traffic conditions
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Medium





Active Demand Management: Dynamic Ridesharing

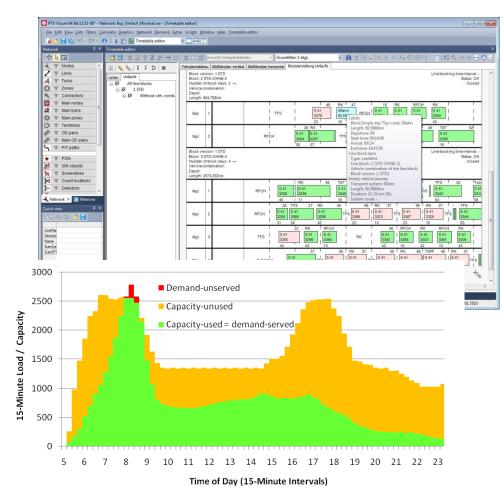
- Algorithms and models used
 - Aggregate tour based destination choice model
- Input data required
 - Demographic data/person types
 - Typical work/school locations
- Tools used to model strategy
 - Visum (tour based demand module)
- Development effort and risk
 - Medium





Active Demand Management: Dynamic Transit Capacity Assignment

- Algorithms and models used
 - Timetable based transit assignment
 - Line blocking, capacity indicators
- Input data required
 - Transit fleet (buses, rail cars etc.)
 - Transit schedules
 - Passenger demand
- Tools used to model strategy
 Visum (line blocking module)
- Development effort and risk
 - Medium

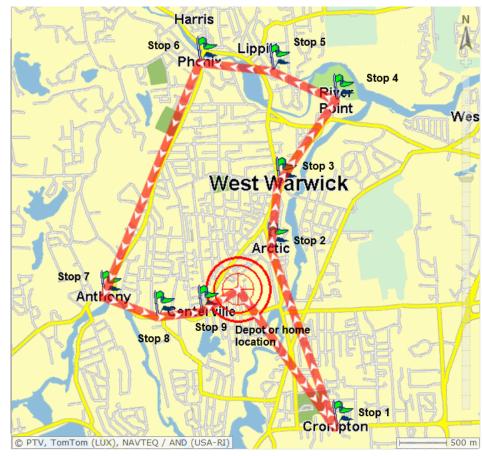


**Scherr. W, Fisher. I "Regional Application of 24-Hour Dynamic Transit Assignment", 12th TRB Transportation Planning Application Conference, Houston TX, May 2009



Active Demand Management: On-demand Transit

- Algorithms and models used
 - Traveling salesman problem (TSP)
 - Fast heuristic solution methods
- Input data required
 - Transit fleet
 - Depot location
 - Passenger demand
- Tools used to model strategy
 - Visum
 - PTV xTour
- Development effort and risk
 - Medium

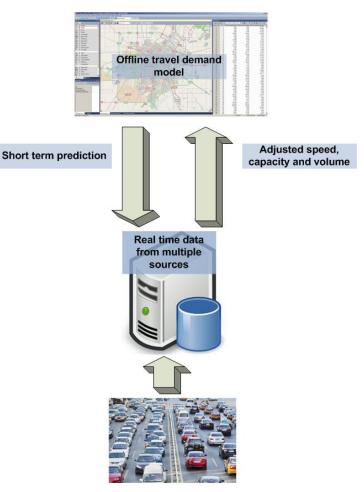


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Active Demand Management: Predictive Traveler Information

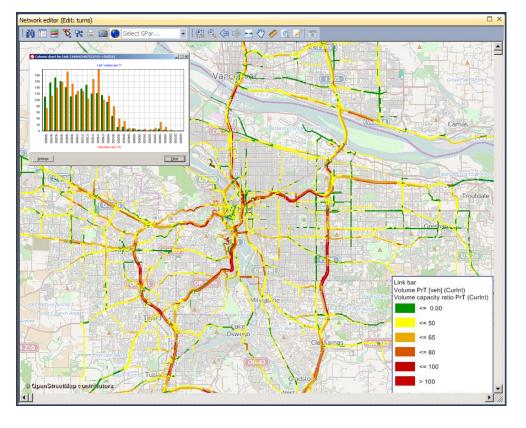
- Algorithms and models used
 - Mode choice model
- Input data required
 - DTA model
 - Predicted traffic conditions
- Tools used to model strategy
 - Visum (incl. tour based demand module)
- Development effort and risk
 - Medium





Active Demand Management: Dynamic Pricing

- Algorithms and models used
 - Adaptation of Vickrey's departure time choice model
 - Mode choice model
- Input data required
 - Price elasticity (surveys)
 - Demographic data for market segmentation
- Tools used to model strategy
 - Visum (incl. tour based demand module)
- Development effort and risk
 - Medium/High





Active Demand Management: Dynamic Fare Reduction

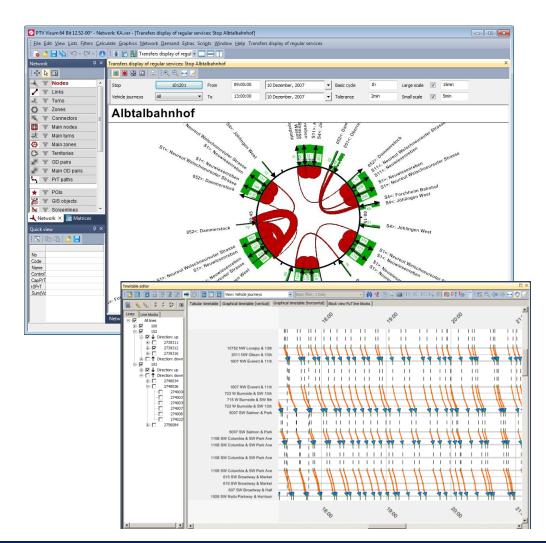
- Algorithms and models used
 - Mode choice model
 - Rule based adjustments
- Input data required
 - Passenger demand
 - Price elasticity
- Tools used to model strategy
 Visum (incl. tour based demand module)
- Development effort and risk
 Minor

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Active Demand Management: Transfer Connection Protection

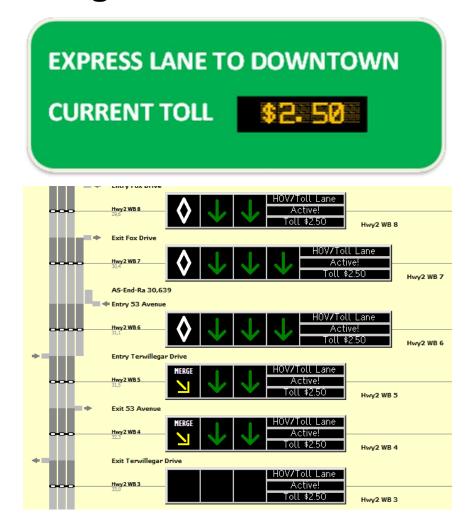
- Algorithms and models used
 - Transit system manager decision support system
- Input data required
 - Transit fleet and schedule
 - Passenger demand
- Tools used to model strategy
 - Visum (transfer display tool)
- Development effort and risk
 - Minor





Active Demand Management: Dynamic HOV/ Managed Lanes

- Algorithms and models used
 - Dynamic HOV/Managed Lane operation based on predicted traffic conditions
 - Facility choice model
 - Heuristic pricing model
- Input data required
 - Predicted traffic conditions
 - Pricing elasticity
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Medium





Active Demand Management: Dynamic Routing

- Algorithms and models used
 - Dynamic Routing for select OD bundles based on predicted traffic conditions
 - Use of "dynamic routes" concept in Vissim
- Input data required
 - Predicted traffic conditions
- Tools used to model strategy
 - Vissim
 - GeoDyn2-Control
- Development effort and risk
 - Minor





Active Parking Management: Dynamically Priced Parking

- Algorithms and models used
 - Mode and departure time choice
 - Simulation based parking choice model/shadow pricing
- Input data required
 - Pricing strategy
 - Pricing elasticity
 - Parking supply
- Tools used to model strategy
 - Visum (incl. tour based demand module)
 - Vissim
- Development effort and risk
 - Medium

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Active Parking Management: Dynamic Parking Reservation

- Algorithms and models used
 - Simulation based parking choice model with dynamic availability
- Input data required
 - Parking supply
- Tools used to model strategy
 Vissim
- Development effort and risk
 - Minor

	⟨ P⇔rkWhiz
	ABM Parking Services 955 S. Clinton St., Chicago, IL
	Mobile passes accepted
	Wed, Oct 2 12:15pm to 3:15pm
	\$6.00 BOOK NOW
	Special online rate!
	Amenities
	🖻 Mobile Pass
	★ Free gift
	🛱 Unobstructed
	Upon arrival, please place the ParkWhiz parking pass face-up on your dashboard for validation.
– Decis	ion
No.:	1 Name: Parking Lot Search
At:	72.006 m Link: 1
	Vehicle Class(es): All Vehicle Types

Condition

estination parking lot fewer than

Decision

No.

1



Spaces

Parking Available

Lot No.

V

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Active Parking Management: Dynamic Overflow Transit Parking

- Algorithms and models used
 - Bi-level parking lot allocation model modeled as optimal lot assignment and capacity reallocation
- Input data required
 - Available parking lots
 - Park and ride demand
- Tools used to model strategy
 - Visum (upper level model)
 - Python (overflow reallocation)
- Development effort and risk
 - Minor





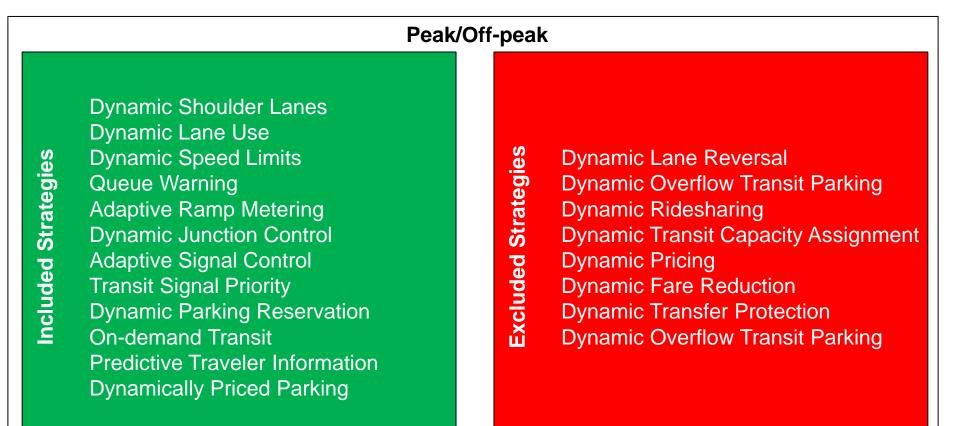
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Operational Conditions

- Operational conditions that can be modeled by the Pasadena testbed
 - Peak/Off-peak
 - Available cell phone sighting based demand profiles cover 24 hours and three different day types
 - Incident
 - Incidents are modeled by placing them in the microsimulation model with the ATM system manager and the traffic prediction system responding to them
 - Work Zone
 - Work zones are modeled by the ATM system manager and the microsimulation model and the traffic prediction system responding to them
 - Planned Special Event
 - Available cell phone sighting based demand profiles cover special events at the Rose Bowl
 - Response ATDM strategies are modeled by all tools



Any combination of Operational Condition and ATDM Strategies is feasible!



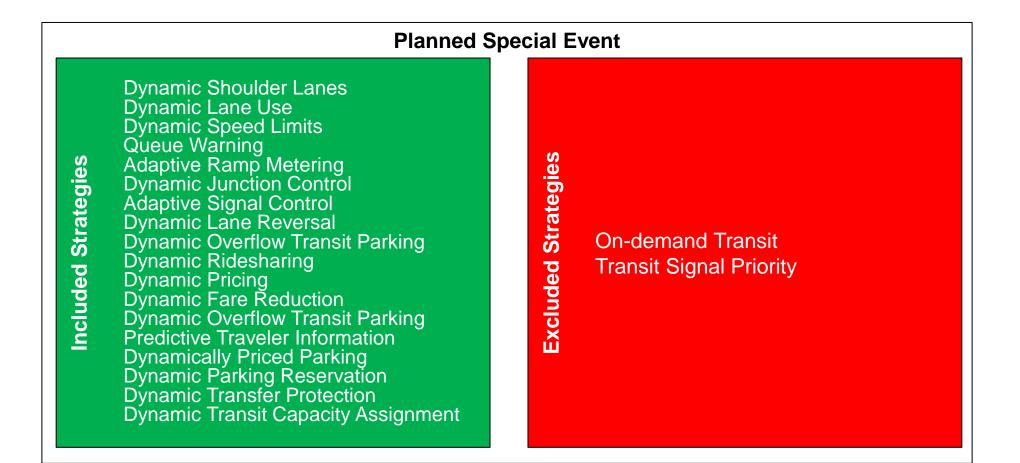


	ncident	
Pynamic Shoulder Lanes Dynamic Lane Use Dynamic Speed Limits Queue Warning Adaptive Ramp Metering Dynamic Junction Control Adaptive Signal Control Dynamic Lane Reversal Dynamic Overflow Transit Parking Dynamic Ridesharing Dynamic Transit Capacity Assignme Dynamic Fare Reduction Dynamic Transfer Protection Dynamic Overflow Transit Parking Predictive Traveler Information	r	



	Wo	rk Zor	ne	
Included Strategies	Dynamic Shoulder Lanes Dynamic Lane Use Dynamic Speed Limits Queue Warning Adaptive Ramp Metering Dynamic Junction Control Adaptive Signal Control Adaptive Signal Control Transit Signal Priority Dynamic Lane Reversal Dynamic Lane Reversal Dynamic Overflow Transit Parking Dynamic Fare Reduction Dynamic Overflow Transit Parking Predictive Traveler Information		Excluded Strategies	On-demand Transit Dynamically Priced Parking Dynamic Parking Reservation Dynamic Transfer Protection Dynamic Transit Capacity Assignment





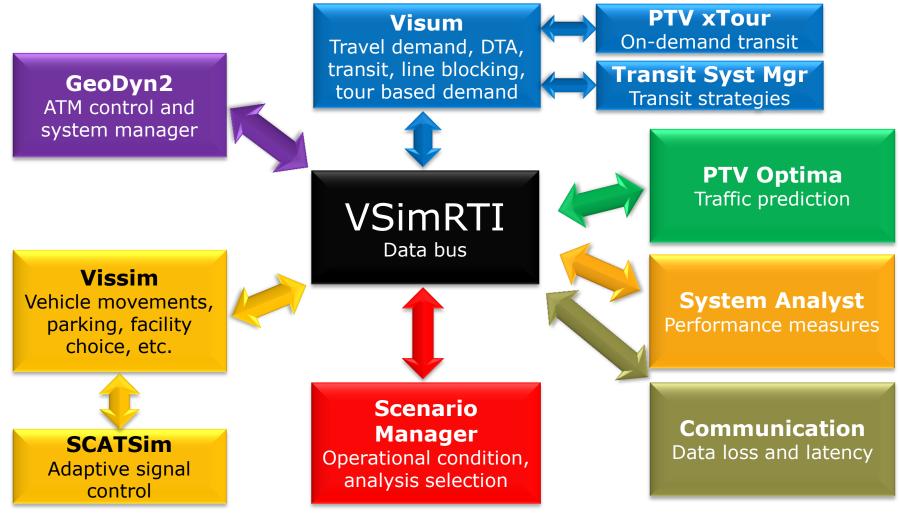


ANALYSIS FRAMEWORK





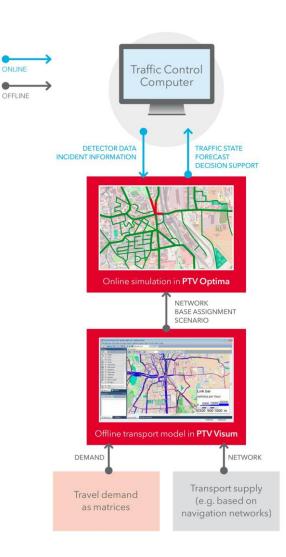
Pasadena Testbed Description





Traffic Prediction

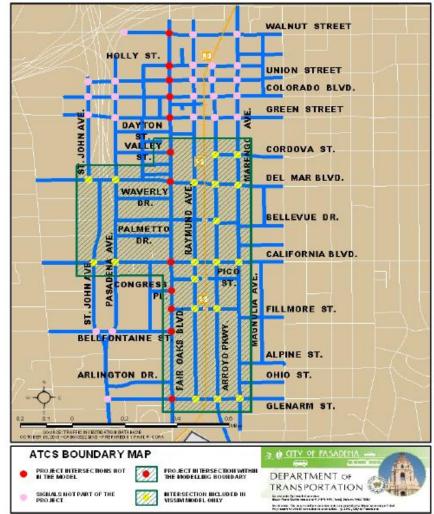
- Model-based short-term (30 min) prediction of
 - Traffic volume
 - Traffic speed
- Input data required
 - Calibrated DTA model (available)
- Tools used to model strategy
 - PTV Optima
- Development effort and risk
 - Medium





Adaptive Signal Control

- SCATS currently deployed on downtown core parallel to LRT
- Existing SCATSim model integrated with Vissim
- SCATSim licensing arrangement to be determined
- Development effort and risk
 - Minor





Communication Model

- Low-fidelity model focused on ATDM requirements
- Representation of
 - Data loss
 - Latency
- Model options
 - Existing tool
 - Custom program







Scenario Manager

- Graphical user interface for run-time control
- Selection of
 - Operational condition
 - ATDM strategy bundle
 - Other parameters

Scenario Manager Operational condition, analysis selection



System Analyst

- Performance measure
 - Definition
 - Aggregation
 - Reporting

Feature of VSimRTI

System Analyst Performance measures

A https://w	erkzeug.dcaiti.tu-be	rlin.de/team/measuring/?a=table									_	☆	ł (
	Upload Logdefiniti	on List of Measurands											
Measurands													
Component- ID	• Name	Description	• DataType	• Unit	• Min. Value	• Max. Value	• Decimals	+ Enums	• Ext_id	• Deprecated	• PID Ref •	To PID •	Fre
	dataStoredInLDMpp	Data was stored with the following repository id.	integer	id	0.0	0.0	0		10060000020000001	false			_
	potiLogProfile	A Log Profile is defined by an integer number.	integer	1	0.0	10000.0	0		10060000030000001	false			
)	latitude	Latitude in degrees: +/- signifies West/East.	float	degree	-90.0	90.0	6		10060000030000002	false			
	longitude	Longitude in degrees: +/- signifies North/South.	float	degree	-180.0	180.0	6		10060000030000003	false			
	speed	The speed over ground.	float	m/s	-125.0	125.0	3		10060000030000004	false			
	heading	Course over ground, degrees from true north.	float	degree	0.0	360.0	4		10060000030000005	false			
	altitude	Altitude in meters.	float	meter	-1000.0	8000.0	3		10060000030000006	false			
	timeStamp	Seconds since the Unix epoch, UTC. The value may have a fractional part of up to .01sec precision, which can be found in timeStampMillis	integer	seconds	0.0	0.0	0		10060000030000007	false			
L.	timeStampMillis	Fractional part of the seconds since the Unix epoch, UTC.	integer	milli seconds	0.0	999.0	0		10060000030000008	false			
	maxTraceLength	Maximum length of the trace list.	integer		0.0	0.0	0		10060000030000009	false			
	traceLength	Current length of the trace list.	integer		0.0	0.0	0		10060000030000010	false			
	positionFixMode	Describes the type of fix for position resolution	integer	1	0.0	10.0	0		10060000030000011	false			
	prn	SV number	integer		0.0	200.0	0		10060000030000012	false			
	signalStrength	Signal strength in dB	integer		0.0	99.0	0		10060000030000013	false			
)	used	True if satellite is used for position computation	boolean		0.0	0.0	0		10060000030000014	false			
	positionOrigin	Origin of this position update.	enum		0.0	0.0	0	GNSS,CAN,CPOS,STATIC,SIMULATION	10060000030000015	false			
	timeSync	Time offset in milliseconds between GNSS time and system time.	integer	milliseconds	-99999.0	99999.0	0		10060000030000016	false			
1	logProfile	A Log Profile is defined by an integer number.	integer	id	0.0	10000.0	0		1006000000500000001	false			
	componentActive	is the component active?	boolean		0.0	0.0	0		100600000050000002	false			_
	error	An errortype, which is logged on occurence.	enum		0.0	0.0	0	onGettingMacAddress,onCommunicationWithCIS,otherError,onConfiguration	1006000000500000003	false			
	type	The type of the ITS Station	enum		0.0	0.0	0	personal,vehicle	10060000050000004	false			_
	idLSB	The least significant bits of the encrypted id as an integer.	integer		-2.14748365E9	2.14748365E9	0		10060000050000005	false			
	idMSB	The most significant bits of the encrypted id as an integer.	integer		-2.14748365E9	2.14748365E9	0		1006000000500000006	false		_	

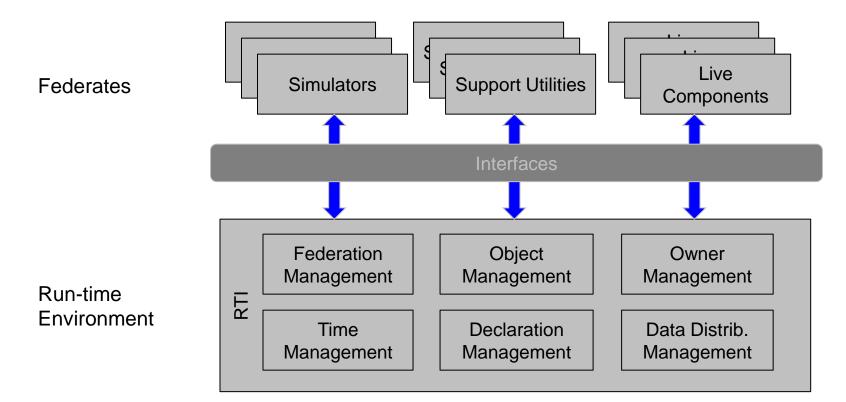


DATA BUS IMPLEMENTATION





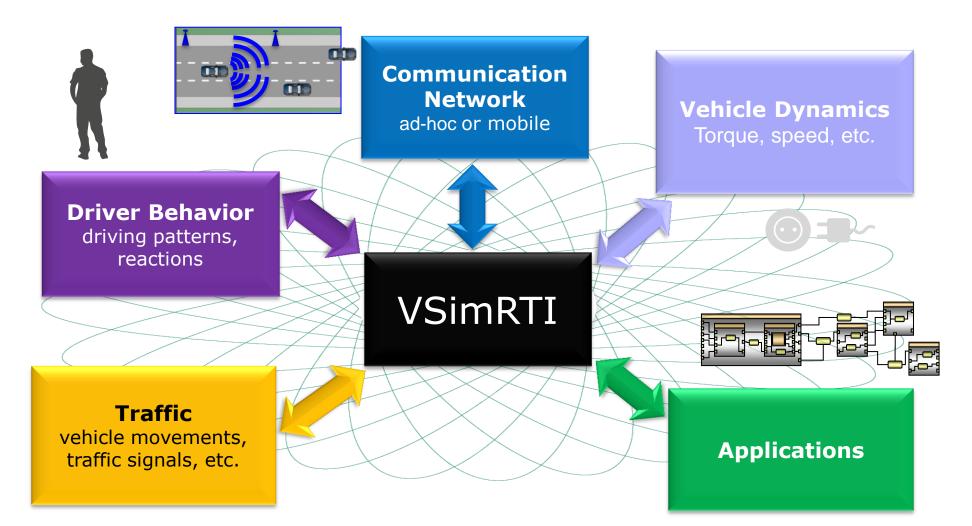
VSimRTI Based on IEEE High Level Architecture HLA





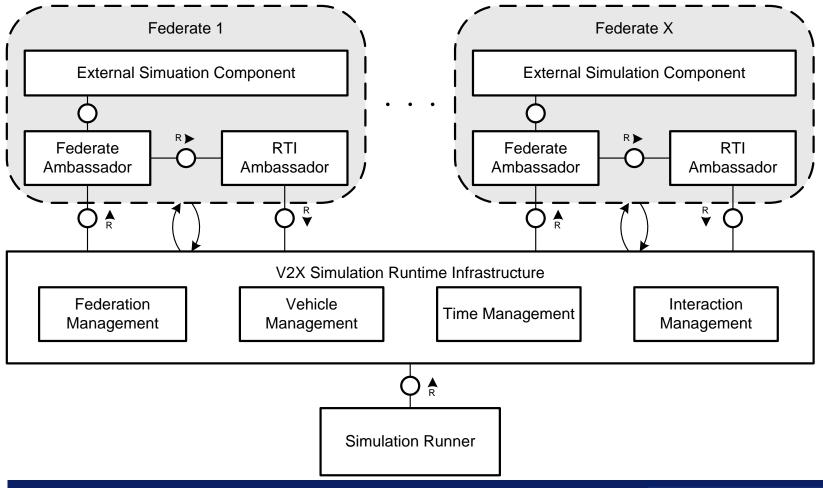
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Off-the-Shelf Data Bus Software





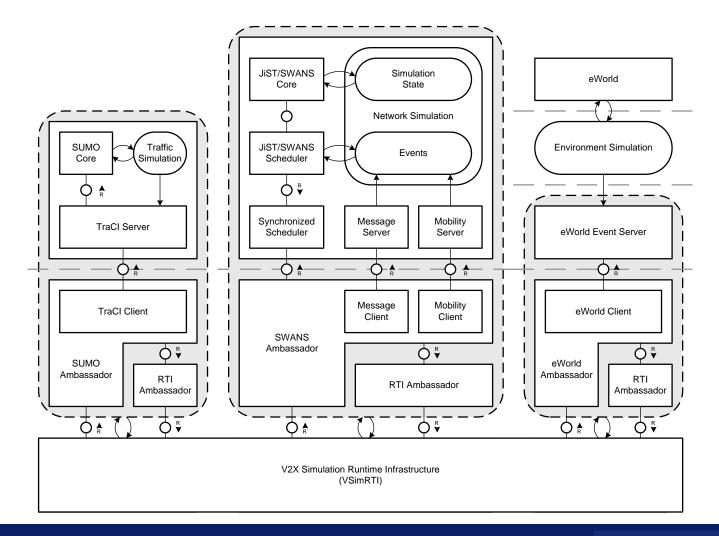
General Architecture of Data Bus (VSimRTI)





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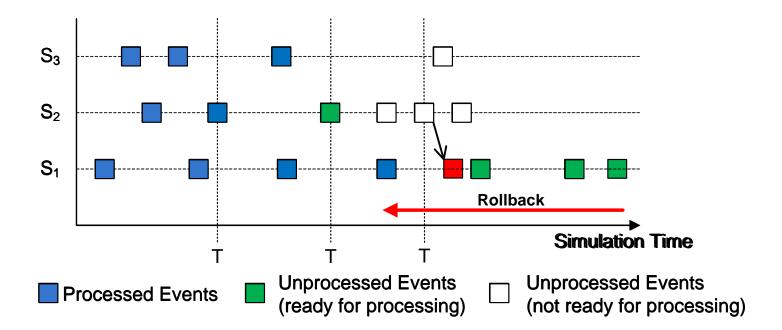
Example Traffic, Communication, and Application Simulator





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Opportunistic Synchronization of Simulators



Processing of local events regardless of dependencies

Rollback if event is scheduled in the past

Time Warp: Save/Restore States, anti-messages

Result: overall simulation time significantly shorter than sequential simulation



Tools Needed for Analysis

Tool	Modes	Performance Measures
Vissim	GP traffic, HOV, transit	Travel time, delay, throughput
Visum DTA	GP traffic, HOV	Volume, travel time, throughput
Visum	GP traffic, HOV, transit, ride-share	Trips, volume, travel time, throughput



Analysis Phases

Phase

- Trip planning
 - Departure time choice
 - Destination choice
 - Mode choice
 - Transit
 - Rideshare
 - HOV
 - SOV

ATDM Strategies

- Dynamic Ridesharing
- Dynamic Transit Capacity Assign.
- On-demand Transit
- Predictive Traveler Information
- Dynamic Pricing
- Dynamic Fare Reduction
- Dynamic Transfer Prot.
- Dynamic HOV/Managed Lanes
- Dynamically Priced Parking
- Dynamic Parking Reservation

Tools

Visum Travel demand, DTA, transit, line blocking, tour based demand

- En-route
 - Route choice
 - Facility choice
 - Parking lot choice



- Dynamic Shoulder Lanes
- Dynamic Lane Use
- Dynamic Speed Limits
- Queue Warning
- Adaptive Ramp Metering
- Dynamic Junction Control
- Adaptive Signal Control
- Transit Signal Priority
- Dynamic Lane Reversal
- Dynamic Parking Reservation
- Dynamic Overfl.Transit Parking

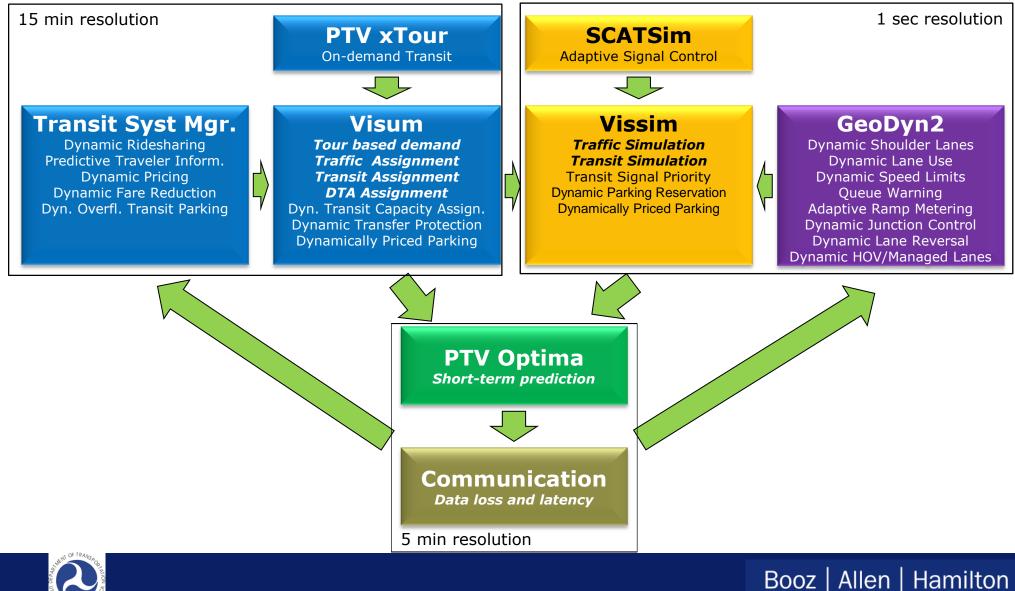


Vissim Vehicle movements, facility choice, parking, etc.



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Analysis Process





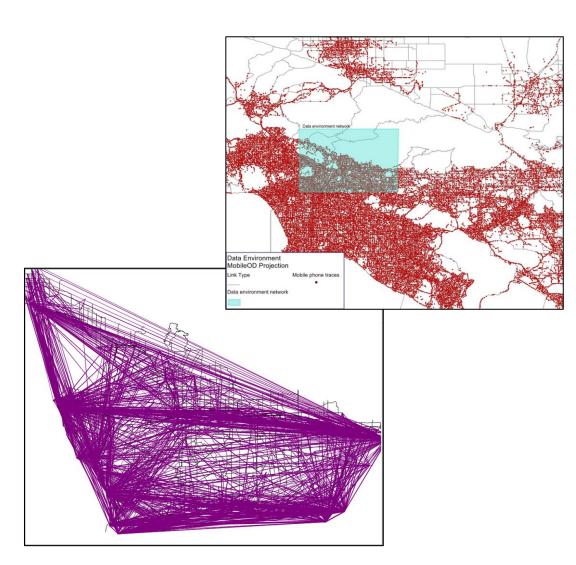
DATA NEEDS AND AVAILABILITY





Historical Data: Cell Phone Based Travel Demand

- Mobile phone sightings
 - Collection period: 12:00AM 09/01/2010 through 11:59PM 10/31/2010
 - Total number of sightings:6.4 billion
 - Encrypted Sprint subscribers: 1.8 million
- Identified trips mapped to TAZs
 - 308,988 for weekdays
 - 102,571 for weekends
 - 158,617 for event days



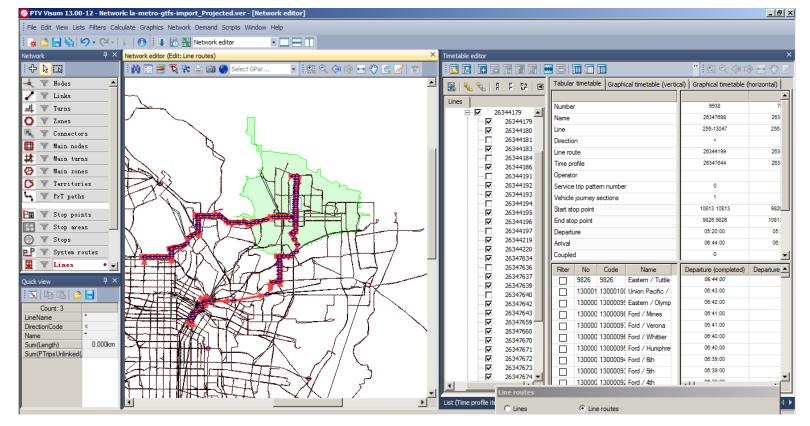


Historical Data: Google Transit Feed

Routes

Stops

Schedules





Historical Data: MTA Transit Data

- Transit trip table
- Transit station count data (on/off/transfer)
- Transit fleet
- Depot locations



Historical Data: Travel Survey

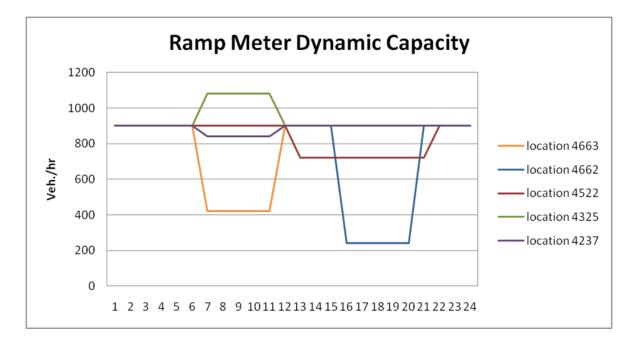
- Travel survey data
 - Price elasticities
 - Demographic data

- Potential sources
 - SCAG travel survey 2001
 - Caltrans household survey 2010-2012
 - SCAG activity-based model development (ongoing)



Historical Data: Caltrans Ramp Metering Rates

- Ramp metering rates by
 - Location
 - Time of day
 - Day of week





Real-time Data

- It is necessary to analyze not only historical data trends but also real-time data and the system's response to various events. The Testbed team needs to list all possible real-time data necessary for the analysis; some examples can be listed below:
 - Sensor detector vehicle count and speed data
 - Video surveillance data, including vehicle occupancy data
 - Signal plans and traffic control device data and real-time operations data (e.g., toll prices, HOV restrictions, turn restrictions, parking restrictions, shoulder lane operations)
 - Work zone data
 - Incident information.



Real-time Data: Caltrans PeMS

- PeMS detector stations
- Categories
 - Freeway mainline
 - On/off ramps
 - HOV lanes
 - Freeway to freeway connectors





Real-time Data: Caltrans LCS

- Caltrans maintains a state wide lane closure system (LCS) data
 - Arranged by Districts
 - Updates every 10-11 minutes
 - Publically available, also authorized for this project

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Index of /trav	vel/dist_07/lcs		
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WS_FTP.LOG	31-Oct-2008 00:25 42K		
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	39 C101LA 317 07/19/2011 08:04 40 C101LA 385 07/19/2011 09:25 41 C138A 3 07/11/2011 12:16 07/ 42 C101FA 153 07/08/2011 08:31	VP1/2011 17/81 00/VF2/001 06/61 VP1/2001 17/81 00/VF2/001 06/61 VP1/2001 17/81 00/VF2/001 06/61 VF2/001 17/81 00/VF2/001 06/61 VF2/001 17/81 00/VF2/001 06/61 VF2/001 17/81 00/VF2/001 06/61 VF2/001 17/81 00/VF2/001 06/61	derstand the general structure of elements please take a look at
	13 C58A 12 07/07/2011 08:83 07/ 14 C10EA 211 07/25/2011 16:16 0 15 C710TA 143 07/22/2011 14:53	/31/2011 18:01 08/01/2011 06:01 511 General Information	
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		document was created, e.g.: "TIS-PRODUCTION-A".	

5.1.2. Provider

Every incidents record contains no or an unbounded number providers, which contain the current active incidents of that provider. A provider is identified through its name, which is provided by *PTV*

<Tncidents> «Provider providerName="?"> <!--Optional, Multiple--> «fncidenta»

If a <Prov1der> element exists, it contains all incidents of that provider. If a <Prov1der> element contains no incidents, either when reading or writing incidents, it means that no active incidents exist for the provider.

For more precise information about the shown elements and their attributes, please refer to the Incidents Schema Documentation [xsd-docu/incidents-xsd/incidents-doc.htmi#Link00000022].

5.1.3. Incident and meta informations

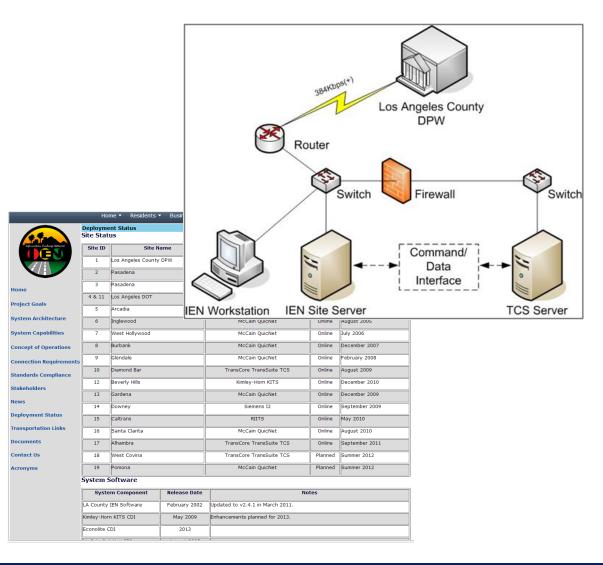
An incident at the least contains the report z4, which makes an incident uniquely identifiable. If there are changes to an incident over time, for example regarding the length of a congestion, the ID is used to identify the incident in the updates.



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Real-time Data: LA County IEN

- LA County Information Exchange Network
 - Open architecture intersection data sharing
 - Monitoring and control
 - Signal timing and phasing
 - Publically available, need to apply for access for this project





MODEL CALIBRATION APPROACH





Model Calibration Parameters and Approach

- Models to be calibrated
 - Visum
 - Visum DTA
 - Vissim
- Operational scenarios calibrated for
 - Peak/Off-peak
 - Incident
 - Work Zone
 - Planned Special Event
- Calibration data sources
 - Caltrans PeMS



SYSTEM EVALUATION





System Performance Measures

- Proposed system performance measures include:
 - Vehicle Throughput
 - Vehicle/Person Delay
 - Travel Time reliability
 - Fuel consumption and emissions

