LOCALSIM
LOCAL TRAFFIC SIMULATOR

ITS FORUM 2017 – TECHNICAL PRESENTATION

Henry Sy Sr. Hall, DLSU Manila
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LocalSim is a microscopic traffic simulation software, designed to be used by road and traffic engineers of LGUs as a <u>decision support system for traffic management</u>.

Research Value

NEEDS	SOLUTION
• Decision support tool to help solve local traffic problems. • Tool must be capable of replicating local driving behavior and relatively inexpensive.	Develop a traffic microsimulation software capable of modeling and evaluating local traffic improvement alternatives or scenarios.

DIFFERENTIATION
• With other commercial simulators:
  • Explicit modeling of local driving behavior
  • Lesser cost
• With LOCALSIM Phase 1:
  • Dynamic routing – more application
  • Improved simulation of intersection movements
  • Inclusion of other vehicle type (tricycle, jeepney) and calibration parameters
	BENEFITS
	
	Enable local traffic managers to objectively analyze and evaluate alternative traffic schemes instead of resorting to trial-and-error implementation.

OBJECTIVES

1
Agent-based traffic models

Develop agent-based models of different traffic scenarios that simulate local traffic characteristics, including unique behavior of the Filipino road users (drivers, public transport passengers, and pedestrians)

OBJECTIVES

2

Calibrated traffic simulation

Calibrate and validate the micro simulation with empirical data, including public transit trip data. This involves supporting the development of a technology (i.e. BEAMS) that collects data automatically with minimal human intervention.

3

Integrated ITS database platform

Develop a platform that is capable of integrating collected, processed, and simulation data with GTFS format

OBJECTIVES

4

Traffic microsimulation software LOCALSIM

Develop a software application that includes capability to simulate and evaluate traffic management schemes; provide a decision support tool for traffic management
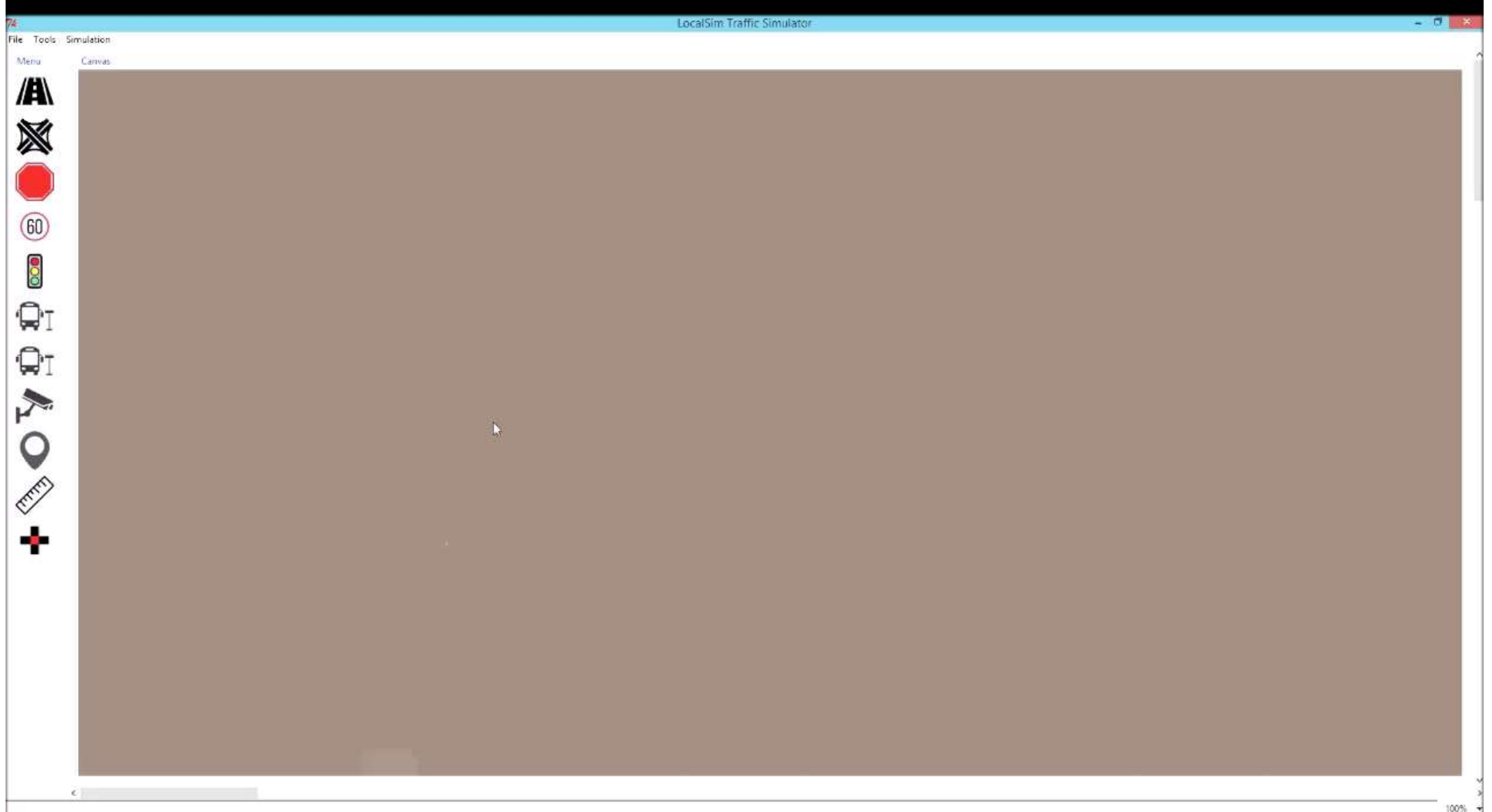
OBJECTIVES

5

Simulation model of:
1. **Pilot corridor in EDSA**
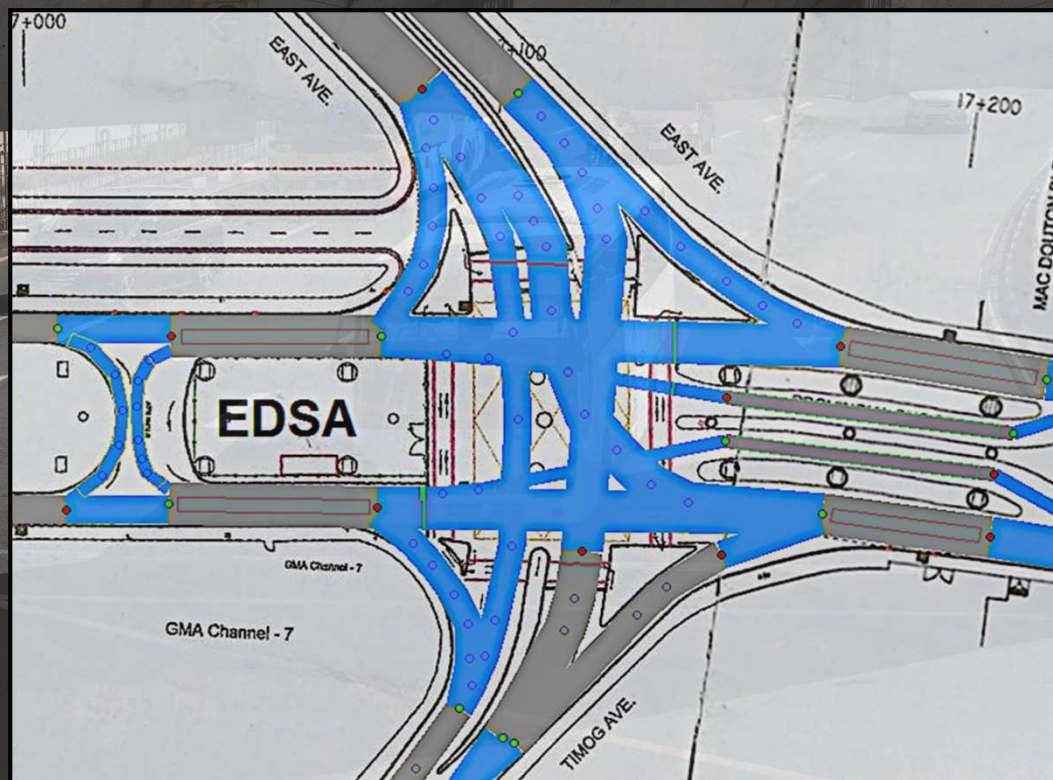2. **Entire EDSA including adjacent network**

- Benchmark the application against existing traffic micro simulation technologies
- Pilot test the simulation model in a selected corridor

(Video - network building, and
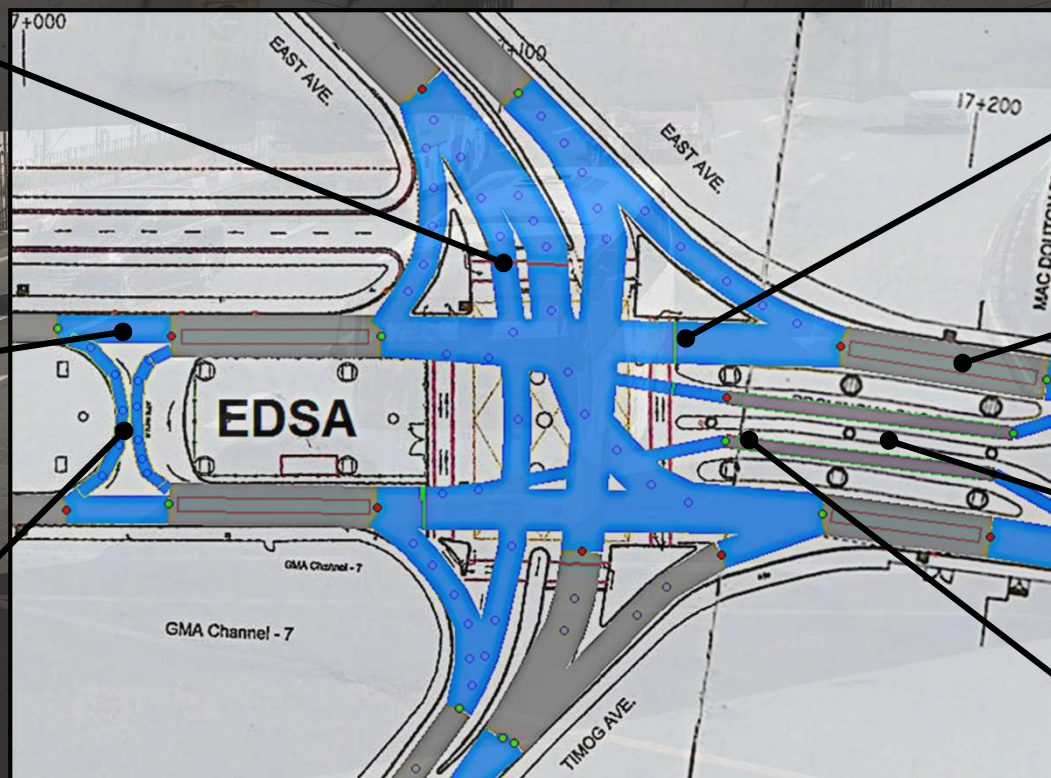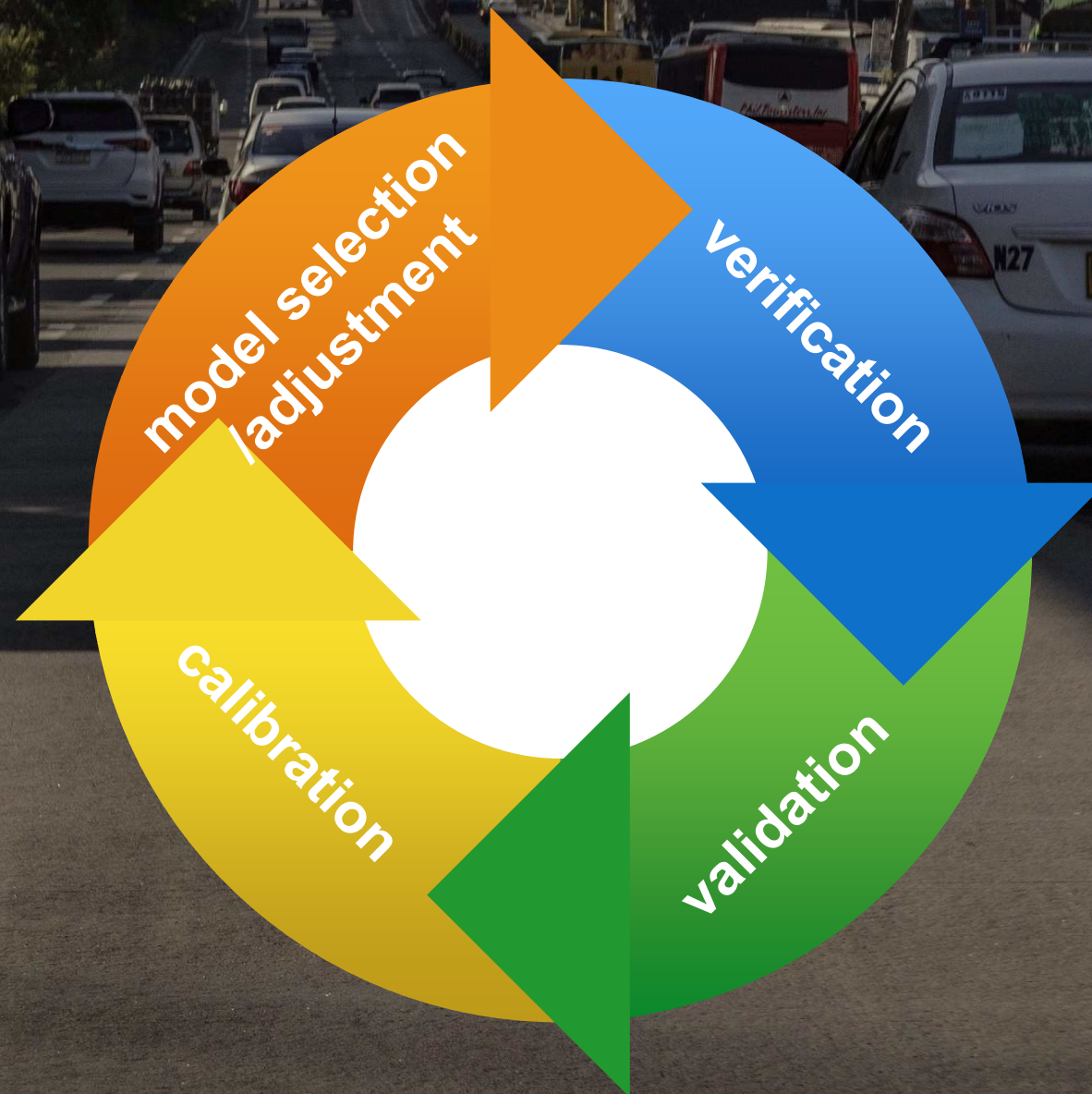sample traffic simulation of EDSA/Shaw)

ROAD FEATURES

- model selection / adjustment
- verification
- validation
- calibration

Standard Verification Process for Traffic Flow Simulation Model v.2

Japan Society of Civil Engineering, 2011

Test	Result
1. Arrival times distribution	negative exponential
2. Input demand consistency	consistent with flow rate
3. Jamming w/o elimination	jammed agents were queued; no elimination
4. Rel. of model parameters in free-flow	road capacity not affected by agent parameter changes

Test	Result
5. Rel. of model parameters in bottleneck	**invariable decreasing trend of volume-density graph**
6. Rel. of model params. with SFR	**SFR highly sensitive to agent's maximum acceleration only**
7. Shockwave queue formation and dissipation	**requires further testing results not conclusive**

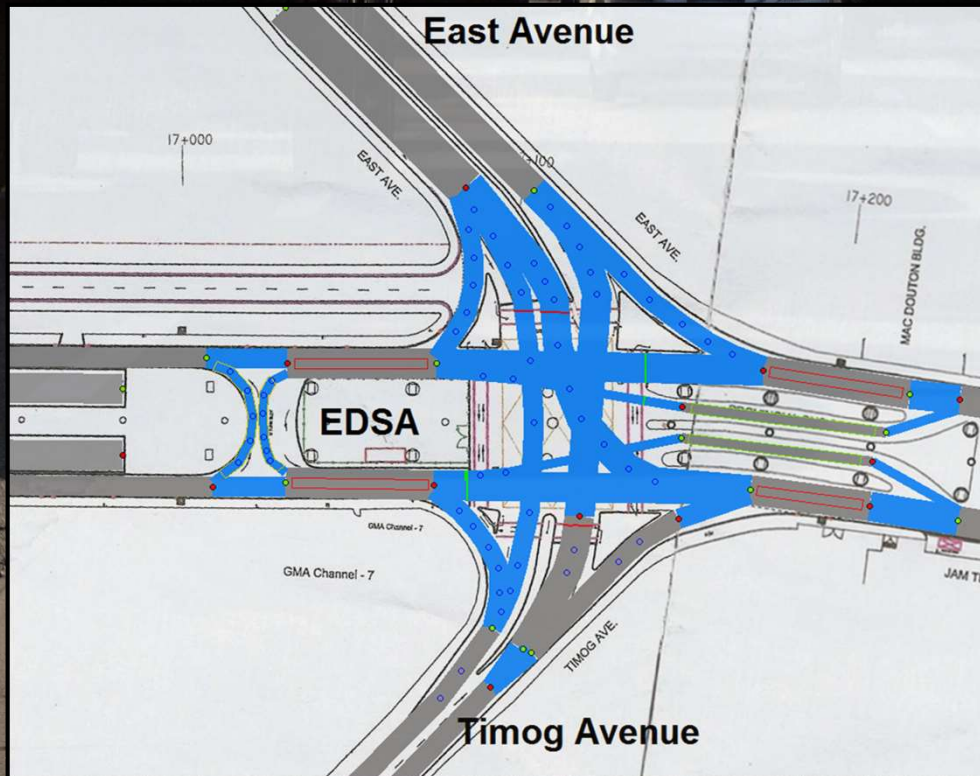*Measure of effectiveness (MOE):*

Degree of Congestion

85.89%

(Agreement between observed and simulated values)
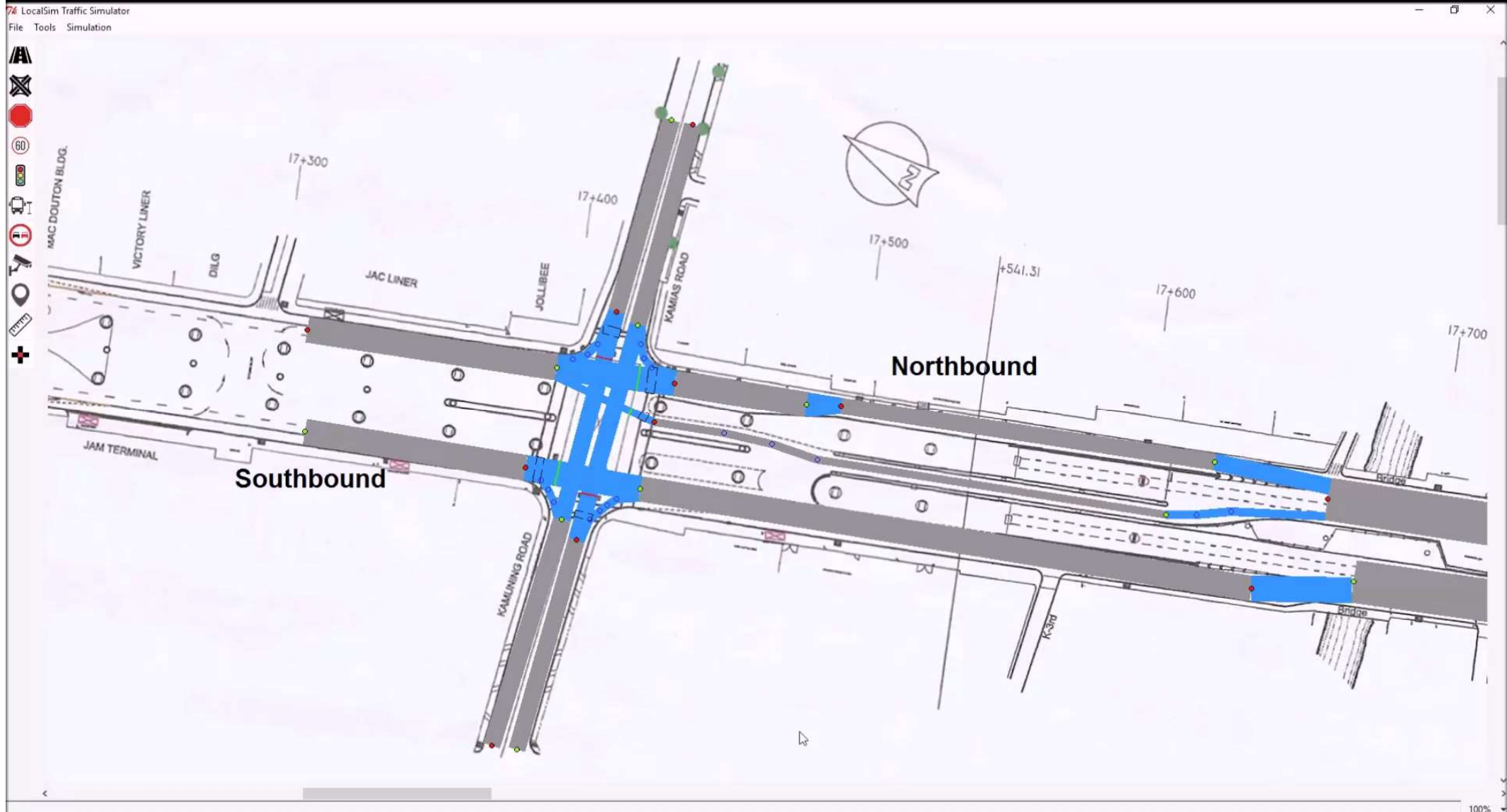
TRAFFIC MODEL

VALIDATION

Greenshield's Model

CONSISTENT

~1800 vehicles / hour

Bus Stop Delay

92.46%
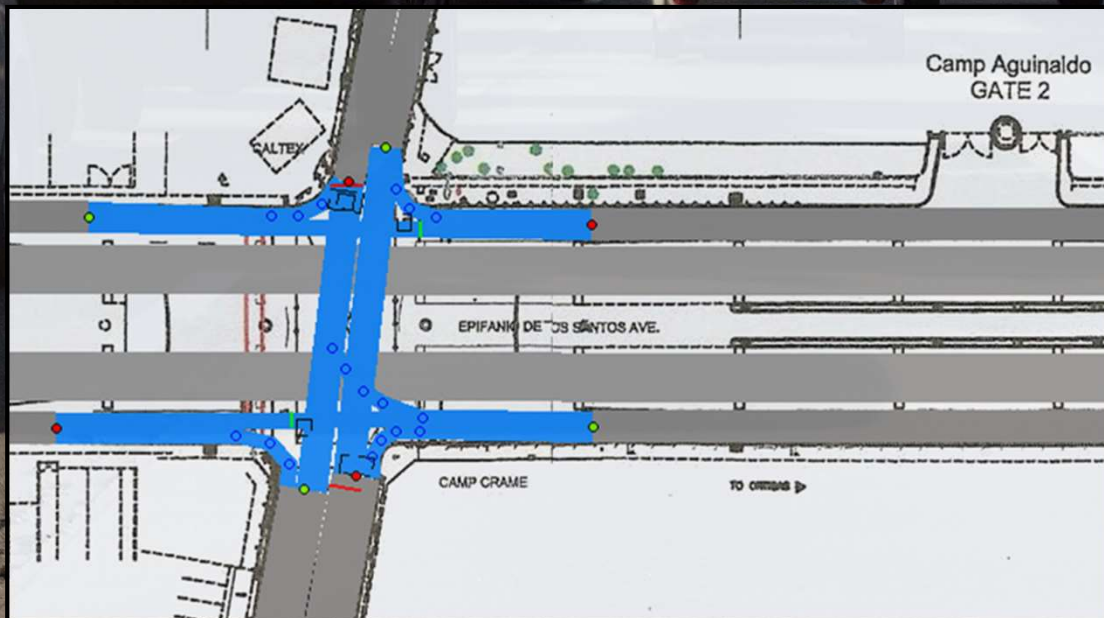
EDSA-Santolan

VALIDATION

Greenshield's Model

CONSISTENT

~1800 vehicles / hour

Degree of Congestion

95.96%

Bus Stop Delay

92.46%

EDSA-Shaw

(Video - sample traffic scenario analysis EDSA/Shaw **intersection w/ u-turn scheme**)

	Alt. Scenario U Turn Scheme	Base Scenario Stop Light
Average speed	10.29 m/s	7.61 m/s
Average travel time	45 sec	55 sec

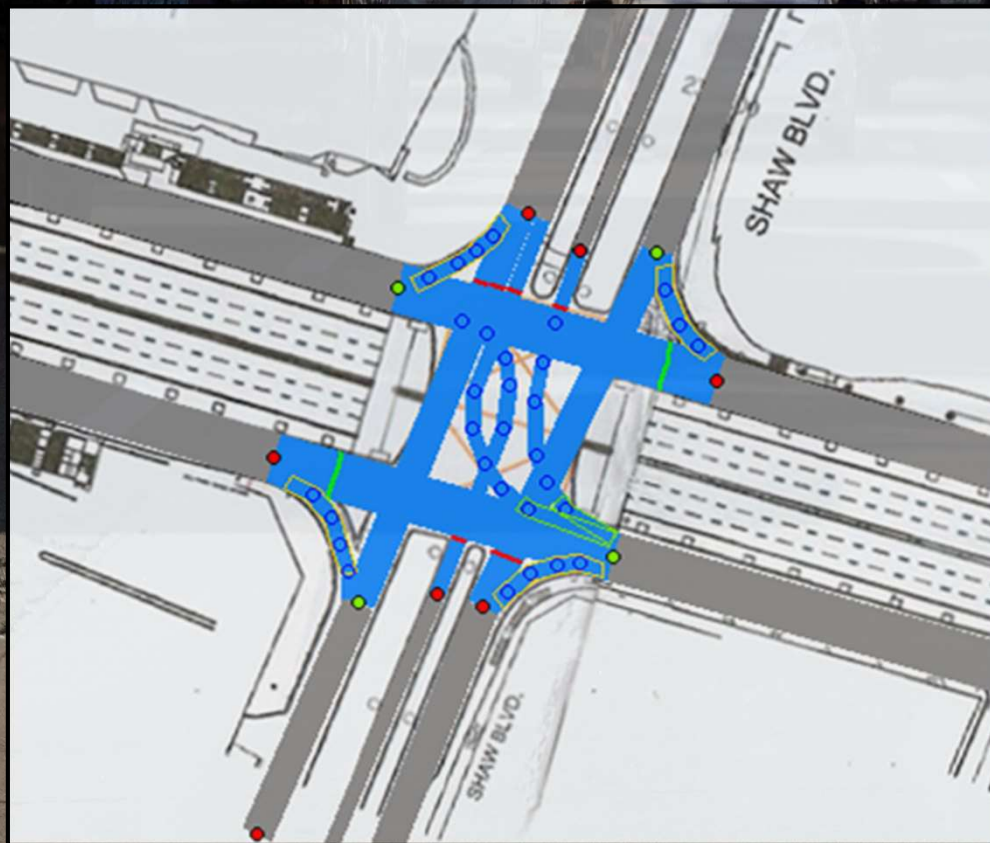| Link	U-turn	Stoplight
North Bound Entry	LOS D	LOS B
Shaw to Guadalupe	LOS B	LOS A
South Bound Entry	LOS C	LOS B
Shaw to Ortigas	LOS B	LOS A
Shaw to St. Francis	LOS B	LOS B
West Bound Entry	LOS A	LOS A
Shaw to Wackwack	LOS B	LOS A
East Bound Entry	LOS A	LOS A
Wackwack to North Bound	LOS A	LOS A
St. Francis to South Bound	LOS A	LOS A

1. PUBLICATION (PLANNED)

RESEARCH PAPERS

- Estimating Filipino-driver Merging Politeness Factor in Free Flow Traffic

- Estimating Filipino-driver Merging Acceleration Gain Threshold in Free Flow Traffic

- Modeling Traffic Flow Near and Inside U-turn

- Modeling Traffic Flow Near and Inside Bus Terminal

- Requirements and Architecture of Time-Continuous Modeling and Simulation Software

1. PUBLICATION (PLANNED)

CASE STUDIES

- Assessment of EDSA-Kamuning Intersection and Design Improvements

- Assessment of EDSA-Santolan Intersection and Design Improvements

- Assessment of EDSA-Ortigas Intersection and Design Improvements

LOCALSIM software - ver. 1
current R&D not yet packaged

very valuable traffic management tool for LGUs

research and educational tool for SUCs

commercial value comparable to other foreign developed traffic simulation softwares

Copyright application may be pursued
(software is not patentable)

Formation of an interdisciplinary team of Faculty (PhD), and emerging experts from Civil Engineering, Computer Science, and Mathematics - 'soft' ITS Lab @ NCTS

Undergraduate students conducted related researches

National Center for Transportation Studies
University of the Philippines

DEPARTMENT OF COMPUTER SCIENCE
COLLEGE OF ENGINEERING
UNIVERSITY OF THE PHILIPPINES

Institute of Mathematics
University of the Philippines

METROPOLITAN MANILA DEVELOPMENT AUTHORITY
MMDA
Marangal
Matapat
Disiplinado
Ako.

CITY OF ILOILO
LA MUY LEAL Y NOBLE CIUDAD DE ILOILO
1898
PHILIPPINES

LUNGSOD NG DABAW
SAGISAG
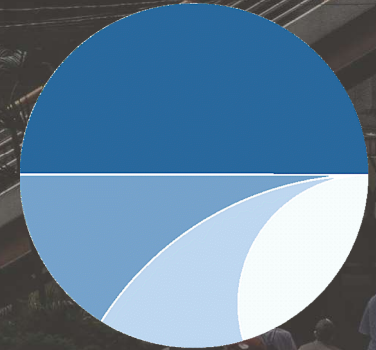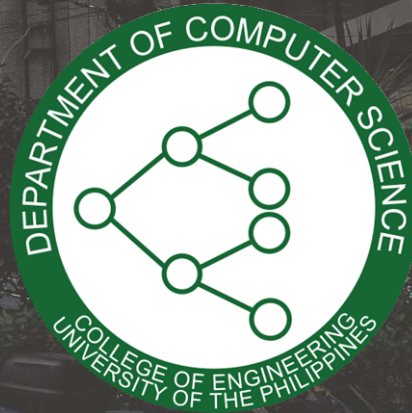
6. POLICY

Support LGU ordinances on traffic impact analysis of site developments

TEAM MEMBERS

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Traffic Simulation Induced with Filipino Driving Pattens Using
Improved Krauss and Improved MOBIL Algorithm
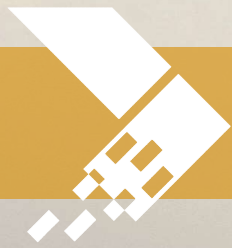
Eugene Dimayacyac

Calibrating Relative Velocity and Lateral
Clearance Parameters of a Lane
Changing Model for Traffic
Microsimulation

Emmanuel Marasigan

Modeling Vehicle Agents for a
VISSIM model of UP Diliman

Tom Mari Jandel Rentoy

Analysis of Load Factor and Dwell
Time of Buses in EDSA

ISSUES & CONCERNS

Administrative

- Bureaucracy
- Permissions

Technical

- Frequently changing road setup / traffic scheme

moving forward

LocalSim 2 *(dynamic route, PUV)*
LGU Deployment
ITS Lab
Driving Simulator

What traffic schemes can LOCALSIM (I) simulate/evaluate?

Truck ban

Exclusive truck lane

Exclusive motorcycle lane

Lane/road closures

One-way

Speed restrictions

Geometric improvements

Number-coding (UVVRP)

Bus stop segregation

Bus loading/unloading

Traffic signal control

Turning restrictions

U-turn scheme

Grade separation

Stop/yield control

Current limitation:

• static traffic assignment – goal-based agents

• needs calibration for other modes (m/c, jeepney)

"To Do" for LOCALSIM (II)

Modeling Task

- Dynamic routing – learning agent (agents able to select routes; path selection algorithms)

- Agent interaction at conflict areas

- Continued calibration and validation of sub-models/algorithms

Expected Additional Capability/Features

- Simulation and evaluation of re-routing as traffic management scheme

- Application in "traffic impact analysis (TIA)"

- Evaluation of impact of schemes over a larger road network (i.e. larger influence area)

- Metrics for assessing traffic impact to be included in the output report of the traffic simulation.

Maraming salamat!