National Technical University of Athens

Impacts of Large Urban Regeneration Projects: The case of the New Athens Intercity Bus Terminal

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Presentation Outline

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2. The project
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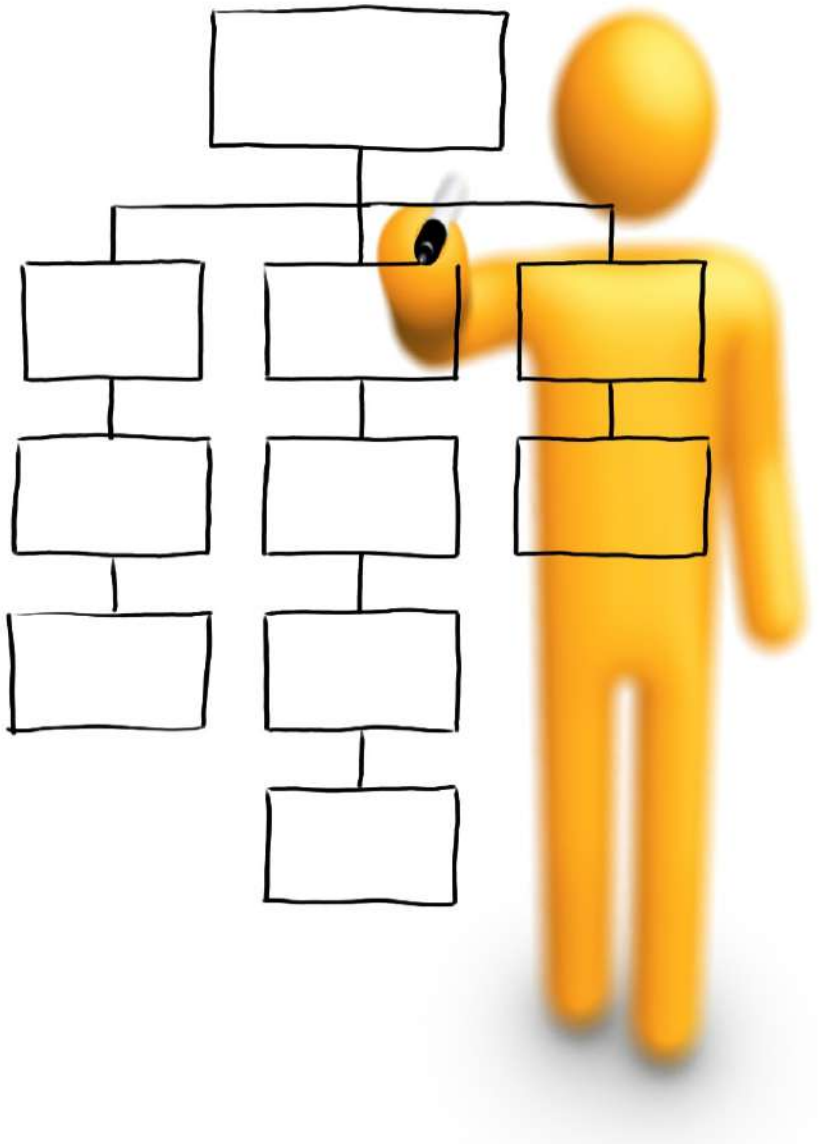
7. Challenges



Urban Regeneration Concept

- Upgrade of the area and its surrounding
- Multimodal transport
- Various impacts
  - Social
  - Economic
  - Environmental
- Traffic conditions improvement
- Transportation projects can lead to urban regeneration

The project

15th World Conference on Transport Research
26 – 31 May 2019 Mumbai, India

ATTIKO METRO S.A.

- **Full project name:**
  - Management, Organisation, Development and Planning of a Multi-Operation System for the Development of the Interurban Bus Central Terminal at Eleonas (KSYL)

- **Contracting Authority and Funding**
  - Cooperative "Athens Interurban Central Bus Station"

- **Technical Coordinator**
  - Attiko Metro S.A.

Objectives

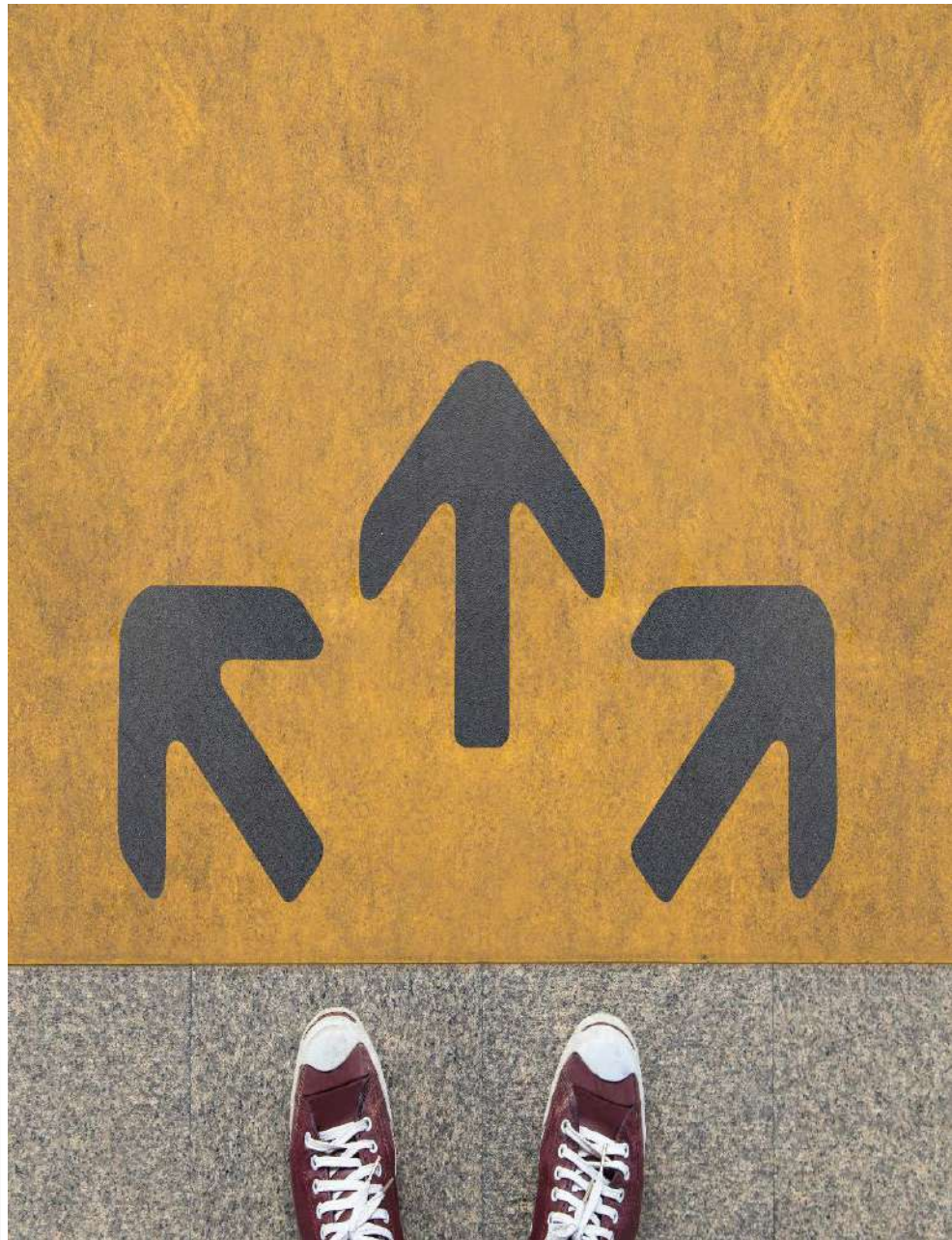
- Assessment of the impact of large transport projects on mobility, traffic, transit operations and environment
- Subobjectives
  - Develop a repository of multimodal information
  - Establish accurate predictions of demand (multiple modes and interacting projects) in future long term horizons
  - Develop a macroscopic multimodal simulation tool to test scenarios of future transit demand and traffic demand evolution
  - Establish efficient traffic management strategies to enable sustainable growth of the new project

Current Situation -1

- Intercity bus terminals in Athens
  - Kifisos Terminal – Terminal 1
  - Liosion Terminal – Terminal 2

- Terminal 1
  - Serves most of the passenger demand
  - Lack of public transport connection
  - High use of private cars and taxis
  - High congestion levels and long queues

- Terminal 2
  - Significant lower passenger demand
  - Accessible by public transport
  - Higher percentage of PT use

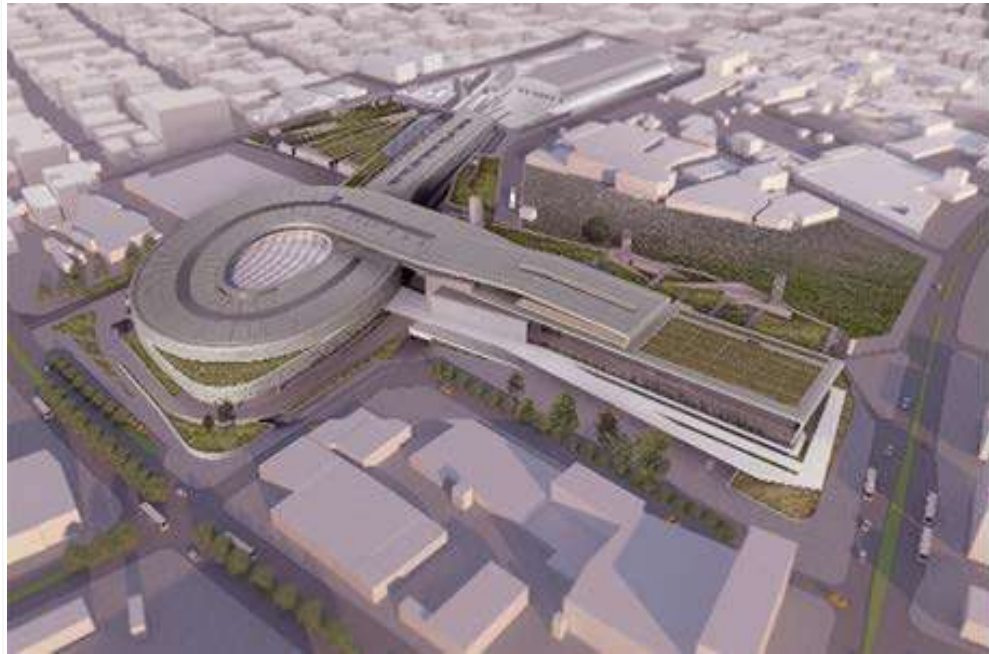


Current Situation -2

- No space for parking in the terminals
  - Illegal parking
  - Frequent stops
  - Deterioration of the already overloaded road network
- Road network around the terminals
  - Low capacity
  - Insufficient geometric characteristics
  - High demand cannot be served
- High demand consists of
  - Users of the intercity busses
  - Passing through traffic
  - Intercity buses

The New Terminal

- Service point of all trips
- Multimodal transportation center
- High PT accessibility and use
  - 17 public transportation lines
  - 5 new PT lines will be constructed
  - Underpass connection with metro station
- Parking facilities
  - Parking garages
  - Park&Ride facilities
  - Kiss&Ride areas



The Near Area Regeneration

- Now:
  - Degraded, risky
  - Abandoned construction sites
  - Abandoned factories
  - Low land use exploitation

- After:
  - Economic and social upgrade
  - Area redevelopment
  - Construction of hotel, cafes, commercial facilities

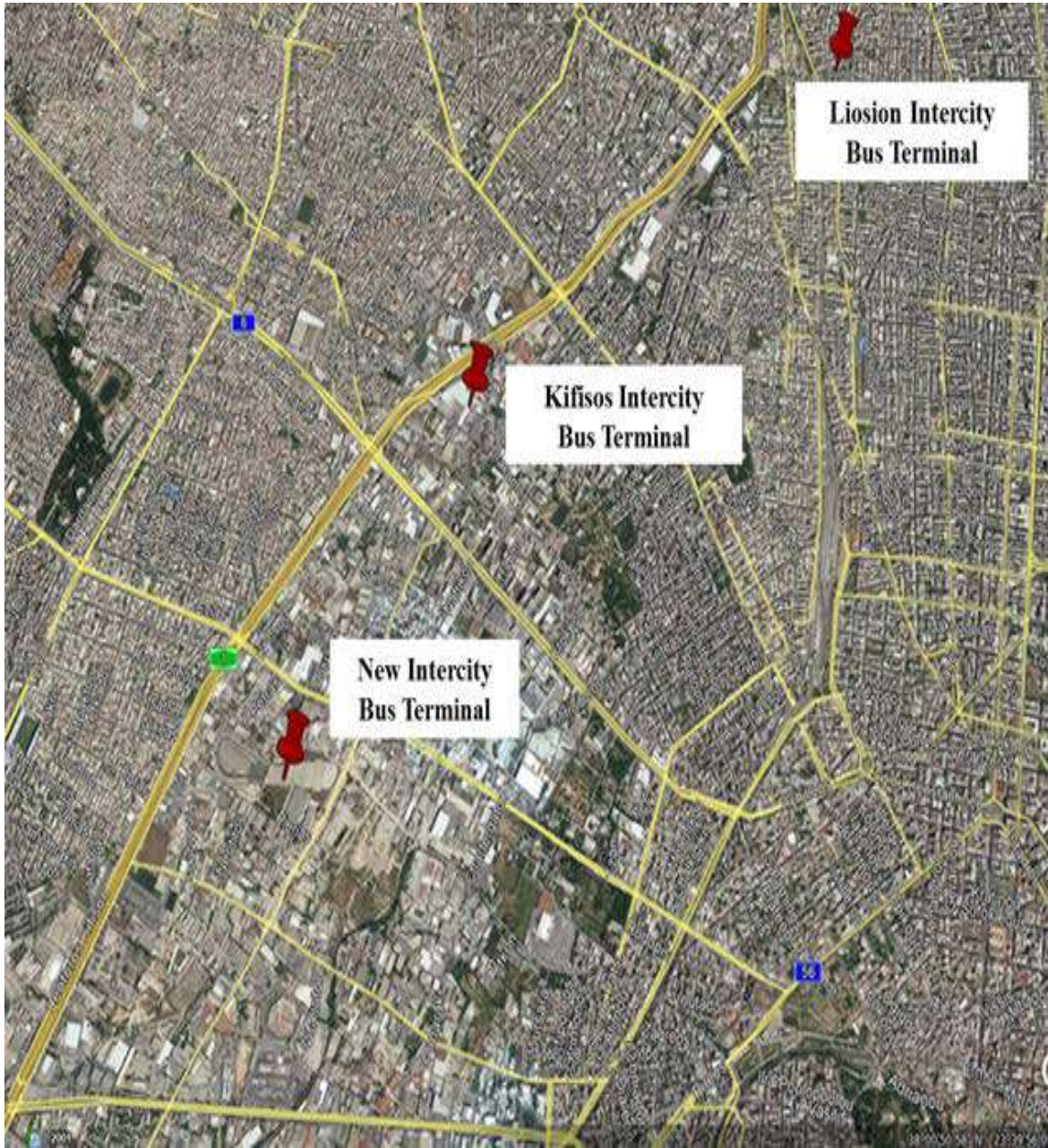
Methodology

- Define the influence area of the new project
- Data collection
- Passenger Demand Prediction and Urban Traffic Prediction → ARIMA modeling
- Traffic Simulation model and Capacity analysis → AIMSUN MODEL

Study Area

Three study areas:

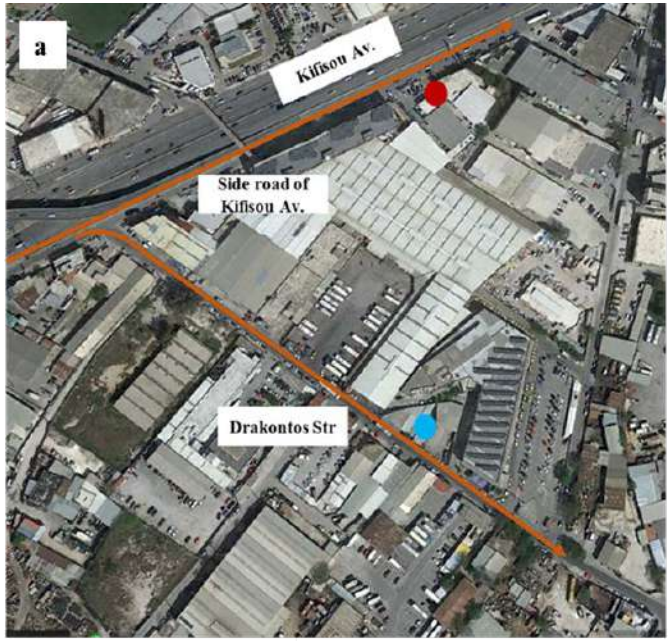
- Kifisos Bus Terminal (Terminal 1)
- Liosion Bus Terminal (Terminal 2)
- New Bus Terminal



Data collection -1

Study Areas: Terminal 1 and Terminal 2

- Typical day and public holiday
- Morning and evening peak hour
- Passenger demand
- Number of intercity buses
- Mode choice (personal interviews)
- Traffic counts at the entrance and exit of the terminals
  - Passenger cars
  - Taxis
  - Trucks
  - Motorcycles



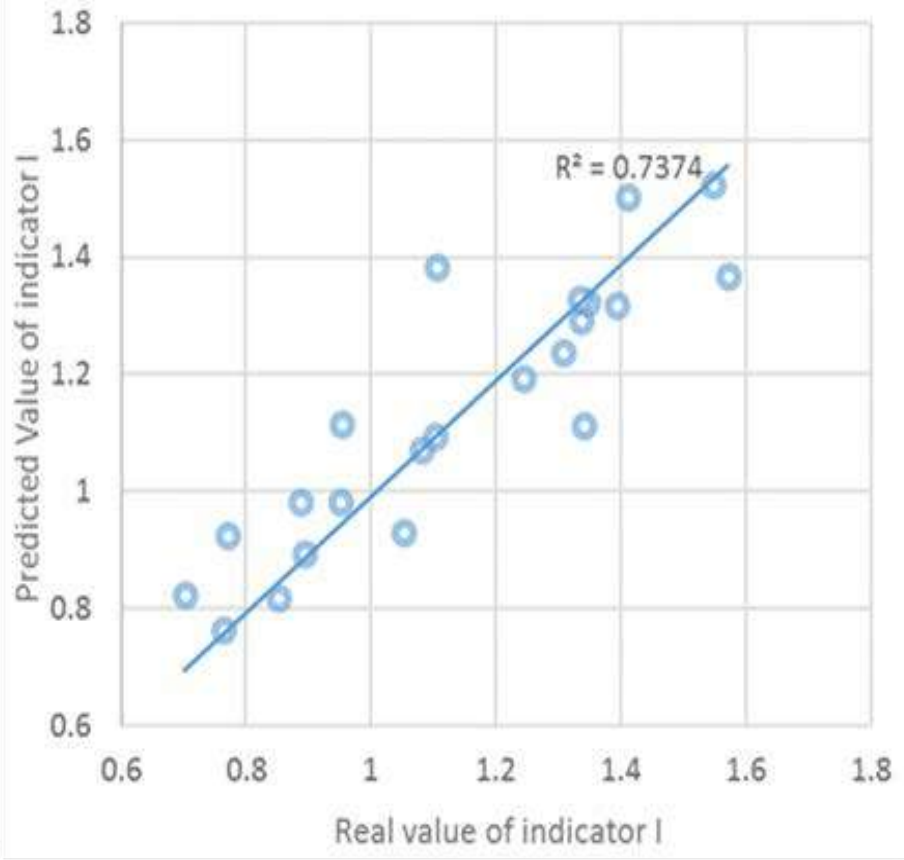
Data collection -2

Study Area: Near and greater area of the new terminal

- Detector data
  - 74 loop detectors
  - Volume, speed, density
  - Typical weekdays and Sunday
  - May and August
- Traffic counts
  - 23 intersections
  - Typical day
  - Morning and evening peak hour
  - Three vehicle classes (passenger cars (incl. taxis), heavy vehicles, motorcycles)

Passenger Demand Prediction

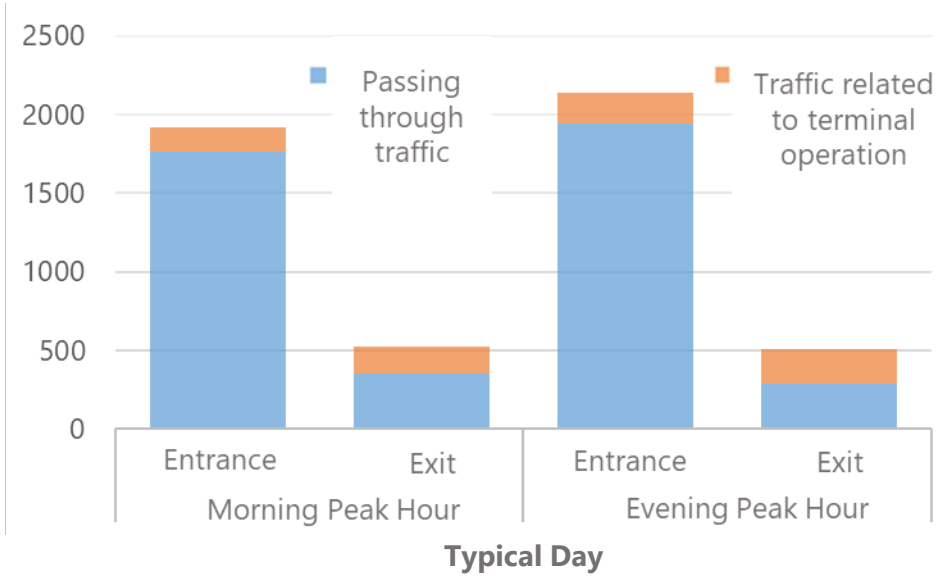
- Factors influencing passenger demand
  - Economic crisis
  - Increased unemployment rate
  - GDP
- Indicator I
  - Ration of passenger demand to GDP per capita
- Historic passenger data
  - 1998, 2006, 2017
- ARIMA (p,q,d) model
  - Best model ARFIMA (0,0.14,0)
  - MAPE 3,9%
- Passenger demand prediction
  - 2020, 2030, 2040



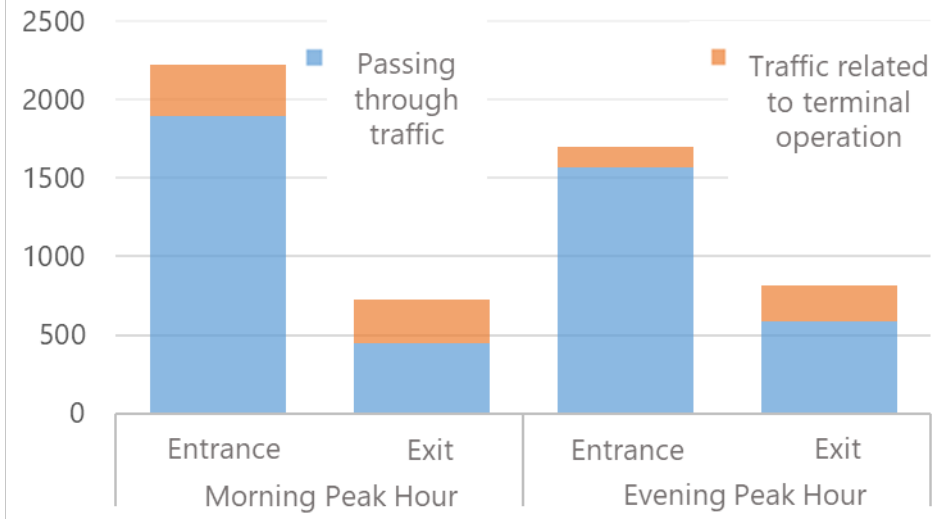
	Coef.	Std. Err.	z	P>|z|
constant	1.193	0.161	7.420	0.000
AR (1)	0.875	0.086	10.140	0.000

Results – Terminal 1

- Traffic generated by terminal operation - Entrance
  - 8% during morning and evening peak hour
  - Up to 16% during morning peak hour on a non-typical day
- Traffic generated by terminal operation – Exit
  - 39% during morning peak hour on a typical day
  - 47% during morning peak hour on a non –typical day
  - 43% during evening peak hour on a typical day
  - Low percentage during evening peak hour on a non-typical day
    - traffic management measures and police enforcement



Typical Day



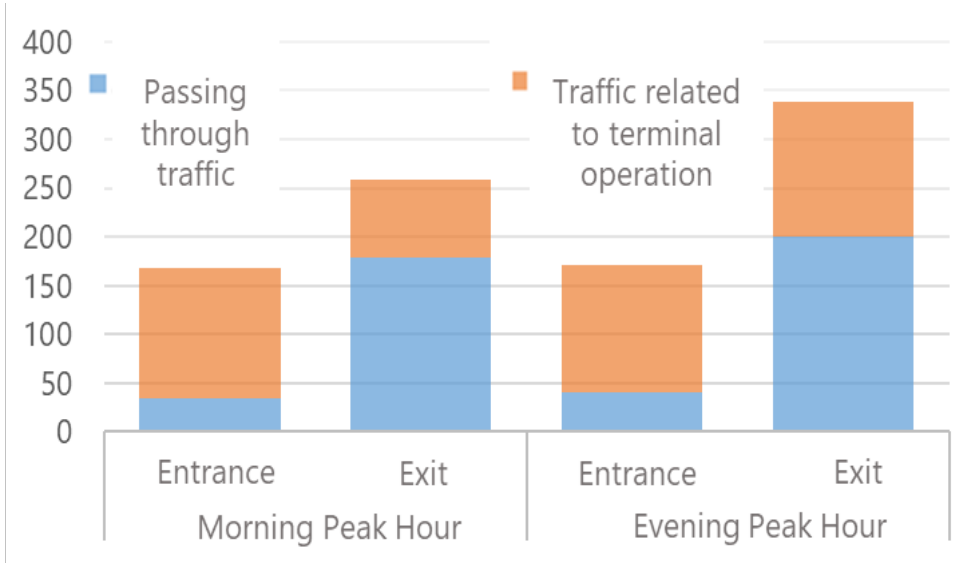
Non - Typical Day

Results – Terminal 1

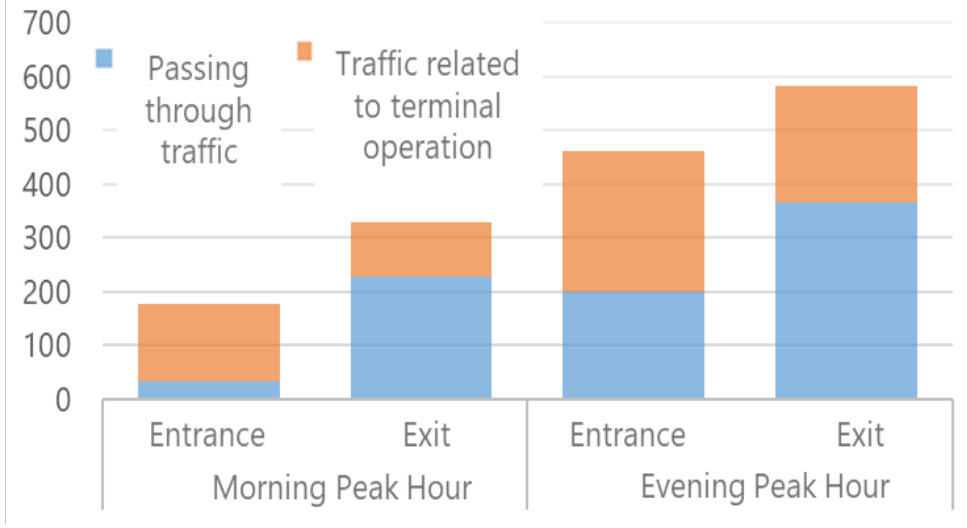
- Increased share of private passenger cars
- Taxi share can be up to 30%
- Taxi share above 50% during evening peak hour on a non-typical day
- Adverse traffic conditions at terminal exit – LOS E

Results – Terminal 2

- Traffic generated by terminal operation – Entrance
  - More than 70% during morning and evening peak hour on a typical day
  - Over 80% during morning peak hour on a non – typical day
  - Around 50% during evening peak hour on a non-typical day

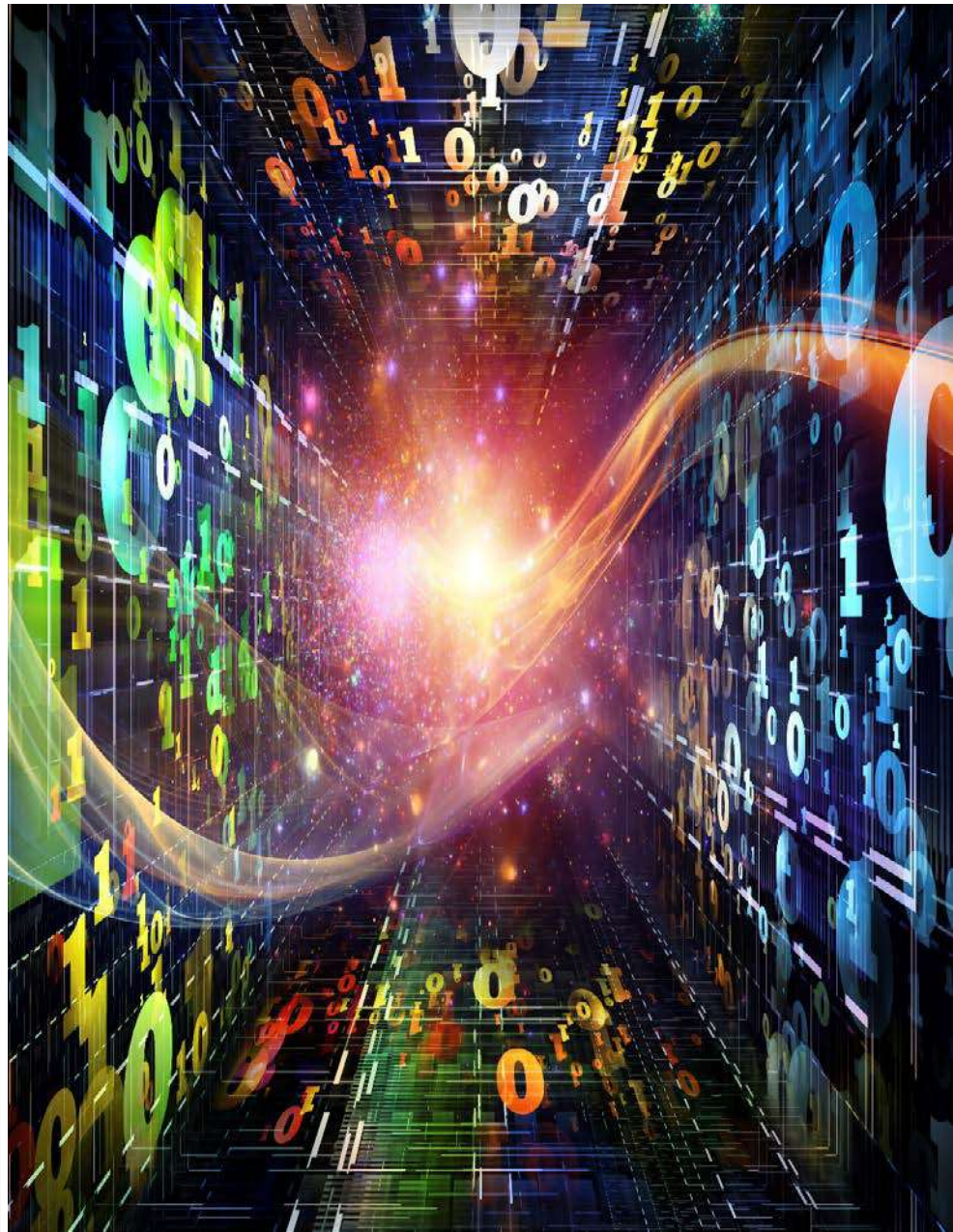


- Traffic generated by terminal operation – Exit
  - Around 30% during morning peak hour on a typical and non-typical day
  - Around 40% during evening peak hour on a typical and non-typical day



Results – Terminal 2

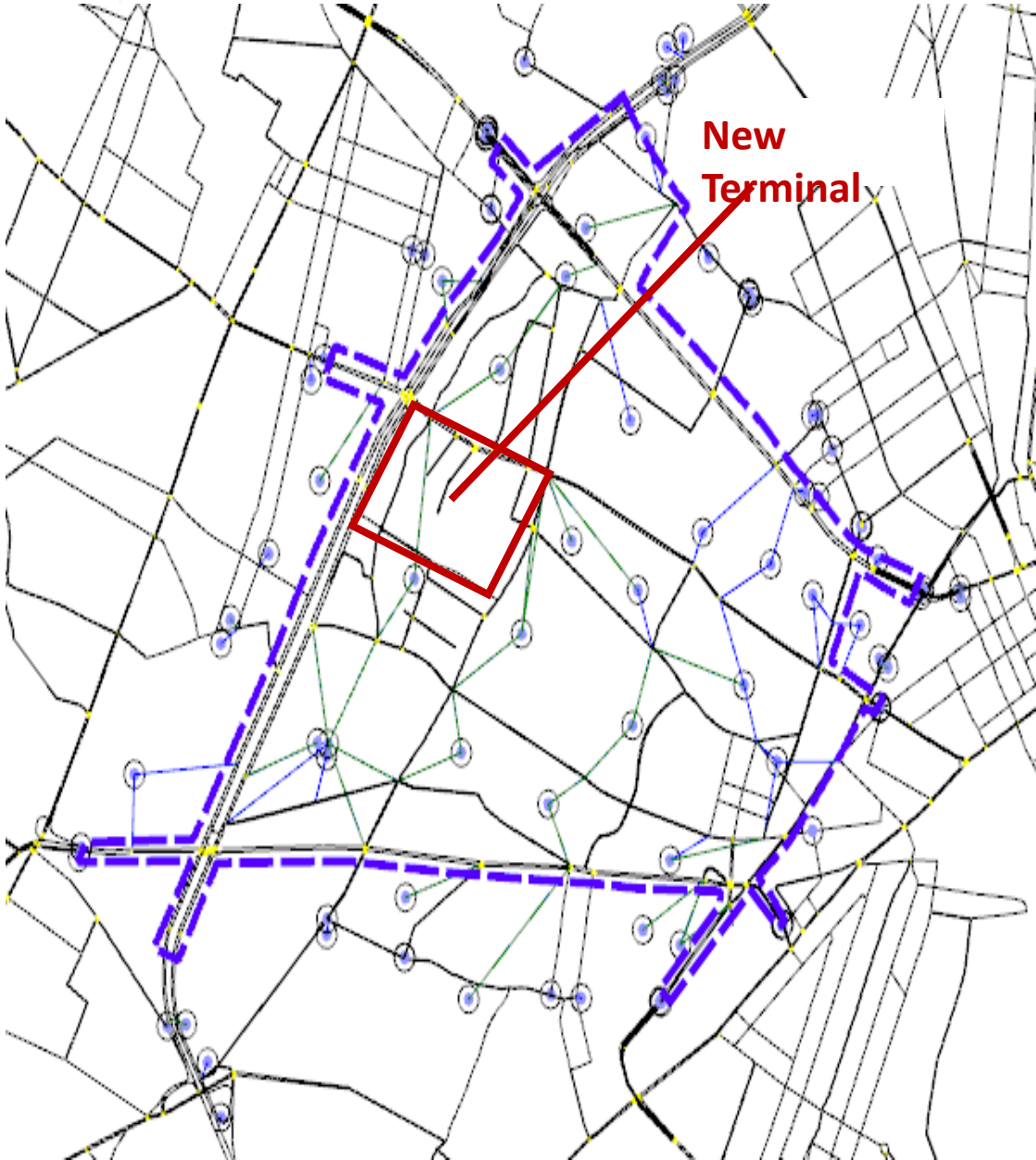
- Increased share of private passenger cars
- Significant share of taxis and motorcycles concerning the traffic due to terminal operation
- Good traffic conditions at the terminal exit and entrance – LOS B



Results – Near and Greater Area

Traffic model development in AIMSUN software

- Traffic volumes (passenger cars, taxis, heavy vehicles)
- Bus routes, schedules and volumes
- Mode choice of additional traffic due to
  - Terminal operation (passenger demand)
  - Other facilities (hotel, commercial center, etc)
- Model calibration
  - GEH Indicator
- 17 different scenarios
  - Horizons 2017, 2020, 2030
  - Morning/Evening peak hour/holidays
  - Changes in road segments and infrastructures
  - Intercity bus routes
  - Traffic management strategies (changes in signal plans)



Results – Near and Greater Area

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- Traffic analysis of the 17 scenarios
  - Delays in all 23 intersections
  - LOS in all 23 intersections
- Comparison with current situation
  - Differences in delays
  - Change in LOS

Best scenario identification

- Volume maps for the 17 scenarios

Intersection id		Current situation	Best Scenario	Difference (%)
20	delay	40.6	49	21%
	LOS	D	D	-
18	delay	50.0	61	22%
	LOS	D	E	▼
3	delay	177.9	217	22%
	LOS	F	F	-
17	delay		17	-
	LOS		B	-

Conclusions

- Transportation projects and urban regeneration and redevelopment actions lead to
  - Areas upgrade
  - Accessibility levels upgrade
  - Traffic and environmental conditions enhancement
- New intercity bus terminal in the city of Athens
  - Improve traffic conditions around the existing terminals
  - Shift towards public transportation
  - Improvement of traffic conditions around the new terminal
    - Implementation of changes in signal plans in critical intersections

Challenges

- New project will bring massive change in the urban dynamics → prediction of traffic and passenger demand is challenging
- Need for an inclusive transport modeling approach (larger influence area will accommodate more meaningful interactions and will improve predictions
- Holistic scenarios that take into consideration not only adjacent changes but also city level interventions

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