Identifying and managing critical network for resilient mobility management in Thessaloniki

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The main goals pillars of the city’s Resilience Strategy towards 2030 are:

✓ Shape a thriving and sustainable city with mobility and city systems that serve its people
✓ Co-create an inclusive city that invests in its human talent
✓ Build a dynamic urban economy through effective and networked governance
✓ Re-discover the city’s relationship with the sea-Integrated Thermaikos Bay

Thessaloniki is member of the Resilient Cities Network (https://resilientcitiesnetwork.org/network/), which consists of 100 cities that are committed to building and investing in urban resilience.
Resilient Thessaloniki

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City resilience framework

Multilevel focus of the resilient approach

✓ **Strategic** level: resilience in **SUMP planning**
✓ **Tactical** level: resilience through **monitoring of mobility systems**
✓ **Operational** level: resilience through mobility system management techniques
Objectives and actions for resilient mobility and city logistics

 ✓ Build an integrated resilient mobility system (PuT as the backbone of the transport system; metropolitan SUMP, local SUMPS)

 ✓ Adopt Transit Oriented Development (TOD)

 ✓ Develop smart urban logistics

 ✓ Move to clean power for transport (electric vehicles, bicycles)

 ✓ Reduce air pollution and urban noise (Low Emissions Zones)

 ✓ Reframe waste management (circular economy)

 ✓ Strengthen environmental public awareness for a stronger environmental policy
Strategic level: resilience in SUMP planning

Benefits of planning and operating a resilient mobility system

- Maximization of the **capacity** and **redundancy** of the mobility system.
- Improvement of **passenger safety** by reducing the numbers of accidents and congestion events.
- Increase of **accessibility** to public transport.
- Reduction of **air and noise pollution**.
- Improvement of the **efficiency** and cost **effectiveness** of transporting people and goods around the city.
- Enhancement of the design, attractiveness and quality of the **urban environment**.
- Development of a **non-motorized vehicle and intermodal transport networks**.
Tactical level: resilience through monitoring of mobility systems

Thessaloniki Smart Mobility Living Lab

Monitoring the city is a core element to support decision making for the planning and operation of a resilient mobility system.

Thessaloniki Smart Mobility Living Lab aggregates data from the mobility eco system with different types of detectors.

The processing of these data:
✓ contributes to the efficient monitoring of Thessaloniki’s transport conditions
✓ reveals valuable insights for mobility patterns traffic conditions predictions

Thessaloniki Mobility Dashboard
(https://www.thessmd.imet.gr/)
Tactical level: resilience through monitoring of mobility systems

Events can be recreated from multiple points of view

✓ Heavy snowfall in January 2017. Data related to mobility such as flow speeds and traffic congestion were collected and analyzed (https://youtu.be/2zI2tUkuwaM).

✓ Heavy rain in May 2018. During that day about 72mm of rain were recorded which implies an increase of about 180% in the average monthly precipitation of May during the last 60 years. (https://youtu.be/uXooiKax8sU).

Monitoring the network of Thessaloniki in extreme weather events
Tactical level: resilience through monitoring of mobility systems

Faster reactions to challenges

Pedestrian routing

Routing

Bike sharing users

Less crowded route

Citizens in leisure activities

Shared bike trips ends

E-scooter trip ends

Dedicated bike dashboard for fleet managers

Keeping social distance while walking in Thessaloniki
TrafficThess Reports
(http://www.trafficthessreports.imet.gr)
A personalized single point of access

A web-based data analytics dashboard was developed for efficient monitoring of the ride sharing system’s operation and related metrics.

Tactical level: resilience through monitoring of mobility systems

Early alerts / alternative and flexible transport modes
Tactical level: resilience through monitoring of mobility systems

Everything ready when the system crashes

COVID quarantine allowed for more detailed analysis of a real application

Before COVID era
First lock-down
Second lock-down
Tactical level: resilience through monitoring of mobility systems

Everything ready when the system crashes
Identifying and managing the network’s criticality is an important element for resilient mobility management in cases of a disruption in the transport system that results in undesirable impacts for the road users.

The capacity of the critical network as main factor for the system’s resilience

Identifying and managing the network’s criticality is an important element for resilient mobility management in cases of a disruption in the transport system that results in undesirable impacts for the road users.

Tactical level: resilience through monitoring of mobility systems
Operational level: resilience through mobility system management techniques

Tool for Traffic Managers

Components

• **Scenario Manager (Management component)**
  - Threshold and target values related to each control strategy (KPI based)
  - Selection, activation and deactivation of a control strategy and of the associated C-ITS services

• **Dashboard (Visualization component)**
  - Traffic status and strategies performance monitoring
  - KPIs, digital maps, diagrams, historical data

• **C-ITS messages**
  - DENM, IVI, SPAT, MAP

• **KPIs**
  - Average Speed, Level of Service, Traffic Volume, Volume / Capacity Ratio, CO2 Emissions, Noise, Travel Time, Travel Time Rate of change
Operational level: resilience through mobility system management techniques

Tool for Traffic Managers

Scenario Manager
Operational level: resilience through mobility system management techniques

Tool for Traffic Managers

Dashboard
Operational level: resilience through mobility system management techniques

The Perspective of C-ITS services as a policy tool for a resilient mobility network in Thessaloniki

- **Road Works Warning (RWW)**
  *Driving velocity reduction, change lanes, steering manoeuvres*

- **Road Hazard Warning (RHW)**
  *Adjustments and manoeuvres*

- **In-vehicle Signage (IVS)**
  *Driving velocity adaptation, change lanes, steering manoeuvres*

- **Flexible Infrastructure (FI)**
  *Vehicle drivers able to avoid collisions*

- **Green Light Optimized Speed Advisory (GLOSA)**
  *Vehicle drivers able to change driving behavior*

- **Mode and Trip Time Advice (MTTA)**
  *Drivers have extra time to react appropriately → Accidents decrease*

- **Probe Vehicle Data (PVD)**
  *Vehicle drivers able to avoid dangerous situations, change driving behavior*
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