Implementation of an Advanced Spatial Technological System for Emergency Situations

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INNACT - RWG [Action 3.1]

The system was developed within the framework of a EU funded multidisciplinary research project, that involved the collaboration of researchers at:

- **The University Hospital,**
- **The Architectural – GIS Engineering Department and**
- **The Electrical and Computer Engineering Department**

of Patras University,
as well as private consulting firms (ATMEL).

The end users of the project were:
the National Center for Emergency Response (NCER),
the Fire and the Police Departments.

Collaborators: Ministry of Environment, Land Planning & Public Works, Greek Telecommunications Organization (OTE), Mobile Service Providers, Compucon S.A. (AVLC – systems), CISCO – Hellas (Networking Equipment) and KONTOU Inc. (ATMS – systems)

Project's Scope

Development and deployment of a technologically advanced integrated system for trauma incidents in the Region of Western Greece.

Project's Objectives

Coordination of the Emergency Medical Services (EMS) division, Fire and Police Departments, and Hospital Units towards the deployment of an integrated system for:

i) reducing the time needed for arrival of the EMS personnel to the place of an accident,

ii) reducing the overall time needed to transfer the patient to the trauma-centre,

iii) offering medical care of high quality to en-route patients through the use of principles of telemedicine, and

iv) archiving for future optimisation the historical events related to trauma cases in the study area.

Key Components

a) an Emergency-Vehicle (EV) fleet equipped with a GPS-based management system encompassing a cellular (GPRS) module for transmitting the EV's location to a trauma/ dispatch centre,

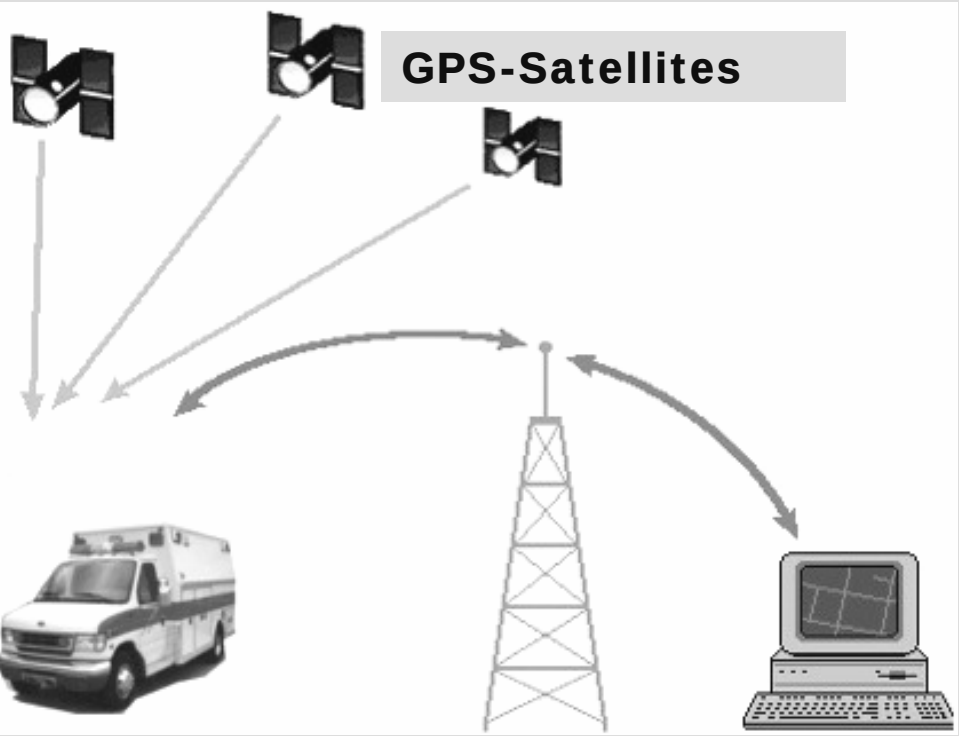
b) an innovative cellular-based (GSM) telemedicine system for transferring key medical data from patients in ambulances to trauma-centres in hospitals,

c) a decentralized traffic management system for EV traffic pre-emption,

d) an innovative GIS-based system for pinpointing the optimum routes for the EVs to the accident's location and back to the hospital, and

e) an on-going lecturing-program for offering up-to-date training to EMS-personnel.

a) EV-fleet management system



EMS-Vehicle

Mobile Service Provider Infrastructure

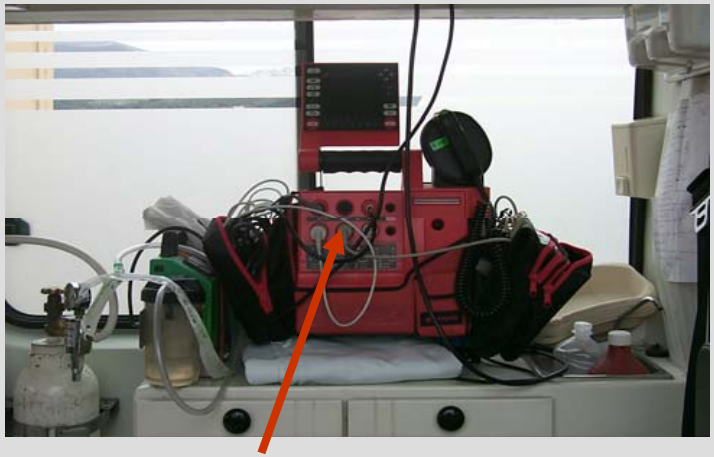
Base-Station

GPRS-transmitter

GPS-receiver

AVLC-on vehicle equipment

b) Wireless Telemedicine System (on EMS-vehicles)



Mobile Medical Equipment

Wi-Fi Observation Camera

EMS-Ambulance (Interior)

c) Decentralized Traffic Management Unit

EMS-vehicle

UHF-transmitter

Traffic Intersection

UHF-receiver

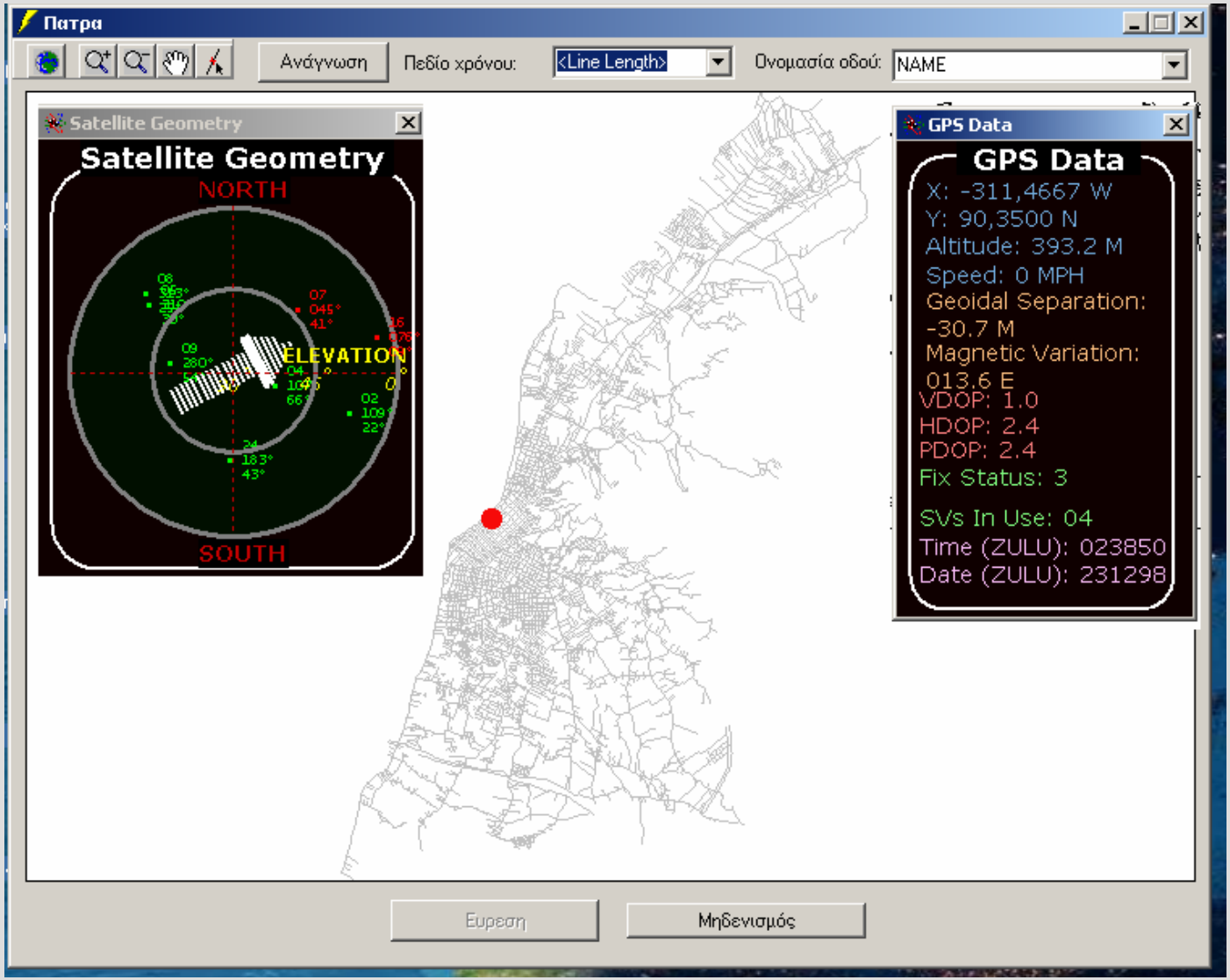
d) GIS for optimum route guidance

The final outcome was the development of a

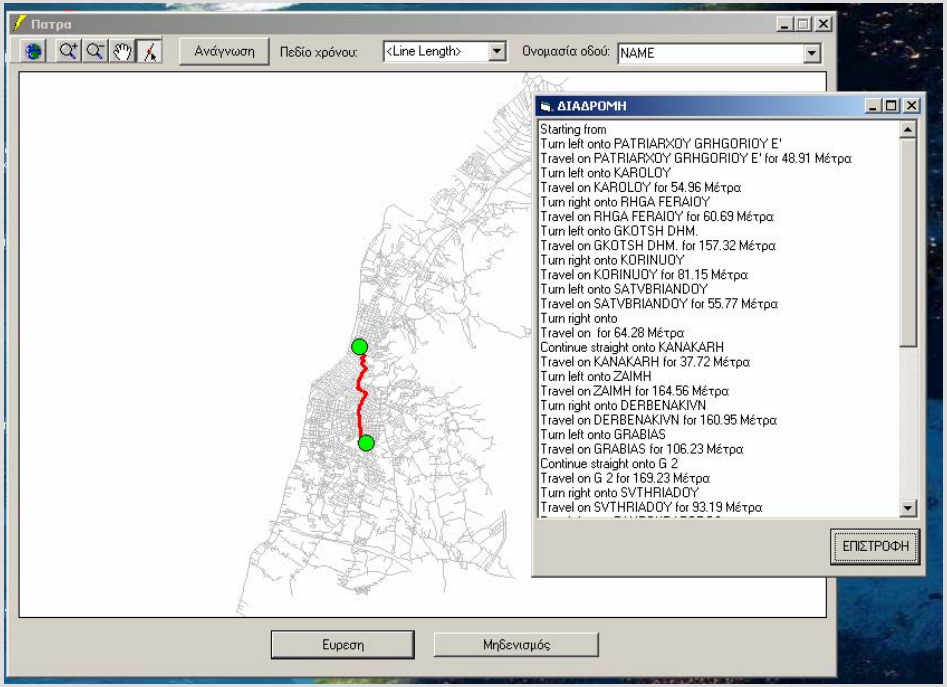
GIS system

relying on the following data layers:

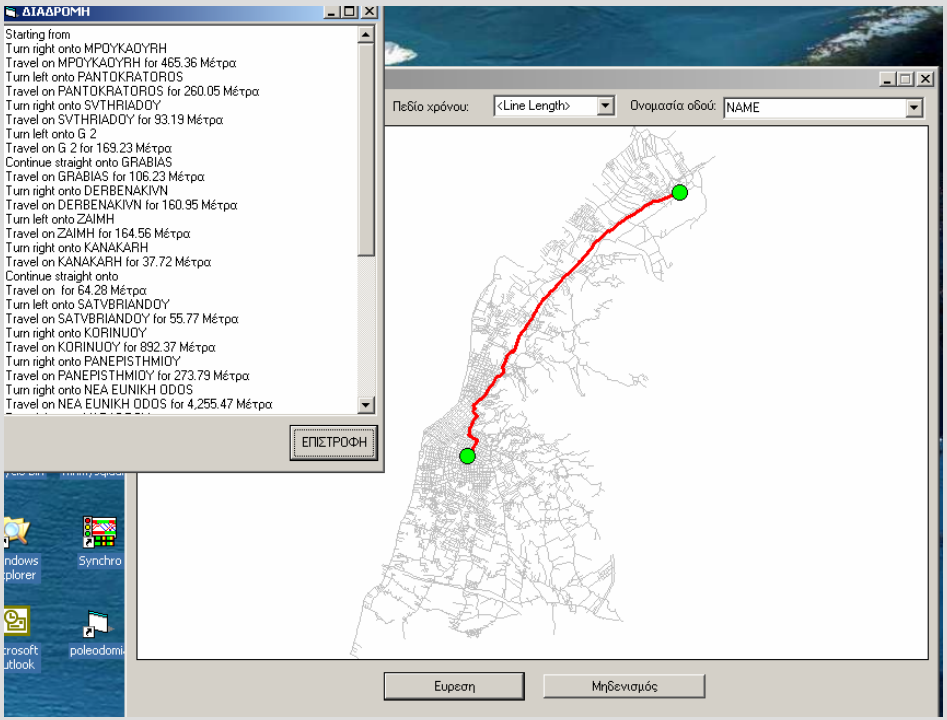
1. **The entire road network, containing information on speed limits, direction of travel, traffic signals, and other important traffic parameters.**
2. **EV GPS data.**
3. **References of the accident location according to the data received by the trauma/dispatch center.**
4. **Best possible route guidance from the EV's location to the accident location and from the accident site to the University Hospital trauma centre.**
5. **Updating and expanding the system by introducing new traffic data.**



EVs location, according to data received by the GPS



Best possible route guidance from the EV to the accident's location



Best possible route guidance from the accident to the trauma center

e) An on-going lecturing-program for offering up-to-date training to EMS-personnel

Human Resources

Medical School – University Hopsital




Architectural – GIS Engineering – University of Patras



Electrical & Computer Engineering – University of Patras

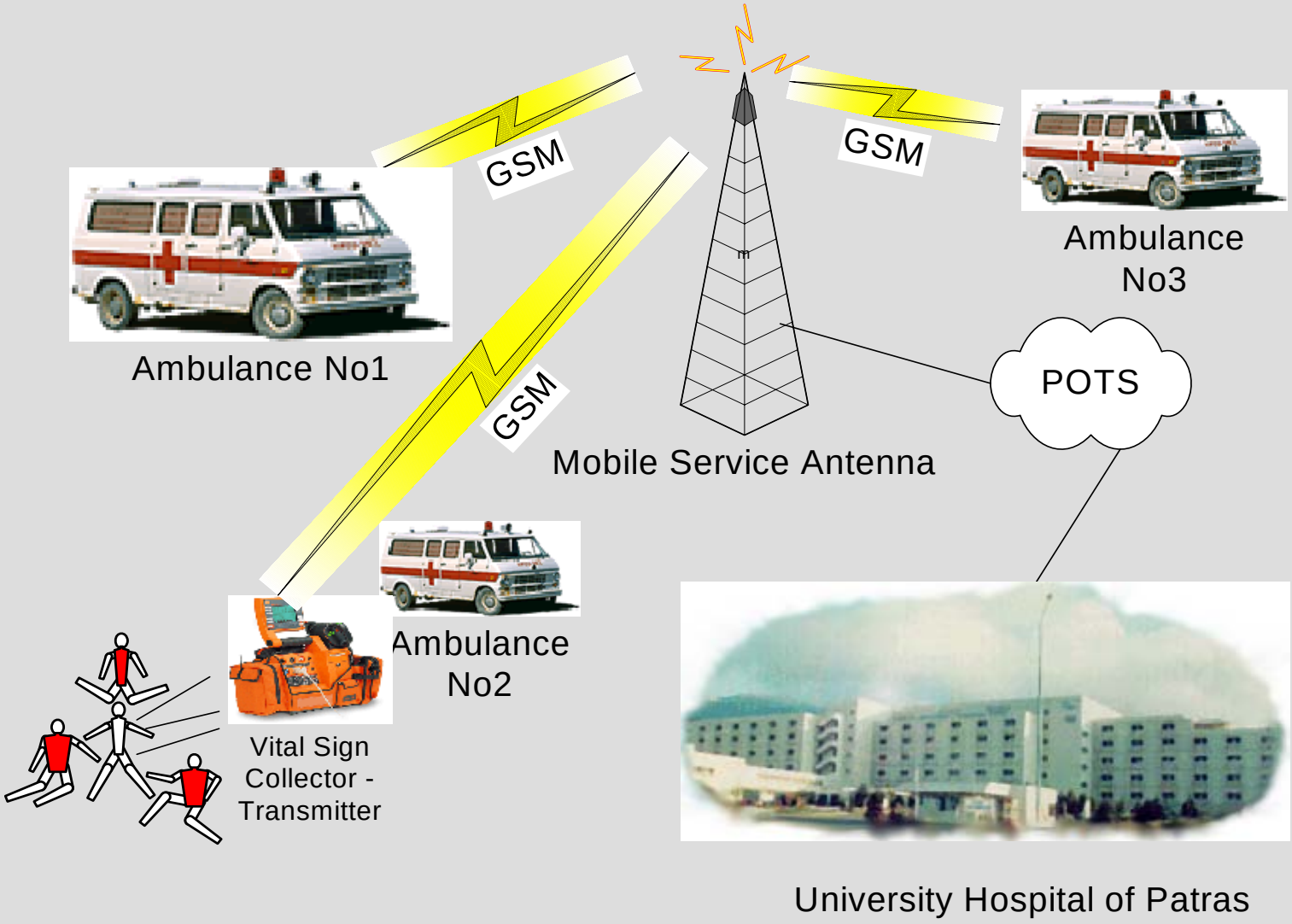


Emergency Response Unit


Private firms

… (and many more)…

Overall Architecture of the System Developed



Results - Conclusions

During the three-month study period, 56 transportations were examined before the implementation of the project, serving as controls and 45 after the implementation of the project, with properly equipped ambulances.

NATURE OF INCIDENTS	BEFORE REGULATIONS	AFTER REGULATIONS
MULTIPLE INJURIE (CAR ACCIDENTS etc)	32	28
PATHLOGY AND REGULAR INCIDENTS	16	11
CARDIOLOGICAL INCIDENTS	8	6
TOTAL	*56*	*45*

Nature of incidents studied

Transportation Time Reduction

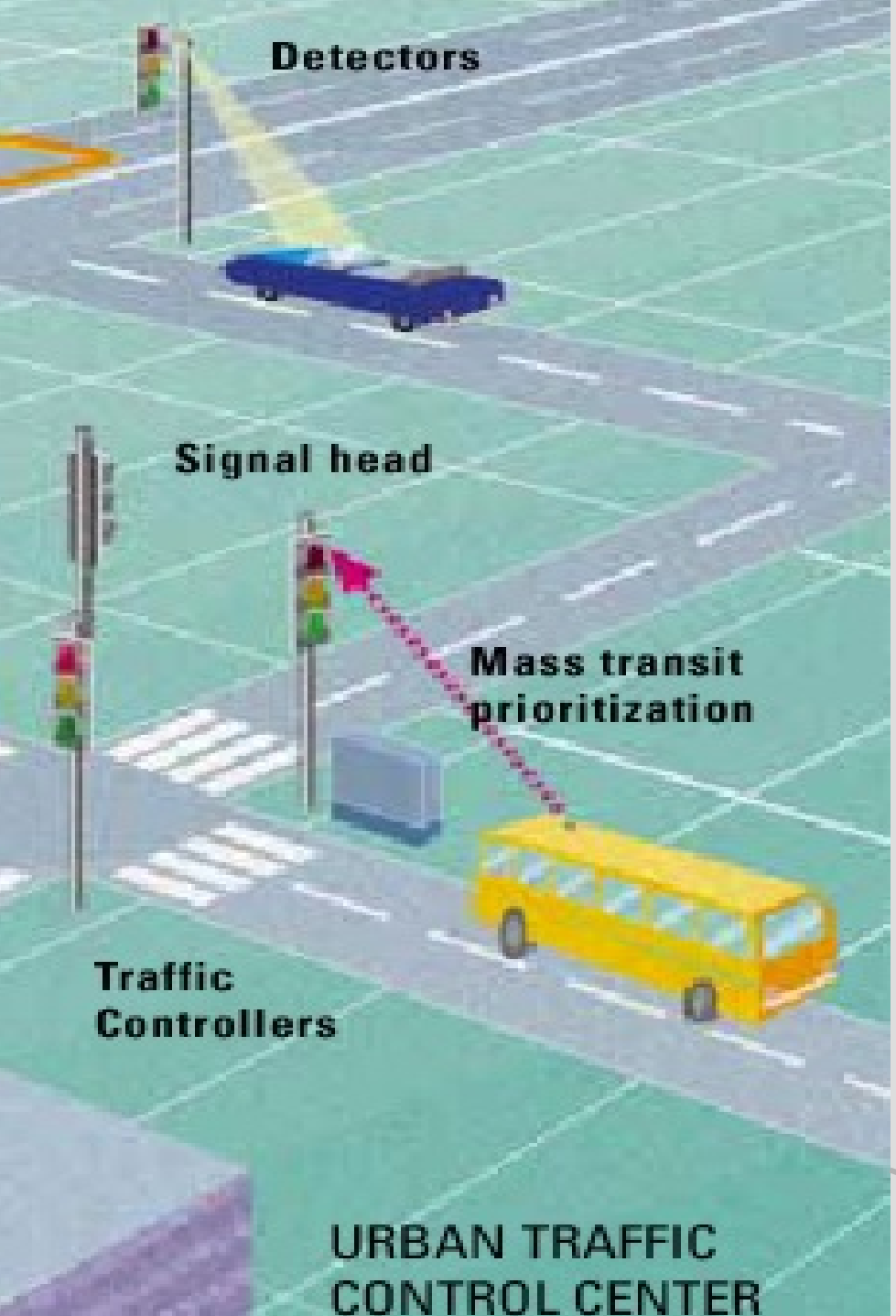
TRANSPORTATION TIME	STAGE I	STAGE II	p
Total time	12,36 min n=56	10,21 min n=45	0,000002
Total time without using sirens and lights	12,34 min n=48	10,20 min n=40	0,000002
Total time using sirens and lights	12,07 min n=8	9,40 min n=5	0,03
In the time period 07:00-19:00 without using sirens and lights	12,40 min n=31	10,36 min n=22	0,0005
In the time period 07:00-19:00 using sirens and lights	12,00 min n=3	9,00 min n=3	0,13
In the time period 19:00-07:00 without using sirens and lights	11,51 min n=17	9,53 min n=18	0,007
In the time period 19:00-07:00 using sirens and lights	12,30 min n=5	9,36 min n=2	0,09

Coordination of the parties involved

✓ **An incident, either a simple one such as a car accident or a complicated one, such as a massive destruction, requires the collaboration of several authorities and organizations, as the police, the army, the port police, the fire department and the NCER.**

✓ **The coordination of all parties, directly or indirectly involved, consists a crucial parameter for the fast and effective confrontation of the trauma incident.**

✓ **The implementation of the system developed within the presented project, rendered the dispatch centre as the significant junction that offered the possibility to notify and coordinate all these parties, so that their mobilization is fast, effective and efficient.**



Thank you for your attention!