

PROJECT

## TOAST

### Tactical optimization strategies to adapt urban transportation networks

### *Réaménagement d'infrastructures de transport urbain*

**Funding:** National (France)

**Duration:** Jan 2013 - Dec 2013

**Status:** Complete with results



#### Background & policy context:

According to the Global Health Observatory (GHO), more than half of the total population lived in urban areas in 2010. This proportion is expected to reach 60% by 2030 and 70% by 2050. The increasing concentration of population and the unplanned extension of urban areas raise several challenges, among which the management of the urban network infrastructures.

The TOAST project (Tactical OptimizAtion Strategies to adapt urban Transportation networks) aims at investigating a new set of emerging tactical optimization problem. It consists in setting directions on each street to improve the global transport system. This research has been funded in 2013 by the DRRT (Délégation Régionale à la Recherche et à la Technologie, Champagne-Ardenne region, France).

#### Objectives:

TOAST is an incentive project dedicated to analysing and improving an urban transport network by means of optimization. Thus, new configurations of the network can provide an alternative ground to reduce traffic jams.

It investigates tactical optimization problems of setting direction in urban networks to minimize travel distance as well as global congestion. Using the very same approach, it also provides solutions which act as deterrent policy, for instance in tourist areas.

**Other funding sources:** DRRT (Délégation Régionale à la Recherche et à la Technologie)

#### Partners:

ICD-LOSI, Université de Technologie de Troyes, Troyes

LIMOS, Université Blaise Pascal, Clermont-Ferrand

Délégations Régionales à la Recherche et à la Technologie (DRRT)

(Phase 1: financial support)

Ville de Troyes

(Phase 2: financial support)

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## **Key Results:**

An optimization framework core has been developed in order to deal with a class of tactical optimization problems, where two objectives are optimized independently:

- (i) Allow fast origin-destination transportation requests,
- (ii) Prevent drivers from entering critical areas such as city centers or touristic points.

The work included the computation of the global congestion and addressed several other settings (such as lanes) to deal with promising applications. The optimization core can be embedded in a support decision systems.

The core TOAST encloses sophisticated heuristics and metaheuristics such as Iterated Local Search (ILS) and Relaxed ILS (RILS), Evolutionary Local Search (ELS) and Relaxed ESL (RELS), Variable Neighbourhood Search (VNS) and Intelligent VNS (IVNS), applied to produce high quality results for different networks structures.

Documents:

 [TRA2014\\_Fom\\_28103.pdf \(Project presentation\)](#)

**STRIA Roadmaps:** Other specified