



FP7-PEOPLE-2009-IRSES:
Project ID 246647

**Optimization and its Applications
in Learning and Industry
(OptALI)**

IRSES

Ongoing Deliverable D1.2

**Description of Research Seminar:
Optimisation of Ambulance Move-up**

Start date of the Workpackage: December 2010

Duration: 48 months

Due date of deliverable: November 2014

Actual submission date: January 2012

Participants: UGOE
UNIKL
DTU
UOA
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Research Seminar

offered by Oddo Zhang (ES-UOA-4)

in December 2011,

in Copenhagen, Denmark

Subject: Optimisation of Ambulance Move-up

Problem: Emergency Medical Services (EMS) are the organisations that provide on-site medical care and/or transport to hospitals. Faced with rapid call volume increases, budget cuts and rising costs of equipment, EMS need to reaccess or reorganise their service to be more effective and cost efficient. One of the key performance measures for their service is the call coverage which is the percentage of calls reached within a response time threshold. The strategic decision on the location of idle vehicles at any point in real time has a significant influence on the call coverage. Move-up is a practice of dynamically relocating idle ambulances in order to better call coverage. We propose move-up models that are tested on randomly generated call data around Auckland.

Main Results: We developed the following three move-up models.

1. Move-up of the newly-freed ambulance using a priority list where the newly-freed the ambulance means it just became idle after completing a service. This policy determines the target base for this newly-freed ambulance.
2. Move-up of all idle ambulances using a priority list. Under this policy, all idle ambulances are considered for move-up in order to maximise the call coverage.
3. An integer programming model (IP) for all-idle-ambulance move-up. This IP model is the generalisation of the previous model and provides a more flexible framework for move-up.

These models are tested using randomly generated call data based on the population distribution in Auckland. Their performance is compared with a benchmark policy (return-to-home-base) under which an ambulance returns to its preassigned home base whenever it completes a service. Our results show that move-up can provide significant improvement on the call coverage.

Participants: students and researchers from DTU.

Publication: A revised paper on optimisation of single-vehicle-next-call: models and insights is submitted to European Journal of Operational Research.