

Research Theme "Logistics"

CWI Scientific Meeting



Rob van der Mei Bert Zwart Sindo Nunez-Queija Monique Laurent Guido Schaefer Marie-Colette van Lieshout

Rob van der Mei (ST)
Overview of Research Activities within the Logistics Theme

Daniel Dadush (N&O)
Solving "Curved" Linear Programs via the Shadow Simplex Method



Peter van de Ven (ST)
Distributed Backup Scheduling: Modeling and Optimization



CWI, 30 January 2015

From Reactive to Proactive Planning of Ambulance Services

CWI Scientific Meeting



- Facts:**
- 1 million calls per year, out of which 500000 A1-calls
 - 35000 times do not meet the 15-minute target

- Challenges:**
- Optimal locations of base stations?
 - How many ambulances needed per base location?
 - How to keep good coverage in real-time?

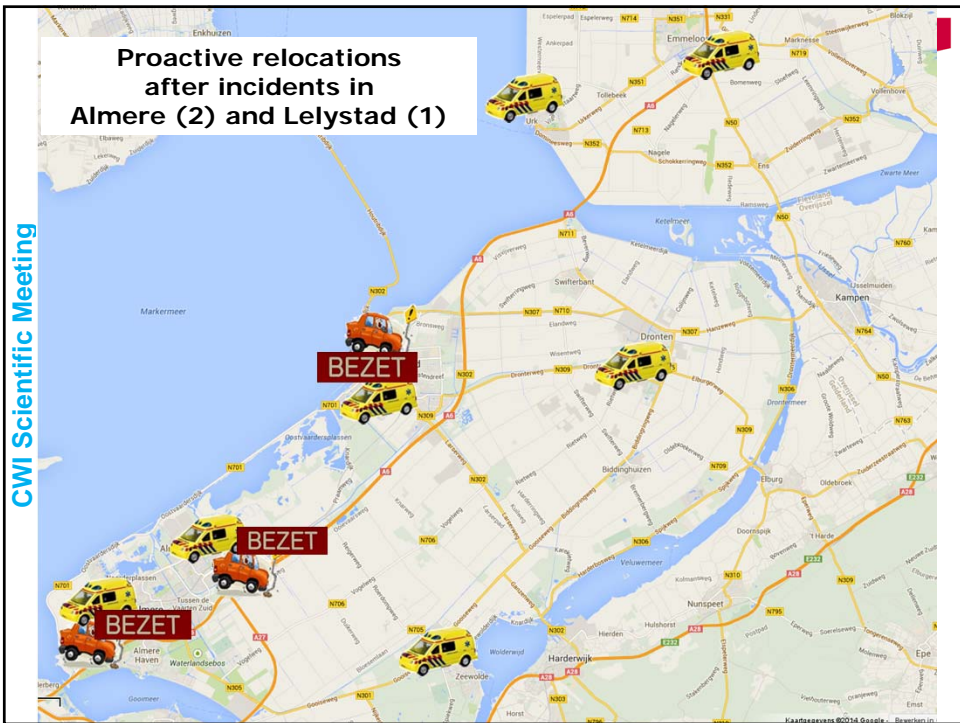
CWI, 30 January 2015

REPRO









From Reactive to Proactive Planning of Ambulance Services

CWI

CWI Scientific Meeting



- Proactive relocation
- Ambulance
- Incident
- Ambulance occupied



#AVS

conexxion

GGD

GGD Flevoland

rivm

Scientific challenges:

- Omnipresence of uncertainty
- Need for fast decision making, scalability of algorithms

Collaboration:

- Five ambulance providers, RIVM, CityGIS

Current status:

- Real-life pilot in Flevoland in Spring 2015!

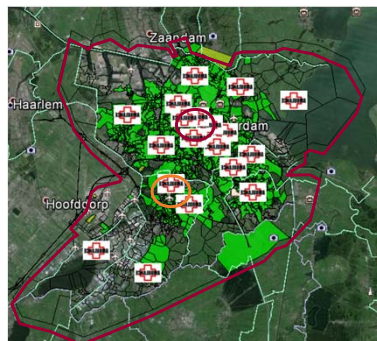
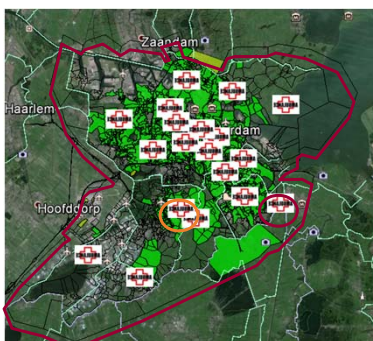
REPRO

CWI, 30 January 2015

Planning Firefighter Services

CWI

CWI Scientific Meeting



Challenges:

- Optimal locations of base stations? Proactive relocations?

Results:

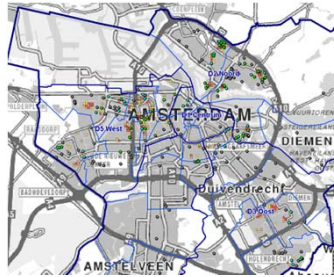
- Strong improvements by 'relocation' of 1 or 2 base stations

Collaboration:

- Momentum and interest from the sector (both A'dam and NL)
- Collaboration to be intensified in 2015

Predictive Policing

CWI



CWI Scientific Meeting

Challenge:

- How to improve effectiveness police services by technique from Data Science?

Project:

- Forecasting crime-incidents based on history
- Cross-correlation with demo-geographical factors
- Spatial dimension plays crucial role
- 'Near-repeat phenomenon'

CWI, 30 January 2015



Pricing & Revenue Management

CWI



CWI Scientific Meeting

- **New paradigm:** Increase revenue by smart dynamic pricing
- **Scientific:** Quantitative models for making optimal pricing policies (stochastic optimization)
- **Controlled Variance Pricing**
- **Research at two levels:**
 - fundamental research with PhD students (influential publications)
 - applied projects with MSc students
- **Industry collaborations:**



STADSSCHOUWBURG
amsterdam



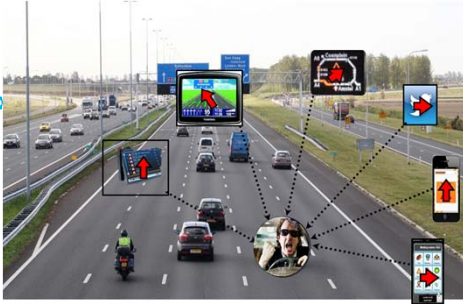
CWI, 30 January 2015



Dynamic Management of Road Traffic and Intelligent TS

CWI

CWI Scientific Meeting



Projects:

- Integral management of road traffic (not local)
- Concept Digital Road Manager (DRM)
- “Incident Management 2.0”
- Real-life pilots in Randstad, ‘boegbeeld-project’ by RWS
- Myanmar and India: Yangon, Delhi, Mumbai

Industry partners:



City Mobility and Logistics

CWI

CWI Scientific Meeting



Challenges:

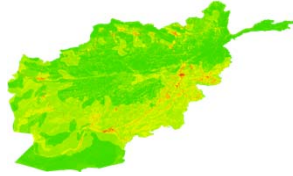
- ‘Optimal’ number of bicycles per base station?
- Asymmetry in travel movements
- How to minimize maintenance and relocation cost?

CWI, 30 January 2015

Risk Modelling for Military Applications

CWI

CWI Scientific Meeting



Projects:

- Predicting risk in hazardous situations
- Counter Interactive Explosive Devices (c-IEDs), piracy attacks
- Real-life validation experiments

Collaboration:

- Ministry of Defense (PPS)
- Part of 'Defense and Security Lab'



CWI, 30 January 2015

Performance & Capacity Planning Application Chains

CWI

CWI Scientific Meeting



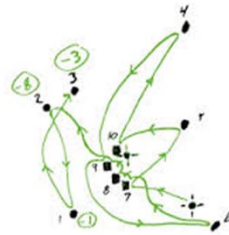
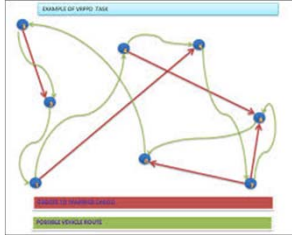
• **ING Bank**

- Reliability online banking system crucial for ING
- Many legacy systems, systems often unreliable
- Research on reliability of complex application chains
 - performance and capacity management
 - automatic code generation, domain specific languages
- Multidisciplinary research (with SWAT)



CWI, 30 January 2015

Planning Engine Touring Cars CWI



CWI Scientific Meeting

Challenges:

- Pick-up and delivery problems
- Matching personnel and vehicles
- Time limits
- Stochastic elements (inclusion uncertainty)

Industry partners:

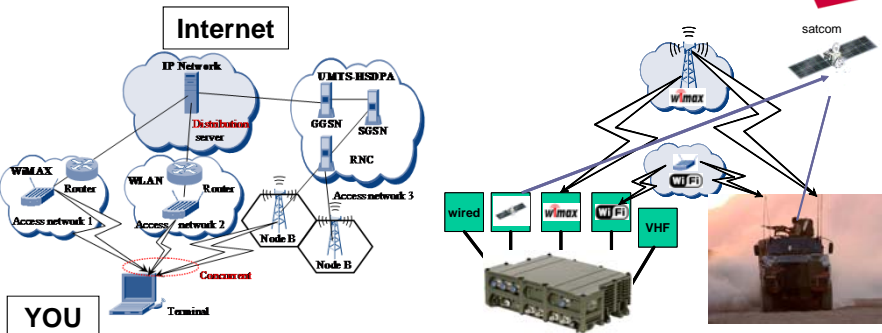
- RoveCom, Lanting Reizen



CWI, 30 January 2015

Concurrent Access in Wireless CWI

CWI Scientific Meeting



Challenge:

- Wireless bandwidth limited, but sustained growth in demand

Solution:

- Overlapping coverage in a lot of places
- Concurrent use attractive (performance, dependability, robustness)

Results:

- Methods for optimal splitting of traffic streams
- Simulations and lab tests: response times down by factor 5-10

THALES

Research Theme "Logistics"

CWI Scientific Meeting

Daniel Dadush (N&O)

Solving "Curved" Linear Programs via the Shadow Simplex Method



Peter van de Ven (ST)

Distributed Backup Scheduling: Modeling and Optimization



CWI, 30 January 2015