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

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?
DAM challenge:
How to relocate ambulances in order to maintain short response times to future requests?
Basic situation (no incidents)

Proactive relocations after incidents in Almere (2) and Lelystad (1)
From Reactive to Proactive
Planning of Ambulance Services

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!

Planning Firefighter Services

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

**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’

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Pricing & Revenue Management

- **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:**

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**Dynamic Management of Road Traffic and Intelligent TS**

- 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

**Projects:**

**Industry partners:**

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**City Mobility and Logistics**

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

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Risk Modelling for Military Applications

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’

Performance & Capacity Planning Application Chains

- 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)
Planning Engine Touring Cars

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

**Industry partners:**
- RoveCom, Lanting Reizen

Concurrent Access in Wireless

**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
Research Theme “Logistics”

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