Evaluating Traffic Management Strategies in an Emergency Call Center Context

Case study at the Swedish emergency call service provider, SOS Alarm

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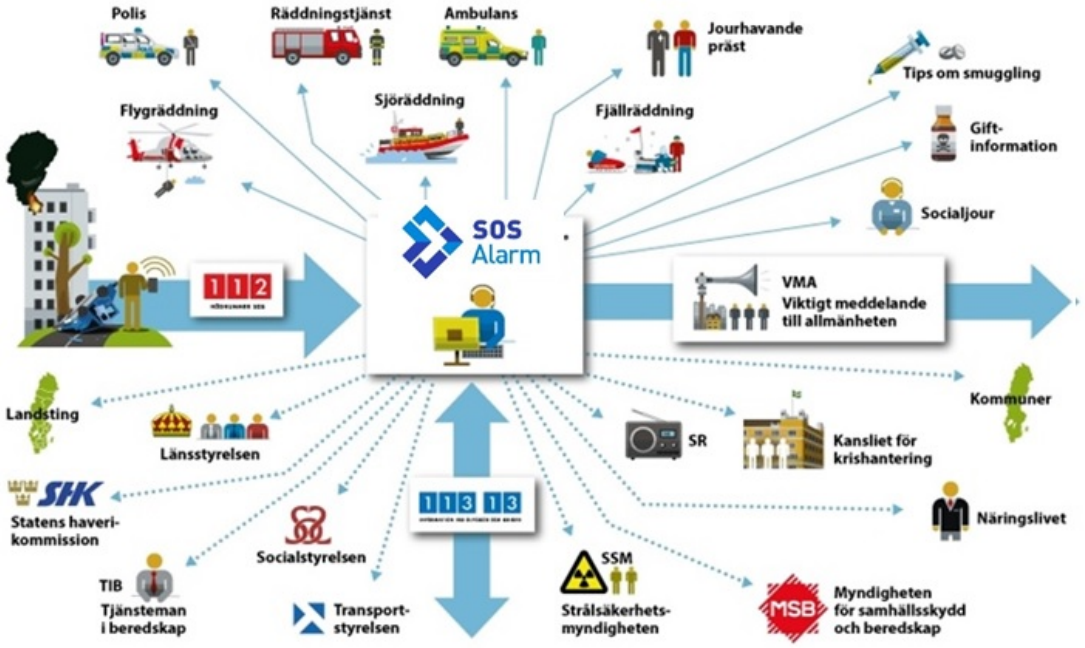
SOS Alarm – An Overview



Alerting & preparedness - Introduction

- The emergency number 112 - person or property in need
- Crisis preparedness
- About 650 employees
- 13 SOS-centers

Research problem

- Steady increase of emergency calls since 2010 (17%)
- Increasing number of non-Swedish speaking emergency calls
  - 250-400 calls/month
- Several other factors (such as service requirements)
- Increasing response time

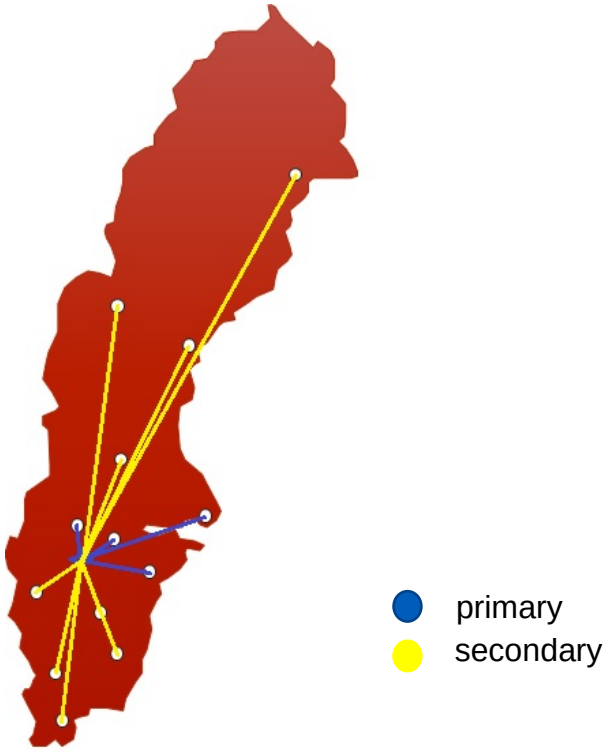
Future challanges
- Climate change
- Instability in the world

Research objectives

- Reduce response time using traffic management strategies
- Especially reduce wait>30s
- Three sub-objectives
  1. Evaluate specified traffic management strategies
  2. Design strategies managing heavy-traffic scenarios/big events
  3. Optimize system adjustable parameters

Traffic management strategies

- Traffic management concepts:
  - Routing
  - Overflow
- Skills/reception:
  - Local
  - Regional
  - National

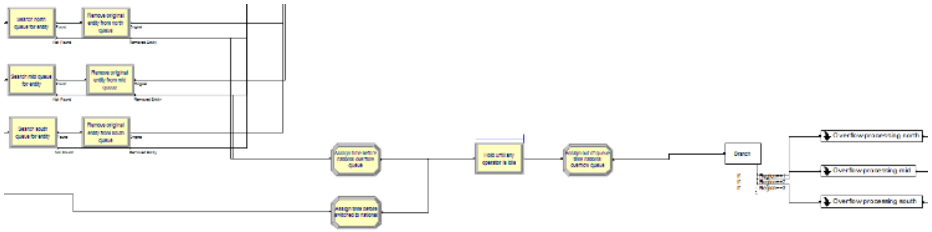


Theoretical framework

- Analytical Erlang-C
  - Probability functions
  - Commonly applied when staffing call center
  - Simplified
  - Single line queues
- Simulation models
  - Networks
  - Details
  - Upcoming in call centers

Approach

- Enabling details
  - All characteristics
  - Various phenomenon



- Arena Simulation Software
  - One of the leading commercial simulation softwares
  - Discrete-Event simulation
  - Module-based
  - Similarities to process modeling

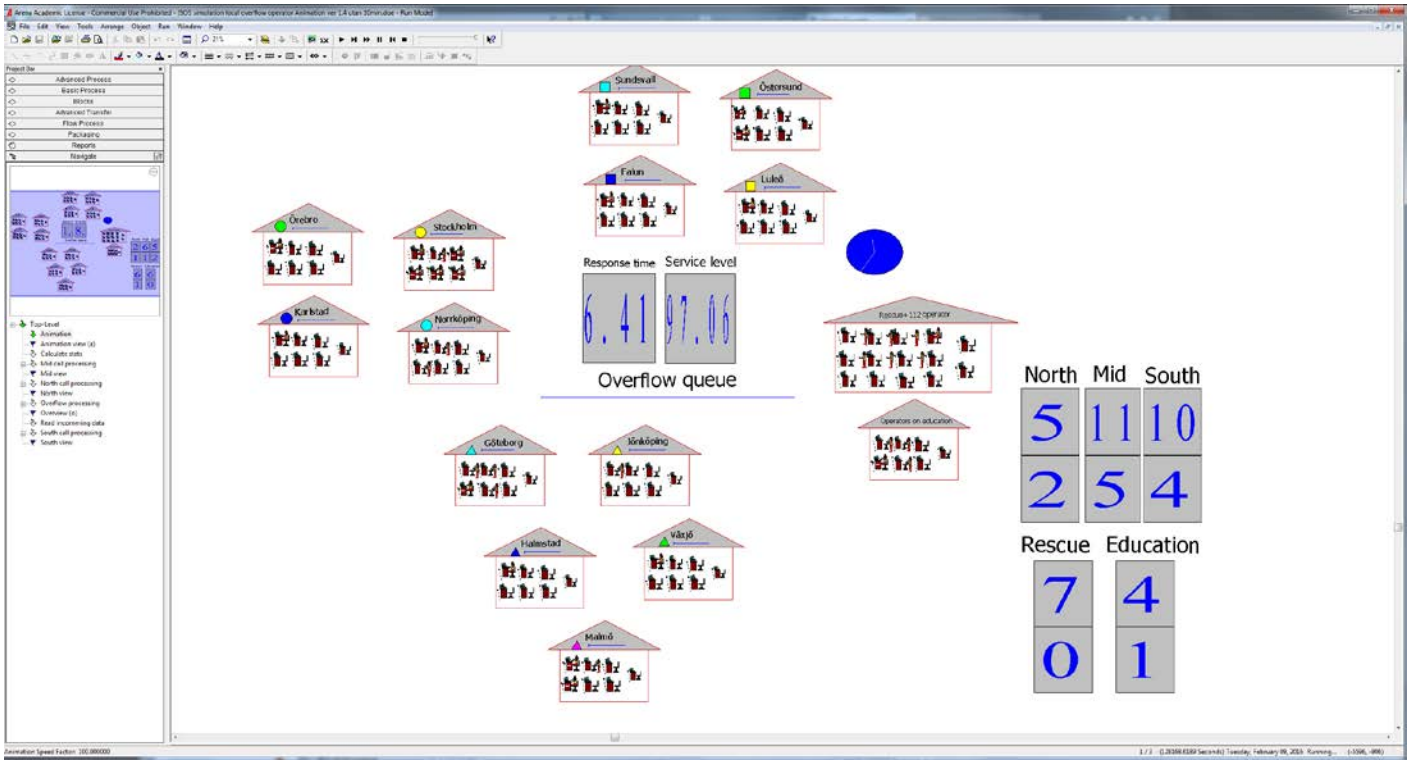
Implementation

- Empirical data
  - Arriving call times and their origin (from call-logs)
  - Staff levels (calculated from operator logs in the system)
  - Distribution of call types
  - Average service time for each call type

	care	rescue	112
fraction (%)	≈30	≈3	≈67
service time (s)	≈288	≈268	≈50

- Estimated data
  - Sociological parameters (about 40% utilization)
- Excluded parameters
  - Situational behaviour among traffic managers and operators

Visualization enables advantageously verification properties

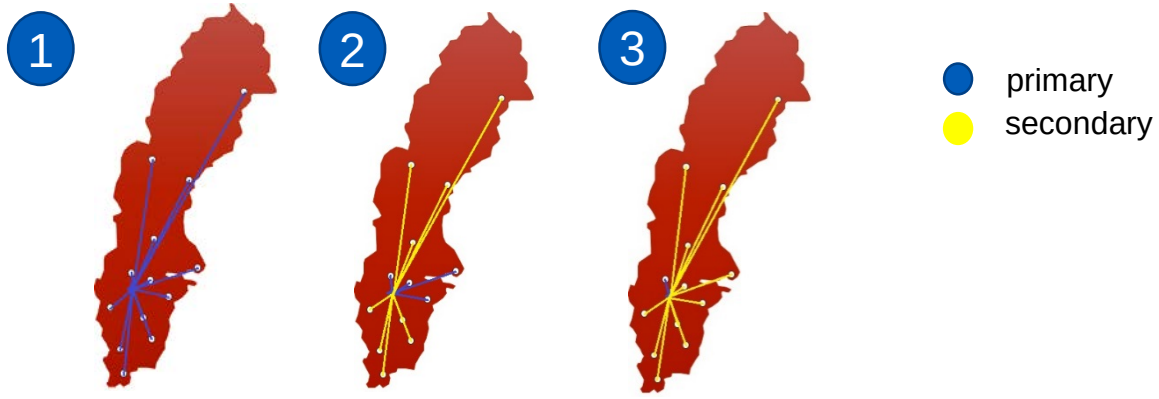


Model validation

- Accessible data since 2010 enable model validation
- Performs equal at 95% significance level
  - Average response time
  - Service level

Results

- The more centralized, the better efficiency
- 2-4s difference between overflow strategies
- Prioritization algorithm
- Trade-off qualitative and quantitative criteria

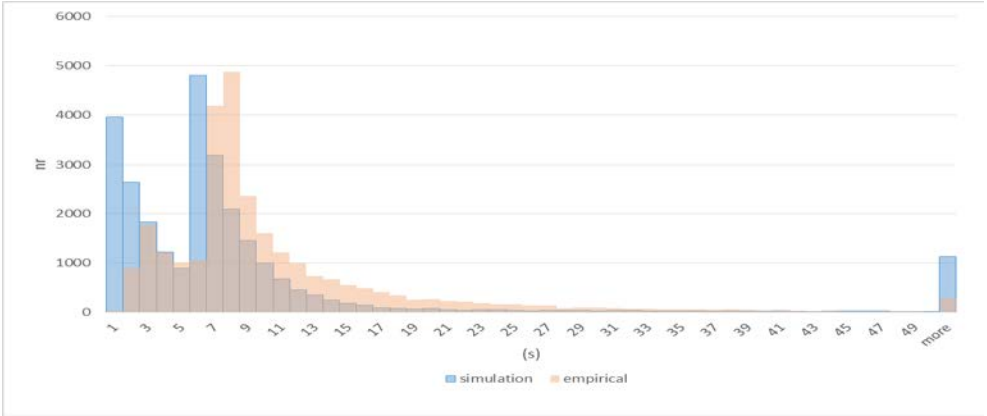


Concluding remarks

- When the project started 2015: 3 regional receptions
- In December 2015: local receptions **with** 5s overflow to national
  - A project delivery
- Service level effect (Jan-Apr)
  - 2015 -> 90.7%
  - 2016 -> 94.6%
- Assisting operational staffing and other analytical issues at SOS
- Interesting journey accompanied with many research questions and issues

Future project challenges

- Discover and estimate contributory parameters
- Socio-technical system
  - Behaviour among operators and traffic managers
  - Operator time to answer the call, answering morality
- Changing environment



simulated
empirical

Questions?

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