Performance evaluation and optimisation through the TIFAR-framework.

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

CWI   VU   REPRO

Partners of REPRO

Academic Partners

Project Partners

Finances By

Goal of this talk

1) Show the tool we develop in REPRO
2) Receive your feedback for continuation

Central TIFAR-tools in this talk

Dispatch Simulator

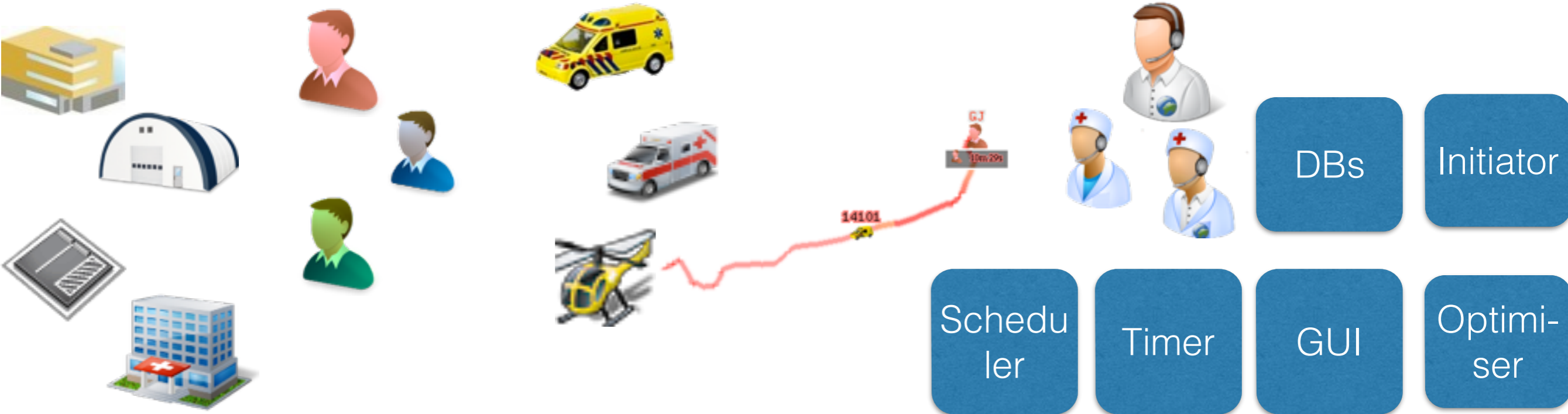Emergency Medical Call Center Simulator

Optimiser

Classes of TIFAR

Main

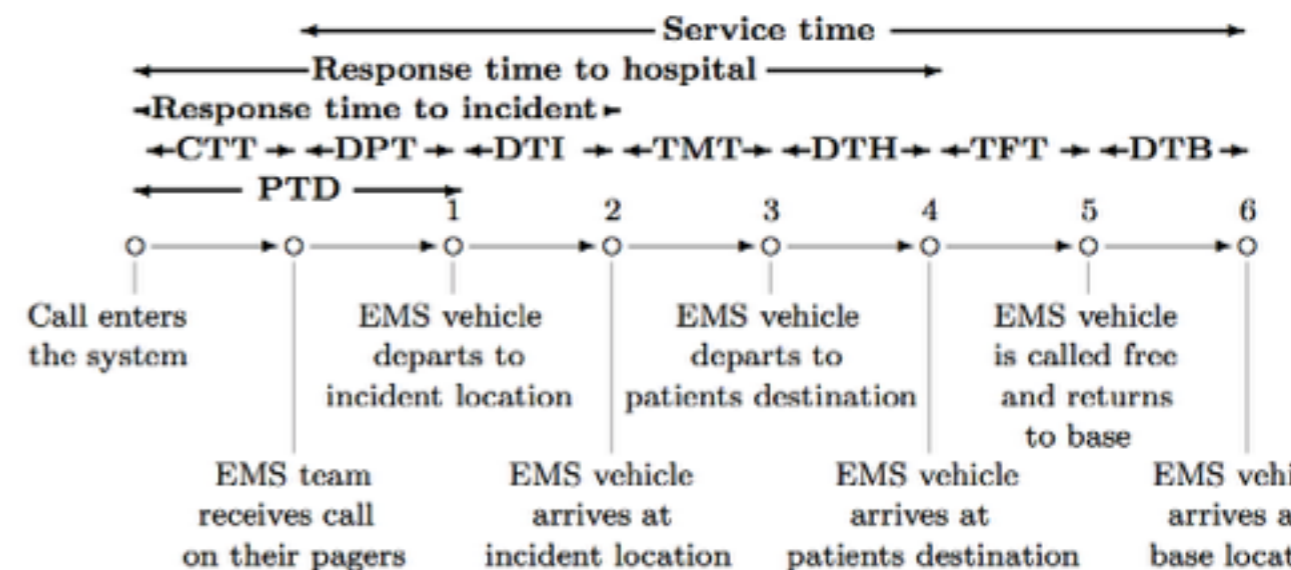Environment | Calls | Fleet | Navigator & Resolver | EMCC | Log

Vertex | Vertex | Call | Call | Ambu | Ambu | Route | Route | CC Agent | CC Agent | Entry | Entry

DBs | Initiator

Scheduler | Timer | GUI | Optimiser

All built around ambulance data!

We use multiple databases:

- Call records (RAVIS, Opencare Ambu, Ambite, Mios(+))
- Call Center Records (Arbi)
- Duty Rosters
- Base and Hospital Locations

- EXT: Geographical Information
- EXT: Addresses and Buildings

External tools:

- CityGIS Navigator for shortest path and route information
  - RIVM Look-up table
- Quantum GIS for maps

TIFAR Dispatch Simulator

Purpose

To evaluate dispatch strategies:

- DAM

- Major happenings, regional changes

Input

We use the following as input:

- Regional geographical information

- Demand information (where & quant.)

- Fleet information

- Dispatch policy

Output

- Call record database -> All possible performance indicators!

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI   VU   REPRO

TIFAR Dispatch Simulator

Demo!

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI VU REPRO

TIFAR Dispatch Simulator

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI   VU   REPRO

TIFAR EMCC Simulator
Joint work with Geert Jan Kommer

Purpose

To evaluate call center staffings:

- Performance given a staffing

Input

We use the following as input:

- Interarrival time distributions (Call intensities)

- Feedback probabilities

- Service time distributions (Call durations)

- Staffing (Call takers, Dispatchers, Generalists)

Output

- Call Center Records 'arbi'

    - All possible performance EMCC indicators!

CWI   VU   REPRO

TIFAR EMCC Simulator

Demo!

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI VU REPRO

TIFAR EMCC Simulator

Main

Environment | Calls | Fleet | Navigator & Resolver | EMCC | Log

Vertex | Vertex | Call | Call | Ambu | Ambu | Route | Route | CC Agent | CC Agent | Entry | Entry

14101

DBs | Initiator

Scheduler | Timer | GUI | Optimiser

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI   VU   REPRO

TIFAR Optimiser
Joint work with Theresia van Essen

Purpose

To find 'optimal' staffing using
Erlang blocking per demand pt. (WIP)

Input

We use the following as input:

- Demand information

- Possible base locations and hospitals

- Service time constants

- Performance indicators

Output

- Staffing per base, graphical and textual in the log.

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI VU REPRO

TIFAR EMCC Simulator

Demo!

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.
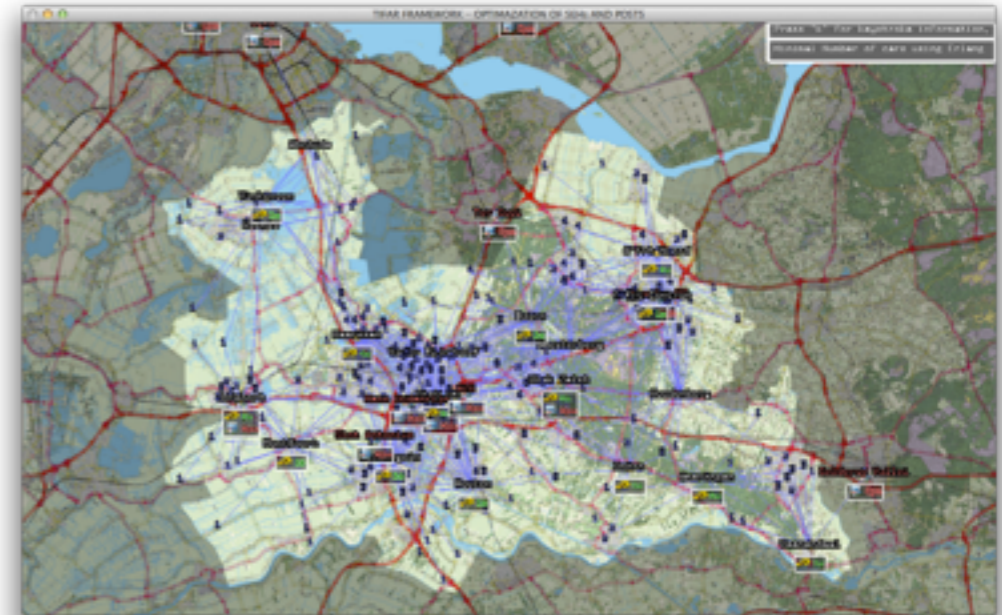
CWI   VU   REPRO

TIFAR Optimiser

Main

Environment | **Calls** | **Fleet** | **Navigator & Resolver** | **EMCC** | **Log**

Vertex | **Vertex** | **Call** | **Call** | **Ambu** | **Ambu** | **Route** | **Route** | **CC Agent** | **CC Agent** | **Entry** | **Entry**

14101

DBs | **Initiator**

Scheduler | **Timer** | **GUI** | **Optimiser**

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI VU REPRO

Future Research

- Validate all models:
  - *Theory and Practice*
- Implementing REPRO policies into TIFAR
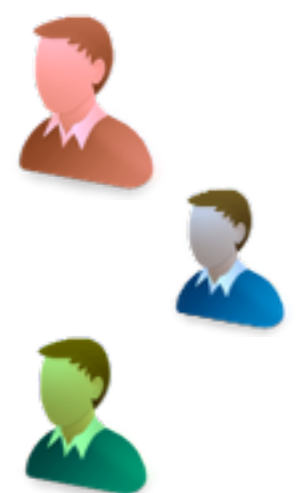- Combining optimisation tools with evaluations
  - for real time decision support tools.
- Better user interface for mostly used indicators
- Help out our partners and make great articles!

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI   VU   REPRO

Concluding

- TIFAR is an all round ambulance simulation framework, incl:
    - Simulating the 'road domain'
    - Simulating the 'call center domain'
    - Decision support for tactical decisions
- Many performance indicators possible
- Useful for evaluating dispatch rules & DAM

Martin van Buuren
1st International Workshop
on Planning of Emergency Services

Performance evaluation and optimisation
through the TIFAR-framework.

CWI   VU   REPRO