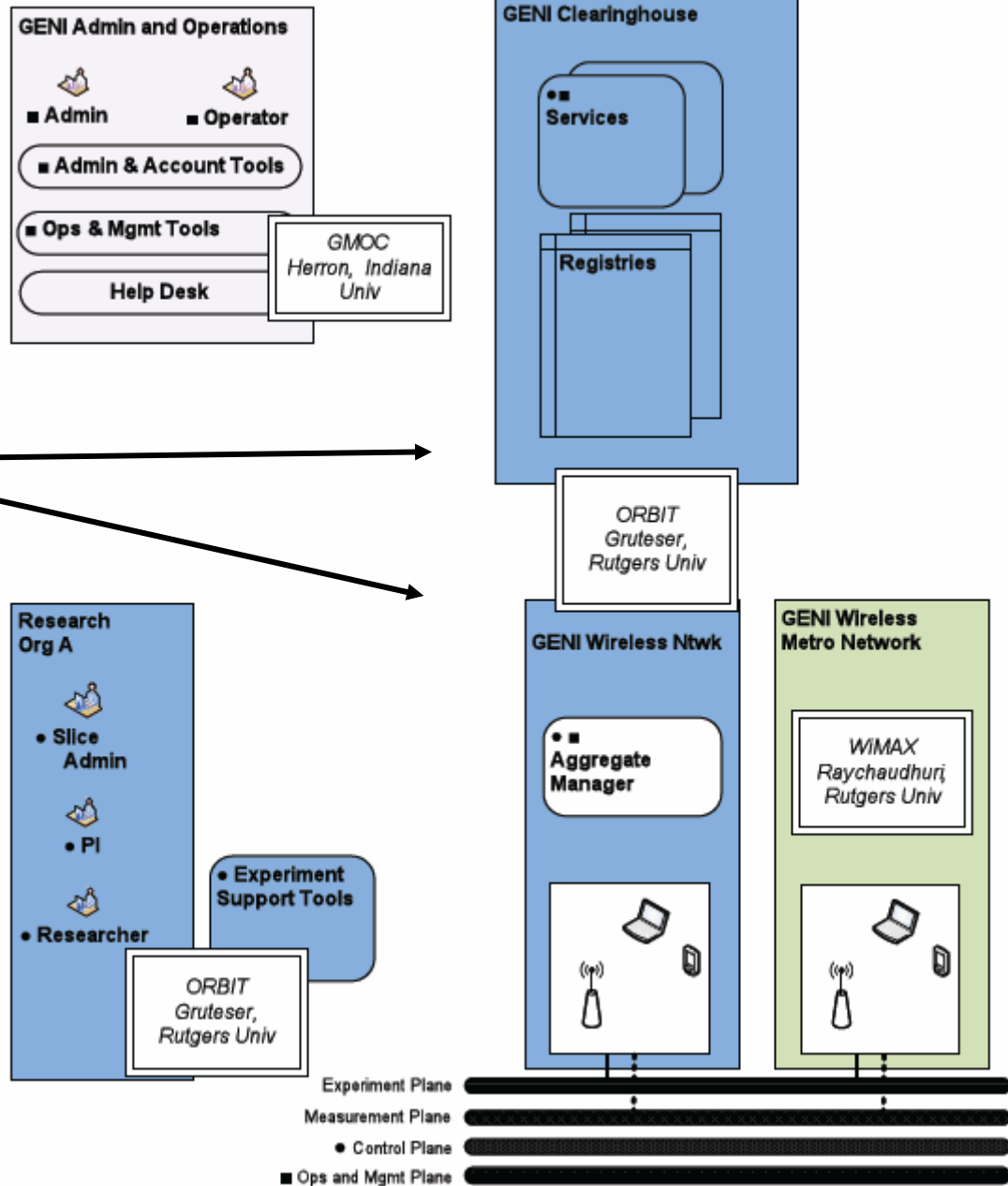# Control, Measurement and Resource Management Framework for Heterogeneous and Mobile Wireless Testbeds

Marco Gruteser
Ivan Seskar
WINLAB

Max Ott
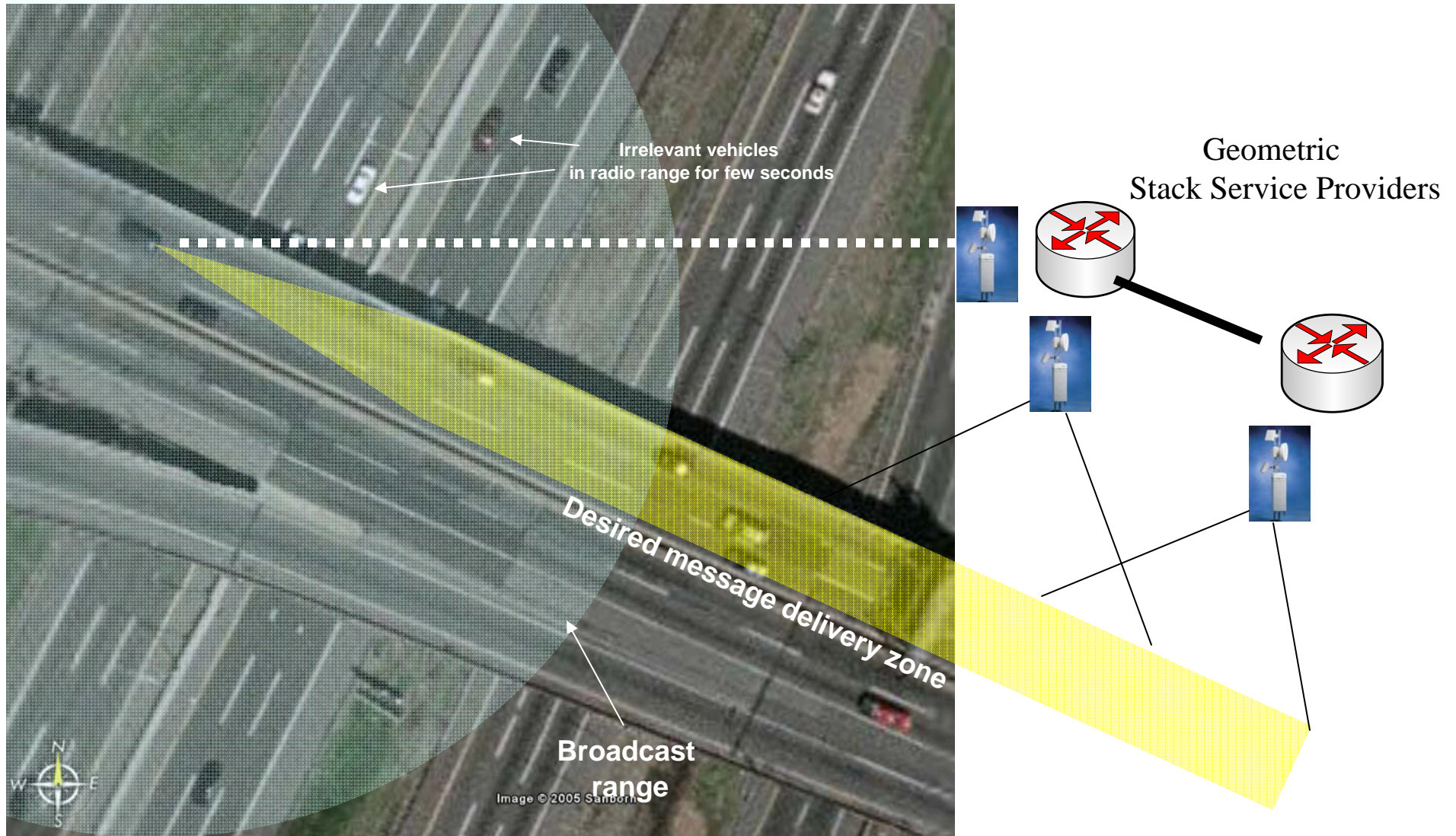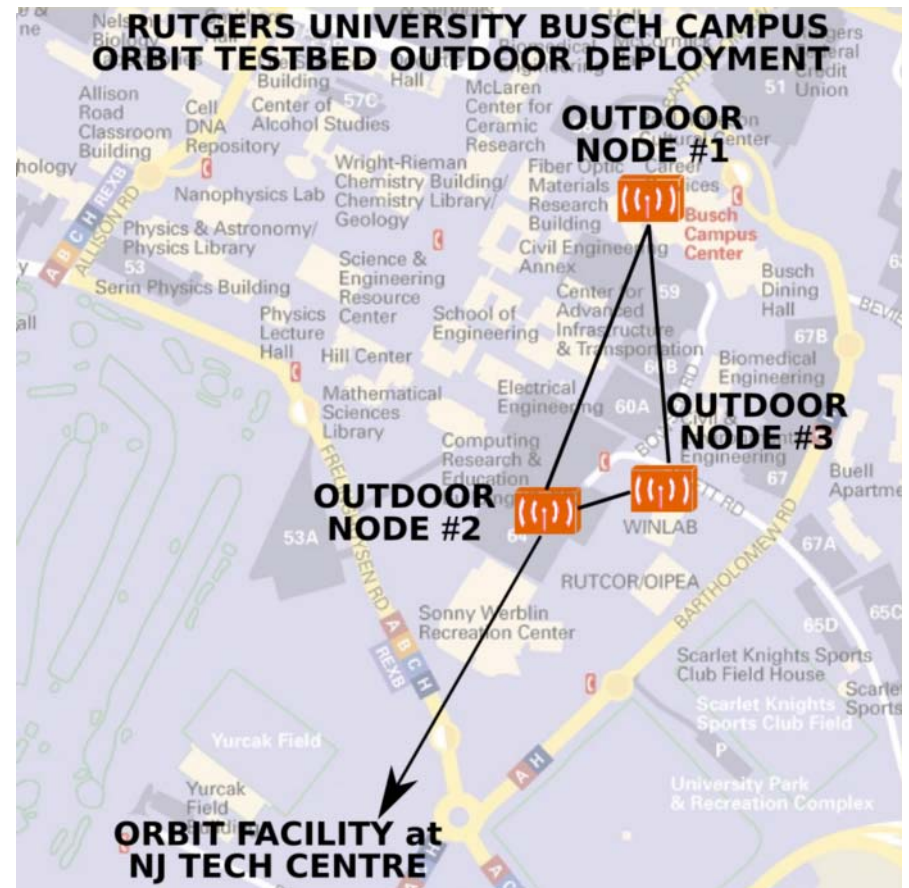Thierry Rakotoarivelo
NICTA

"Our Cluster"

OMF

Motivational Experiment: Geocasting for Vehicular Applications

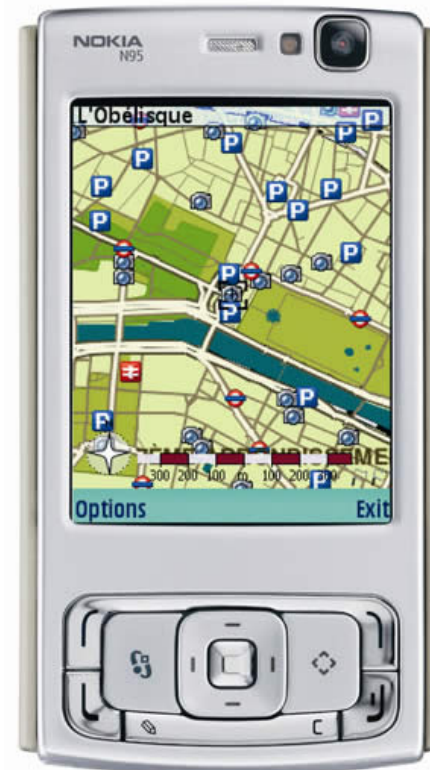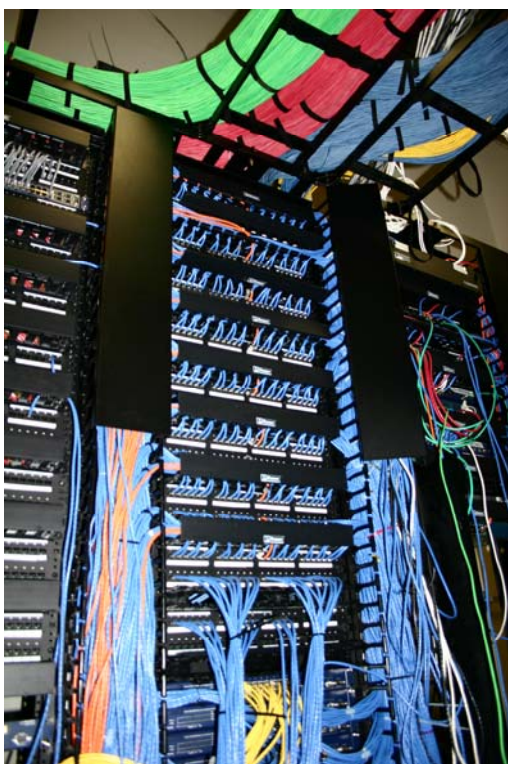# From Ad hoc Experiments to a Testbed with Uncontrolled Mobility

RUTGERS UNIVERSITY BUSCH CAMPUS
ORBIT TESTBED OUTDOOR DEPLOYMENT

OUTDOOR NODE #1

OUTDOOR NODE #3

OUTDOOR NODE #2

WINLAB

ORBIT FACILITY at NJ TECH CENTRE

Goal

Support reproducible experiments across
wired, wireless, and mobile testbeds
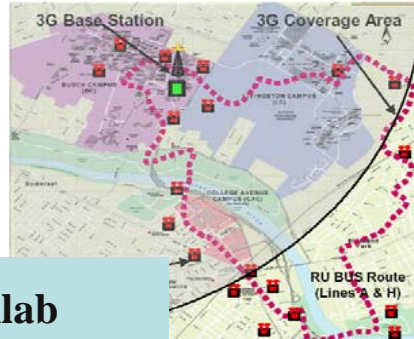

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WIRELESS INFORMATION NETWORK LABORATORY

RBIT Management Framework

Where is OMF currently used ?

Orbit, Winlab
Rutgers University, USA

Thomson Lab,
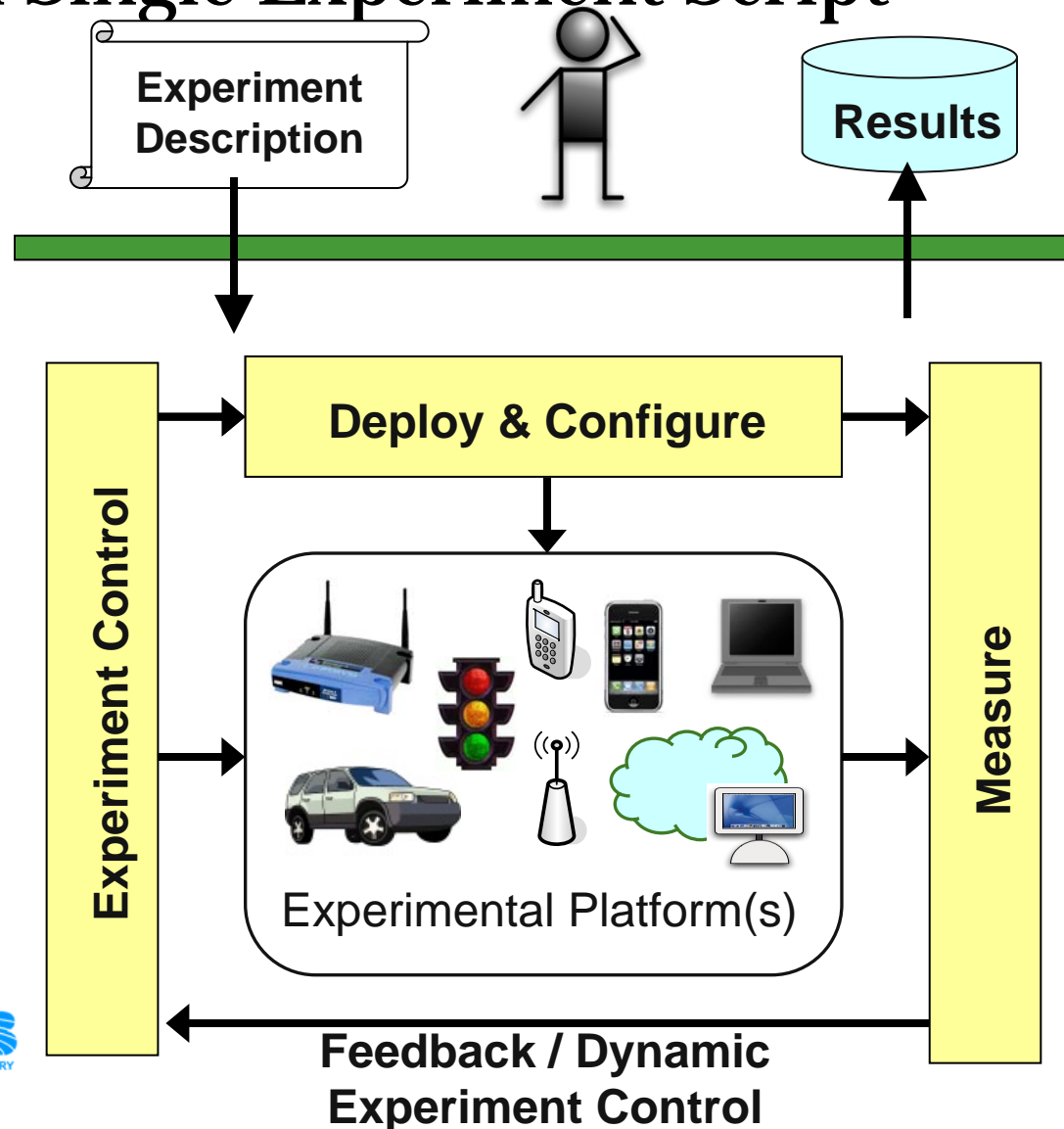Paris, France
(under deployment)

PlanetLab,
(early deployment)

NICTA
Sydney, Australia

Center for Research and Technology,
Greece, (under deployment)

WIRELESS INFORMATION NETWORK LABORATORY

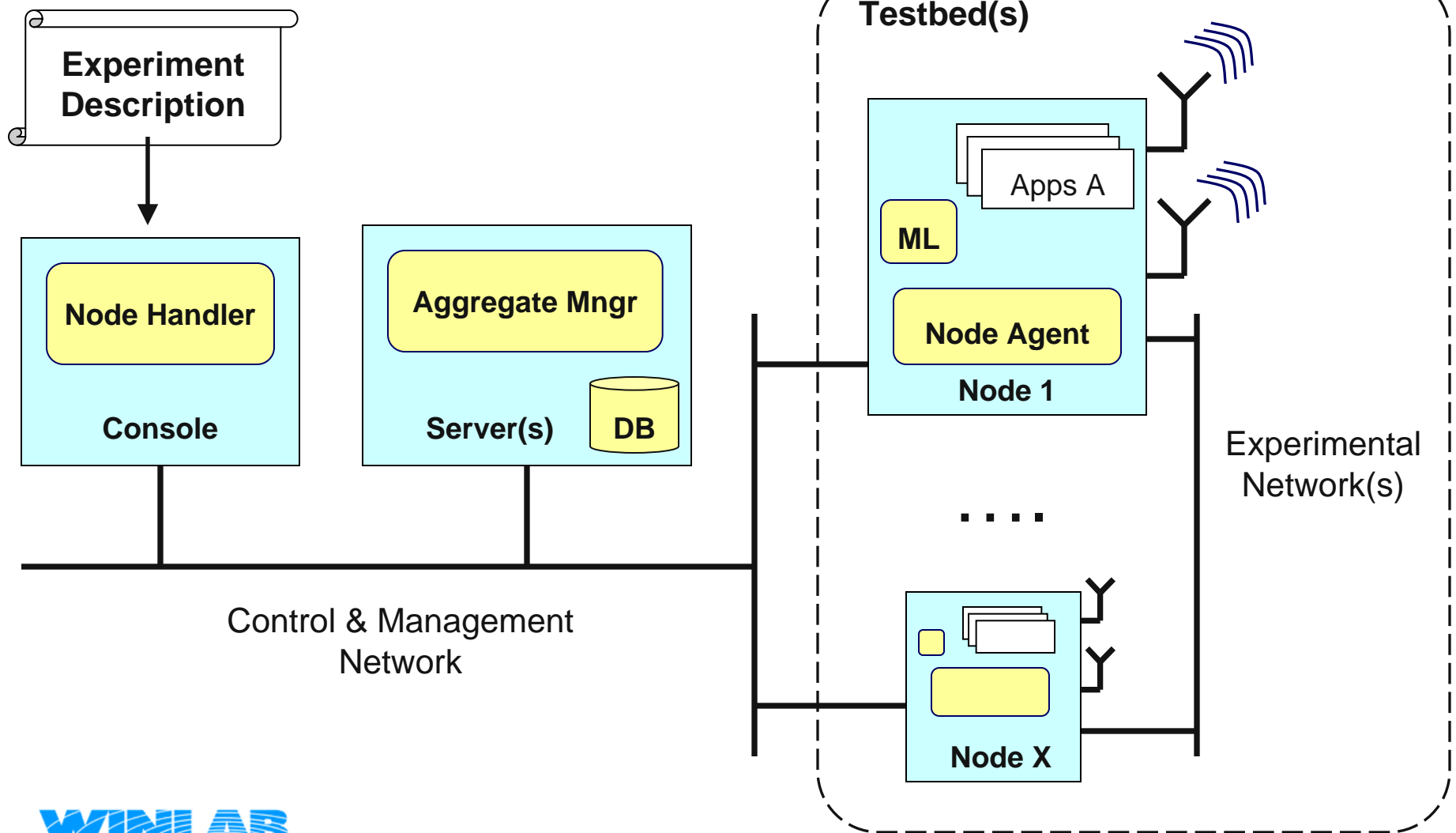# OMF User View: Enhanced Reproducibility through Single Experiment Script

OMF - Operator View

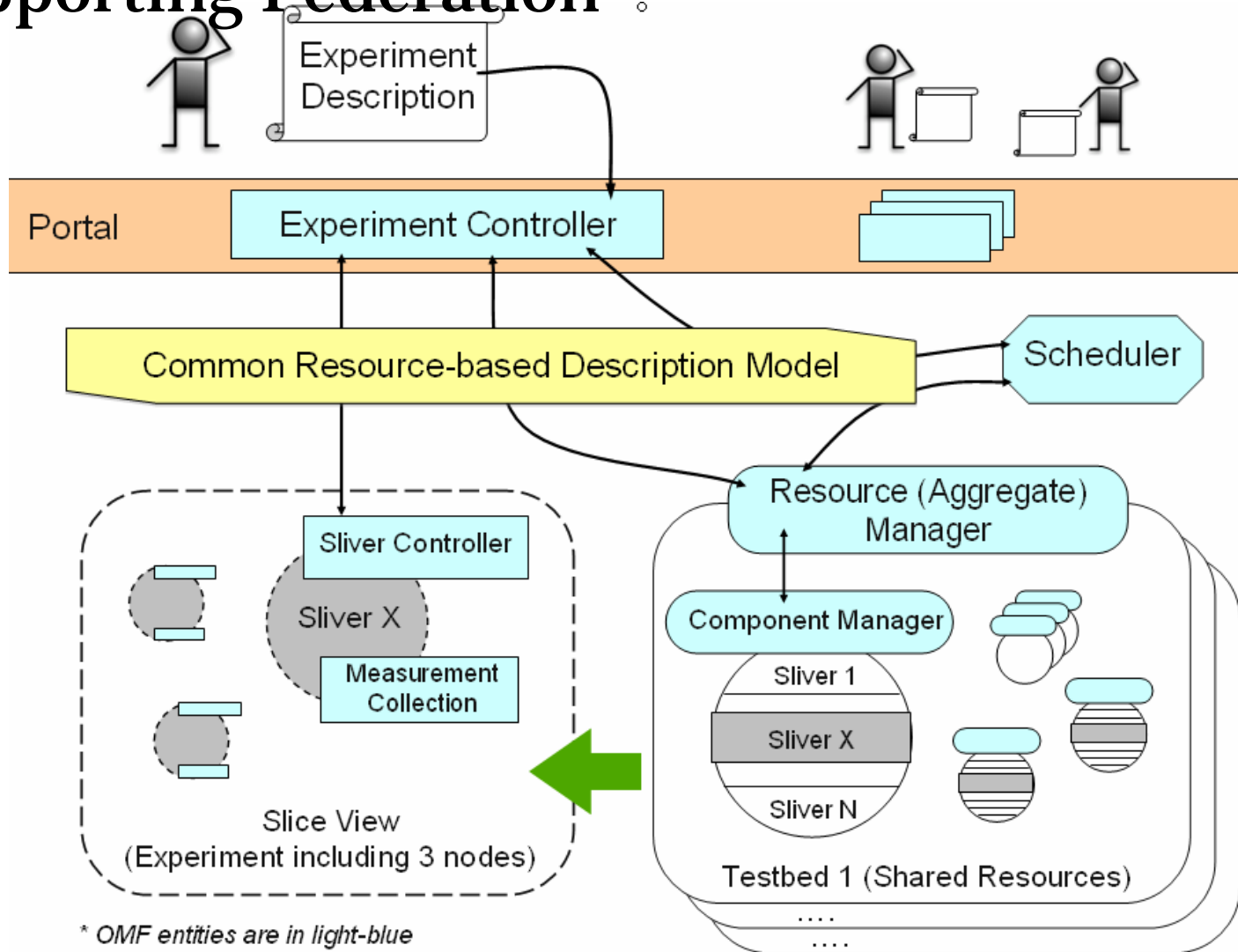# Building on this Existing OMF Framework to Support Federation and Mobility

Currently Supports

- Full "*experiment cycles*"
- Enhanced reproducibility
- Ease operation and maintenance tasks
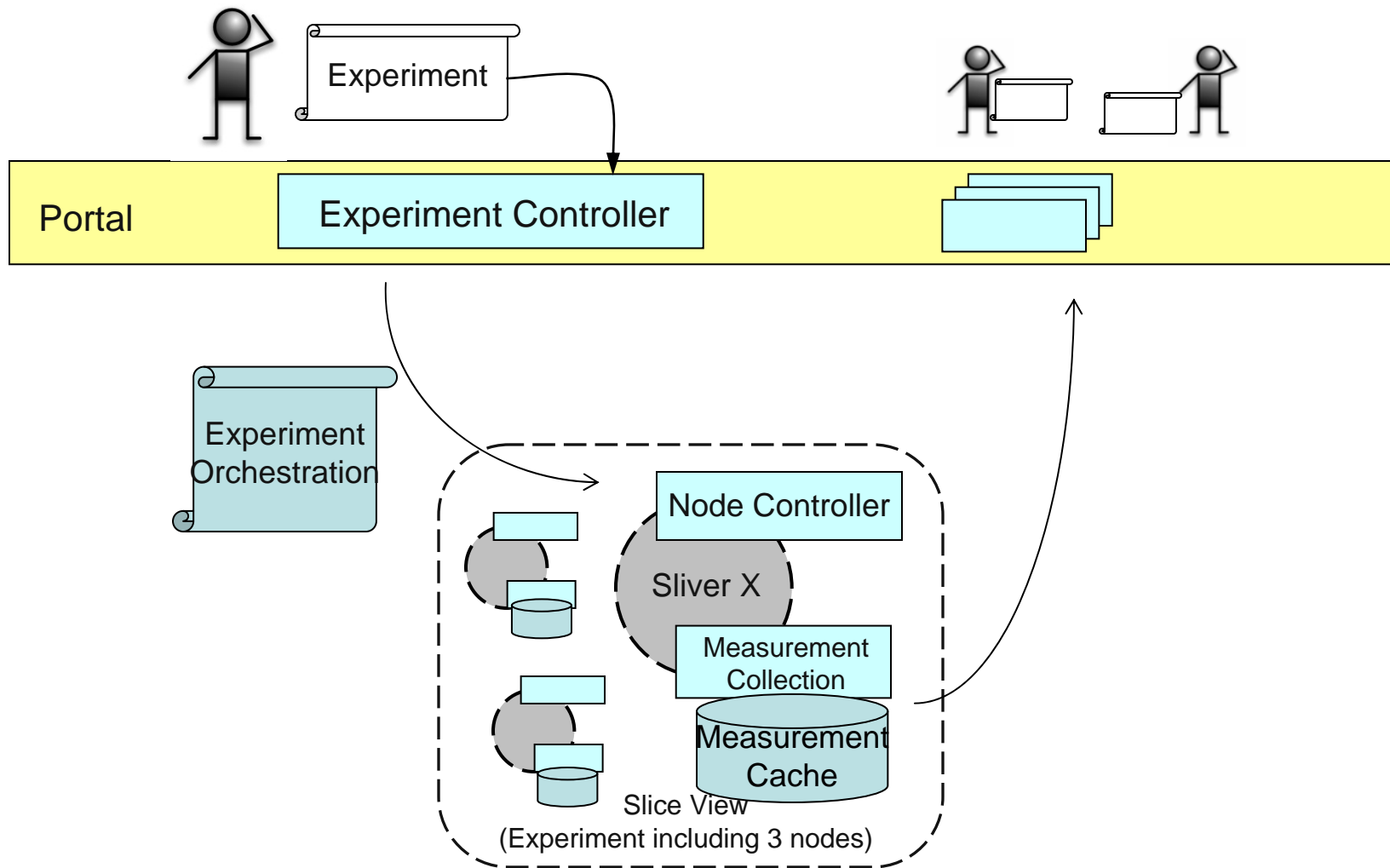- Optimize resource utilization inside / across testbeds

Project Tasks

- Supporting federation of testbeds
- Disconnection tolerance
- Spatiotemporal orchestration tools
- VLAN connection from ORBIT to NLR
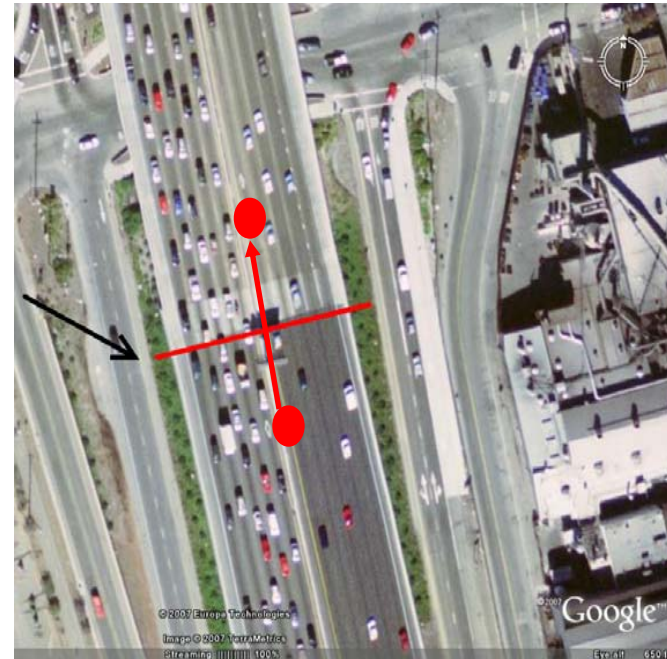
Supporting Federation

* OMF entities are in light-blue

Disconnection Tolerance

Portal

Experiment

Experiment Controller

Experiment Orchestration

Node Controller

Sliver X

Measurement Collection

Measurement Cache

Slice View
(Experiment including 3 nodes)

* OMF entities are in light-blue

Controlling Mobile Experiments with Spatial and Temporal Triggers

Spatial Trigger

Executed command when
    Node passes spatial trigger
    15s after experiment start
    5 nodes are within ½ mile radius
Implemented through feedback loop

12mo Milestones

- **Build on existing Framework that Supports Full Experiment Cycle**
  - Currently deployed on 4 testbeds: Australia, USA, Europe
  - Currently partner in two EU 7thFP projects: OneLab2 and NADA

- **Support experiments across multiple heterogeneous testbeds**
  - Support GENI experiments on ORBIT with VLAN connection to NLR

- **Mobility Support**
  - Disconnection-tolerant experimens
  - Time-based orchestrations

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Thank you