NOKIA Bell Labs

Wolfgang Van Raemdonck
Eline Philips

Tom Van Cutsem
Marc Roelands

Kyumars Sheykh Esmaili
Lieven Trappeniers

Mauricio Cortes
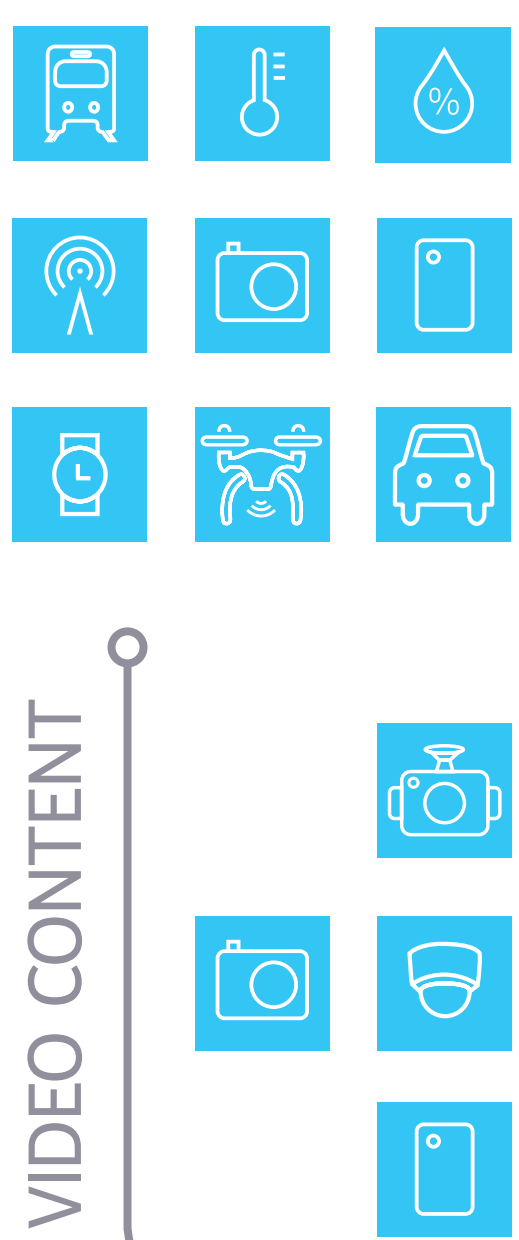Lode Hoste

Philippe Dobbelaere

BUILDING CONNECTED CAR APPLICATIONS ON TOP OF THE WORLD WIDE STREAMS PLATFORM

IOT PLATFORMS ARE NOT JUST STREAMING PLATFORMS

Connected Objects

IoT Characteristics

Resource Constraints

Geographical Distribution

Mobility

VIDEO CONTENT

Content Richness

Expensive Computation

Privacy Sensitive

Distinctive Requirements

Interaction with Endpoints ❶

Geospatial Middleware ❷

Decentralized Deployment ❸

Dataflow Dynamism ❹

Multi-modal Processing ❺

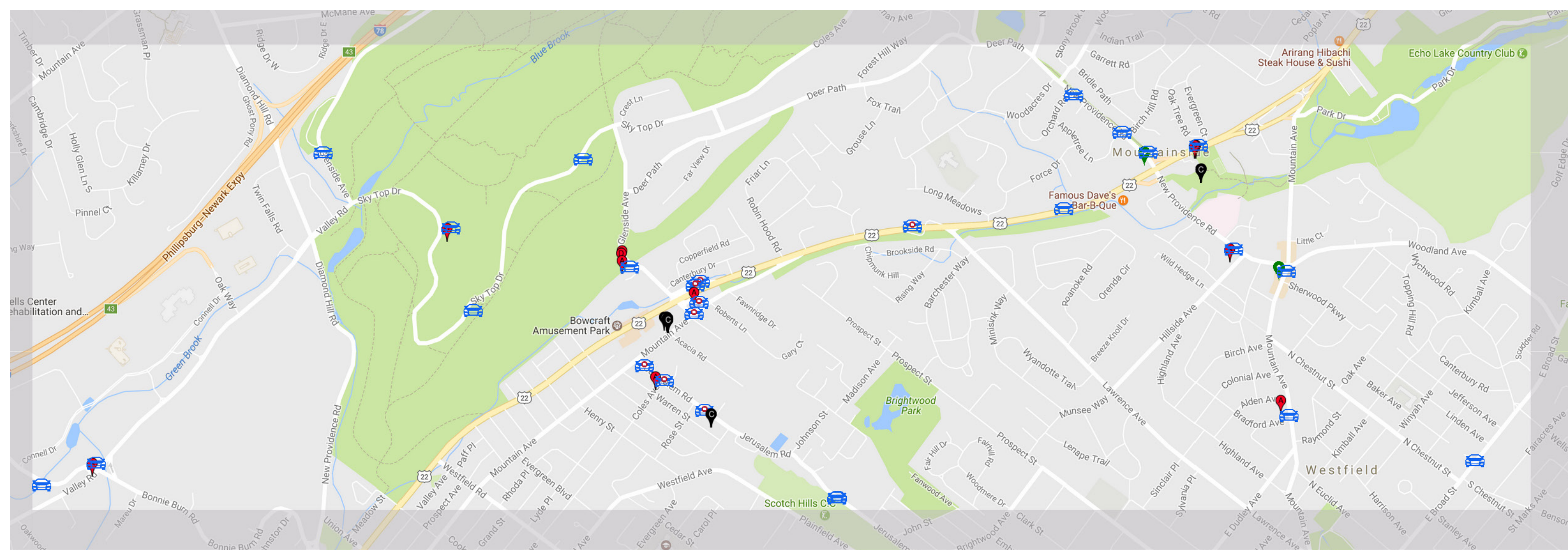### Emerging Applications

home automation
smart metering
M2M
security &
smart grids
smart water
emergency
electrochemical energy
INTERNET OF THINGS
co-generation
tracking
logistics
autonomous
smart cities
wind
eHealth
surveillance
smart wear
connected cars
farms
industry 4.0
smart Government
servers
smart environment
smart animal farming
data center
smart
agriculture

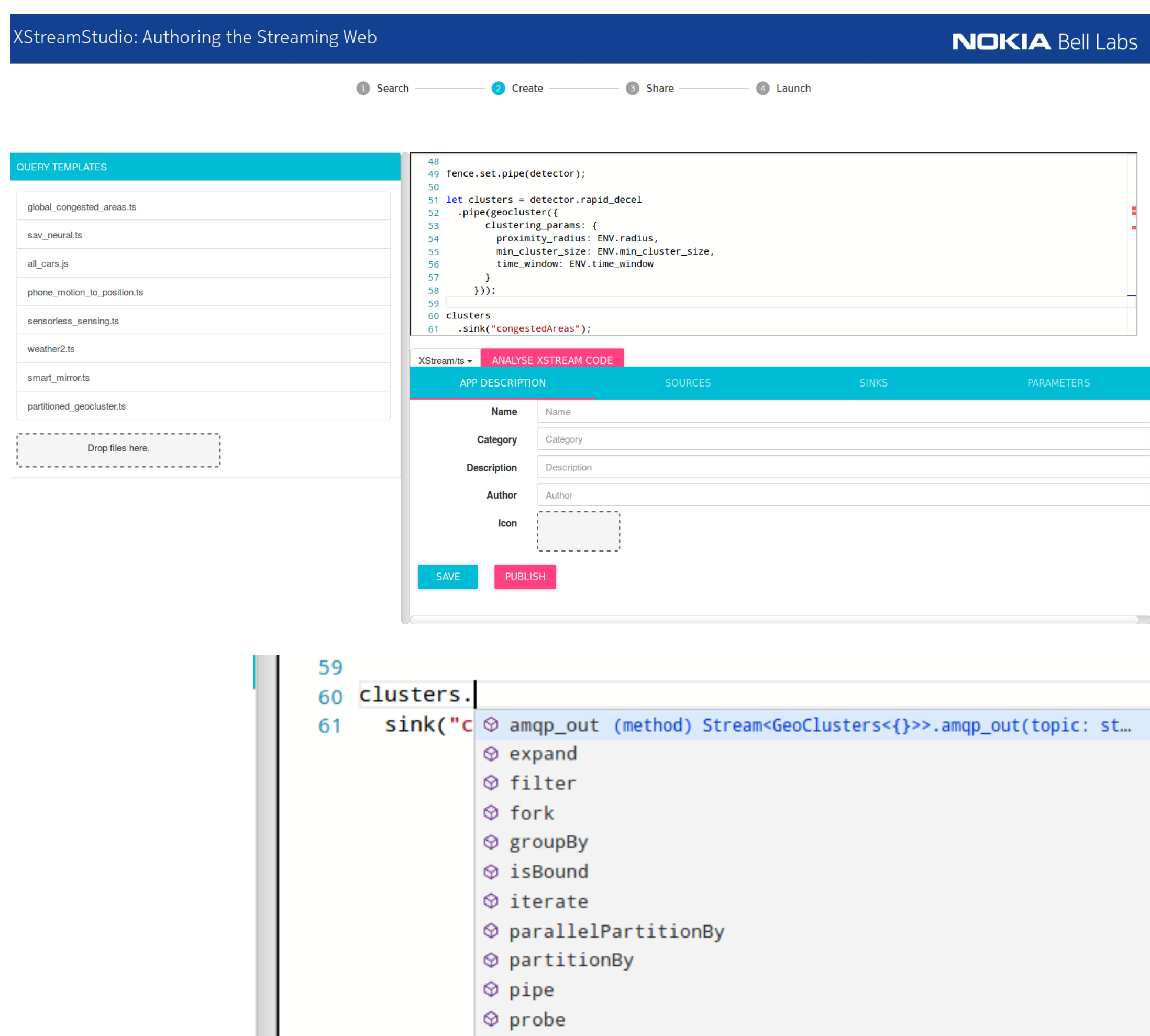## FIVE CONNECTED CAR SCENARIOS

400 virtual cars
10 hours recordings

OBD VIA CAN BUS

GPS RECEIVER

DASHCAM

ON-BOARD UNIT

Anomalous Driving ❷

Congested Areas ❷

Remote Video Monitoring ❶❷❺

Amber Alert ❷❸❹

Aggregate Statistics ❷

PIONEERING PLATFORM FOR AGILE MASHUP OF IOT APPLICATIONS

XStream Language & XStream Studio

Platform Architecture

External Interfaces

Orchestration Layer

GATEWAY

COMPILER

Placement Algorithm

Deployer

Registry

STREAM BRIDGE

Processing Sites

SITE MONITOR

Dispatcher

XStream Processor

Media Processor

Geo Processor

Media Server

Message Broker