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SUSTAINABLE SILICON VALLEY

smart Traffic Analytics for East Palo Alto (smartTA)

A SCIKE project

Jürgen Mück, August 21st, 2019
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EuropeSV August 21st Breakfast Meeting, 2019
at Mind the Bridge
450 Townsend Street
San Francisco, CA, USA

smart Traffic Analytics Project East Palo Alto (smartTA)

German – American Collaboration on innovative Smart & Sustainable Urban Services, funded by the German Ministery for Education and Research through SCIKE

SCIKE: Software-Cluster-Internationalisierungsstrategie zur Komplettierung von Kernkompetenzen für Zukunftsthemen – Teilvorhaben Silicon Valley

funded by the German Federal Ministry of Education and Research, Berlin

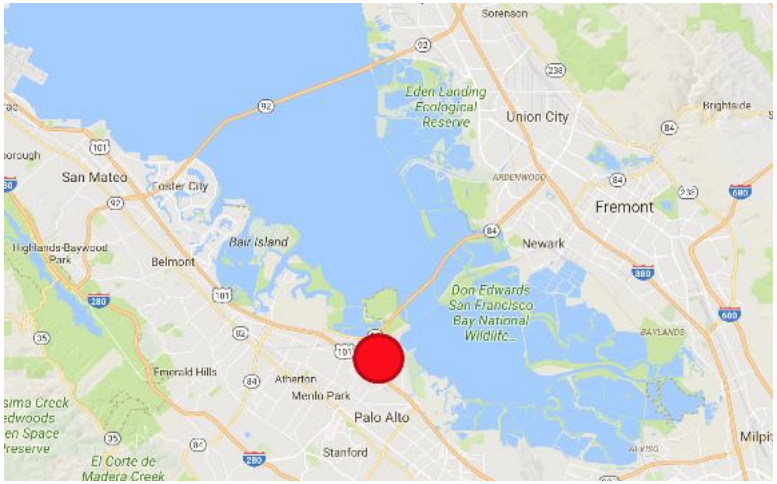
Consortium members Germany:

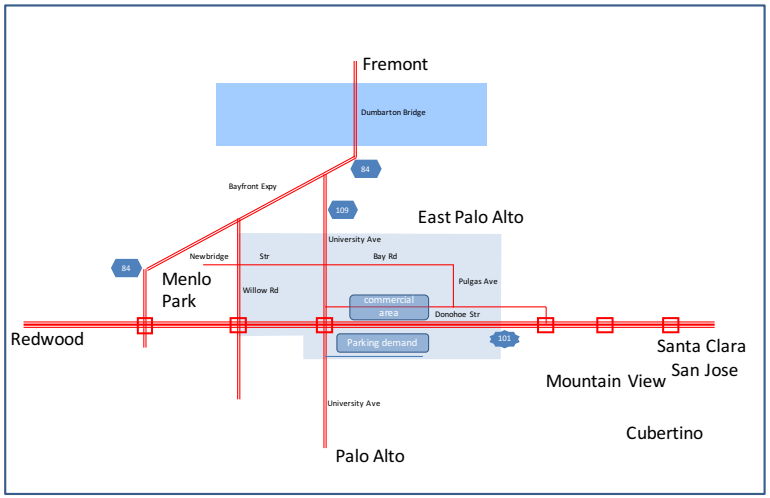
- Urban Software Institute GmbH, Chemnitz ([ui!] Germany)
- German Research Center for Artificial Intelligence, Kaiserslautern (DFKI)

Consortium members USA:

- Sustainable Silicon Valley, Santa Clara, CA (SSV)
- Urban Integrated Inc., New York City, NY ([ui!] USA)
- Assoc. Partner: City of East Palo Alto, East Palo Alto, CA (EPA)
- Assoc. Partner: EIT Digital Silicon Valley Foundation, CA (EIT Digital)

Starting point





Situation in East Palo Alto

- primary traffic artery between
  - leading tech companies
  - Residential areas
- Driving through EPA is the shortest way to access the Dumbarton Bridge (one of three bridges that cross the SF Bay)

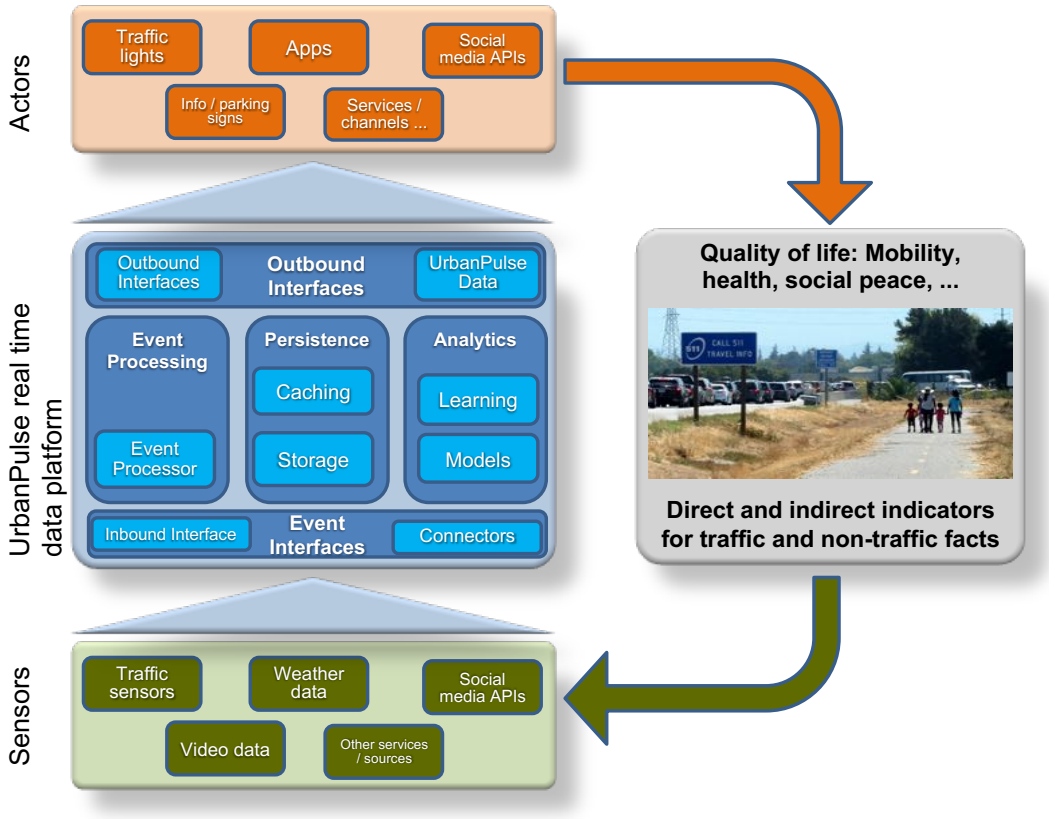
➔ roadways struggling to handle today's volume of traffic

➔ poor air quality in EPA

➔ Significant more people with health issues

Can IoT and Open Urban Platforms help?

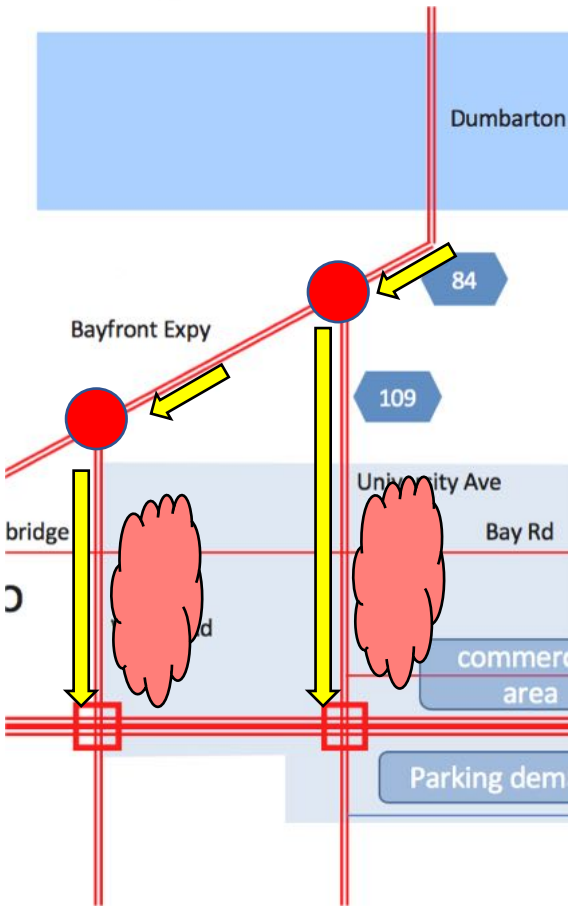
How can an IoT Platform help cities to cover traffic problems?s



smartTA goals and steps

- Analyse traffic problems (Study)
- Research most valuable data sources for traffic
- Connect to the traffic signals
- Develop & apply methods to identify congestion from induction loops
- Install Air Quality (AQ) sensors & collect data
- Analyse correlations & make them transparent, educate
- Recommend future actions

Example traffic situation: Morning Peak Traffic from Dumbarton Bridge (Study phase of smartTA)



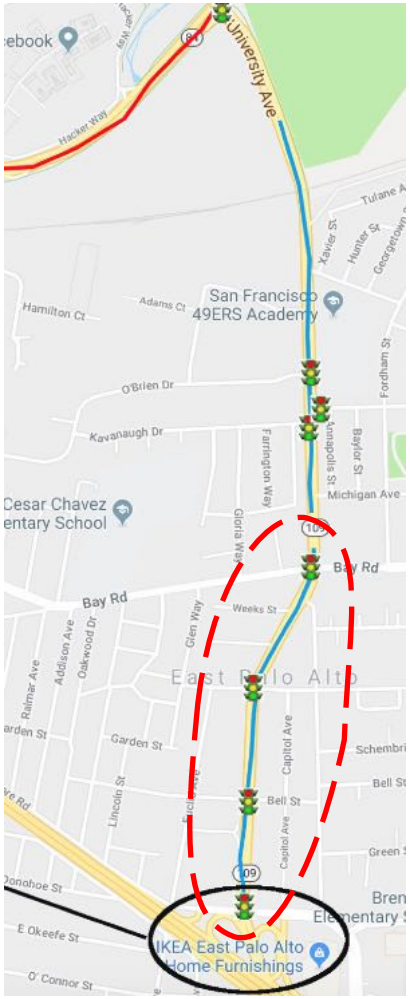
Most important traffic flows
- Coming from Dumbarton Bridge
- Heading to HW 101

Impact of traffic
- Congestion
- High travel times
- Air pollution

Possible point of action (future)
- Careful Load Balancing
- based on capacity of all available road sections

To be managed by superior authority

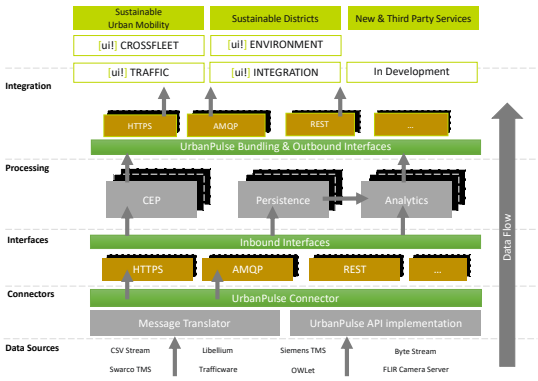
Connect four controllers on University Ave to the platform [ui!] UrbanPulse



4 Signal Controllers

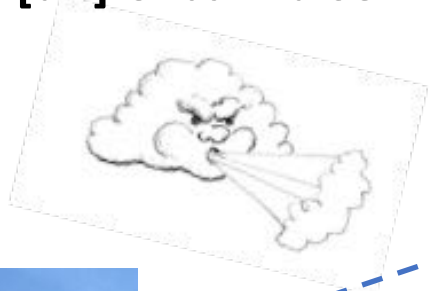
4 Modems

Virtual Traffic Management Center



Induction Loops

Installation of Air Quality Sensors on three locations along University Ave and connect them to [ui!] UrbanPulse



Sensor Technologies

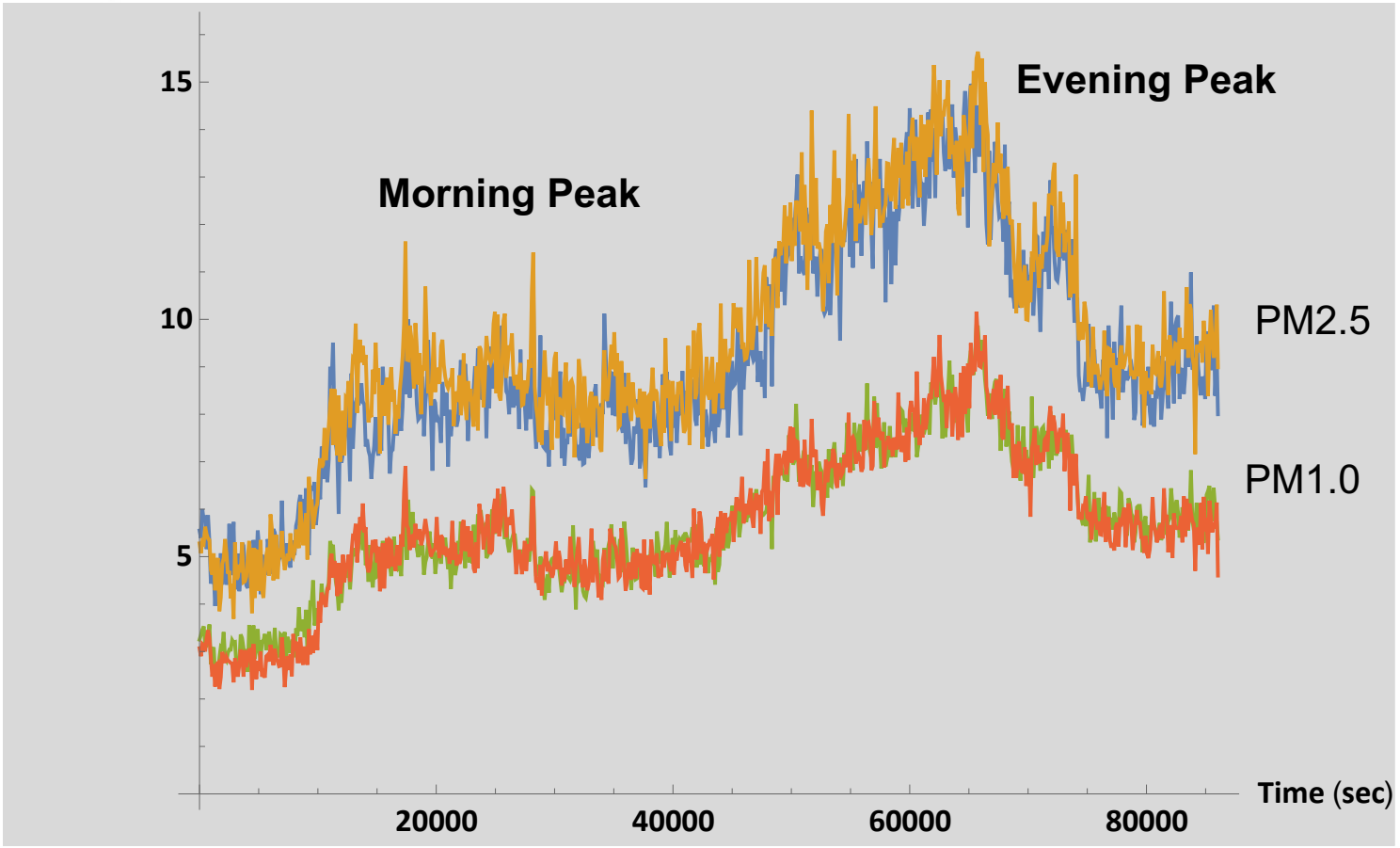
Vaisala AQT410 Gas Sensors

- NO2
- SO2
- CO
- O3
- Temperature, Humidity
- Upload to [ui!] UrbanPulse every 40s

PurpleAir Particle Sensors

- Particles PM1.0 (µg/m^3), PM2.5
- Temperature, Humidiy
- Upload to [ui!] UrbanPulse every 80s

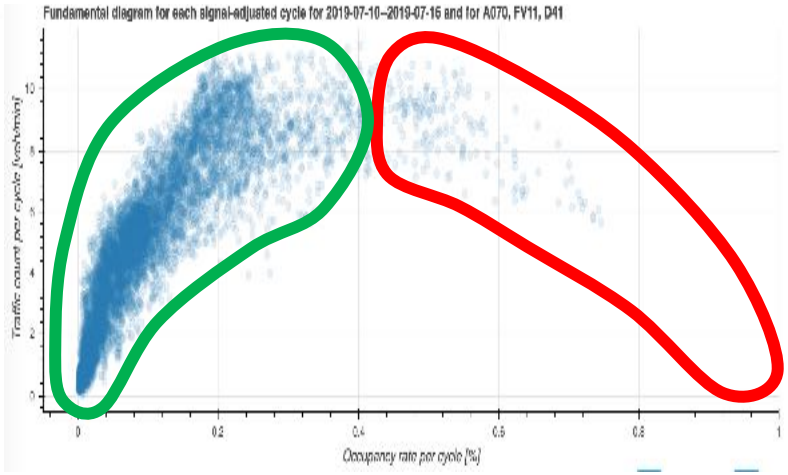
Example PM measures: PM @ St. Francis, July 31st (Wed), 24h



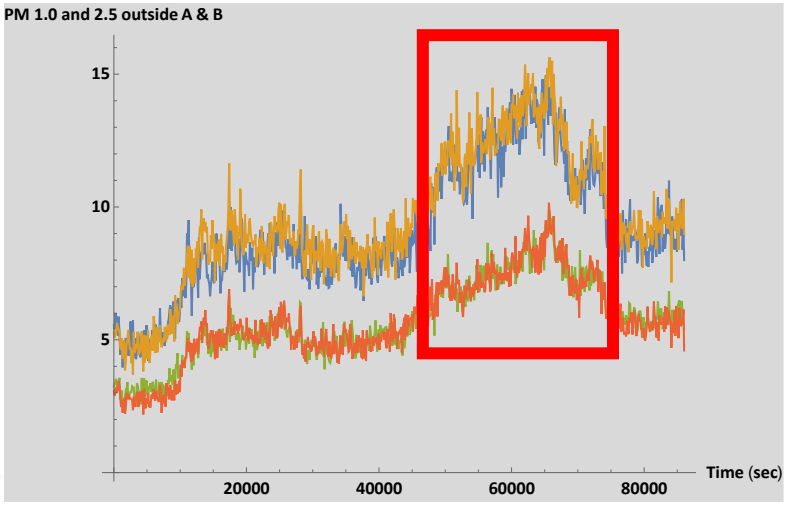
Recent Data Analytics Work

Traffic data from induction loops and signals

Fundamental diagram of one detector



AQ data from gas and PM sensors



Questions

- Can congestion be identified from induction loops?
  Probably yes – to be verified yet
- How good is correlation between congestion and air polution?
- Any chance to predict congestion in advance?

Outlook and expection

- Inform in time
- Allow predictive measures to avoid congestion

Part of the analytics work had to be done based on Darmstadt data, due to delays in the project schedule

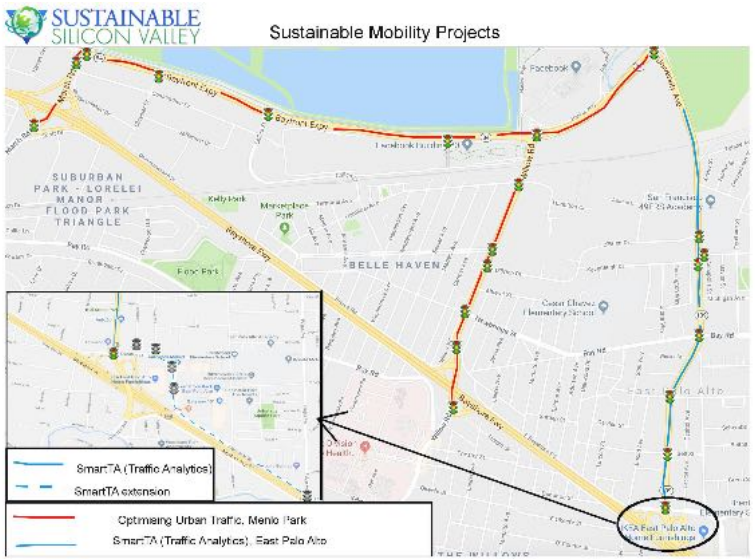
Expected result and benefit

- IoT / Sensor infrastructure for traffic and air quality
- Permamently growing data collection
- First insights into relation of traffic and AQ
- First ideas how to improve the situation
- Second trial area to be contracted, in Menlo Park

Beyond smartTA, options for the future

- Long term operation of platform and sensors
- Addition of new data sources
- Implement first automatic actions
- Extend data coverage by more sensors and traffic lights
- ...

New trial area for traffic light assistance applications, funded by San Mateo County



The [ui!] Group has highly benefitted from SCIKE and the support of the Software-Cluster already now, by

- Building a local network in Silicon Valley and California
- Creating local footprint by the smartTA project and its Urban Platform demonstrator
- Establishing partnerships with local authorities to continue the demonstrator and akquire new funded and commercial projects beyond O.U.T.

Software-Cluster

Thank you to the Software Cluster, and to the very supportative SCIKE project management!

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Thank you for your attention!

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