City of Ljubljana
CiVITAS FORUM 2015
CIVITAS ANNUAL CONFERENCE | 7-9 OCTOBER 2015 | LJUBLJANA

# Air Quality measurement through mobile sensors on top of buses

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**Ljubljana**

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## Measure main objective: 2MOVE2

***To obtain a detailed air quality map of the city with the minimum investment, in order to improve traffic monitoring & management***

## Reference Legislation: Directive 1999/30/CE and 2000/69/CE

| Index value | Air quality | Color |
|---|---|---|
| 0-50 | Good | Green |
| 51-100 | Acceptable | Yellow |
| 101-150 | Poor | Red |
| >150 | Bad | Brown |

## Project Plan

**Environment analysis → Technical work → Testing & Field Evaluation**



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## Key points of monitoring Stations

- *Pollutant indicators* → CO, NO2 and O3 (included in CIVITAS initiative)
- *Use of reliable sensors* → Alphasense calibrated A4 family
- *Air flow control* → Use of ventilators
- *Power supply* → Bus & external batteries
- *Communications* → Zigbee & GPS
- *Impact, vibration, dust rain& bus washing resistant* → Design of custom case

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## Tests: Scenarios

- Indoor measurements, laboratory environment
- Outdoor measurements, laboratory environment
- Mobility simulated measurements, laboratory environment
- Comparative measurements with high resolution stationary systems following current regulations


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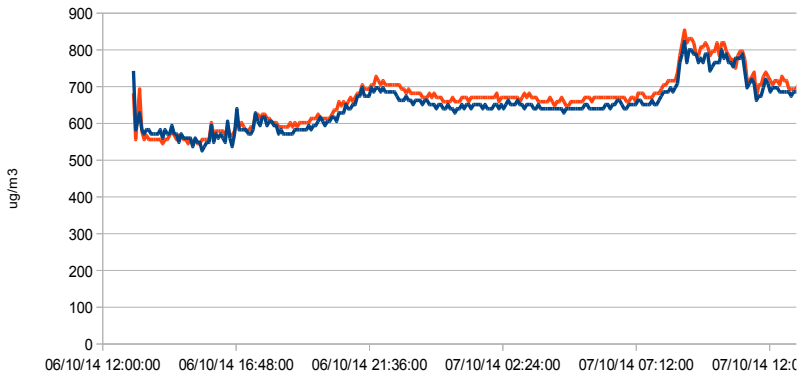
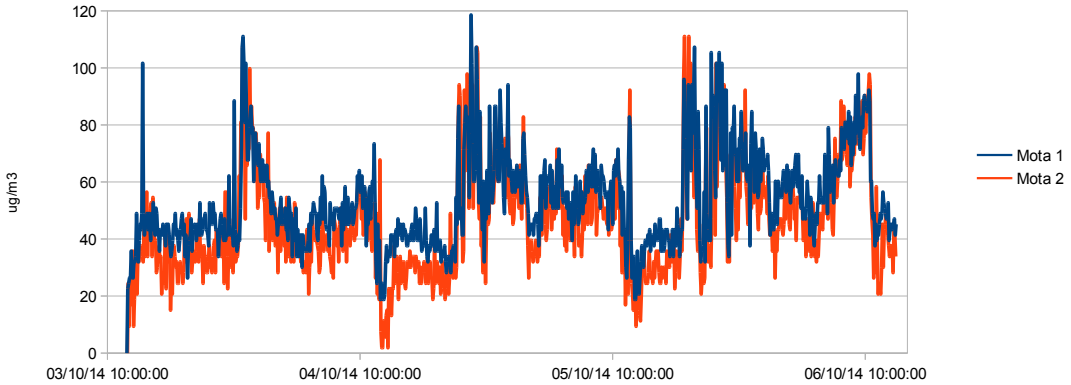
## Tests: Results

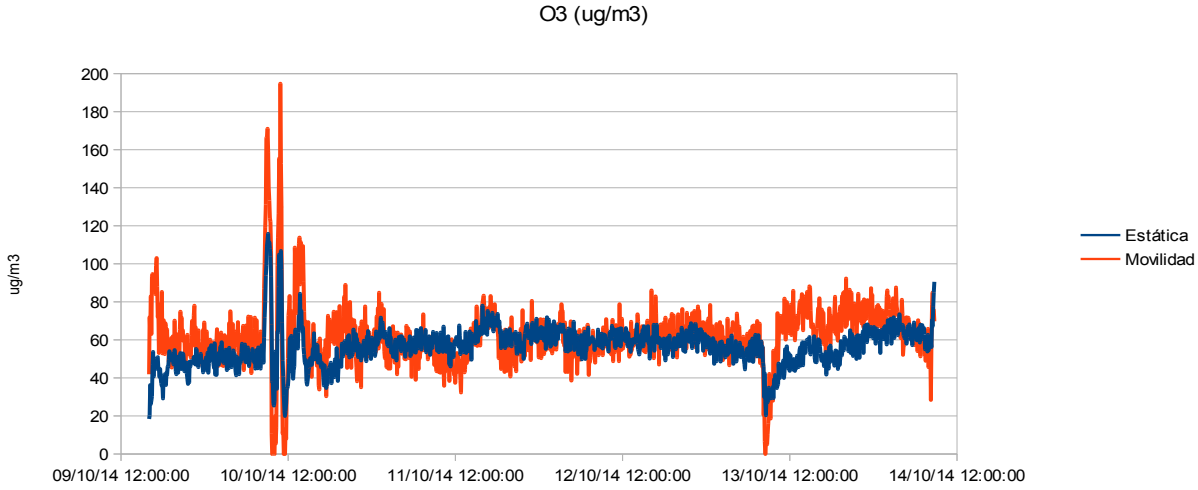
### Static Indoor Test




### Static Outdoor Test




### Static & Movile Test



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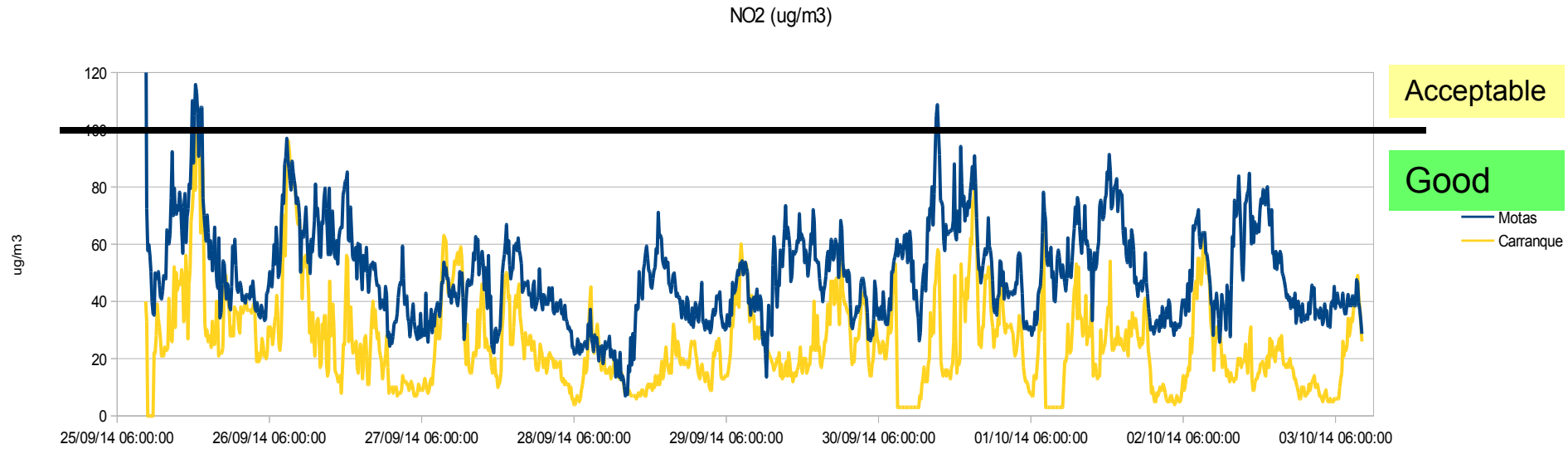
## Tests: Results

### Comparative with High Precision Station



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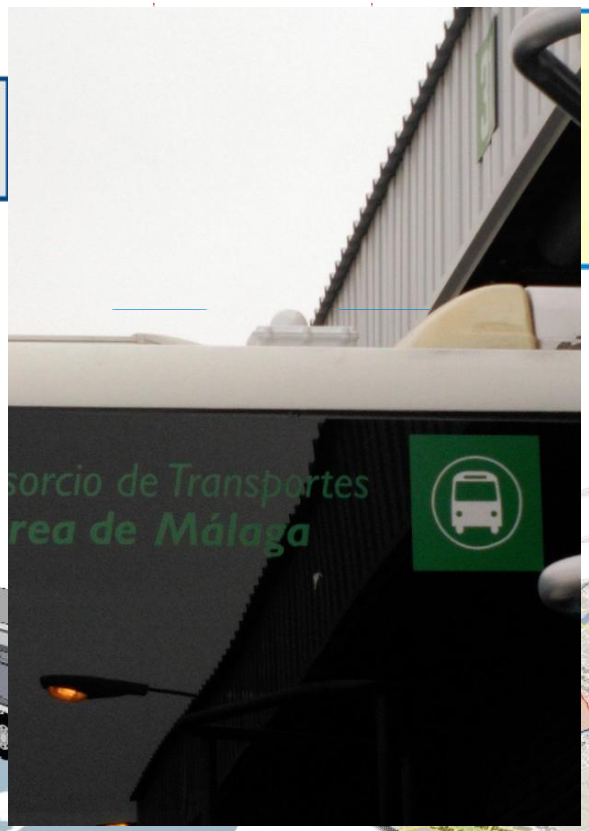
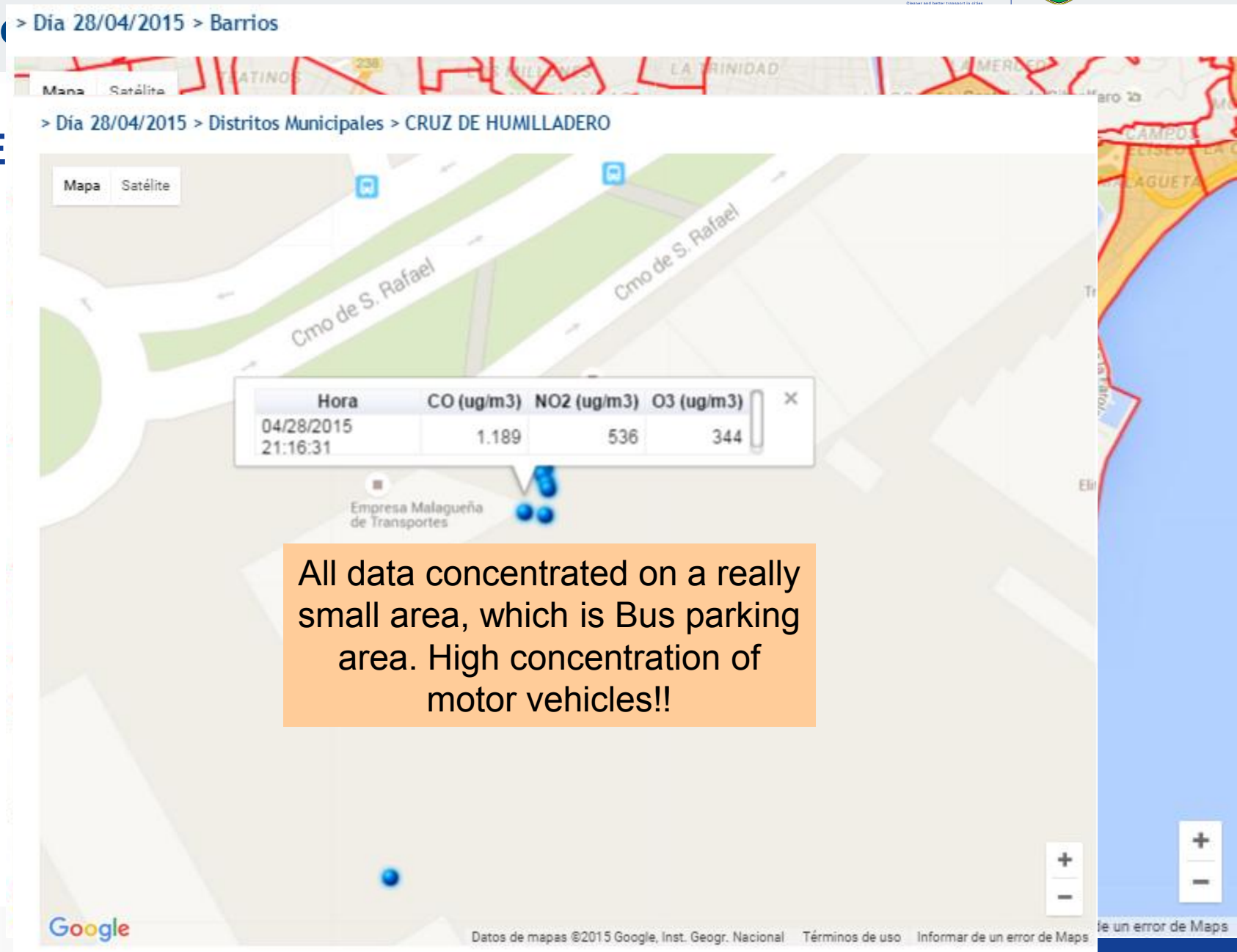
## Field Evaluation: Scenario



# Air Quality measurement through mobile sens

## Field E



## Results & Conclusions

- Solution provides good enough results for the intended application
- Current number of motes in mobility doesn't allow the acquisition of a sufficient number of samples to obtain adequate reliability as intended
  - More stations to be added for a reliable Temporal & Spatial resolution
- Better understanding of the complete system will be known after whole evaluation is finished
- Solution provides a valid platform for adding other sensors as particles (PM) or sonometers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# Thank you!


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