



Institute of Microelectronic Applications and involving in EUREKA

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4 December 2014

Agenda



- **IMA engagement in:**

Eurostars: InSider (Eurostars Success Story), In3DG, CityFlow, LSU

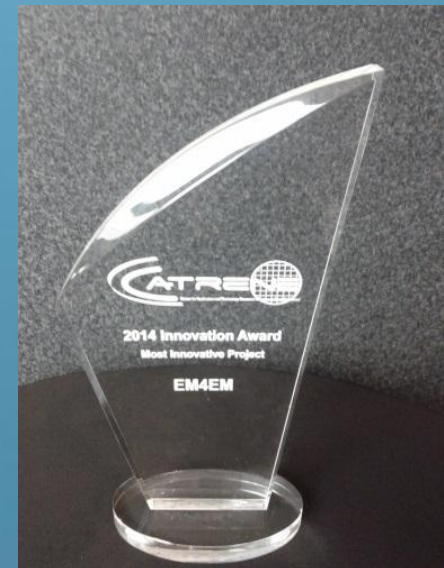
CATRENE: CORTIF, EM4EM (CATRENE Innovation Award 2014), H2O

- **Example #1 Eurostars CityFlow**

7D12003 „Flow Analytics for Smart Cities“ (Jan2013 - June2014)

- **Example #2 CATRENE EM4EM**

LF130110 „Electromagnetic Reliability of Electronic Systems for Electro Mobility “ (March2013 – March2015)



Eurostars CityFlow

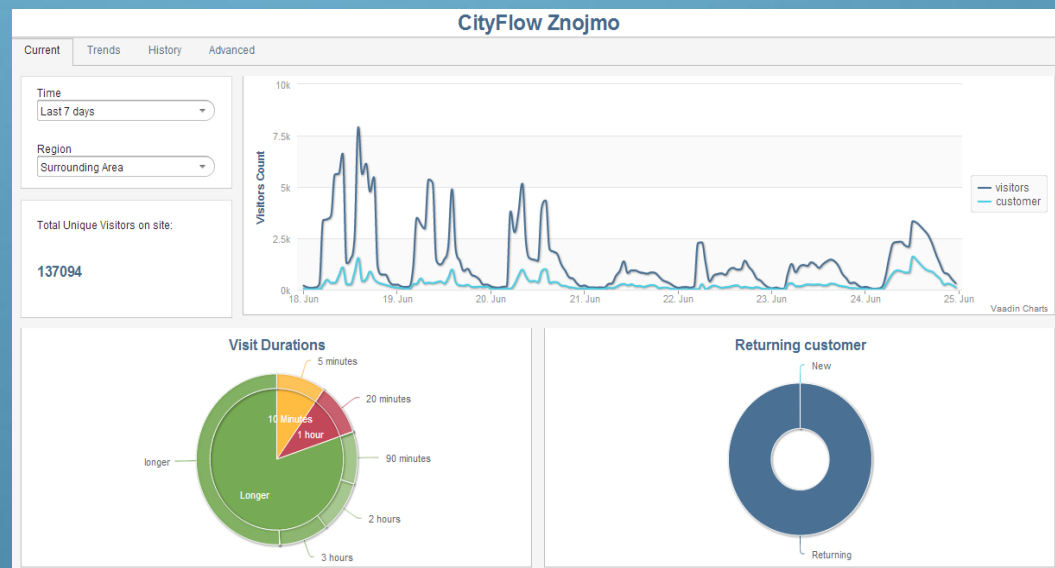


- DFRC (Swiss), IMA (CZ), ČAS (CZ)
- Eurostars instrument fits for small flexible projects
- Goal:
 - Localization on wireless networks
 - Behavior profiling
 - Enhanced security of access control systems
- Outcomes as follows...

Requirements Engineering



- IMA has designed a network for covering Znojmo major traffic hubs with WiFi sensors
 - full city coverage reached in June 2014



Solar powered sensor



- Designed in two variants for
 - European region
 - Equator region

Equipped with

- GSM modem for connectivity
- WiFi sensor
- security box
- backup battery



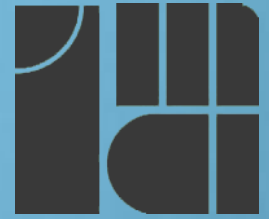
Car/bus sensor



- Designed for use in cars (12V) and buses (24V)
- Equipped with
 - GSM modem for connectivity
 - GPS to detect current location
 - BeagleBoard PC with embedded linux
 - 12/24V adapter
 - WiFi dongle to perform detections



Security box for GSM sensor



- Robust housing for expensive sensor equipment
- Equipped with
 - MUL-T-LOCK secure lock
 - Secure steel case
 - GSM modem to report breach or movement
 - USRP GSM detector
 - ZOTAC PC
 - two cooling fans
 - overvoltage protection
 - chain for securing the case

CCTV fusion



- D3.4 CCTV Integration (M15) [software]
- IMA integrated IDSIMA ACS with CCTV system to enhance security
- Legal Analysis
 - CZ regulatory base
 - EU Directive 2009/136/ES

Metadata okno vyhledavani

☒ POS-POS
☒ POS-POS
☒ POS1-POS1
☒ Lantronix-Lantr...
☒ POS1-POS1
☒ POS1-POS1
☒ POS1-POS1
☒ POS1-POS1
☒ POS12-POS12
☒ POS1-POS1
☒ POS1-POS1
☒ POS-POS

Datum a cas trvani

Pocatecni cas: 2014/06/04 00:00:00

Koncovy cas: 2014/06/05 11:53:32

Hledat:

Klicove slovo:

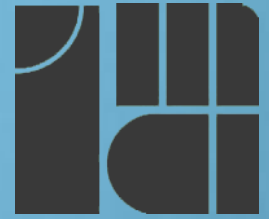
☐ Pouziti normalnich vyrazu
☐ Vyhledavani bez vysledku

Transakce

Datum a cas	Transakce
2014/06/04 08:08:53	"Karta = 172, Osobni cislo = 5007, Drzitel karty : nahradni kart.
2014/06/04 08:18:20	"Karta = 200, Osobni cislo = 19, Drzitel karty : BENES, Vlastim
2014/06/04 09:02:07	"Karta = 69, Osobni cislo = 54, Drzitel karty : Zdimal, Svatopluk
2014/06/04 15:38:45	"Karta = 168, Osobni cislo = 7, Drzitel karty : Struk, Petr"
2014/06/04 16:13:21	"Karta = 129, Osobni cislo = 195, Drzitel karty : Pokorny, Milos"
2014/06/04 16:15:52	"Karta = 55, Osobni cislo = 123, Drzitel karty : Sebkova, Jana"
2014/06/04 17:10:14	"Karta = 200, Osobni cislo = 19, Drzitel karty : BENES, Vlastim
2014/06/04 17:15:14	"Karta = 36, Osobni cislo = 97, Drzitel karty : Mikulenkova, Mar.
2014/06/04 17:32:17	"Karta = 139, Osobni cislo = 110, Drzitel karty : Onderka, Ludvi
2014/06/04 19:23:58	"Karta = 123, Osobni cislo = 50, Drzitel karty : Kalivoda, Karel"
2014/06/05 07:03:26	"Karta = 29, Osobni cislo = 20, Drzitel karty : Kristof, Pavel"
2014/06/05 07:31:11	"Karta = 48, Osobni cislo = 13, Drzitel karty : SCHLIKSBIER, Vi
2014/06/05 07:50:59	"Karta = 69, Osobni cislo = 54, Drzitel karty : Zdimal, Svatopluk"

168, Osobni cislo = 7, Drzitel karty : Struk, Petr"

Deployment and system calibration



- LBA coverage built in three phases:
 - Full Coverage – done by DRFC in Barcelona
 - Partial Coverage – done by ČAS Znojmo in Znojmo
 - Global – done by DFRC in Singapore, Sweden and by IMA in Prague

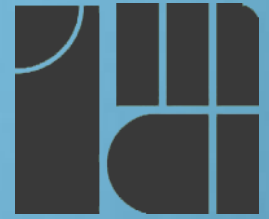
Partial Coverage Znojmo



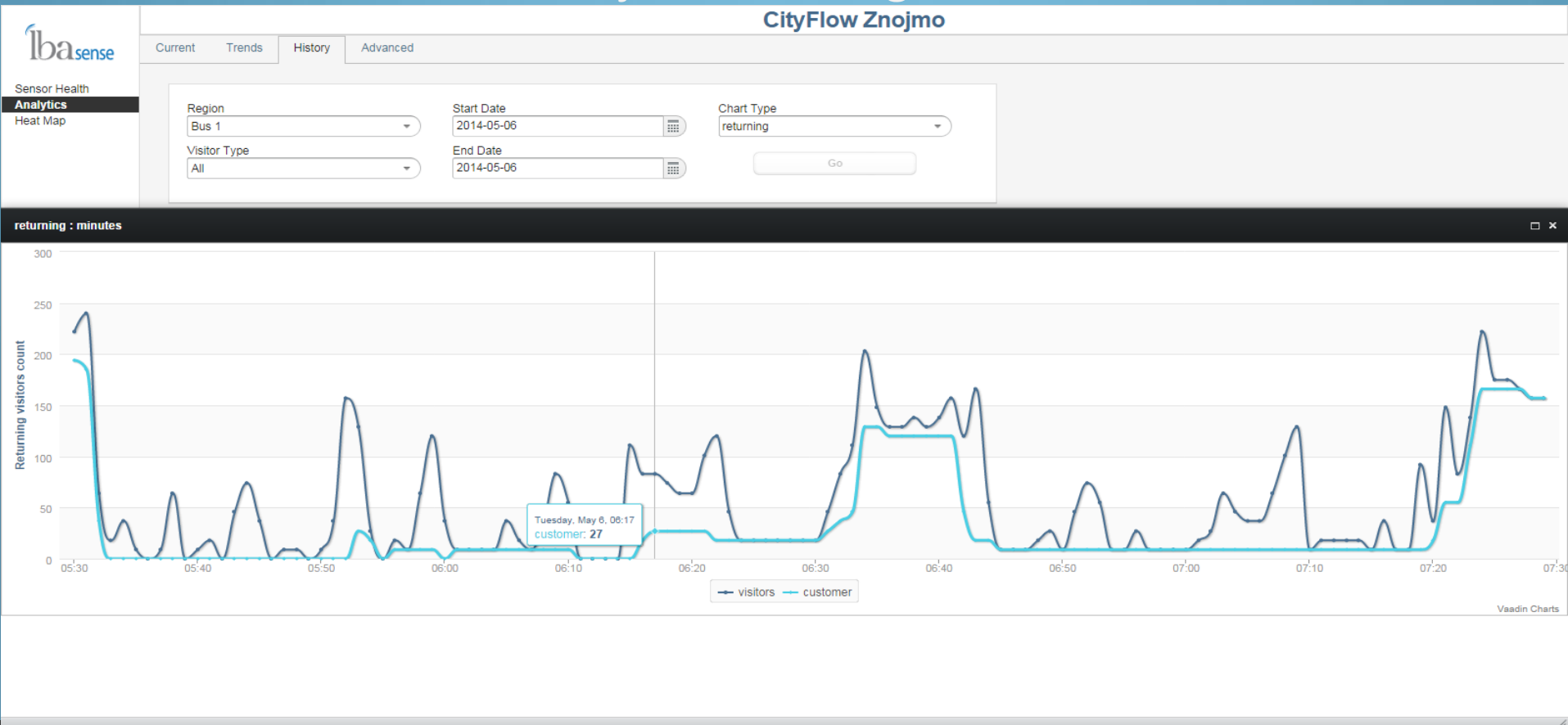
- IMA together with ČAS Znojmo designed and built LBA network for monitoring traffic and inhabitants behavior
- AUTHOR CUP on 28.6.2014 starting at 9:30 caused two peaks on main train/bus station in Znojmo



Partial Coverage Znojmo



- Customers of ČAS Znojmo travelling in bus



Partial Coverage Znojmo

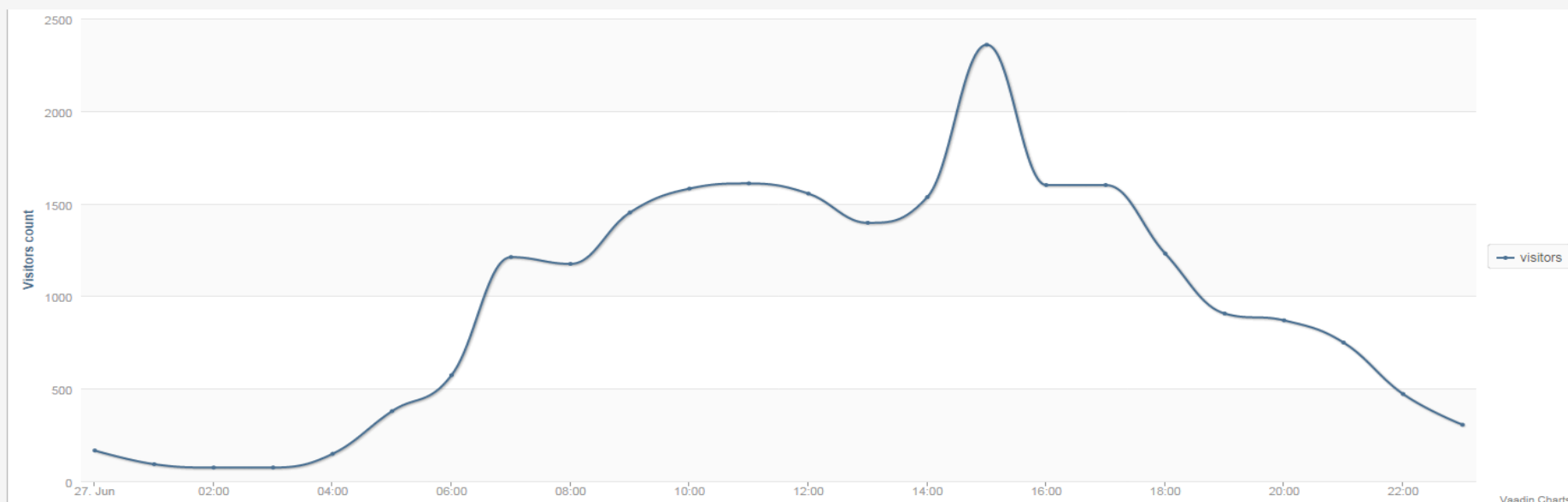


- Leaving the city at Friday afternoon (road traffic detection)

CityFlow Znojmo

Current Trends History Advanced

Region CAS Petrol Station	Start Date 2014-06-27	Chart Type visits
Visitor Type visitors	End Date 2014-06-27	Go



Global coverage Prague



- Standard week at Prague 5 (this time the whole Smíchov region - GSM)

Prague

Current Trends History Advanced

Time

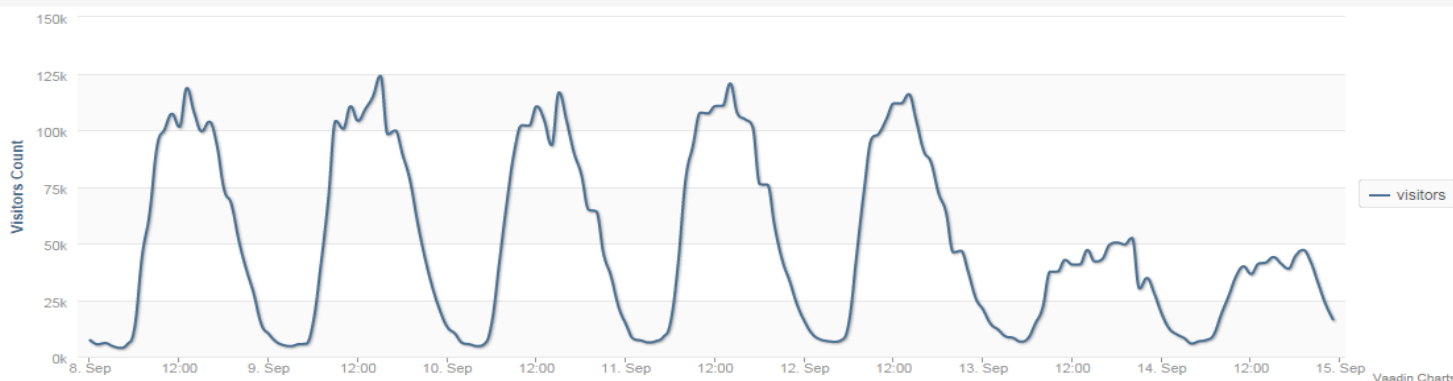
Last 7 days

Region

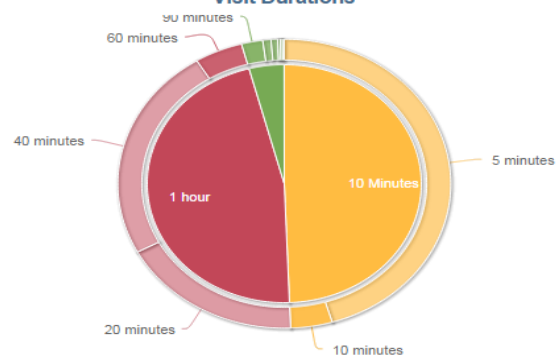
Entire Site

Total Unique Visitors on site:

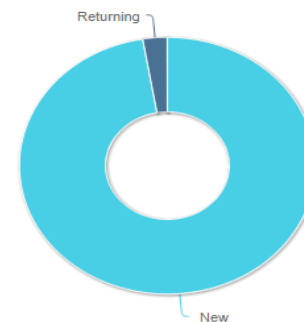
322402



Visit Durations



Returning visitors



Global coverage Prague



- Standard week at Prague 1 (significantly less pedestrians than in busy Smíchov)

CVUT

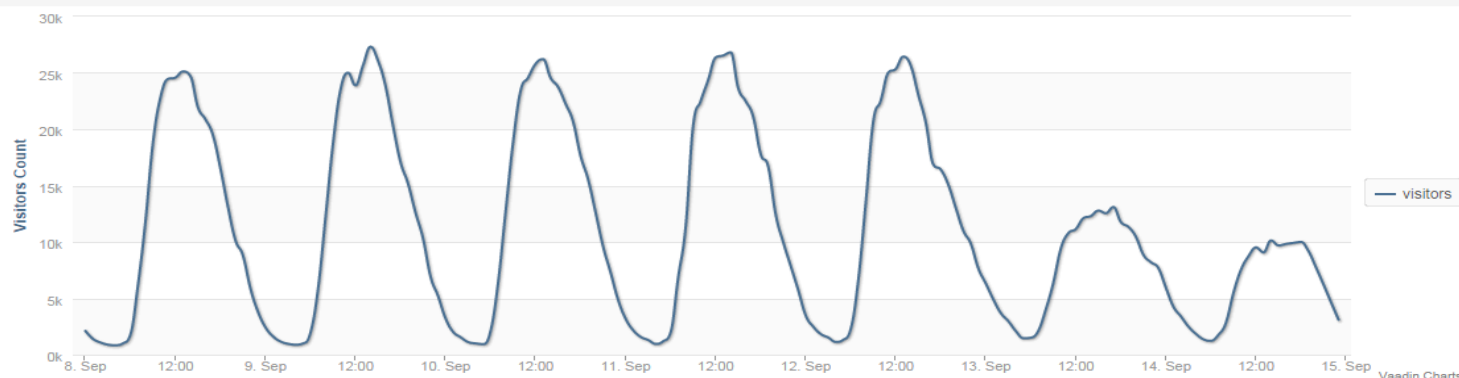
Current Trends History Advanced

Time
Last 7 days

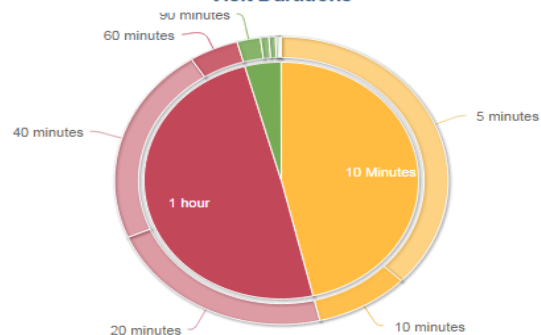
Region
Entire Site

Total Unique Visitors on site:

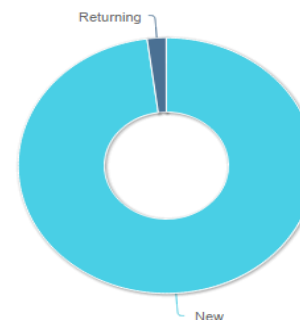
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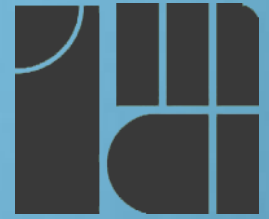
Visit Durations



Returning visitors



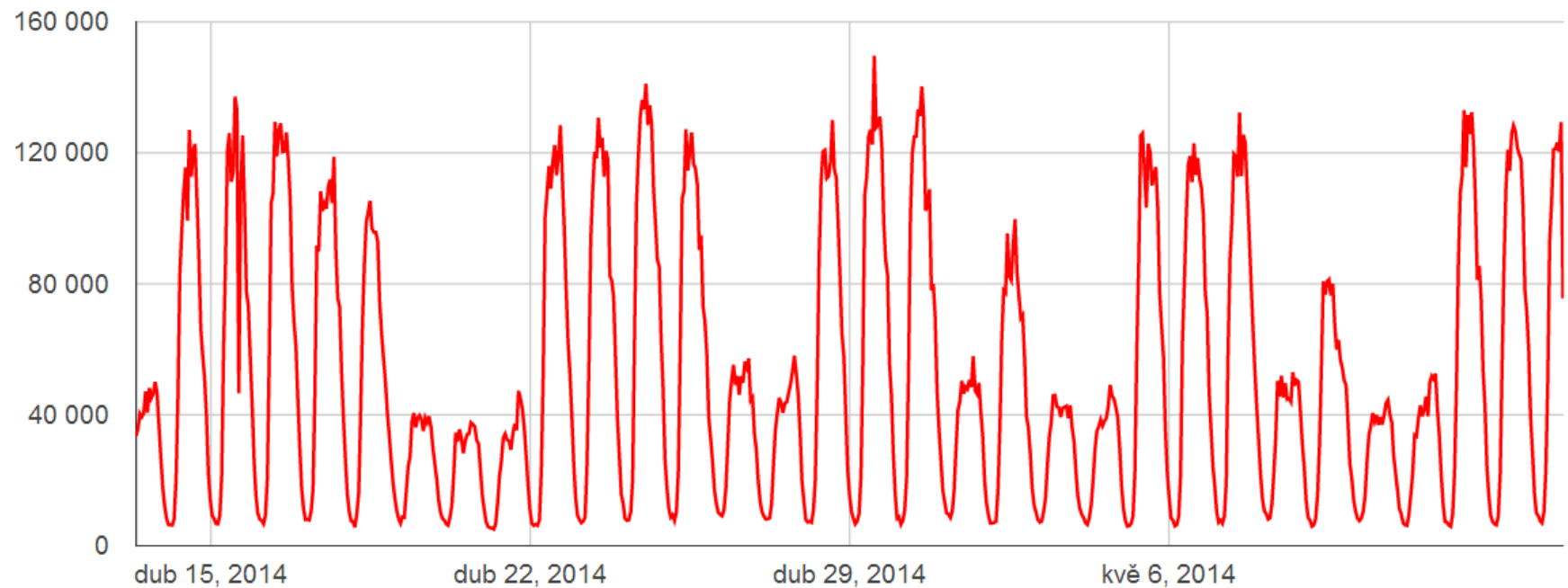
Global coverage Prague



- What is the effect of National Holidays?

(Easter Monday, Labour Holidays, Day of Victory over nazism)

People Count - IMA Prague



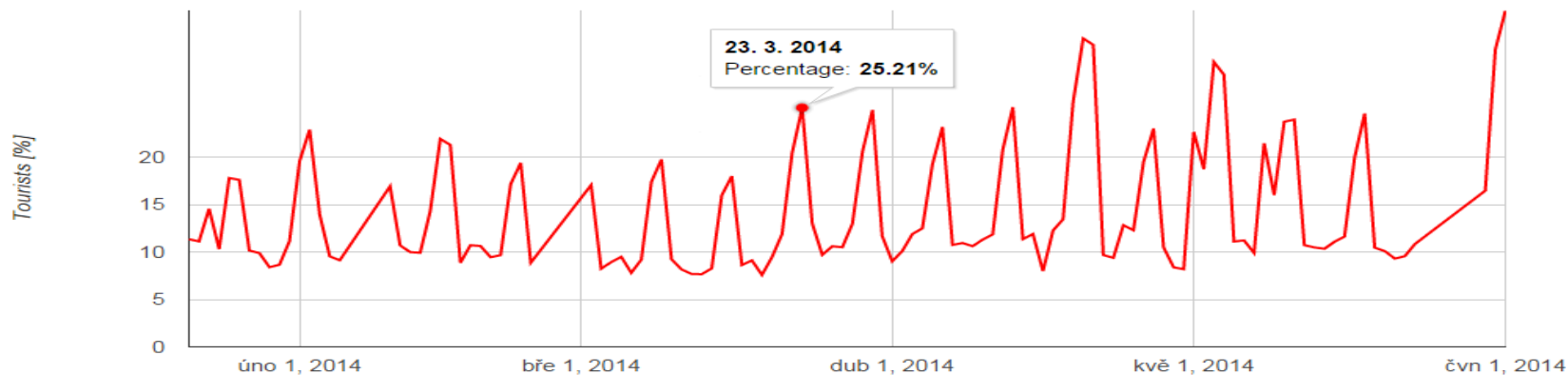
Global coverage Prague



- What is the number of tourists in Prague 5?

LBASense Home Contact Iba data Legal Information

Tourists at



Tourists

 Poland
 Germany
 United Kingdom
 Slovakia
 Bulgaria

Project commercialization



- Three commercialization aims
 - **Special sensors** manufacturing (solar powered, security, car/bus)
 - **CityFlow system deployment** (for municipalities, retails, shopping malls...)
 - **IDSIMA** enhanced security system by **CCTV fusion** (upgrade for current customers, new prospective customers)

Project No.: **CA 310**

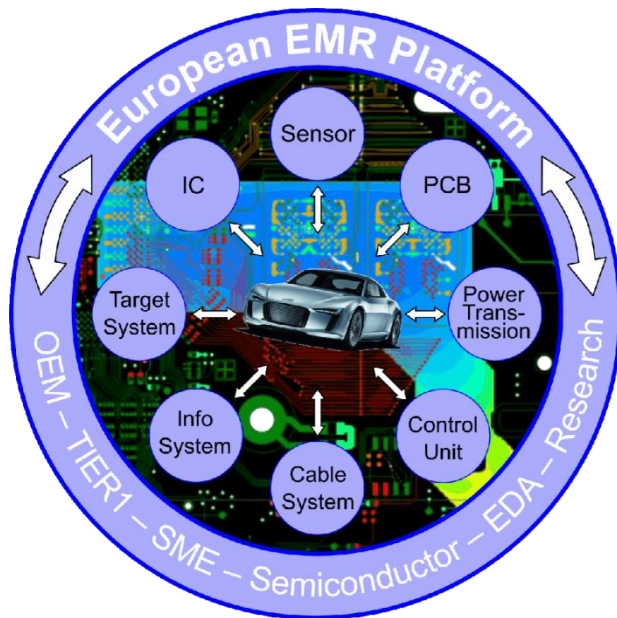
Project Acronym: **EM4EM**

Project Full Title:

**Electromagnetic Reliability (EMR)
Of Electronic Systems for Electro
Mobility**

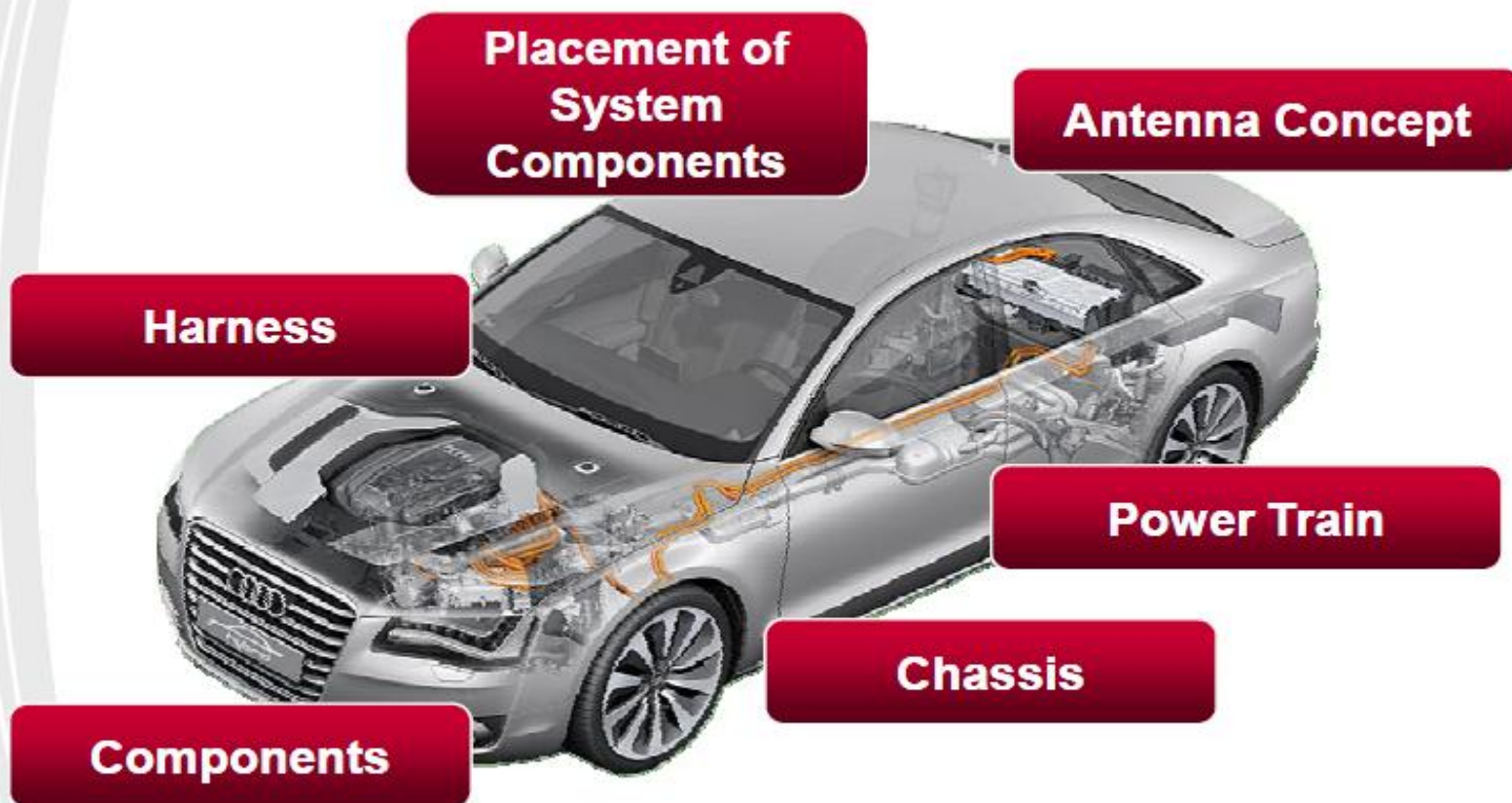
Start Date of Project: **2012-07-01**

Duration / PY: **33 Months / 233**



#	Partner	Country	1. Quarter 2013		2. Quarter 2013	
			Planned [PM]	Spent [PM]	Planned [PM]	Spent [PM]
1	Audi	GER	10,0	11,0	10,0	11,0
2	DAG		4,5	3,4	3,3	2,6
3	IFAG		19,3	20,3	19,3	24,8
4	CONTI		18,5	11,3	18,5	11,7
5	BOSCH		4,0	4,0	5,3	5,3
6	NXP		6,4	4,4	4,9	4,4
7	ZUKEN		6,5	6,5	3,5	3,8
8	ELMOS		2,4	2,4	3,7	3,7
9	LUH/TET		4,5	3,0	11,0	11,0
10	FAU		6,0	6,0	6,0	6,0
11	TUDO		11,9	11,0	11,7	7,0
12	CVUT	CZ				
13	IMA				4,5	4,5
14	VTT	FIN	4,0	3,5	4,0	4,0
15	OKMETIC		3,8	3,8	3,8	3,8
16	MURATA		7,0	7,0	7,0	7,0
Total [PM]			108,7	97,5	116,3	110,4

EMR Influencing Factors on Vehicle Level



EM4EM INTERNAL - CONFIDENTIAL

EM4EM Added Value Chain - Exploitation -

Vehicle



System



Components



Semiconductor



Vorsprung durch Technik Audi



DAIMLER



BOSCH

Continental

tu technische universität dortmund

ZUKEN BE FIRST

BOSCH

Continental



infineon

elmos

NXP

tu technische universität dortmund

FAU

muRata

OKMETIC

VTT

muRata

2

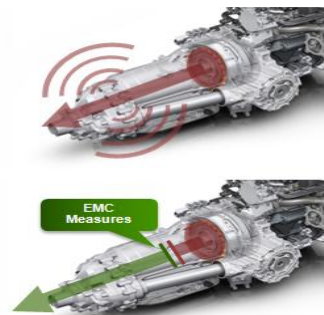
Vehicle



System

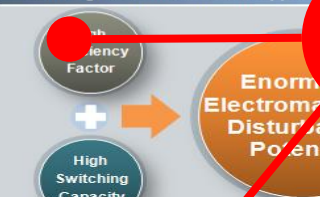
Without EMC Activity
Electromagnetic interference via motor shaft

With EMC Activity
Electromagnetic interference to keep within gear unit



Semiconductor

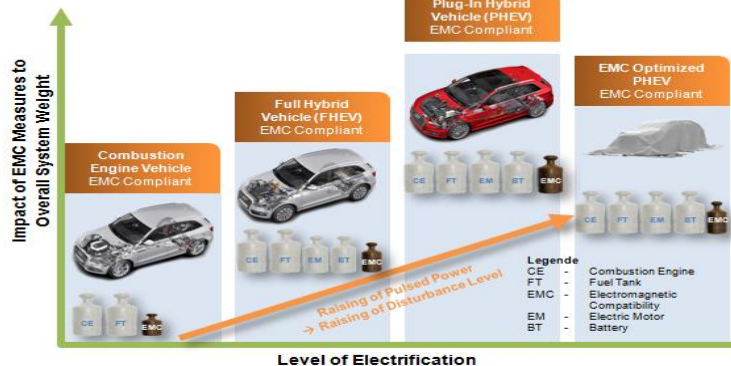
Challenges: Semiconductor Application



Status Quo
Inspection of EMC at semiconductor level in HV-Range actually not focused

4

Vehicle



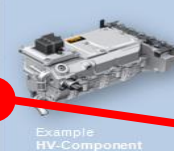
Shielding

- ⇒ Consideration of shielding requirements for housing concepts
- ⇒ Homogeneity shield standard to impermeability, crash, weight
- ⇒ Usage of geometrical separation

Filtering

- ⇒ Advancement, i.e. more compact and powerful HV-DC-Filter
- ⇒ Collaboration with filter experts
- ⇒ Consideration in concept phase of HV-Components

Components



Challenge Approach: Semiconductor Application



EM4EM Goal
Usage of EMC Optimization Potential by HV Semiconductors

3

Slide

WORK PACKAGES



WP1 EMR Definition + System Architectures for EV and Related Industrial Applications

WP2 Advanced Electronic Components and Systems Electromagnetic Reliability (EMR)

WP3 EMR Modelling and Simulation of Advanced Semiconductor Devices



WP4 Advanced EMR Design for Smart System Integration



WP5 Advanced EMR Measurement and Test Methods for Components and Complete Systems



WP6 Efficient Application Integration and Demonstrators (Proof of EMR Sureness)

WP7 Exploitation and Dissemination of R+D Results Dissemination

WP8 Project Coordination + Risk Management

NEW SYNERGIES



- **ENIAC KET THINGS2DO**
THIN but Great Silicon 2 Design Objects
- **ARTEMIS Call 2013 ARTEMIS-2013-1 EMC²**
Embedded multi-core systems for mixed criticality applications in dynamic and changeable real-time environments
- **ENIAC KET PANACHE**
Pilot line for Advanced Nonvolatile memory technologies for Automotive microControllers, High security applications and general Electronics
- **ENIAC: E3Car, MotorBrain, IDEAS, Artemis: Pollux, IoE**



“Interactive Power Devices for Efficiency in Automotive with Increased Reliability and Safety” reference number: ENIAC – 304603



Thank you for your attention
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