

A company working on the Intelligence Behind Things

IWSES 2017
La Sapienza, Roma
September 7-8, 2017

Carlo Brandolese, William Fornaciari, Matteo Grotto,
william.fornaciari@ibtsystems.it
ibt@ibtsystems.it

The company

- Born in 2016 as a spin-off of IBT Solutions (active since 2013), the company benefits of more than **20 years** of experience of its founders



- Targets the entire stack of **Embedded Systems** and **IoT** markets



Reference market

- Embedded systems are everywhere...



Industries



Consumer Electronic



Automotive



Smart Cities



Telecommunications

- 2020 Outlook: Four billion people involved

1300 billions tags & sensors



450 billion interactions per day



31 billions devices



2000 billion financial transactions



25 million apps

▪ Assessment

- System-level product analysis
- Design process analysis



▪ Technology scouting

- Analysis of the technology's state-of-the-art
- Identification of ad-hoc cutting-edge technologies



▪ Steering and Support

- Requirement elicitation and definition
- System architecture design
- Design process definition and monitoring
- Design reviewing
- Maintenance and evolution roadmap



- Modeling and data analysis

- Signal processing
- Model identification
- Data analytics & mining



- Marketing support

- Feasibility studies
- Proof of concepts and demonstrators
- Technical focus groups



- Design and development

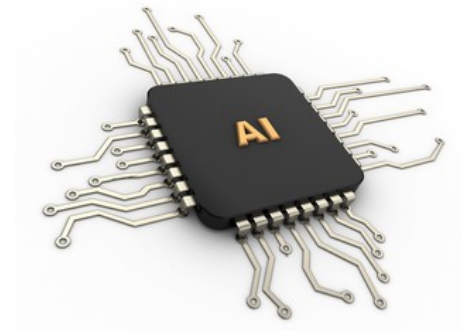
- System-level design
- Hardware design and development
- Firmware design, development and testing
- Software design, development and testing



Design & Development experience

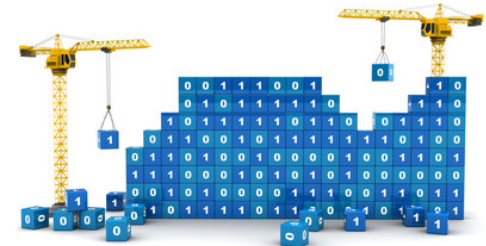
■ Hardware

- Microcontroller & DSP based solutions
- Schematic design and layout of PCBs
- Sensors & communication modules



■ Firmware

- Drivers and hardware abstraction layers
- Bare-metal applications
- Embedded and real-time operating systems
- Floating and fixed point data processing
- Performance optimization
- Power optimization



■ Software

- Diagnostic & test software
- Graphical user interfaces
- Cloud & Server based remote access and control
- Web-based dashboards



Research experience

- Research activities

- Cooperation with Politecnico di Milano
- Academic research
- Industrial research and innovation
- European projects



- Project preparation

- Consortium identification and construction
- Proposal structuring and organization
- Technical and financial documentation preparation



- Project execution

- Technical activities
- Management
- Financial



- Automotive

- 2013-2017 Insurance black-boxes for cars and motorbikes
- 2014 Inertial sensing unit for low-energy crash tests
- 2016 Data loggers for WRX Rally World Championship
- 2017 On-board unit for V2I traffic management and accident avoidance

- Environmental monitoring

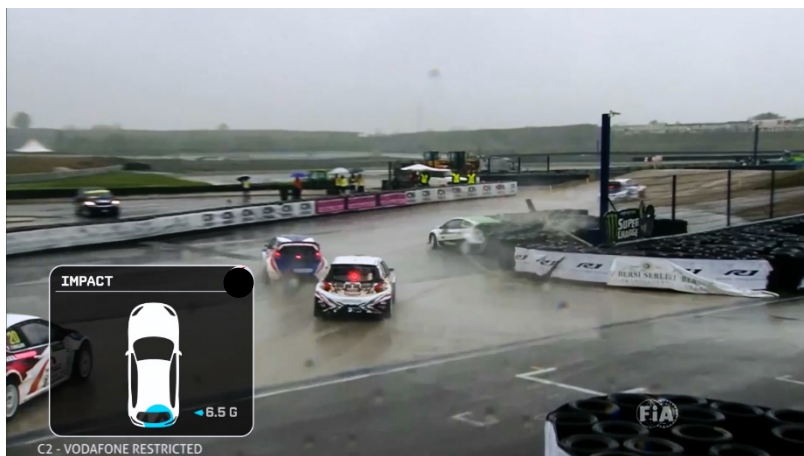
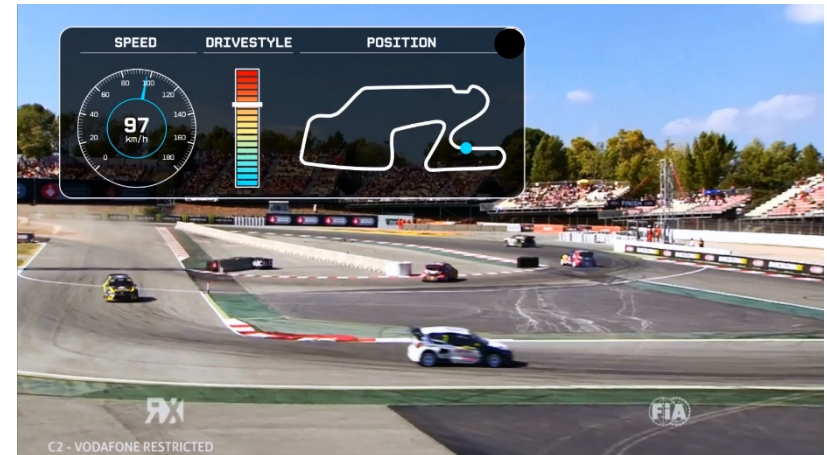
- 2016-2017 Multi-sensor remote data logger for rivers water level
- 2016 Industrial sensor platform for large structures vibration monitoring

- E-Health

- 2014-2015 Step dynamic analysis for parkinsonians and elderly people
- 2015-2016 Smart Playful Space & toys for disabled children

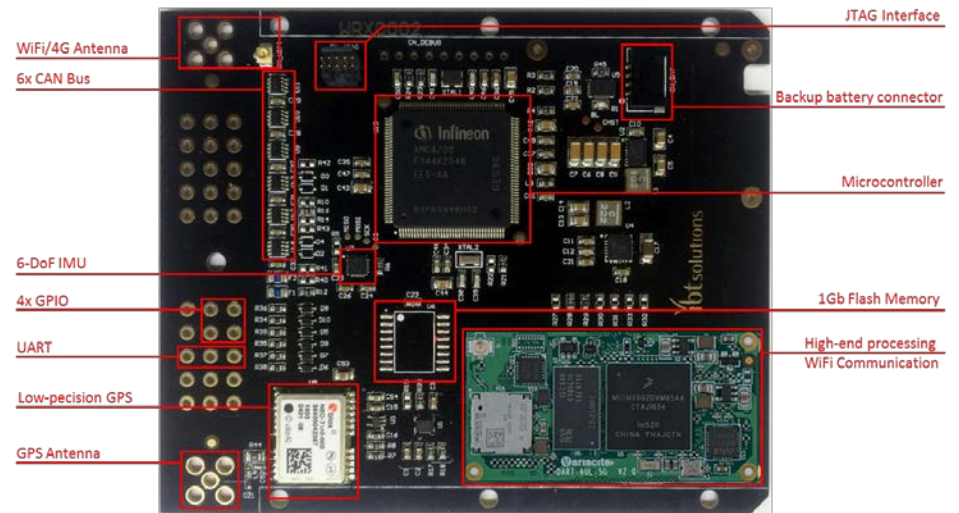
Sample: Automotive (IBT Racer)

- WRX Rally Cross
 - Developed a telemetry systems for WRX rally cross racing for video entertainment
 - Validation during four 2016 races, installation on the cars of two teams

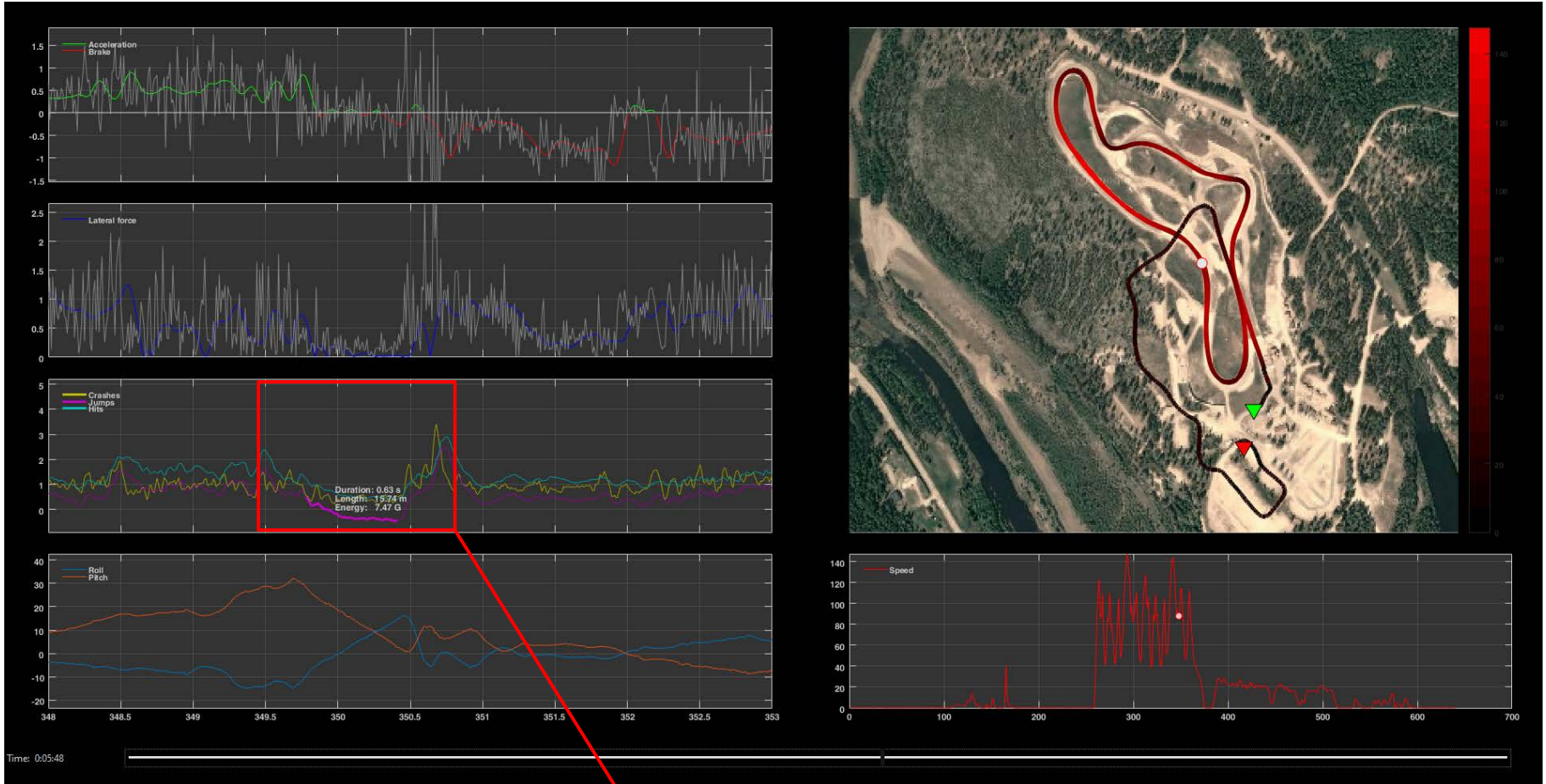


IBTRacer: hardware platform

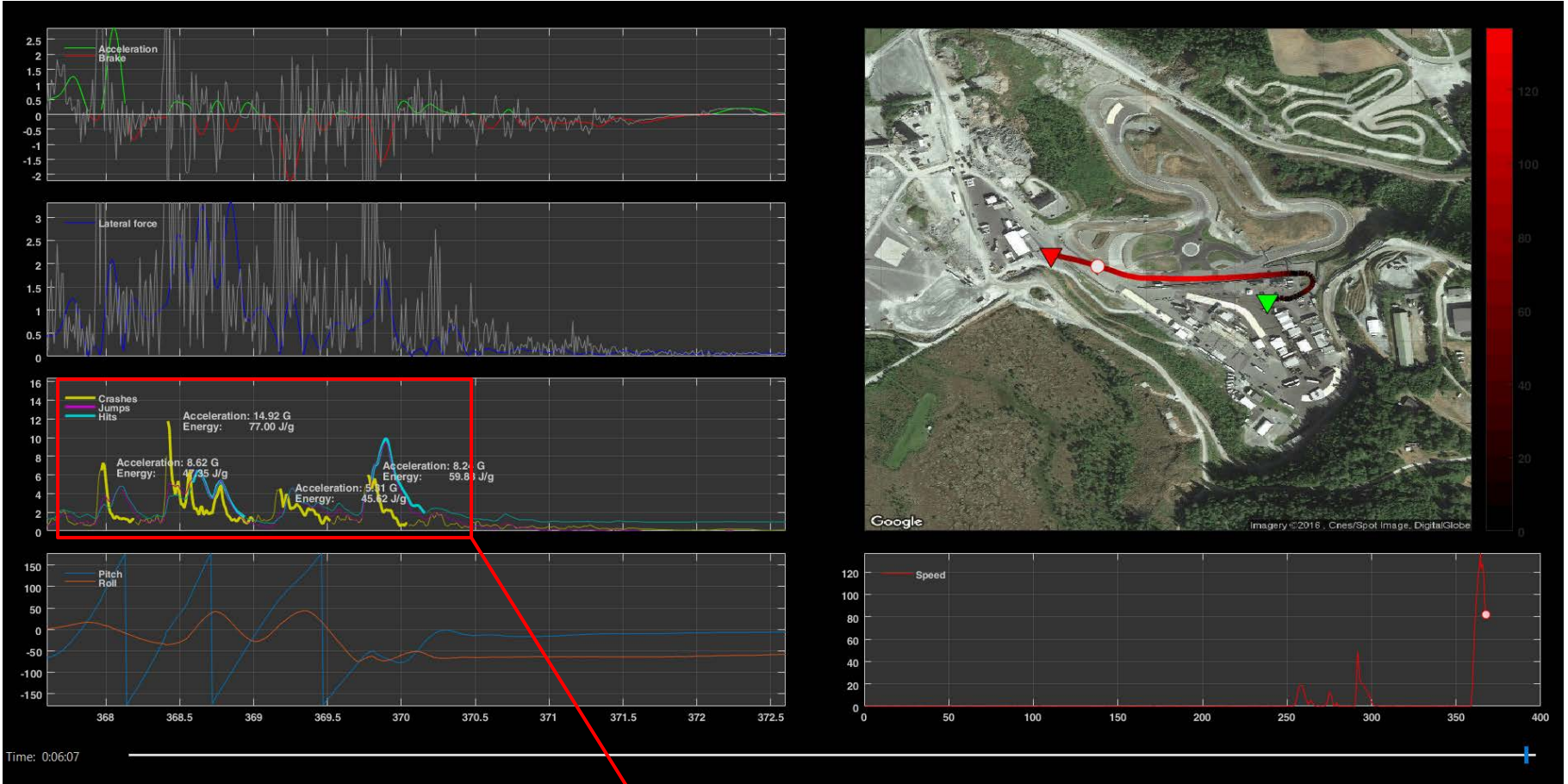
- High-end data logger for racing
 - Data
 - Accelerations, angular velocities, speed, heading, position
 - Algorithms
 - Crash detection, Minor collisions detection, Jump detection and jump length/height estimation
 - Connections
 - Support connection to vehicle CAN BUS, WiFi connection to paddok tools



IBTRacer analysis – Jump detection



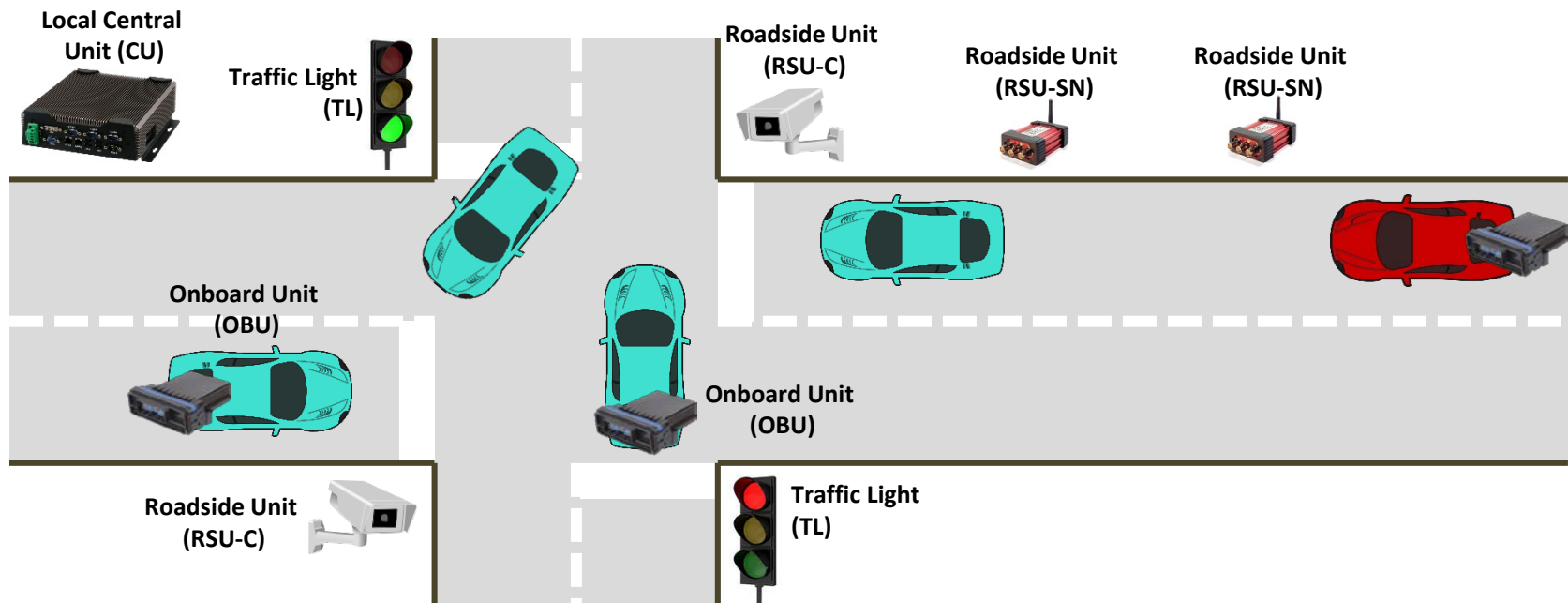
IBTRacer analysis – Crash detection



Several impacts with different energies

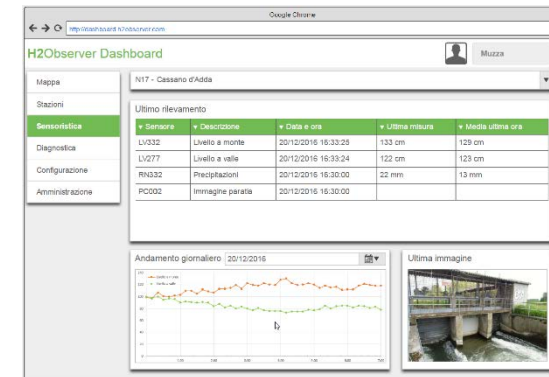
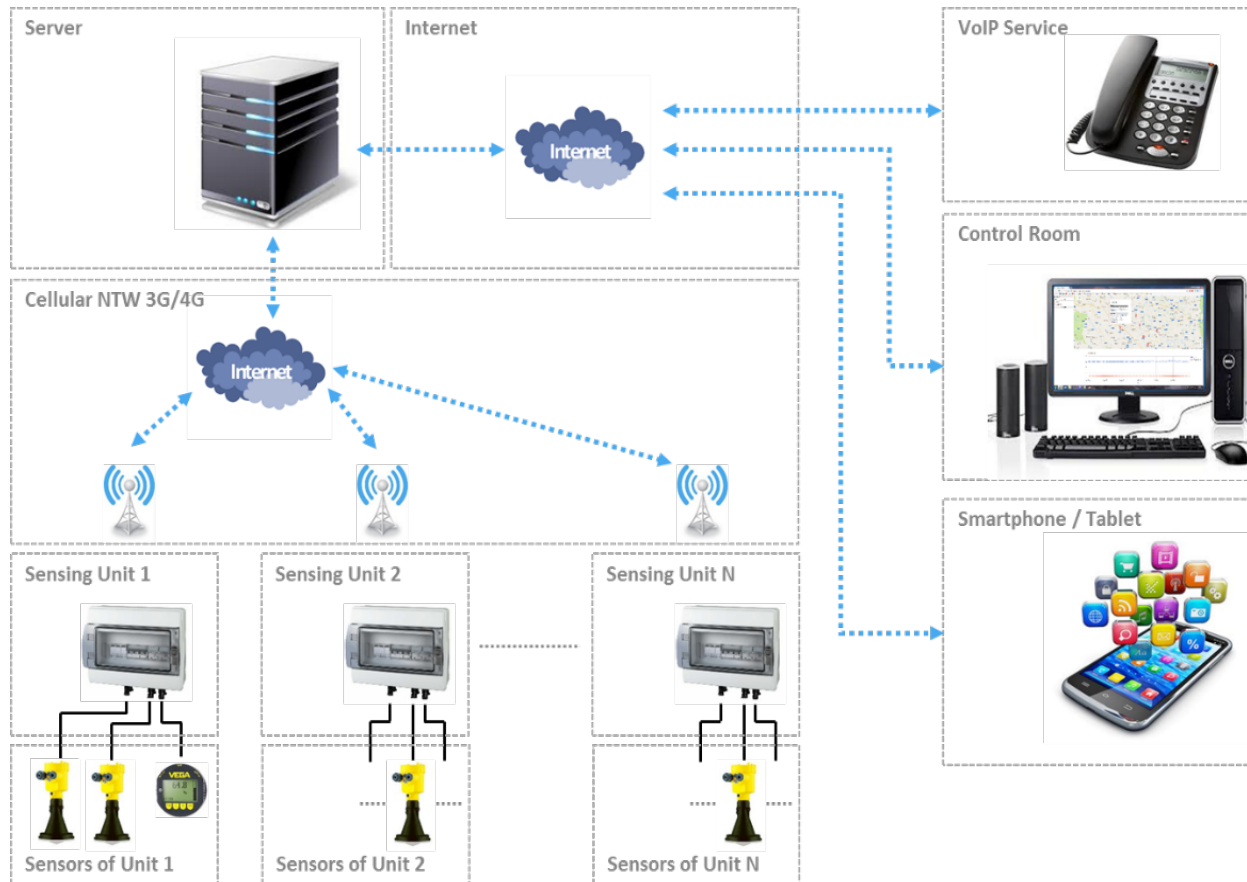
Sample: Automotive – SafeCOP EU Project

- Intelligent traffic light based on cooperating systems
 - OnBoard Units installed on vehicles (derivative of IBTRacer)
 - Cameras for video-content analysis installed on the traffic light
 - Wireless Sensor for environmental conditions detection installed on the road side
- Functions
 - Comfort: traffic and pollution reduction
 - Safety: accident avoidance through active vehicle control (warning/slow-down/brake)



Sample: Environmental Monitoring-H2Oobserver

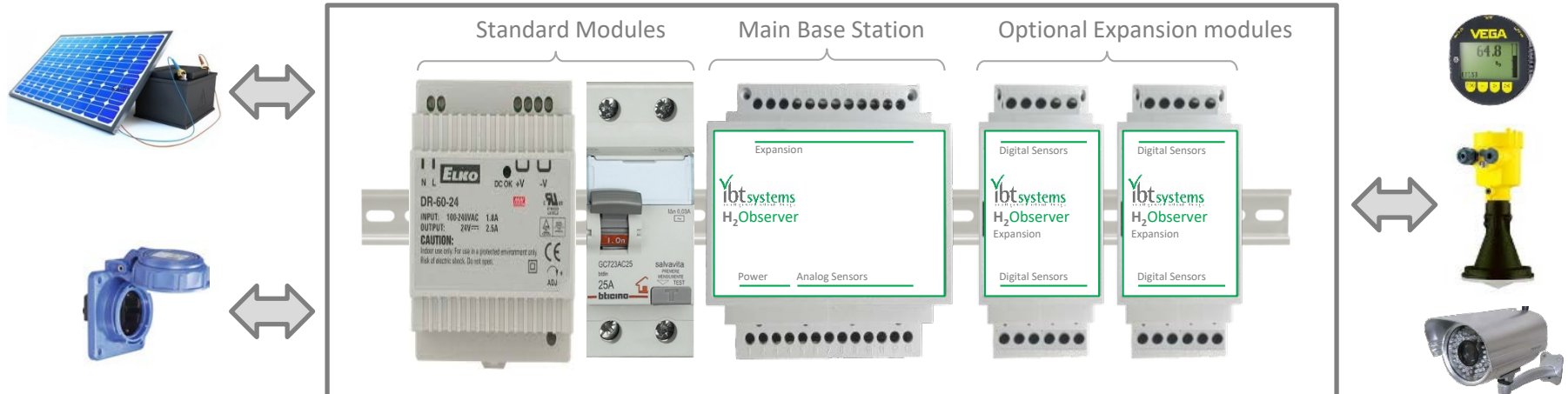
- Goal: keep under control an hydraulic basin
 - Focus on the water levels
- System architecture
 - Data collection and processing (local vs cloud/server)
 - Monitoring/configuration Dashboard



H2Observer: Main hardware features

- **Modularity**
 - 3G/4G with base functionality
 - Analog sensors reading (e.g. water level)
 - Digital sensor reading (e.g. rainfall sensor)
 - Expansion modules
 - Acquisition from other sensors, support for video-cameras (Ethernet and/or WiFi), PLC commands
- **Reliability and maintenance**
 - Remote configuration and diagnostics
 - Local data storage in the case of 3G/4G unavailability
 - Use of «industrial» qualified components, small form factor of the system
 - Easy installation, replacement and maintenance (no special training of technicians)

Modular Architecture



Samples: P3S EIT EU project

- Playful & Embodied Learning
 - play and bodily interaction (tangible manipulation of objects, physical movements in space)
 - stimulates cognitive processes & sensor-motor capacities in all contexts of children's life



Therapeutic Center

Hospital

School

Home

Public Playground

New forms of therapy and learning

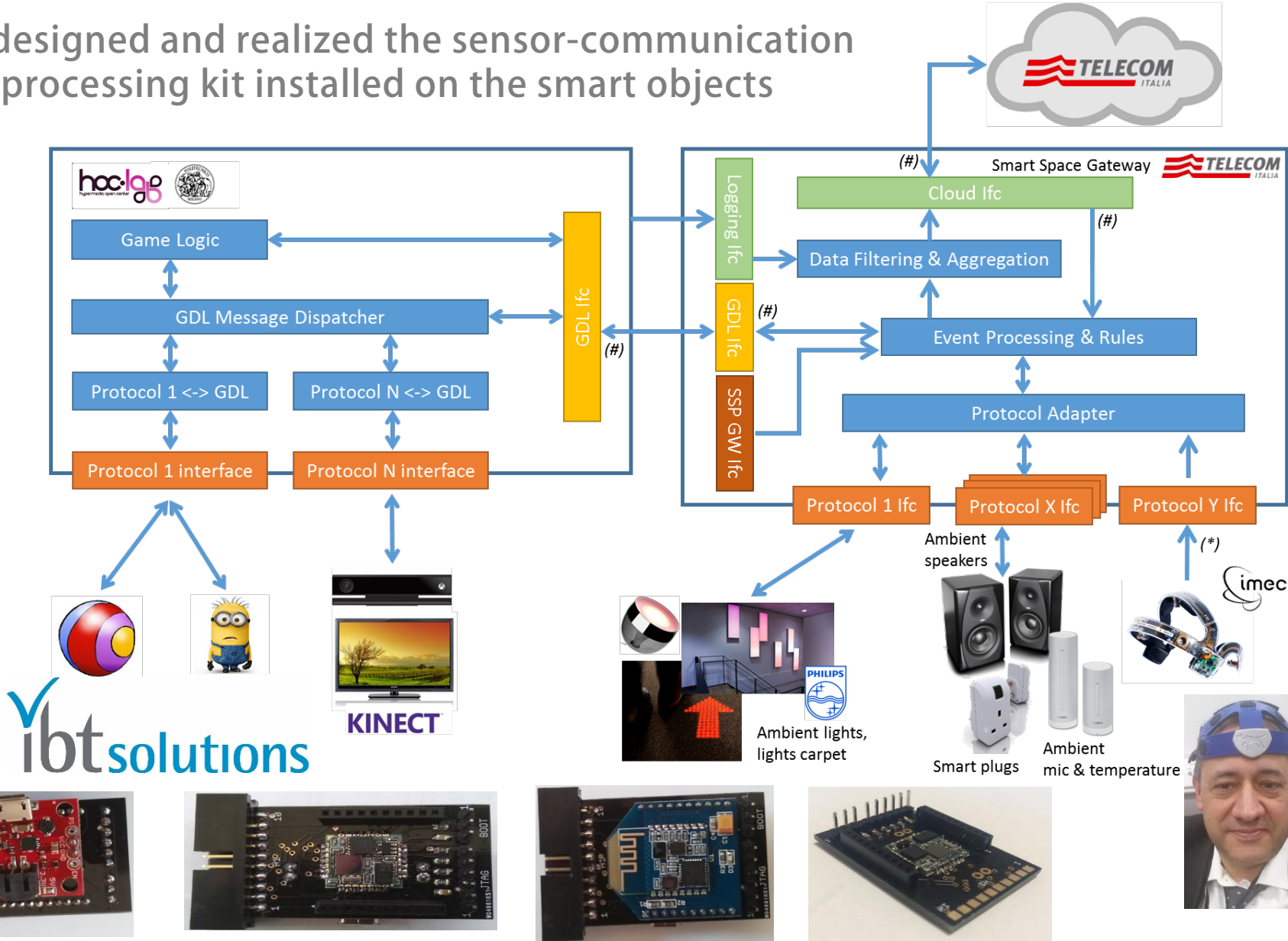
Smart Spaces

Playful Smart Spaces

Playful Supervised Smart Spaces

P3S architecture

- IBT designed and realized the sensor-communication and processing kit installed on the smart objects



ibt solutions

