An Open OSGI Embedded Platform: a new Perspective for Intelligent Transport

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Introduction: Geensys, RDTL
E-bus project
From E-Bus to E-Nove
Beyond Public Transportation
Fast Growth

Over 30% Growth y2y

Capital: 7 389 746 Euros

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Embedded Electronics
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Aerospace Defense

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Industry Energy

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AUTOSAR Builder

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ISO 26262

DO 254

DO 178B

SIL

IEC 61508

FDA CFR

CMMI

Quality Processes

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Core business: public transportation (180 buses)
- City, inter-city, school, tourism
- 80% of client employees are on the road (drivers)
- 100% of RDTL customers are mobile and need «on time» information.

- Keep in touch with employees
- Deliver services to customers on the field (ticketing, timetables, ….)
- Improve QoS
- Get data from the field
Mobile Information Systems: Transport equipments environment

Mobile equipments:
- Printer (ticketing)
- Driver control system
- Embedded server
- Passenger information display
- Digital Signage
- GPS-GPRS
- Gas access control

Fixed equipments:
- Priority lighting system
- Security system

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RDTL major needs

- Re-use capability
  - from one activity to another one (school, inter-city, urban, tourism)
- Large mobile infrastructure management
- Old and obsolete ticketing system
- Gasoline cost increase
- Environmental impact on vehicle systems
- Impact of political decisions & regulations
RDTL: today’s constraints

- Heterogeneous, non-interoperable systems
  - Ticketing, customers information,…

- Non scalable “Black box” systems
  - Proprietary system, mono-application system, difficulty with inter-operability,…

- Tied to, or “prisoner of ”, manufacturers

- High cost of investment and maintenance
Risks & Costs

Driver’s acceptance: 🐔🐓🍗
Investment costs: 🐔
Set-up cost: 🐔
Maintenance cost: 🐔…..
Upgradability: 🐔…..
Independency: 🐔
Customization: 🐔
QoS: 🐔…..

Information system
Ticketing system
Maintenance system
RDTL strategic objectives:

- Compliance with the law
  - Law for Disabled People (2015)
  - Law for school transport
  - ...
- Build an homogeneous Information System
- Reduce gas consumption
- Be independent from HW manufacturers and SW providers
- Get capabilities to manage the information system (versus the “black box” approach).

New IT capability for mobile applications required
RDTL Technical vision: E-Bus Project

- Plug-in applications
- Open Interfaces
- Inter-operable applications
- HW independence

Diagram elements:
- Application software A
- Application software B
- Application software C
- Interface
- Back-office
- Embedded system
- API
- Printer
- Display
- Payment Terminal
- Wifi, GPRS, Ethernet...
E-Bus HW system

Complete E-Bus HW System

- LCD Display
- CAN FMS
- Audio
- HP extérieur
- Interior Display
- Front Display
- Lateral Display
- Digital IOs
- Wifi, Gprs, Gps Antenna
- Printer

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Hardware Architecture
HW System

Aton PC (ACTIA):
- Celeron 1GHz, 512 MO RAM, 1 GO Compact Flash
- 2 USB, 4 RS232, 15 I/O, 2 CAN HS
- Extension Boards: Wifi, Gprs, Gps.
- Compliant with Automotive standards

4 displays panels
- Hanover equipment : RS485

Printer
- Mylox
  - RS485 thermal printer

CAN FMS
- Read information from CAN bus through an FMS connection
**Multi-band Antenna:**
- ✓ Wifi
- ✓ GSM / GPRS
- ✓ GPS

**LCD touch screen:**
- ✓ 6,5” 640 * 480
- ✓ LVDS for Video support
- ✓ USB
- ✓ Day/night Management

**Audio IN / OUT:**
- ✓ AC’97 I/O

**Digital IOS:**
- ✓ 11 protected inputs
- ✓ 4 outputs
- ✓ + APC
System Architecture

Embedded System
- Ticketing
- Fleet management
- Administration

Back office System
- Administration
- BO Applications

Applications

Operating system

Equipments

OSGI

CAN  I/O  Display  …

+ Drivers

Back office / Operation Center

GPRS  Wifi

Web Services
E-bus leads the way to e-nove

E-nove, open integration platform for Intelligent Transport applications
E-nove: What is it?
- An open, scalable & powerful platform providing infrastructure services to ITS applications
- Making applications reusable & HW independent

E-nove: Whom is it targeting?
- Public Transport companies/operators
- Application providers, equipment manufacturers, integrators, service providers, …
The first open, modular and scalable platform for ITS applications enabling HW & SW independence

First ITS platform with a tool based development environment
Why now?

- **Economical constraints**
  - Gasoline costs

- **Legal constraints**
  - New EU law on PT accessibility (2015)

- **Societal & environmental trends**
  - Environmental constraints
  - Fewer private vehicles, increasing need for Public Transport

- **Technologies maturity:**
  - OSGI & ECLIPSE
  - SOA Architectures: Web Services

- **Strategic Shifts**
  - Collaborate on standards, compete on VA solutions & services
Application VF BUS

Embedded System 1

Embedded System 2

Embedded System 3

Back Office

Framework
Linux
Hardware

Framework
Linux
Hardware

Framework
Linux
Hardware

Framework
OS
PC

Wireless network (WiFi or GPRS)
Objectives

Standardization of an open SW architecture platform, to allow application suppliers to focus on their business expertise

**Project objectives**

- **Decrease costs** of possession, installation, and maintenance,
- **Allow interoperability** between equipments and applications,
- **Offer more services** and **ease application adaptation** for public transport exploitation companies
- **Facilitate evolutions** of systems and applications, **facilitate re-use**
- **Allow suppliers to focus on applications**, which bring added value, instead of on HW and SW infrastructures
- **For suppliers**: **facilitate access to other markets** in their own country, in Europe, ultimately worldwide.

**Functional domains**

- **For Public Transport companies**
  - Fleet Management
  - Ticketing
  - Drivers assistance
  - Security
  - New services...

- **For passengers**
  - Passengers Information
  - Security
Open architecture, allowing upgradability & flexibility

Independent architectures from application providers & hardware providers

Cost reduction of SW design
- Software designers can focus on their core business
- SW reuse

Cost reduction for PT operators
- Lessening investments, maintenance costs,…

Increased quality, reusability & upgradability

Community approach to offer win-win strategy between partners
E-nove demonstrator ready March 2009

E-nove platform installed at RDTL on April 2009

The open architecture of the E-nove platform will lead to the setup of a dedicated eco-system interested in adding application content to the platform
Beyond Public Transport

Automotive  Aerospace  Public Transport  Industry  Telecoms
Defense      Marine       Energy       Medical
Questions?

Thank you for your attention