

**E T N A**  
**2 0 2 0**

# **ETNA2020**

## **Pitch-matchmaking Session**

### **@ Shift2Rail 2019 Info Day**



## Part I

14:00	<b>Opening</b>	Miriam de Angelis, ETNA2020
14:05	<b>Altran</b>	Daniel Fulger
14:10	<b>Galiboff</b>	Nurettin Yalcin
14:15	<b>STAM S.r.l</b>	Unberto Battista
14:20	<b>Sakarya University</b>	Erkan Çelebi
14:25	<b>Sustainability Booster</b>	Alice Lunardon
14:30	<b>Paragon</b>	Harry Tsahalīs
14:35	<b>NETWORKING GROUPS</b>	

# A software platform for bridging the gap between electronic systems of hugely different life cycles and modernity/ Micro SOA

Bringing Service Oriented Architecture  
to the embedded world

Project Idea! – Call for Partners

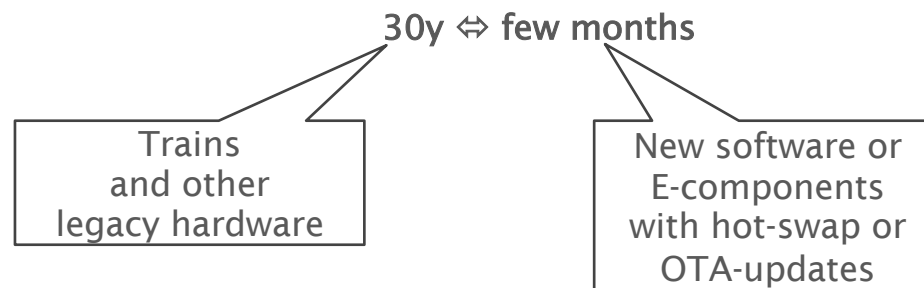
Presenter:  
Mike Greenan  
Altran Group/Technology Consultancy  
Rail, Infrastructure & Transport  
[altran.com](http://altran.com)

Shift2Rail Open Call Info Day 2019

# Current Situation

Electrical and Electronic (E/E) architectures must deal with a shift in environment with forces applying all at the same time:

- Highly disruptive technologies all maturing at the same time: power electronics, fast backbones...
- Adds complexity, impacts product development thinking and creation of systems of systems
- Demand for Vehicle internet connectivity is challenging existing software and electronics architectures.
- Growing cyber security risks and safety regulations create new corporate obligations
- Increasingly difficult to manage this complexity in a coherent way
- Manufacturers and operators must deal increased technology complexity, safety and cyber-security implications, while always reducing costs and time to market.
- **Products/system consisting of sub-systems of very different life cycles**



## Solution:

Bring Service Oriented Architecture (SOA) to the embedded rail world: the concept of “Micro SOA”  
=> Compare to AUTOSAR

# embedded S.O.A.

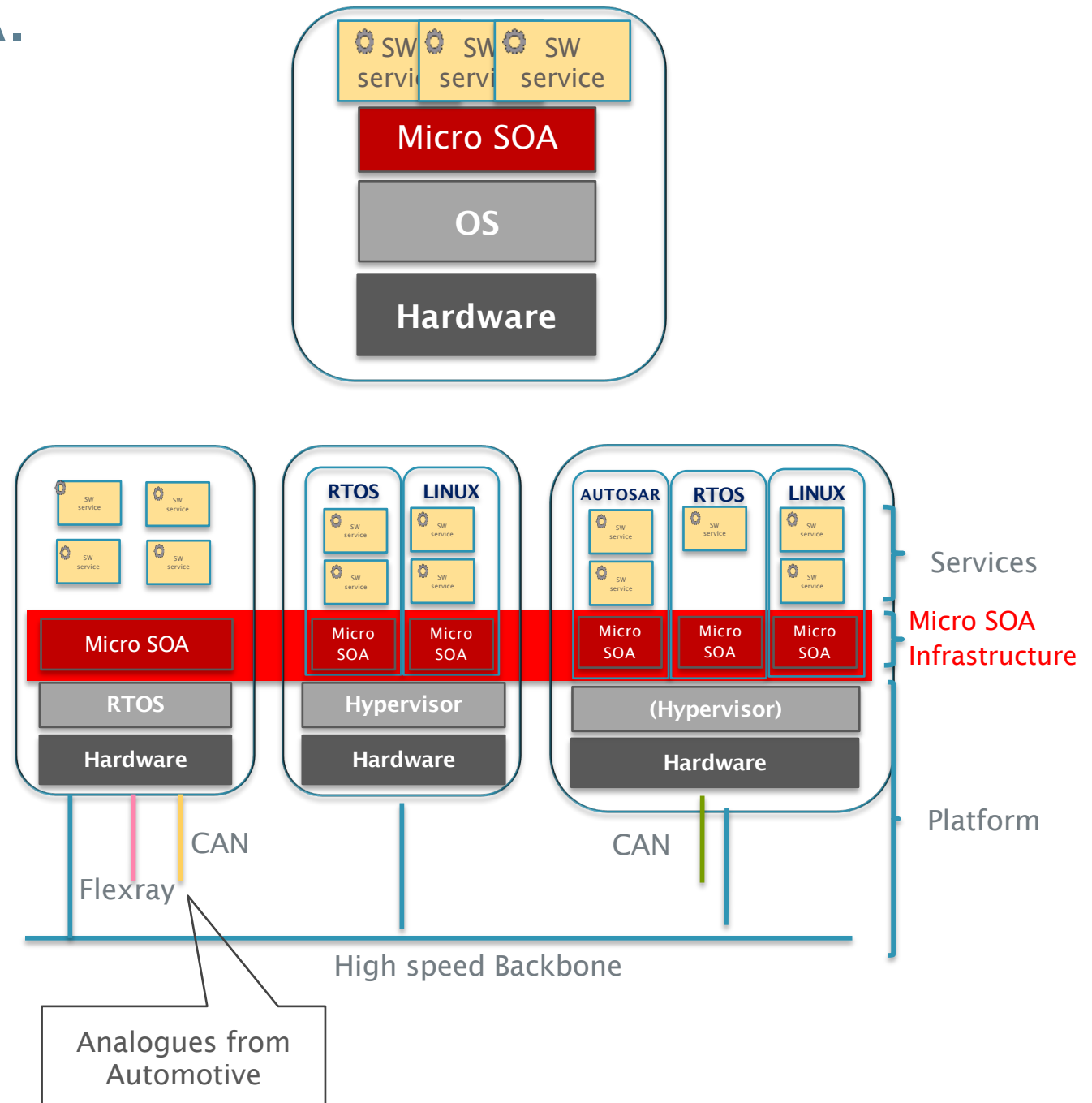
A **SW Middleware** (runtime)  
for modern vehicles and  
machines.

## Model Based Tooling

- Application development
- System topology definition

Aimed at providing **coherence**  
to the engineering of  
increasingly complex intelligent  
systems.

- Bringing **SOA** principles and methods of the consumer technology and IT industry to the **embedded world**: the **Micro SOA** concept
- Progressive deployment by dealing with **legacy sub-systems**



# Proposal abstract .. to be modified..

*The objectives of this project are to develop a future, sustainable, reconfigurable, distributed railway TCMS architecture and TCMS system that will enable better and faster integration of different OEM electronic, HW, and SW systems including safety systems, and better cross-operation and standardization. Similar developments are underway in the avionics and automotive industries that are also leading standardization of suppliers and control, safety, and communication systems, as exemplified in the case of the Autosar partnership (Autosar = automotive open system architecture).*

*Threefold objectives are targets to be achieved within SMART-TCMS project:*

*(1) development of future concepts and technologies to enable distributed, standardized and safety relevant / enabling TCMS (enabling SIL3/SIL4 functional safety integration), based on functional distributed architecture*

*(2) conduction of corresponding technology feasibility studies, and*

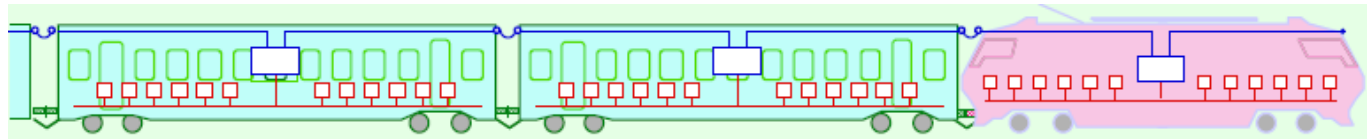
*(3) progressing on standardization in the railway sector similar to the Autosar approach Goal: RailwaySAR.*

*Cross-functional methodologies in Technology and Innovation management will be applied throughout the project, coupled with enhanced V-cycle model of architecture and product development (covering requirements, systems engineering, architecture analysis, as well as working out SMART-TCMS specifications and proof-of-concept feasibility & demonstrator cycles).*



# Partners wanted

- Manufacturers and operators in EU dealing with above problems, or having similar ambitions.
- Embedded software specialists/SMEs.



**RailwaySAR**

Contact:

**Mike GREENAN**

Global Industry Director

Rail, Infrastructure & Transport

ALTRAN

[mike.greenan@altran.com](mailto:mike.greenan@altran.com)

+44 (0)7876 207212

Current partners: Schindler, Chalmers Univ., Chiao Tech, ALTRAN



• Name: Nurettin YALCIN

• Name of organization:

*Galiboff*

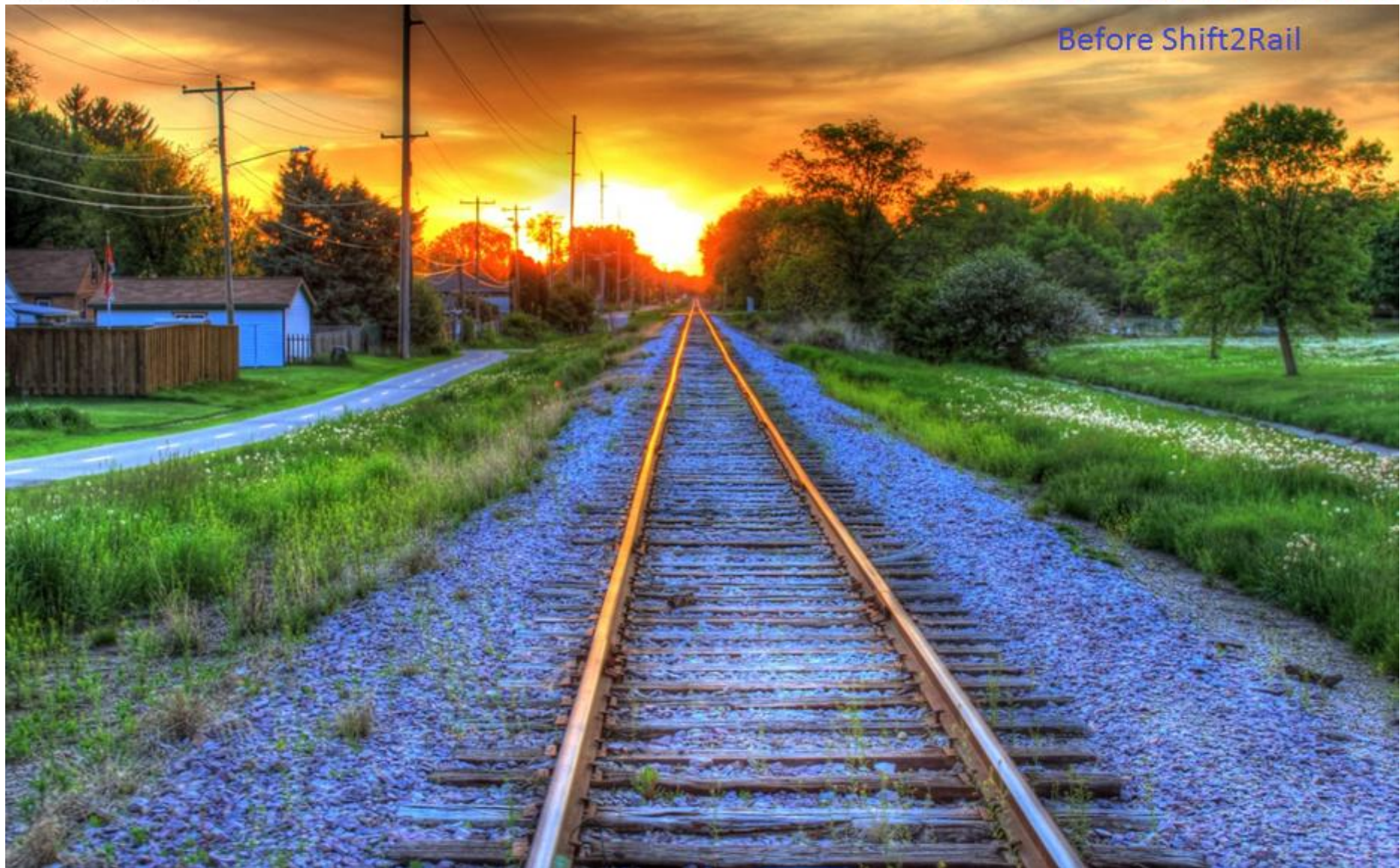
• Country: TURKEY

• Department within the organization: Research, Development and Innovation

• Expertise of the department: Plastic Composites

• Contact details: [nurettin.yalcin@galiboff.com](mailto:nurettin.yalcin@galiboff.com)

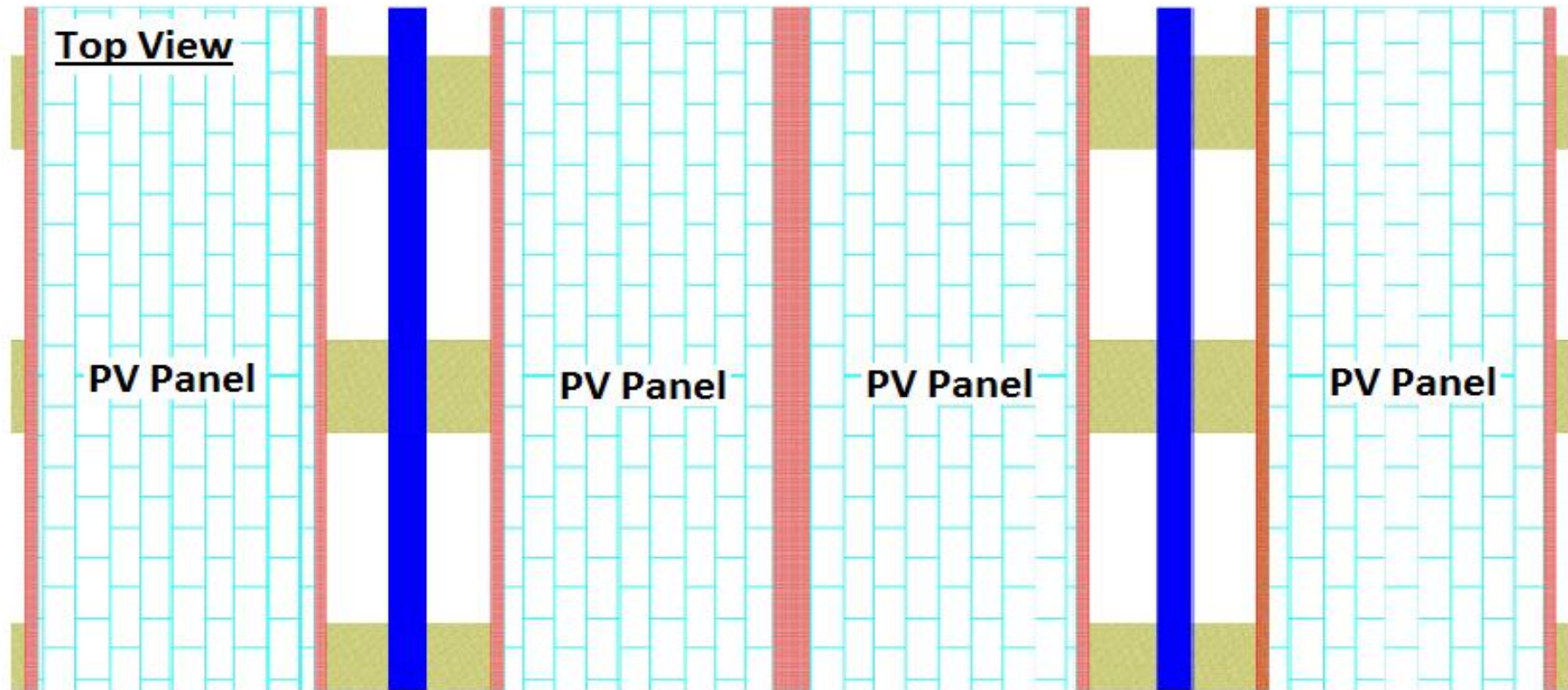
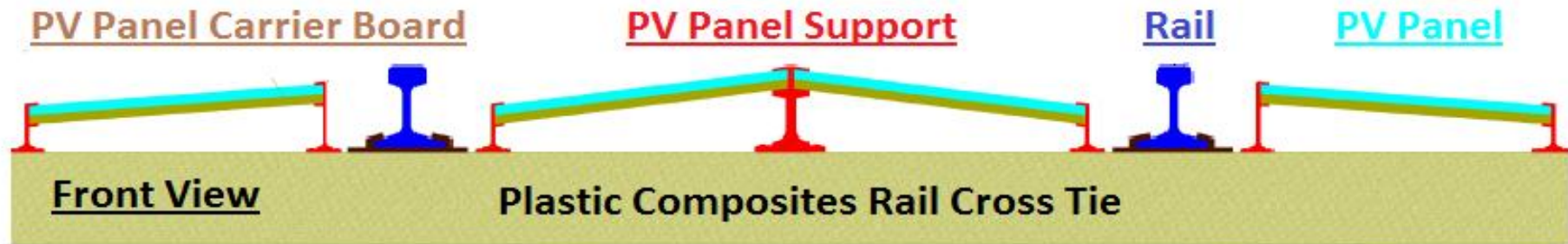
• web: [www.galiboff.com](http://www.galiboff.com)

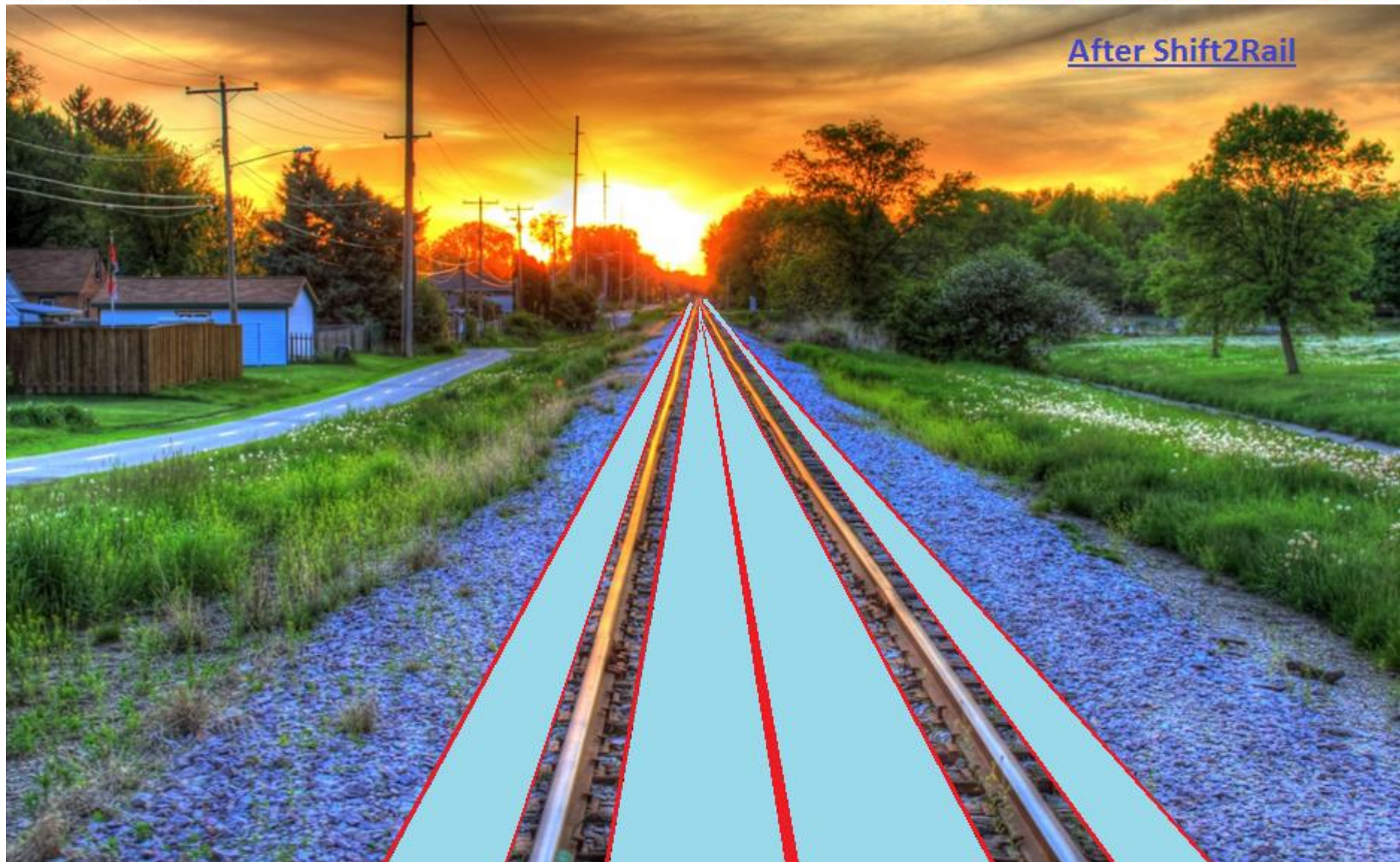


Before Shift2Rail



- Project proposal title: **‘Energy from Rail Tracks’**
- Topic to be addressed: **1.3.3 Innovation Programme 3 (IP3): Cost Efficient and Reliable High Capacity Infrastructure** and **4.2.6 S2R-OC-IP3-01-2019: Future traction power supply for railways and public transport.**
- Project description (brief):
  - ❖ Wooden and Concrete Cross Ties replaced by Composite Ties produced from landfill plastics and wood flour waste. Cross Ties are Reusable and Recyclable Profiles.  
Benefits: Composite Cross Ties have **Long Life**, **Increased Physical and Mechanical properties** compared to both Concrete and Wooden Ties. Composite Cross Ties are produced from **non-recyclable** plastics. TRL9.
  - ❖ Flexible Photovoltaic solar cells laminated to plastics composite boards and fixed along the way of **Train Roads**. Profiles designed and applied onto train carriages **roof tops**.  
Benefits: **Clean Energy**. Imagine: Train Rail Roads **paved** with Photovoltaic solar cells from Brussels to Istanbul.
  - ❖ Cost effective Tunnel & Bridge solutions with Plastic Composites Profiles  
Benefits: Long Life, less maintenance and **save money**
  - ❖ Grid Interaction between Railway power supply system and Public grids
- Current consortium (if any): Solar cells, batteries and system application producers
- Profile of the partners sought (type, skills, role, etc.): Engineering, Producers and Constructors





After Shift2Rail

**E T N A**  
**2 0 2 0**



**S2R-OC-IP1-01-2019**

**Advanced car body shells for railways and light material  
and innovative doors and train modularity**

Umberto Battista  
Area Manager, Stam S.r.l.  
Project Coordinator of S2R-OC-IP3 FAIR Stations  
[u.battista@stamtech.com](mailto:u.battista@stamtech.com)  
+39 345 6589384



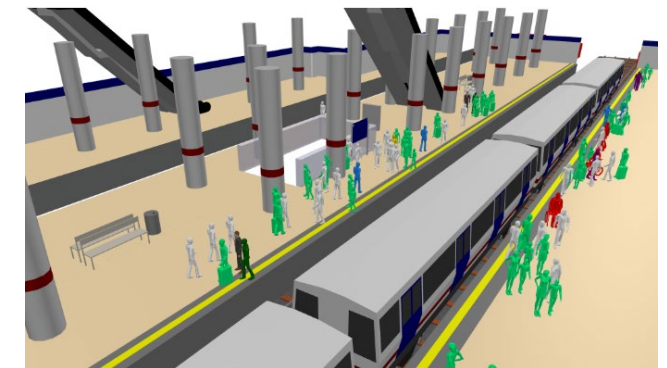


- Italian engineering SME
- 20+ years of experience in R&D
- 40+ successful EU R&D projects since FP4
- 100+ successful collaborative projects
- Transport & Security Area
  - PTI and accessibility
  - Reconfigurable tools for composite manufacturing
  - Software and DataBase development
  - Data analytics and monitoring
  - Mobile apps and decision-support systems
  - AI, machine learning, neural networks
  - Risk assessment and cost-benefit analysis
  - Crowd modelling and simulation
  - Analysis of user behaviour



MASTERING EXCELLENCE

[www.stamtech.com](http://www.stamtech.com)





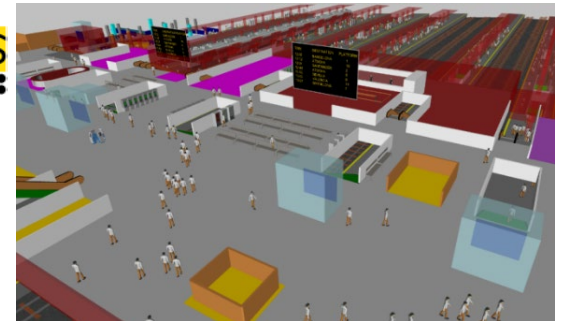
- **TRAINS SAFE** (FP5, partner) “Railway interoperable manufacture and modular safety”



- **SECUREMETRO** (FP7, partner) “Inherently secure blast resistant and fire safe metro vehicles”, [securemetro.inrets.fr](http://securemetro.inrets.fr)



- **RAMPART** (DG Home, partner) “Development of a risk assessment toolbox for the prevention and reduction of terrorist attacks on metro and light-rail critical infrastructures”, [www.rampart-project.eu](http://www.rampart-project.eu)



- **FAIR Stations** (H2020, coordinator) “Future secure and accessible rail stations”, [www.fairstations.eu](http://www.fairstations.eu)



## **S2R-OC-IP1-01-2019 Advanced car body shells for railways and light material and innovative doors and train modularity**

### Current Consortium

- Stam (IT): PTI systems, accessibility, composite manufacturing tools
- University of Newcastle (UK): accessibility, composites and joints
- Metro de Madrid (ES): metro operator and use-case
- PRMs interest group (TBC)
- Transport association (TBC)

### Partners sought

- Structural health monitoring
- Noise reduction
- Train interiors
- Driving cabin

- **S2R-OC-IP4-01-2019: Complementary Travel Expert Services**
  - Smartphone apps, support-decision systems, user behaviour analysis
- **S2R-OC-IPX-01-2019: Artificial Intelligence (A.I.) for the railway sector**
  - AI, robotics, machine learning, neural networks
- **S2R-OC-IP2-02-2019: Support to development of demonstrator platform for Traffic Management**
  - DataBase and software development
- **S2R-OC-IP5-01-2019: Condition-based and preventive maintenance for locomotive bogie**
  - Data analytics and monitoring



**Umberto Battista**  
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**SAKARYA**  
UNIVERSITY

*Public University: 13 Faculties, 6 Institutes, 4 Vocational Schools*

*Number of Research and Application Centres: 36*

*Total student numbers: 58651 (B.Sc.-42059, M.Sc.-8563, PhD-1665)*

*Faculty members: 834 (Prof.-30%, Assoc. Prof.-20%, Assist. Prof.- % 50)*



## **Prof. Dr. Erkan ÇELEBİ**

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Telefax: ++902642955601

e-mail: [ecelebi@sakarya.edu.tr](mailto:ecelebi@sakarya.edu.tr)

Web: <http://www.ecelebi.sakarya.edu.tr/en>



**TUBITAK Research Project Team**: In situ measurement of environmental vibrations induced by high -speed trains and mitigation of structural vibrations (duration: 2018-2021).



*Committee Member of Scientific Research &  
Development Coordination of Engineering Faculty*

**Web:** <http://mf.sakarya.edu.tr/en> (SAU Engineering Faculty)

**Web:** <http://cie.sakarya.edu.tr/en> (SAU Civil Engineering)

Cooperated with <http://inism.tf.duzce.edu.tr/Sayfa/1278/>

Linked with <https://inismuh.itu.edu.tr/en/research/laboratories/structure-and-control-eng-lab>

# Interest Topic

## **Project proposal title:**

*Developing an innovative wave isolation barrier to reduce the effects of vibrations generated by railway traffic on railway track and nearby building structures*

**Problem statement to be addressed:** *S2R-OC-CCA-01-2019: Noise & Vibration*

## **Project description:**

*Railway induced ground motions not only can give damage to the nearby buildings and their footings but also effect the human comfort by undesired vibrations. Thus, for an effective protection of railway platforms, nearby buildings, and mitigation of strong vibrations, optimum in-situ isolation material needs to be determined by well understanding the wave propagation problems depending on soils conditions. Extensive in-situ research are still required for both recent ongoing construction projects in soft soil deposits and for planned construction projects on highly populated areas.*

*The goal of this research study can be summarized as to determine comfort disturbance and devastating structural vibration created by high speed trains on railway track and nearby structures and to reduce these vibrations depending on the design parameters for in-situ conditions.*

*The Isolation performance of wave barriers based on construction location, geometrical dimensions, filling material and various train speed will be investigated parametrically both conducting numerical and experimental studies (Figure1).*



A vertical strip of six photographs showing the construction of a stone-lined water channel. The photos show the channel being dug, lined with stones, and filled with water, with a person visible in the second photo.

- (a) *Problem Statement,*
- (b) *Experimental Site,*
- (c) *Mitigation Measures*

(c)

*Developing a cost effective wave barrier model to reduce the adverse effects of strong environmental vibrations in soft soils which can decrease the serviceability life of railway track and structural elements of building*

***Preparing a response spectrum curves for various soil conditions to be used in the design of industrial structures and residential buildings planned in areas close to high-speed train lines to avoid vibration affects causing discomfort in human daily life and structural damages***

# **National and International RESEARCH and INNOVATIVE EXPERIENCE on Railway Train-induced Structural Vibrations**

## **Know How in**

- *Numerical and Experimental Investigations of Soil- Structure Dynamic Interaction for Engineering Structures*
- *Fields Experiments on Wave Propagation and Vibration Isolation*
- *In situ Investigations on Reduction Measures of Train-Induced Ground Borne Vibrations*

## **Research PROJECTS Funding (over €150000)**

Field experiments on wave propagation and vibration isolation on track slab and surrounding ground by using wave barriers (*Financially supported by Turkish State Planning Organization (DPT) under the project number of 2003 K 120970, duration: 2004-2007*).

Novel methods for mitigation of high speed train induced structural vibrations (*Financially supported by SAU Scientific Research Projects funding under the project number of 2011-50-02-011, duration: 2011-2014*).

Experimental studies on soil-structure interaction problems by using small-scaled shaking table (*Financially supported by SAU Scientific Research Projects funding under the project number of 2013-01-04-022, duration: 2013-2015*).

In situ measurement of environmental vibrations induced by high-speed trains and mitigation of structural vibrations (*Financially supported by TUBITAK (The Scientific and Technological Research Council of Turkey) Research Project funding under the project number of 217M427, duration: 2018-2021*).

## **Chapters in BOOKS**

S.Fırat, E. Çelebi, , G. Beyhan İ. Çankaya, O. Kırtel, İ. Vural , ***Wave Propagation in Materials for Modern Applications***, VI Chapter: *Some experimental Methods in Wave Propagations*, pages 509-526, InTech, Croatia, ISBN:978-953-7619-65-7, 2010.

# National and International Research and Innovative Experience on Railway Train-induced Vibrations



## Selected PUBLICATIONS indexed in Science Citation Index

- Goktepe, Fatih; Kuyuk, Huseyin S.; **Celebi, Erkan**, “In-situ measurement of railway-traffic induced vibrations nearby the liquid-storage tank”, *Earthquakes & Structures*, Vol.: 12, Issue: 5, 583-589, May 2017.
- **Çelebi E.** and Kirtel, O., Non Linear 2-D FE Modelling for Prediction of Screening Performance of Thin Walled Trench Barriers in Mitigation of Train-Induced Ground Vibrations, *Construction and Building Materials*, Volume 42, Pages 122-131, February 2013.
- **Çelebi E.**, Goktepe F., Non-linear 2-D FE analysis for the assessment of isolation performance of wave impeding barrier in reduction of railway-induced surface waves, *Construction and Building Materials*, Volume 36, Pages 1-13, November 2012.
- **Çelebi E.**, Fırat S., Beyhan G., Çankaya İ., İ. Vural, O. Kirtel, “Field experiments on wave propagation and vibration isolation by using wave barriers”, *Soil Dynamics and Earthquake Engineering*, Volume 29, Issue 5, Pages 824-833, May 2009.
- **Çelebi E.**, “Three dimensional Modelling of Train-Track and Sub-Soil for Analysis of Surface Vibrations Due to Moving Loads”, *Journal of Applied Mathematics and Computation*, Volume 179, Issue 1, Pages 209-230, August 2006 .
- **Çelebi, E.**, Schmid G., “Investigation of Ground Vibrations Induced by Moving Loads” *Journal of Engineering Structures*, Volume 27, Issue 24, Pages 1981-1998, December 2005.

# THE “SUSTAINABLE-CITY PROMOTER”

AN EVOLUTION OF TRAIN STATIONS TO MAKE SMART &  
SUSTAINABLE CITIES WHILE INCREASING BUSINESS OF  
COMPANIES AND CREATING NEW JOBS

In the context of Shift2Rail's topic #10  
“Stations and smart city mobility”

Conceptualized by **Alice Lunardon**  
Architect & Sustainability Consultant  
Independent\_France/Italy

[www.sustainability-booster.com](http://www.sustainability-booster.com) - [alice.lunardon@gmail.com](mailto:alice.lunardon@gmail.com)

## Collaborations:

### Experience-Makers

Strategy & Transformation Consultants  
Small-Medium Enterprise\_France  
[www.experience-makers.fr](http://www.experience-makers.fr)  
[christophe.chaptal@experience-makers.fr](mailto:christophe.chaptal@experience-makers.fr)  
38 Rue Godefroy Cavaignac 75011 Paris

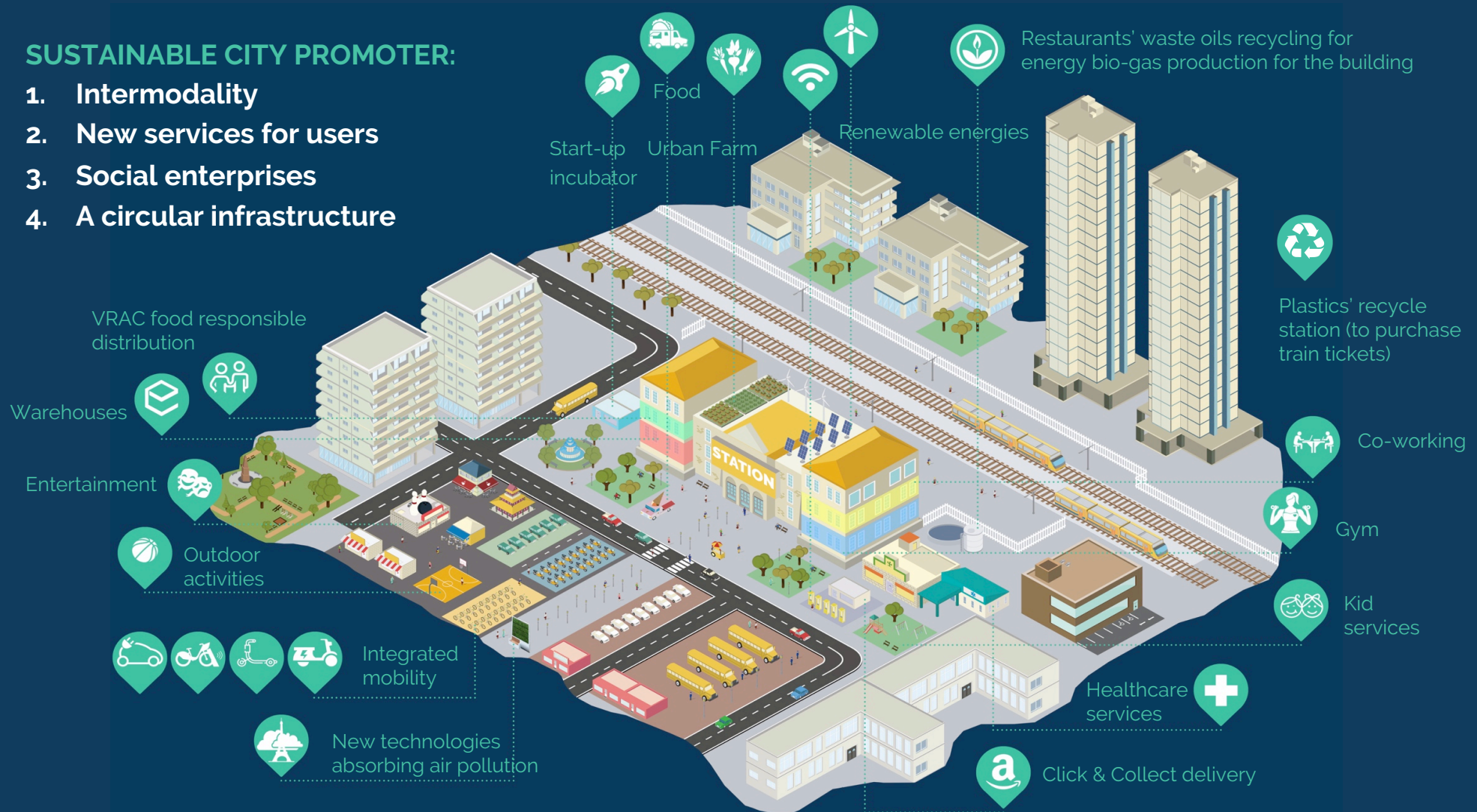
### Nicolas Fieulaine

Associate Professor Social Psychology  
Université Lumière Lyon 2  
[fieulaine.socialpsychology.org/](http://fieulaine.socialpsychology.org/)  
[nf.etudes@gmail.com](mailto:nf.etudes@gmail.com)  
GRePS Université de Lyon

# Train Station as a hub of mobility & services for citizens and as an energy-efficient & circular infrastructure

## SUSTAINABLE CITY PROMOTER:

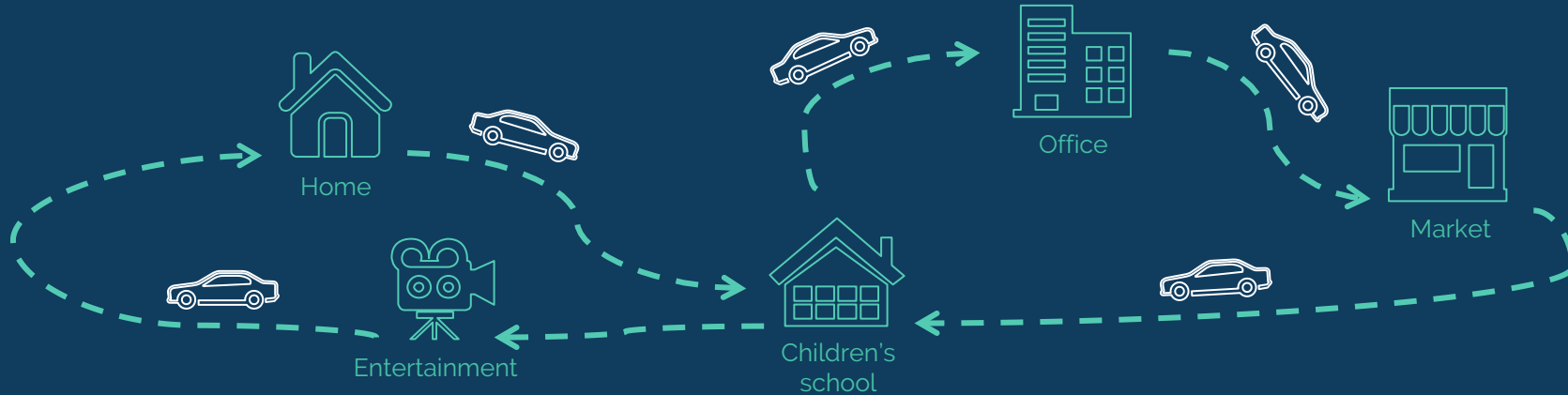
1. Intermodality
2. New services for users
3. Social enterprises
4. A circular infrastructure



**Technology** is improving sectors and **Social Enterprises** are revolutionizing the way to make business producing profit while developing communities and protecting the environment.

# The Sustainable City Promoter fosters mobility for all, social inclusion and city's decarbonization.

## Before : car-based



## Effects



## After : train-based



## Effects



# Methodology to design a business case for the SCP

## PHASE 1 CONTEXT ANALYSIS



### ANALYSIS OF THE POPULATION POOL

Analysis of the usual clients' needs + analysis of new potential clients' needs. Analysis must be done for services, commerce and mobility modes.

### CITY ASSESSMENT

Analysis of the KPIs of a sustainable smart city (based on the UNECE protocol) + evaluation of which SDGs the city aims to achieve.

## PHASE 2 BUSINESS MODEL



A business model based on the "**client experience**" that takes in account the User value, Emotion, Ethics, Environment, Social aspect and determines the **offer** for users, clients and citizens.

A business model for the "**circular infrastructure**" using the **Natural Capital** for its functioning and optimizing consumption through the **digitalization** of the facility management.

Using the **Nudge** to change users' routine : a concept in behavioral science and economics that proposes positive reinforcement to **influence the behavior** and decision making of groups.

# Stakeholders engagement



**RAILWAY COMPANIES** Design the business model and manage pilot projects all around Europe. Advocate the concept.



**PRIVATE PARTNERS** Invest in projects and participate to the business model design.

**These partners could be:**

- Energy providers
- Free floating companies
- Promoters



**CITIZENS** Through surveys, action involvement and campaigns & Nudge practice.



**LOCAL INSTITUTIONS** Subvention projects and participate to the business model design in order to integrate the "city assessment" and KPIs for a smart sustainable city to achieve their SDGs.



**EUROPEAN COMMISSION** Through instruments and funding, H2020, ERDF & others.

## Outcomes & impacts

### UN AGENDA 2030



### EU AGENDA & STRATEGY

#### Common Transport Policy

"Placing people at the heart of transport policy".

#### Urban Agenda

Urban mobility, Air quality, Digital & Energy transition, Climate adaptation, Circular economy, Jobs, Inclusion, Public procurement.

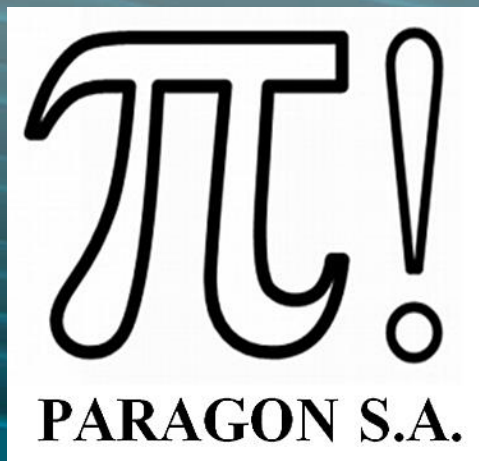
### VALUE CREATION

#### Business for stakeholders



#### Wellness & Sustainability





# SME RTD Partner Presentation

Shift2Rail Info Day on 2019 Call for Proposals

The Square, Brussels, 06/02/2019

Presenter: Mr. Harry Tsahalīs

Email: [htsahalīs@paragon.gr](mailto:htsahalīs@paragon.gr)

LinkedIn: <https://gr.linkedin.com/in/htsahalīs>

Web: <https://ict2018.b2match.io/participants/230>

# Profile



- Research & Technology Development SME (micro-SME) active in R&D and Commercial services.
- Based in Athens (EL), est. Y1995, active as an SME RTD partner in EC Framework Programme research projects from Framework Programme 4 - Horizon 2020.
- Active in a no. of research areas (participation (to date) to 30 EC research projects) in areas that include: Aeronautics (including Clean JTI) • ICT • Factories of the Future (FoF) • Energy & Environment • Security.
- Summary info on EC projects experience, expertise, examples of research derived applications:
  - <https://ict2018.b2match.io/participants/230>
- One of our commercial activities is the representation of industrial & scientific instrumentation manufacturers to industrial and academic markets. Our SME represents for over a decade a number of international manufacturers (sensors, daq/dsp, portable and remote measurement & analysis, actuation) from the EU and USA to markets in Greece and S.E. Europe.



# Expertise areas + S2R '19 Main topics of interest

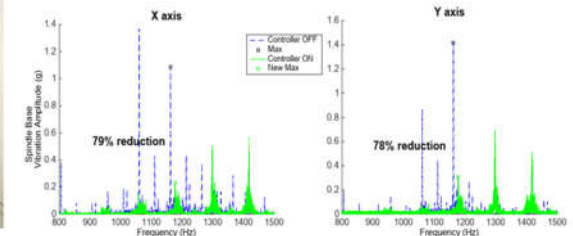
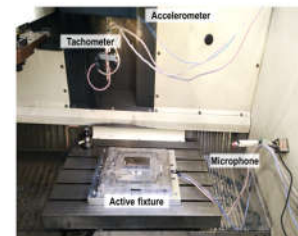
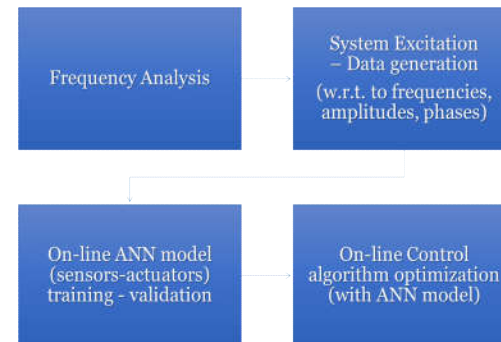
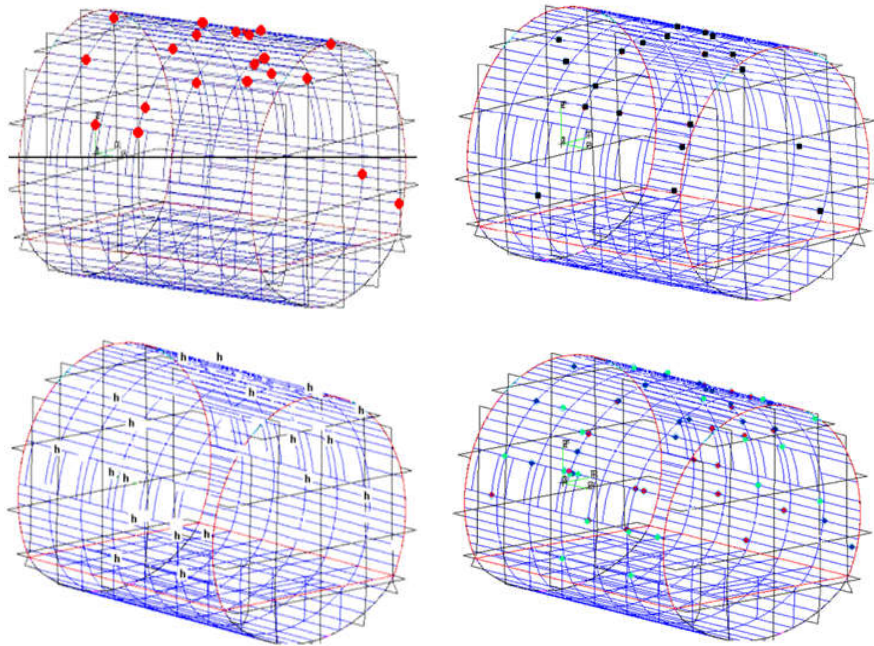


- Computational - Artificial Intelligence.
- Evolutionary Computation - Multi-objective Optimization.
- Multi-objective Optimization for Sensor - Actuator networks.
- Acoustics (incl. beamforming) & Vibration -related applications (measurement - processing - analysis - monitoring - detection - control - optimization).
- Active Vibration Control (AVC).
- Active Structural Acoustic Control (ASAC).
- Active Noise Control (ANC).
- Active Flow Control (AFC) | active aerodynamics.
- Structural Health Monitoring networks (SHM).
- Integrated -Simultaneously Optimized- Active Control/Monitoring networks | e.g., combined active vibration control + structural health monitoring.
- Multi-parameter Passengers / Crews Fatigue(Comfort) & Well-being (subjective + objective) modeling - simulation - monitoring - control applications.
- Centralized / De-centralized Fault Detection - Diagnostics applications (mechanical, electrical, electro-mechanical systems; in design, testing, on-line/off-line)
- **S2R-OC-CCA-01-2019:** Noise & Vibration, with heightened interest on 'New Technologies'.
- **S2R-OC-IP1-01-2019:** Advanced Car body shells for railways and light material and innovative doors and train modularity, with heightened interest on 'Structural Health Monitoring Systems' and 'Solutions for thermal and noise reduction'.
- **S2R-OC-IP1-02-2019:** Tools, methodologies and technological development of next generation of Running Gear, with heightened interest on 'Control technology'.
- **S2R-OC-IP5-01-2019:** Condition-based and preventive maintenance for locomotive bogie.
- **S2R-OC-IP5-02-2019:** Advanced obstacle detection and track intrusion system for autonomous freight train.
- **S2R-OC-IP3-01-2019:** Future traction power supply for railways and public transport.



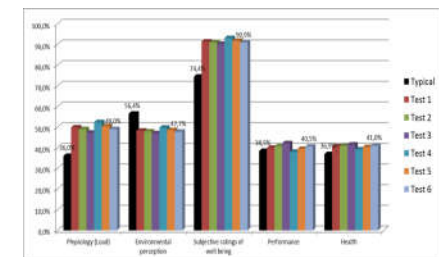
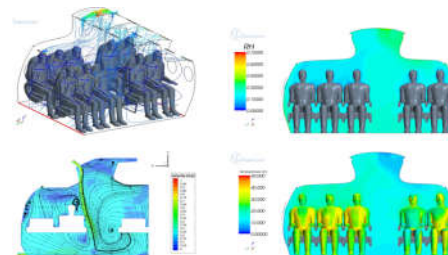
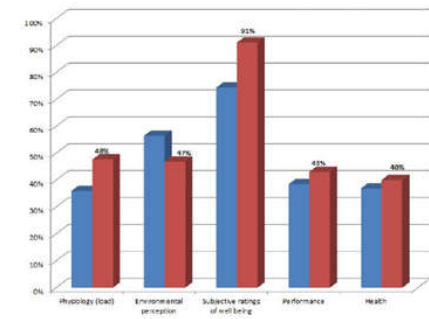
# Active Control / Monitoring Systems

- Model -based Active Control Systems (active vibration, structural acoustic, noise, flow control, active/passive SHM, and combined SHM/AVC systems).
- Non Model -based Active Control Systems (automated 'on-line' setup of active control systems, combination of ANNs + EAs).



# Multi-parameter Passenger Fatigue & Well-being

- Method and Application (based on ANNs) facilitating modeling - simulation - processing - assessment of the combined impact of interior environmental conditions on passengers and/or crews comfort & well-being.
- Integration of a range of parameters:
  - Environmental parameters (Noise ▪ Vibration ▪ Psycho-acoustics ▪ Temperature ▪ Humidity ▪ Airflow ▪ Glare ▪ Pollutants ▪ Other).
  - Medical - Physiological parameters.
  - Psychological - Sociological parameters.
- Sensor -based applications (during actual revenue flights) and Design -based applications (environmental control systems - passenger impact simulation in product development - virtual design phase).





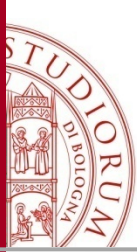
# Groups (1)



# Groups (1)

## Part II

15:05	<b>University of Bologna</b>	Davide Giusino
15:10	<b>Bozankaya</b>	Türker Yüksel
15:15	<b>EGLF Engineering</b>	Frédéric Henry
15:20	<b>DITECFER</b>	Guido Ancarani
15:25	<b>Alcatel-Lucent</b>	Emmanuel Helbert
15:30	<b>Asaş Alüminyum</b>	Cem Mehmetlioğlu
15:35	<b>Hitrail</b>	Antonio E. López
<b>15:40</b>	<b>NETWORKING GROUPS</b>	

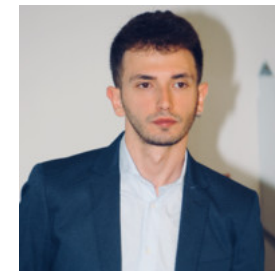


## Human Factors, Risk and Safety research group

Alma Mater Studiorum – University of Bologna (Italy)

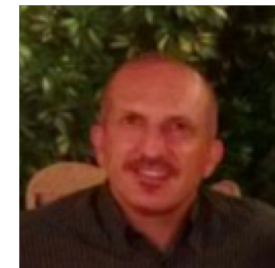
**Dr. Daide Giusino**, M.Sc.

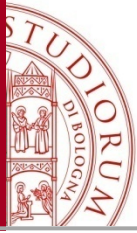
Department of Psychology  
davide.giusino2@unibo.it



**Prof. Luca Pietrantoni**, Full Professor

Department of Psychology  
luca.pietrantoni@unibo.it





# Areas of Expertise

---

- Human Factors and Ergonomics
- Traffic and Transport Behaviour
- Risk and Safety in Transportation

## Research activities

- Users' risky and safe behaviours analysis and promotion
- Technology, automation and digitisation acceptance
- Socio-cultural differences in travel choices and behaviour
- Human-machine interaction and communication
- User-centered design
- Human performance
- Human capital



# SHIFT2RAIL'S 2019 INFORMATION DAY: Open Call for Proposals

- [S2R-OC-IP1-01-2019 Advanced car body shells for railways and light material and innovative doors and train modularity:](#)
  - *Doors*: assessing **passenger comfort** to support a **user-centered design** of innovative door solutions allowing easy and friendly access to all categories
  - *Interiors*: analysing differential impacts of **human factors**, **cognition** and **culture** to design the most efficient cabin commands
  - developing a European survey to define new **human-machine interactions** and a new common human-machine interface
- [S2R-OC-IP4-01-2019 Complementary Travel Expert Services:](#)
  - investigating factors influencing consumers' **travel decision-making and behaviour** based on behavioural studies and **passenger surveys** about aspects **comfort**, **satisfaction** and **specific needs**



# SHIFT2RAIL'S 2019 INFORMATION DAY: Open Call for Proposals

- [S2R-OC-IPX-02-2019 Breaking language barriers:](#)
  - examining (un)safe and (un)effective driver **communication** across routine, degraded and emergency situations to support the design and development of the aimed technological solutions
  - evaluating the technological communication solution's **impact on safety** based on **human factors methods**
- [S2R-CFM-IP5-01-2019 Smart data-based assets and efficient rail freight operation:](#)
  - *CBM*: applying human factors investigation methods to support a **user-centric** design of condition based maintenance dashboards
  - *Real-time Network Management*: analysing interactions between yard and infrastructure manager to promote solutions for improving **human interaction and communication**
  - Intelligent Video Gate Terminals: applying human factors methods to support a **user-centric** design of IVG

# Bologna main Italian railway junction



- Strategic geographical location
- Italy's fifth-largest station
- 159 000 passengers/day
- 700 trains/day

- Research and Innovation as priorities of UNIBO mission
- EU Project Management with technical, legal, financial, and administrative expertise



# BOZANKAYA



Research & Development Department

Expression of Interest for Shift2Rail 2019 Call

# Company Profile

- Established in 1989 in Salzgitter, Germany and in 2003 in Ankara, Turkey
- R&D Centre in 2015, Turkey
- Active in electrical bus and railway industries
- 1000+ employees
- Area of expertise: Rolling stock manufacturing, commercial vehicle manufacturing, computer aided design
- Projects: Malatya Trambus, Kayseri Tram, Bangkok Metro, more than 300 electric buses in Turkey and EU

# Bozankaya R&D Centre and Activities

- 29 projects in 6 years
  - 21 completed → 7 TÜBİTAK, 14 own resource  
Total budget: 42.7 M TL
  - 6 ongoing → 4 TÜBİTAK, 1 TTGV, 1 EU Project (EME), 1 own resource  
Total budget: 109.4 M TL
  - 2 evaluated → TÜBİTAK  
Total budget: 4.5 M TL
- R&D volume: 156.6 M TL
- R&D expense in 2017: 19.8 M TL
- R&D Expense/Sales in last 3 years: 7,2%
- 22 academic advisors from 13 universities
- R&D focused human resource and know-how
- Dissemination and localization through R&D

# Past & Present Projects



# Contact Information

Mr. Durmuş SAĞIR

Design Engineer

Bozankaya

E-mail: [durmussagir@bozankaya.com](mailto:durmussagir@bozankaya.com)

[www.bozankaya.com.tr](http://www.bozankaya.com.tr)

+90 312 267 11 41

# WHO ARE WE ?

---



- **Engineering Company in transport, mainly Railway.**
- **15 years of experience.**
- **Located in Belgium: 3 offices**
- **Daily involved in projects with international dimension.**
  - 4 languages
- **Contact: [info@eglf-engineering.be](mailto:info@eglf-engineering.be)**
- **URL: <http://www.eglf-engineering.be>**

# TRANSPORT AS CENTER OF ACTIVITIES

---

## Mainly:

- **Railway**
  - Rolling Stock
  - Signaling
  - Infrastructure (Tunnels)
- **Road Public Transport**
  - Electronic Equipment for operators
- **Automotive**
  - Embedded electronics devices
  - Communication intra-vehicles



# OUR COMPETENCIES

---

## Some of our expertise domains:

- **System Engineering**
  - System Architecture
  - Technical specifications (functional/hardware)
  - Tests and validation
- **Safety/Risk Analysis (RAMS)**
- **Software**
  - Analysis
  - Development
- **Project Management**
- **Process Definition**



# INNOVATION WITHIN SHIFT2RAIL

---

Based on our previous experience, those innovation are of interest for us:

- **IP2: Advanced traffic management and control systems**
  - Already involved on “Train Integrity” R&D in the past.
  - Deeply involved in ETCS deployment.
  - Experience in ATO on-board algorithms.
  - Assessment competences.
  - Wireless tele-communication expertise.
- **Other, if matching with our competencies and expertise**

# COUNT ON US

---

## Because:

- **We are engineers used to work in innovative context.**
- **We are multi-disciplinary.**
- **We have demonstrated experience in safety developments**
- **We are used to work with partners/customers abroad.**



# The leading Railway Cluster of Italy

Contacts:

Mr Guido ANCARANI | Business Development

[guido.ancarani@ditecfer.partners](mailto:guido.ancarani@ditecfer.partners)

Ms Veronica Elena BOCCI | Coordinator

[coordinatore@ditecfer.eu](mailto:coordinatore@ditecfer.eu)

[www.ditecfer.eu](http://www.ditecfer.eu) | [www.ditecfer.partners](http://www.ditecfer.partners) |  @DITECFER



**DITECFER**  
DISTRICT FOR RAIL TECHNOLOGIES  
HIGH SPEED SAFETY & SECURITY

I L T E  
E T Y

# WE CAN BRING EXCELLENCE IN THESE FIELDS

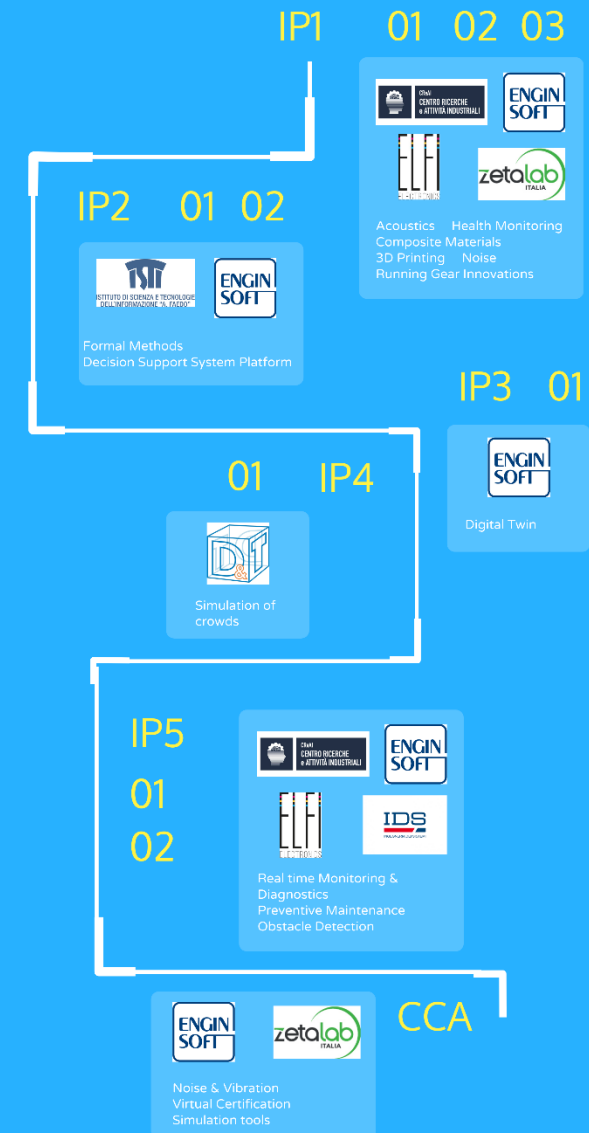


### IP1-02 / IP5-01

to **instrument bogies** in order to monitor the actual mission profile in real time, to diagnose the status and to collect data for carrying out maintenance on condition and fault prediction, in order to increase their reliability and to reduce the life-cycle-cost. Methods and algorithms used by our company in other research projects can be improved in order **to monitor frame and suspension in addition to wheelset and bearings**.

### IP1-01

to **redesign structural members and panels with integrated sensors and low voltage circuits** to monitor stresses, vibrations, noise, temperature, air quality, smoke and fire in order to analyze the actual mission profile in real time, to diagnose the status and to collect data for carrying out maintenance on condition and fault prediction. Moreover, lighting system can be redesigned with **Li-Fi capability** for data broadcasting and communications.



## SOME DETAILS ON PROJECT IDEAS

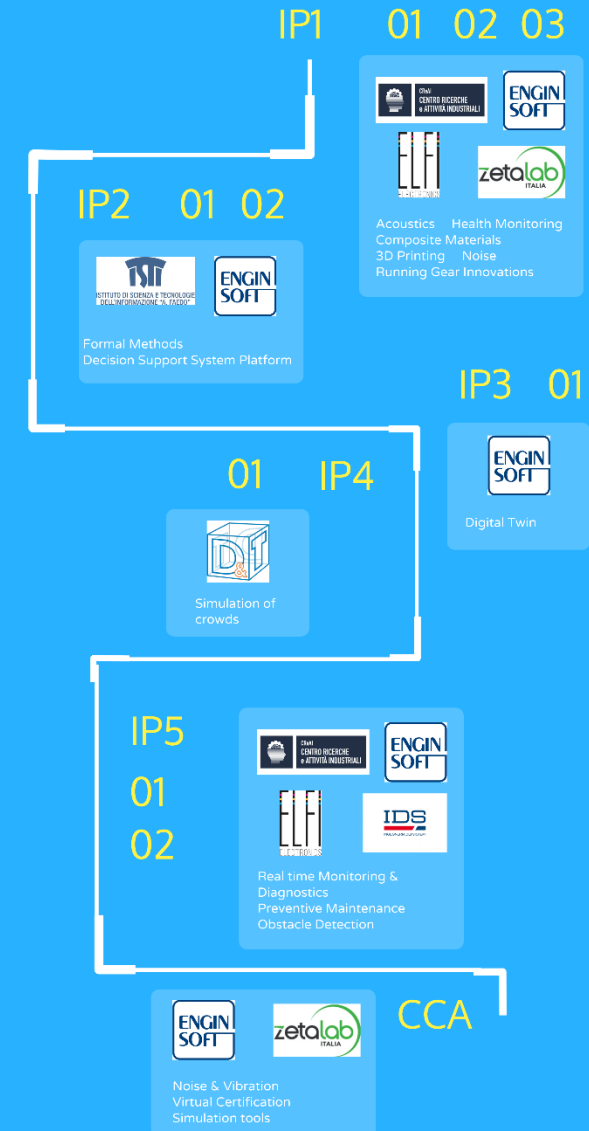
### IP5-02

to prototype an **improved performances SIL-4 radar** (e.g. to minimize false positives) to be exploited both as track-side installation to enable “**behind the curve**” **obstacles detection** for the overcoming freight trains and as a “**track intrusion detection system**”, to overcome un-authorised and / or dangerous items and people trespassing over sensitive areas. + to prototype an **on-board radar obstacle detection system**, by performing an experimental program to assess the effects of the railways environment on radar technology.

### IP4-01

to apply and **extend D&T crowd simulation algorithms** in order to:

- 1) Predict behaviour and travel time spent in travel bottlenecks (paths of short length and long duration), including pedestrian legs connecting interchange nodes, and
- 2) Provide, in real time, situation-aware and crowd-compatible alternative paths to the travel services/apps.



# LEADERSHIP VS. PARTNERSHIP

## LEADERSHIP → IP5-02

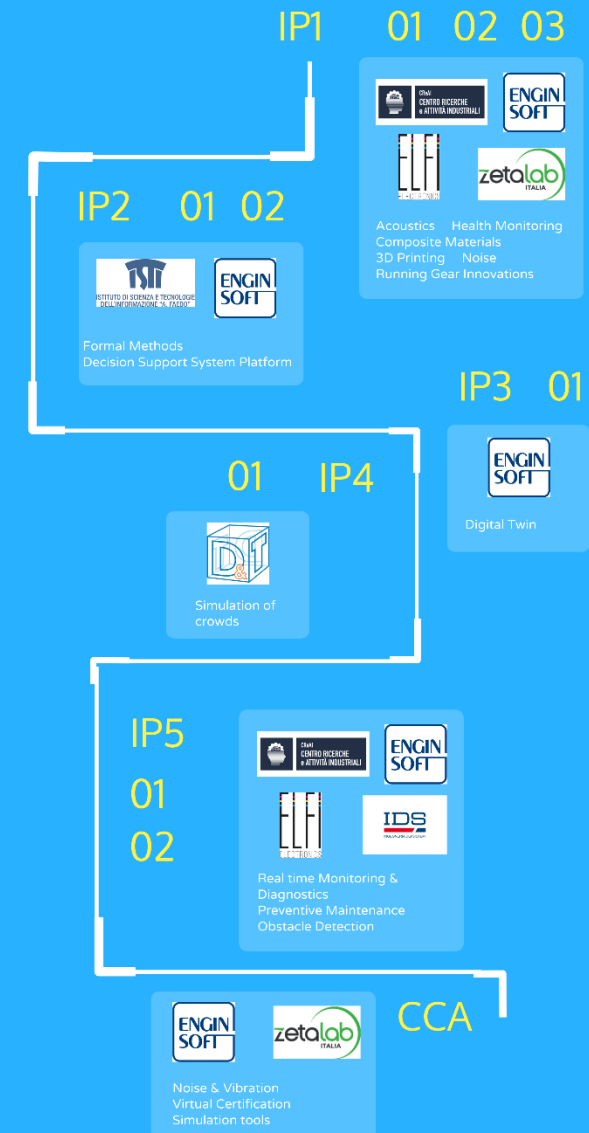
- ✓ Capability to lead a consortium with a **Large Company** specialised on the topic. Relevant operators/infra managers/companies/universities can contact us.

## PARTNERSHIP → Other cited IPs

We can offer:

- ✓ **SMEs** with very focused competences tailored for the Topics.
- ✓ A leading **Cluster** very effective in Dissemination and Communication in general and more specifically in Cybersecurity.

Mr Guido ANCARANI | Business Development | [guido.ancarani@ditecfer.partners](mailto:guido.ancarani@ditecfer.partners)  
Ms Veronica Elena BOCCI | Coordinator | [coordinatore@ditecfer.eu](mailto:coordinatore@ditecfer.eu)





# Shift2Rail Call for Proposals 2019

Alcatel-Lucent Enterprise  
France subsidiary ~1000 emp  
Cloud Connect Business Division

« To support and integrate business needs for transportation by tailoring an open and ubiquitous communication platform which connects men, machines, services and objects »

Helbert Emmanuel  
emmanuel.helbert@al-enterprise.com  
Muraine Roch  
roch.muraine@al-enterprise.com  
www.al-enterprise.com



## Our Assets

- Cloud Building blocks for multimedia communication
- Communication engine
- Open evolutive API platform

# Rainbow, the Real-Time Relationship Engine

## AS A SECURE DATA PROVIDER

Messages, Files, Emoji  
Conference rooms,  
Groups, Contacts  
Notifications  
Audio/Video Media  
Records  
Location  
Activity (collab, phone...)  
Presence  
...

Real Time  
Secure  
P2P conversation  
Group conversation  
Media Relay  
Client-To-Client  
Client-to-Server  
Server-To-Server

## AS A SECURE DATA BROADCASTER

## Where Our Contributions Make Sense

S2R-OC-IP2-01-2019: Support to implementation of CSIRT to the railway sector

Development of a **secured real-time communication platform** to host CSIRT and CSIRT workflow as the basis of the CSIRT collaborative environment prototype

S2R-OC-IP4-01-2019: Complementary Travel Expert Services

**Real-Time communication platform** as the communication module of the Ride Sharing application to **connect** travelers and **conveys** any kind of information

S2R-OC-IPX-02-2019: Breaking language barriers

Development of a **cognitive digital assistant** which supports drivers in communication



[www.al-enterprise.com](http://www.al-enterprise.com)



[facebook.com/ALUEnterprise](https://facebook.com/ALUEnterprise)



[linkedin.com/company/alcatellucententerprise](https://linkedin.com/company/alcatellucententerprise)



[twitter.com/ALUEnterprise](https://twitter.com/ALUEnterprise)



[youtube.com/user/enterpriseALU](https://youtube.com/user/enterpriseALU)

# ASAŞ Alüminyum Sanayi Ticaret A.Ş. / TURKEY



Sadık Mutlu Ayan

Technical Coordination Group Manager

[sadik.ayan@asastr.com](mailto:sadik.ayan@asastr.com)

[www.asastr.com](http://www.asastr.com)

To be an Industrial Partner as Product/Process/Material Developer  
For Shift2Rail 2019 Open Call

## COMPANY PROFILE

**Foundation** : 1990, Gebze, İSTANBUL  
**Nr Employees** : 2400+  
**Turn Over (2017)** : 463m.€  
**Land Area** : 750.000m<sup>2</sup>  
**Closed Area** : 300.000m<sup>2</sup>  
**Export** : 80+ Countries  
**Growth Rate** : % 22 (avrg in 25 years)  
**Locations** : Head Office; Kavacak/İSTANBUL,  
Factory; Akyazı/ SAKARYA  
Warehouse; Neuwiet, GERMANY



## GROUP OPERATION

- Aluminium Extrusion Products,
- Aluminium Architectural Systems
- Aluminium Composite Panels
- Aluminium Flat Rolled Products
- PVC Windows and Doors Systems,
- Roller Shutter and Steel Shutter Systems
- Aluminium Design Products
- ASAŞART



### ALUMINIUM EXTRUSION PRODUCTION (Since 1992)

- 7 Extrusion lines (75.000t/y)
  - 55mn biggest press in Turkey
  - 0,5kg-75kg/m profile up to 600mm width complex profiles.
  - Billet Casting (90.000t/y)
  - Extrusion Die Production (2500/y)
  - Anodic Oxidation (40.000T/Y)
  - Electrostatic Powder Coating (25.000t/y)
  - Sublimation
  - Mechanical Treatment Facility
- CNC Machining, (up to 30m x 4m x 1m)**  
**Welding ( robotic up to 30m) Cutting, Bending, Kitting, Forming, Deburring, Cleaning, Assembly**



### FLAT ROLLED PRODUCTS PRODUCTION ( Since 2014)

- Continuous casting lines (120.000t/y)
- Rolling mill (140.000t/y)
- Plate annealing kilns
- Slitting/cut-to-length lines
- Foil Mill (75.000t/y)
- Foil Slitting Line
- Painted plate production facilities. (50.000t/y)
- Widest and fastest foil mill in the world
- Ability to roll down to 6 microns
- Low carbon foot print with regenerative thermal oxidizer



### PVC PROFILE PRODUCTION FACILITY (Since 1992)

- PVC Profile Production 35.000 t/y
- 26 PVC extrusion lines
- Wide range of products for different climate condition world wide
- 15 different window, door and sliding systems



### ALUMINIUM COMPOSITE PANEL PRODUCTION FACILITY (Since 2006)

- Composite panel production 10.000.000 m<sup>2</sup>/year
- Fire classification: A2, FR, B2, B1
- 20 years guarantee
- 4 Composite panel lines



### ROLLING SHUTTER FACILITY (Since 2008)

- Roller Shutter 30.000.000 m/y
- Products :37-39-43-55-55 Eco and 77 mm roller shutter and garage door slats with polyurethane filing by Aluminium Rollform technology
- Aluminium Roller Shutter Box (137-400 mm)
- Steel Commercial Door Profiles
- Galvanized Octagonal Tubes (40-60-70 mm)
- Accessories for Roller Shutter and Commercial Door Systems
- PVC Monoblock Roller Shutter Systems



## RAILWAY PRODUCTS

## EXPERTISING ON RAILWAY

## REFERENCES

## CERTIFICATION

1. Aluminium Tram Body Profiles&Kits
2. Aluminium Car body Profiles
3. Tram-Metro-High Speed Train Passenger Access Doors
4. Window Frames of All types of Trains
5. Access System for Disabled Cars
6. High Speed Train Side flap
7. Train Interior Accessories
8. Rack system & profiles
9. Sliding System for Freight wagon
10. Lighting, Heating System Profiles
11. Rigid Catenary System
12. Third rail production

1. Car body design & Production
2. Car body manufacturing (machining, bending, welding, assembly etc.)
3. Alloy development for railway industry
4. Large extrusion die design and manufacturing in house
5. Complex large and thin wall extrusion section production capability
6. All type of fixtures & apparatus design and manufacturing
7. Weight reduction by design new extrusion section
8. Co design & Co Engineering
9. Training on extruded product
10. Process development
11. Prototyping

## JU MEMBERS

1. ALSTOM 
2. SIEMENS 
3. BOMBARDIER 
4. CAF 
5. FAIVELEY 
6. TCDD 

## OTHERS

1. HYUNDAI ROTEM 
2. TUVASAŞ 
3. TUDEMSAŞ 
4. METRO İSTANBUL 
5. DURMARAY 
6. BOZANKAYA 
7. ÖZBİR VAGON 
8. ...

## FOR RAILWAY

ISO/TS 22163 (IRIS)  
DIN EN 15085-2

## GENERAL

ISO/TS 16949  
ISO 9001  
ISO 14001  
ISO 50001  
ISO 27001

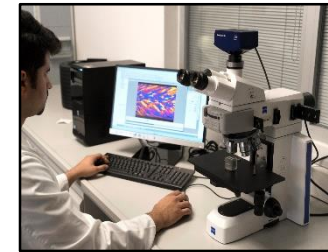
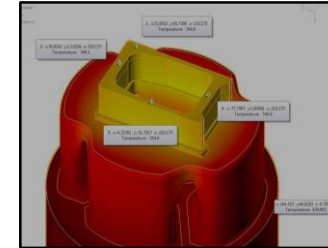


OHSAS 18001  
CE ( EN 15088 )  
CE / TS EN 40-6  
DIN EN ISO 3834-2  
EN 1090  
TS EN 14351-1  
TS 5358 EN 12608  
QUALICOAT  
QUALANOD  
RAL-GZ 7161/1



## RESEARCH & DEVELOPMENT CENTER

- 82 Researcher and technicians
- 2 Ph.D., 14 MSc, 27 bachelor's degree
- 3.100 m2 equipped with laboratories and test centers
- New product and process development
- New aluminum alloy development for extrusion and rolling
- Feasibility (Metallurgical and Mechanical properties )
- Prototype/Mock up Production
- Solutions and know how provider
- Analysis/Simulation (Ansys, Qform, Solidworks,...)
- Reverse engineering
- Metallurgical and Chemical Analysis (OES, Optical, SEM, EDS, FT-IR, DSC, Conductivity Measure, Hardness,...)
- European/ National / Local Projects



## ALUMINIUM EXTRUSION

### Billet Casting:

- 6" to 14" billets, 1xxx, 6xxx, 7xxx, 9xxx alloys
- Automatic %100 ultrasonic billet control

### Die Production:

- 200 dies/month production
- Up to Ø1000mm dies, with CAD/CAM/CAE

### Extrusion:

- 7 Extrusion presses.(12MN to 55MN Biggest in Turkey)
- 600 mm wide , 0,05 to 70 kg/m profiles extrusion
- Capacity of 75.000 tons/year

### Surface Treatment:

#### Anodizing:

Annual capacity 40.000 tons (apr.13.300.000 m<sup>2</sup>)

- Wide range of colors and surface effects
- In two facilities up to 15 m-long profiles.

#### Electrostatic Powder Coating;

- Capacity 25.000 tons (apr. 8.500.000 m<sup>2</sup>)
- Up to 8 m-long aluminium profiles and accessories
- RAL colors and various glosses in 2 lines

### Mechanical Treatment:

- Machining, Bending, Forming, Punching
- 5 axial CNC operations up to 30-meter length,
- Joining (bonding, rivet, weld bolt etc.),
- Welding (MIG/TIG) robotic and manual up to 30m
- Assembly lines

## RAILWAY R&D PROJECTS

### European :

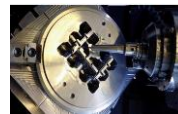
- **Mat4Rail** - H2020/Shif2Rail – On going – WP 5  
777595 - Designing the railway of the future: Fire resistant composite materials and smart modular design  
ASAS provide co-design structure, select materials, characterization, material development (metal, aluminium alloys, sheet metal, profile, aluminium foam, honeycomb etc.) testing and control support for weight reductions, acoustic and thermal conduction

[www.mat4rail.eu](http://www.mat4rail.eu)



### National :

- **Development of Parameters For High Speed Train Extrusion Products**  
Productivity Awards, Process Optimization



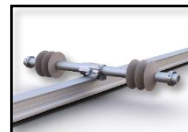
- **Development of Manufacturing Technique for Structural Aluminum Profile Die which is Wider than 500 mm**

Industrial R&D Projects Grant Programme, Process Optimization



### Local:

- **Rigid Catenary System Development**  
Internal – Finished – New Product



## OTHER PROJECTS

### European :

- **VULKANO** – H2020/SPIRE – On going – Demonstrator, 723803- Novel Integrated Refurbishment Solution As A Key Path Towards Creating Eco-efficient And Competitive Furnaces  
ASAS validate the solution proposed by VULKANO in the aluminium sector and also related to project dissemination.

<http://www.vulkano-h2020.eu/>



### National :

- **Trailer Aluminum Box Body Tipper** - Industrial R&D Projects Grant Programme – Finished – Design and manufacturing
- **Semi Trailer Chassis Hanger Bracket Mono Blok Extrusion Profile** - Industrial R&D Projects Grant Programme – Finished – Design, simulation, manufacturing, validation (patented)



### Local :

- **Heat Pipes For Satellite** – Internal – Finished – New Product



## MEMBERSHIP THE RELATED PLATFORMS

- Aluminium Manufacturers Association of Turkey (TALSAD),
- Anatolian Rail Systems Cluster (ARUS),
- Istanbul Chamber of Industry (ISO),
- Istanbul Chamber of Commerce (ITO),
- Aluminum Surface Treatment Association (AYID),
- Turkish Exporters Assembly (TIM).



## **S2R-OC-IP1-01-2019:** Advanced Car body shells for railways and light material and innovative doors and train modularity

Car Body Shell



Doors



Interiors



New aluminum alloys and new section design for railway  
(lighter, thinner, more strength)



Application to the railway sector of materials  
which used in other industries

### **Contribution/ Project Idea**

**We can**

- design lighter aluminium car body, windows and door frames,
- develop special welding, bolting, gluing, fixing process together with....
- develop special fixtures and apparatus for sub and final assembly processes
- develop extrusion die technology for railway business
- simulate all extrusion process
- improve design together OEM
- create combined process aluminium profiles and sheets,
- develop new aluminum alloys/materials
- produce mock up

# Contact Information

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Project Coordination Manager

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R&D Manager

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Cem Mehmetalioglu

R&D Specialist

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**ASAŞ ALÜMİNYUM SANAYİ TİCARET A.Ş.**

Tel: +90 264 462 47 92

[www.asastr.com](http://www.asastr.com)

[info@asastr.com](mailto:info@asastr.com)

Adress: Küçücek İstiklal Mah., Kışla Alanı Cad. No: 2-2/1,  
54400 Akyazı - Sakarya / Turkey



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THANK YOU

## CSIRT VISION

**S2R-OC-IP2-01-2019: Demonstrator development for the use of Formal Methods in railway environment - Support to implementation of CSIRT to the railway sector**

**Hit Rail BV, railway owned technical service provider  
Based in The Netherlands & operating in 22 European countries  
Expertise in railway IT connectivity and interoperability**

**[www.hitrail.com](http://www.hitrail.com)**

**Antonio E. López  
General Manager**

**[alopez@hitrail.com](mailto:alopez@hitrail.com)**

**+34 679 181 181**

# CSIRT VISION: OBJECTIVES and SCOPE

Computer Security Incident Response Team implies:

- A **distributed team** from the European Rail Sector,
- A **plan for response** to specific **incidents**,
- Operational **model for human response**,
- Platform for **secure collaborative working**,
- **Secure European Network** for interconnection.

To **deliver a CSIRT MODEL dedicated to railway**:

- Identify and agree ***Railway Needs***
- Clarify ***preferred Collaboration Approach***
- Ensure ***wide agreement among Railway Actors***

To **deliver a TRL4 collaborative environment prototype**:

- Identify reliable base ***Collaborative Working Platform***
  - ***Adapt to Rail CSIRT Model***
- or
- ***Create Rail CSIRT collaborative environment prototype***

## Enabling Connectivity and Interoperability for the European Railways

Interconnecting the main actors within the European Railways Community, HIT Rail is a foundation for international passenger, freight and infrastructure railway services.



## PROJECT ROLES / TASKS

- Rail Collaboration Modelling (People side of CSIRT)
- Technical Requirements / Architecture Design
- Secure Collaborative Working Design
- Prototype Development
- Field Testing (realistic on secure network and platform)
- Rail community organizing / events / engagement
- Secure hosting and EU secure network provision



## HIT RAIL BACKGROUND & ROLE

- Working with EU Rail stakeholders
  - <http://www.st4rt.eu>
- Organised Rail Cybersecurity Conference
  - <https://www.hitrail.com/events/cyber-security-for-railways-conference-2017>
- Studied CERT, CSIRT and ISAC models for Rail
- Conducted discussions with EC Cyber Team and several DGs
- Mediated Rail-Commission and ENISA meetings for ISAC planning
- Operate Secure VPN for Rail-to-Rail secure collaboration
- Operate secure data handling, storage and interoperability services



## NEXT STEPS

- Form the project team
- Begin detailed working a.s.a.p.
- Work closely with key Rail actors (IMs and RUs + EU level)
- Establish shared vision before proposal
- Work closely with Shift2Rail
- Discussion and preparation starts today !





# Networking groups (2)

## 15:40 – 16:00

## Part III

16:05	<b>EnginSoft S.p.A.</b>	Carla Baldasso
16:10	<b>IRT SystemX</b>	Amira Ben Hamida
16:15	<b>Expandium</b>	Claudio Ottombrino
16:20	<b>Sant'Anna School of Advanced Studies</b>	Gabriele Cecchetti
16:25	<b>Ocado</b>	Sverker Lindbo
16:30	<b>NETWORKING GROUPS</b>	



## SHIFT2RAIL Info Day

**ENGINSOFT S.p.A (SME)**

Italy, France, Germany, the UK, Sweden, Turkey, U.S.A.

Carla Baldasso

Research & Development

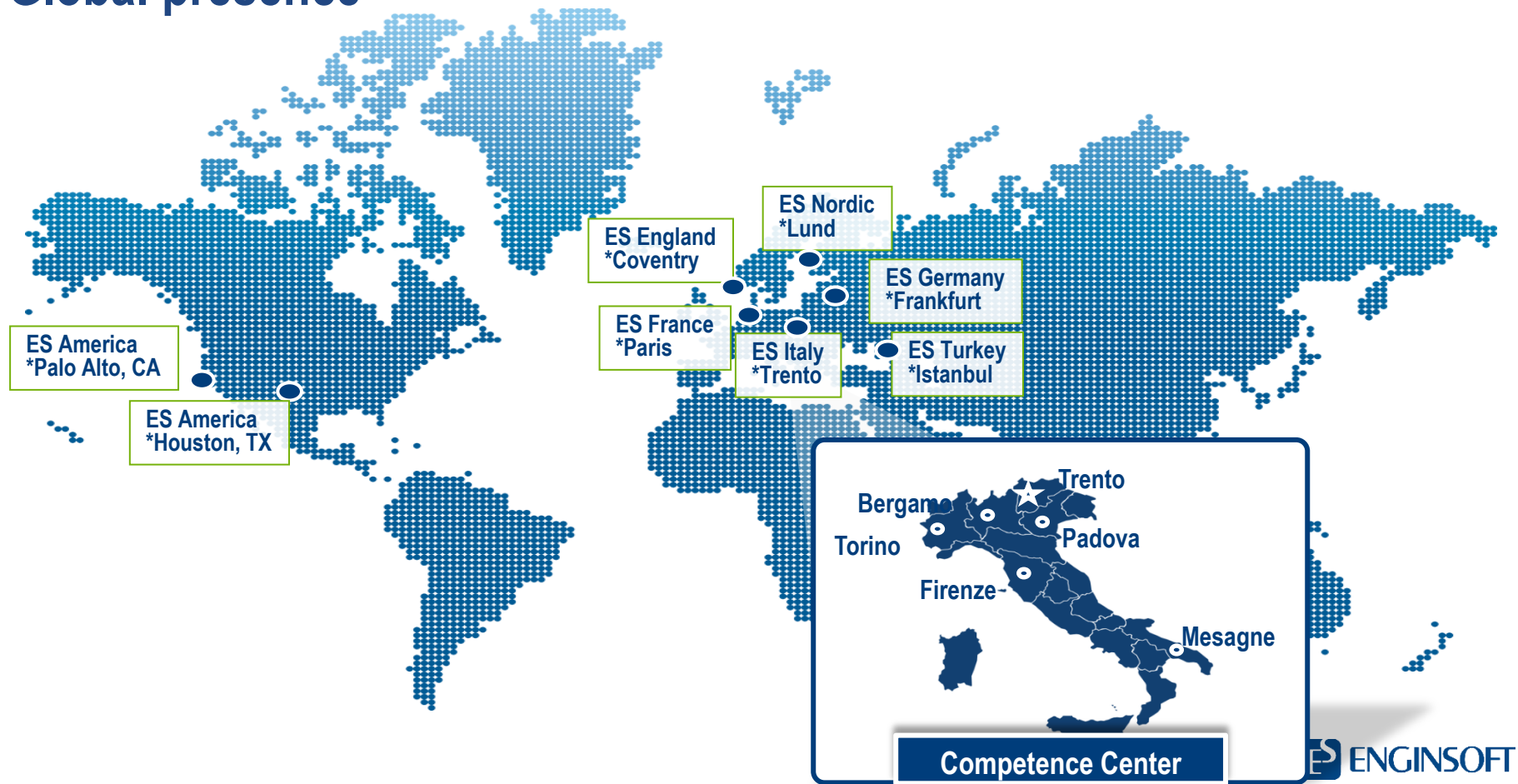
[c.baldasso@enginsoft.com](mailto:c.baldasso@enginsoft.com)

[www.enginsoft.com](http://www.enginsoft.com)

## Fact & Figures

- EnginSoft is an Italian Multinational company founded in 1983 by a group of engineers passionate in powerful advanced CAE technologies
- Today EnginSoft is formed of a group of over 120 experts in new technology and leaders in Virtual Prototyping and Optimization
- EnginSoft provides customised solutions and leading innovative technology to supporting clients in complex simulations
- Involved in EU/National Projects since 2003 (77 co-funded projects)

# Global presence



# Our activities

CONSULTING



4.000

SOFTWARE



1.500+

TRAINING

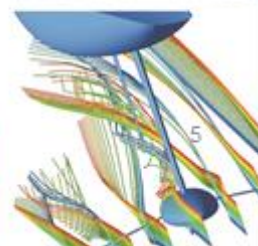
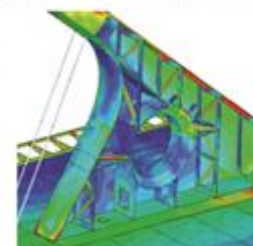
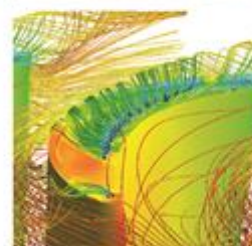


130+

RESEARCH



60+



# Our expertise for SHIFT2RAIL Calls

IP	Call	EnginSoft expertise
IP1: Cost-efficient and reliable trains, including high-capacity trains and high-speed trains	S2R-OC-IP1-01-2019: Advanced Car body shells for railways and light material and innovative doors and train modularity	<b>Materials modelling (especially for composite), multi-scale simulation, experimental calibration</b>  <b>Members of EMMC</b>  <b>3D printing process simulation and topological optimization</b>
	S2R-OC -IP1-03-2019: Support to the development of technical demonstrators for the next generation of brake systems	<b>Noise and vibration simulation</b>
IP2: Advanced Traffic Management and Control Systems	S2R-OC-IP2-02-2019: Support to development of demonstrator platform for Traffic Management	<b>Decision Support System customized platform</b> <b>Interoperability and standardization</b>
IP3:Cost-Efficient and Reliable High-Capacity Infrastructure	S2R-OC-IP3-01-2019: Future traction power supply for railways and public transport	<b>Digital Twin able to preview behaviours and envisage corrective actions</b>
IP5: Technologies for Sustainable & Attractive European Rail Freight	S2R-OC-IP5-01-2019: Condition-based and preventive maintenance for locomotive bogie	<b>Preventive maintenance platform (data analysis, meta-models, cognitive system, repairing actions)</b>
Cross Cutting Activities (CCA)	S2R-OC-CCA-01-2019: Noise & Vibration	<b>Noise &amp; Vibration, virtual certification, simulation tools in general</b>

*Carla Baldasso*  
c.baldasso@enginsoft.com  
www.enginsoft.com

*Thank you!*

 **ENGINSOFT**  
www.enginsoft.com



PROJECT IDEA :  
AN INTEGRATED FRAMEWORK FOR A CONTEXT-AWARE  
MOBILITY

AMIRA BEN HAMIDA  
IRT SYSTEMX



## AMIRA BEN HAMIDA

PROGRAM MANAGER  
SMART TERRITORIES DEPARTMENT



Up to 10 European and French projects.



10 year-experience in R&D as Research Engineer and Project Manager.



Keen on Smart Cities, Smart Mobility, Energy and Middleware domains.



PHD Graduated from INSA Lyon, in middleware and Service-Oriented Architectures.



"Be yourself, everyone else is already taken". Oscar Wilde

### CONTACT DETAILS



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**Phone:** +33 6 31 44 42 19



**Twitter:** [amirabenhamida](https://twitter.com/amirabenhamida)



## SystemX Technological Research Institute

Data science and Interaction

Systems & Software Engineering

Infrastructure and Networks

Scientific Computation & Optimization

### Partners



83

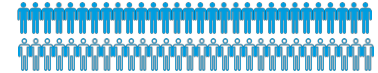
Industrial partners



24

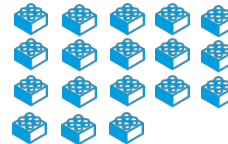
Academic laboratories

### Researchers-engineers and doctoral students



100 researchers-engineers,  
30 doctoral students

### Research projects



23 projects ongoing  
and 13 projects completed

### Finance

Industrial financing

French Research  
National Agency





### Demand-driven

Many mobility preferences

Many mobility constraints



### Numbers

8% of rail passengers  
growth per year in EU

1043 millions passengers  
2017

+44% of passengers  
growth during summer  
holidays 2017



### Objectives

How to offer to each passenger a door-2-door transport that is greener, faster, cheaper, with few walking distance, with shops, without shops, etc ?

How to reduce (as much as possible) infrastructure cost and energy consumption?



# Observation: A complex and Multi-layered System

## Sensors and Metering Historical and real-time data



Events can be addressed



User Habits can be identified



Itineraries can be updated



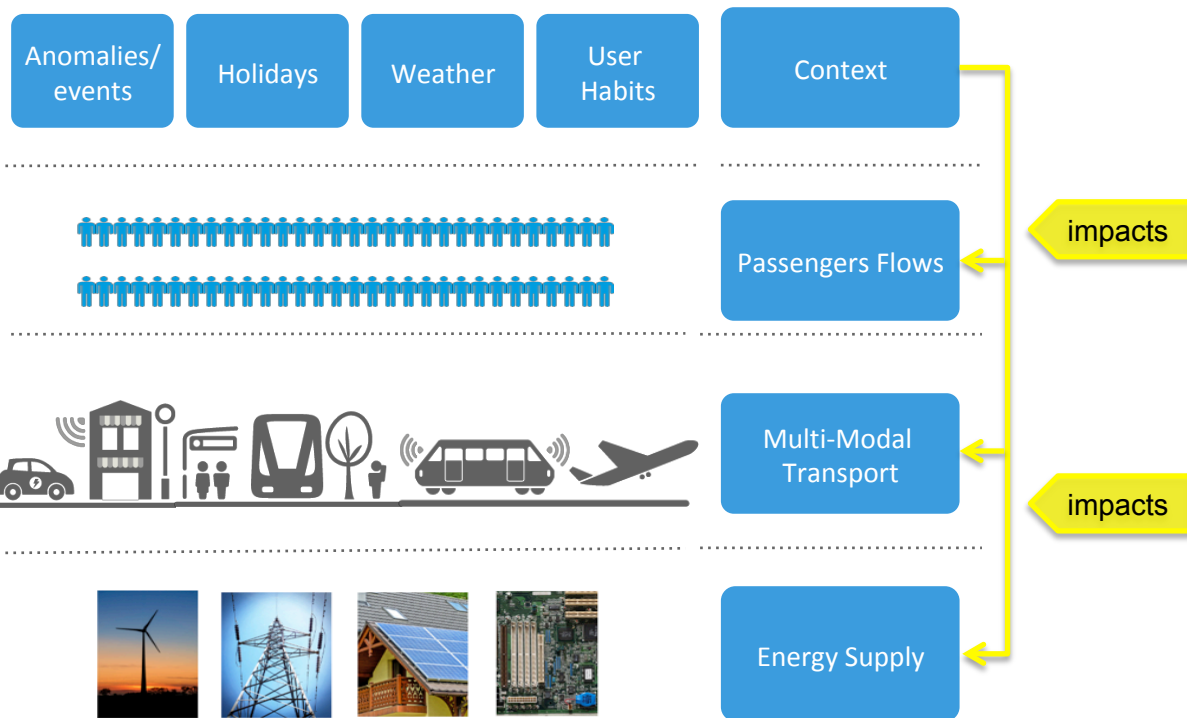
Infrastructure can be adapted



Weather can be forecasted



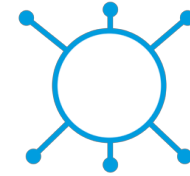
Energy Supply can be secured



# Project : An Integrated Framework for a Context-aware Mobility

Our project aims at providing a context-aware mobility that considers all the collected data from sensors, meters, weather forecasts, energy generation, flow measurement to design an integrated solution federating **five** main actors:

- **Energy utilities** for managing the energy-mix for railway power supply: renewable energy production is **forecasted** to anticipate peaks of passengers and to **align** (permanent and punctual) energy (ahead of time and real-time).
- **Power grid system operators**: Invest in **new technologies** to maximize infrastructure ROI and efficiency.
- **Transport system operators**: **Network planning** is computed based on passenger flows and renewable energy generation (long-term). They can be **updated** (in short-term to real-time) to take into account changes in predictions and special events.
- **Mobility service providers and passengers**: Passengers can be **recommended** each a customized itinerary. Passengers can be rerouted to other paths without losing comfort, as their behavior is learnt thanks to **interactive machine learning**.



The consortium should include mobility operators, energy utility, technological service providers,...

## IP2 SUPPORT TO DEVELOPMENT OF DEMONSTRATOR PLATFORM FOR TRAFFIC MANAGEMENT

Providing an interoperable middleware that ensures a common model communication between services and data sources.

Interactive ML for identifying user travel preferences

Unsupervised learning for identifying user habits

## IP3 FUTURE TRACTION POWER SUPPLY FOR RAILWAYS AND PUBLIC TRANSPORT

A smart grid model that includes optimization techniques for the energy mix.

Mobility network utilization and investment optimization

Multi-criteria optimization for customized paths

## IP4 COMPLEMENTARY TRAVEL EXPERT SERVICES

A set of analytic algorithms as well as a passenger profile model to recommend adapted context-aware and multi-criteria itineraries.

Micro-services based software architecture

Heterogeneous collected data from passengers, stations, trains, events, sensors, ...

# Realization: How can we implement this project?

## Permanent Team

21 Data science and interaction,  
8 Scientific Computation and Optimization  
8 System and Software Engineering

## Hub

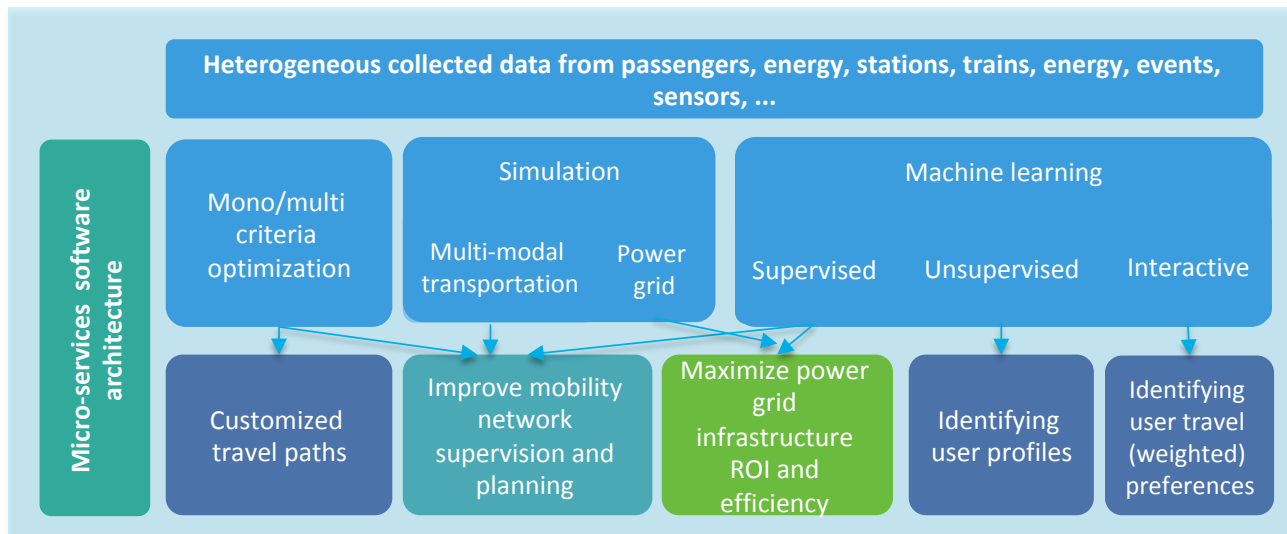
Connection to a hub of partners, cities,  
academic and industrial in digital,  
energy, and transport fields.

## Background

Several Research and Innovation 3  
ongoing Projects in Mobility, 2 Energy,  
2 autonomous vehicles, ..

## European Projects

Several H2020 European Projects,  
In2Rail, Holiship, TOICA, ..





**AMIRA BEN HAMIDA**

## CONTACT DETAILS



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# Expandium SAS - France

## S2R Pitch Presentation

Feb 6<sup>th</sup>, 2019

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R&D

ERTMS MONITORING

Claudio Ottombrino, +33698374470

[Claudio.ottombrino@expandium.com](mailto:Claudio.ottombrino@expandium.com)

[www.expandium.com](http://www.expandium.com)

# S2R-OC-IPX-01-2019: ARTIFICIAL INTELLIGENCE (A.I.) FOR THE RAILWAY SECTOR

## Company Profile:

Expandium SAS established in France in 2005

Specialized in ERTMS QoS monitoring with QATS Solution

In 2019:

- 16 customers in 20 countries in Europe, Africa & Middle East

- + 50 employees – 70% dedicated to R&D

- + 7 M€

<https://www.expandium.com/about-us/>

# S2R-OC-IPX-01-2019: ARTIFICIAL INTELLIGENCE (A.I.) FOR THE RAILWAY SECTOR

Product / Solution

Expandium Solution provided **Machine Learning solution** for:

**Predict Train delay** on ETCS L2 lines with or without Railway Operator Time Table – Target: Improve Capacity / Efficiency & Performance

**Predictive Maintenance** on Railway Telecom elements: OBU, Antennas, BTSs – Target: Reduce Human Errors / Supervision

Train follow up for Invoicing purpose – Target: Improve Capacity / Efficiency & Performance

<https://www.expandium.com/railway-solutions/>

# S2R-OC-IPX-01-2019: ARTIFICIAL INTELLIGENCE (A.I.) FOR THE RAILWAY SECTOR

## Research & Development

Collaboration with Infrabel in Belgium to develop GSM-R Simulator

The tool allows Infrabel to simulate the impact on the Railway traffic in changing Telecom specifications like shutting down and antenna (to simulate an elements under maintenance).

Data integration from weather conditions, Traffic Management, Telecommunications, Signalling and Rolling Stock.

Target: Reduced complexity, simplified and interoperable interfaces

# S2R-OC-IPX-01-2019: ARTIFICIAL INTELLIGENCE (A.I.) FOR THE RAILWAY SECTOR

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## Project Idea

Integration of different set of data for predictive maintenance purposes with the minimum interaction of Human Resources.

Detect Cybersecurity intrusion from Telecom Department to IP networks

INSTITUTE  
OF COMMUNICATION,  
INFORMATION  
AND PERCEPTION  
TECHNOLOGIES



**Sant'Anna**  
School of Advanced Studies – Pisa



**SANT'ANNA SCHOOL OF ADVANCED STUDIES – PISA** is an Italian research public university with 6 Research Institutes operating in social and experimental sciences

<https://www.santannapisa.it/en>

It's ranked among the top 200 University according **TIMES HIGHER EDUCATION WORLD UNIVERSITY RANKINGS 2019**, 1<sup>st</sup> place at national level



<http://tecip.santannapisa.it/en>

**TeCIP, Institute of Communication, Information, and Perception Technologies** consists of 5.500 m<sup>2</sup> in the CNR Area of Pisa + a 1000m<sup>2</sup> Clean room for PIC manufacturing.

TeCIP is co-located with CNIT PNTLab Lab and Ericsson R&D Lab

**GABRIELE CECCHETTI**

*[gabriele.cecchetti@santannapisa.it](mailto:gabriele.cecchetti@santannapisa.it)*

# Main research activities, projects and collaborations

## H2020 Projects

- **5G-Transformer**  
*5G Mobile Transport Platform for Verticals*
- **5GExchange**  
*Layering of mobile 5G infrastructure services derived from LTE network*
- **ICONET**  
*New ICT infrastructure and reference architecture to support Operations in future PI Logistics NETWORKs*

## Other projects

- **5G-Bari-Matera** (*National 5G project*)  
*Innovative services, to exploit 5G bandwidth, introduction to dynamic spectrum sharing by the means of virtualization and network slicing.*

## Relevant papers related to railways

*WCRR, IEEE Trans. Industrial Informatics, IEEE MT-ITS, IEEE CloudNet, IARIA Mobility, ICREM*

## Railways activities and collaborations

- **Safety Radio System for faster and more efficient rail traffic circulation**  
(*SR-SECURE, National project*)
  - *Radio InFill System to make more secure and more efficient the train circulation*
  - **Development of full EURORADIO software stack**
- **RFI** (*trackside Italian operator*)  
collaboration about:
  - Improved Backbone networks
  - Wireless link as a redundant connection for backup purposes in the case of failure of the wired link
  - Energy harvesting for trackside
- **TRENITALIA** (*onboard Italian operator*)  
collaboration about:
  - On board wireless network and sensors
  - Redefining the architecture of the train on-board network



# TeCIP Institute main knowledge and experience related to Shift2Rail Open Call 2019

- Definition of specifications, design, and implementation of **data centers, computer systems, information systems** and **cyber security** (*IP2-02*)
- Definition of specification, design, implementation, assessment of **network infrastructure** (core and edge), **availability analysis** and **communication systems** (*IP2-02, IP5-01, IP5-02*)
- Analysis and evaluation of trackside and onboard **railways systems**, with special regard to **energy harvesting systems** (*IP-03*)
- Design and development of algorithms and **information systems**, with particular attention to **interoperability aspects** (*IP-04*)
- Being an **academic institution with accredited PhD programs**, SSSA can be the natural **host** and/or **tutor** of the PhD researchers enrolled for studying Artificial Intelligence for railways sector (*IPX-01*)



# S2R Open Call 2019 SSSA interest

## **IP2-01: Demonstrator development for the use of Formal Methods in railway environment - Support to implementation of CSIRT to the railway sector**

*SSSA could participate as partner in the implementation of CSIRT and of the CSIRT collaborative environment.*

## **IP2-02: Support to development of demonstrator platform for Traffic Management**

*SSSA could participate as coordinator or partner in the requirements definition of the communication platform and in its design. Moreover it could participate in the experimentation of the demonstrator bringing a unified vision.*

## **IP3-01: Future traction power supply for railways and public transport**

*SSSA could participate as partner in study and analysis of the state of art and best practices and in the definition of performance target and specifications.*

## **IP4-01: Complementary Travel Expert Services**

*SSSA could participate as partner in the development of algorithms and in the implementation of proof of concepts*

## **IP5-01: Condition-based and preventive maintenance for locomotive bogie**

*SSSA proposes its participation as partner on the design and implementation of the sensors and communications boxes, of the monitoring system and of the related information system.*

## **IP5-02: Advanced obstacle detection and track intrusion system for autonomous freight train**

*SSSA proposes its participation as partner on the design and implementation of the communications infrastructure of the monitoring system.*

## **IPX-01: Artificial Intelligence (A.I.) for the railway sector**

*SSSA could participate as coordinator or partner in the study, analysis of the state of art of the A.I. technique suitable to be applied to the rail sector.*



**TeCIP Institute@SSSA** is a strong research institution that can be a partner for railways projects related to:

- Trackside and onboard railways systems
- Signaling systems and protocols
- Communication and network systems
- Sensors and wireless systems
- Datacenter and cybersecurity
- Information systems
- PhD programs



<http://tecip.santannapisa.it/en>  
<http://www.santannapisa.it/en>

thank you!

email: **[gabriele.cecchetti@santannapisa.it](mailto:gabriele.cecchetti@santannapisa.it)**



# Combined Transport Interexchange Point

## The Missing Link for Shifting Freight to Rail

Sverker Lindbo, Duncan Russell

Ocado Technology ([www.ocadotechnology.com](http://www.ocadotechnology.com)) – UK, PL, ES, BG, SE

A division of Ocado Plc. - the world leading online grocery technology provider

Patented and patent pending solution for an automated "switchyard" capable of 800 trailer or container movements between trains per hour

In-house expertise: AI-based Control System, High Fidelity Digital Twinning, Flow Optimisation



# Combined Transport Interexchange Point

## The Missing Link for Shifting Freight to Rail

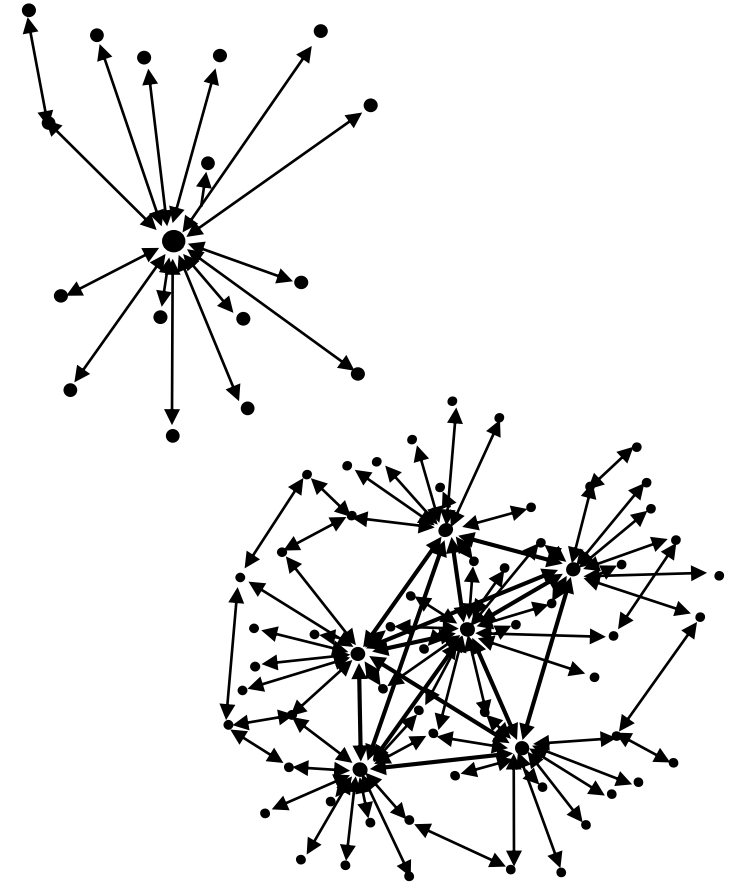
Combined transport really only works point to point at long distances.

What is needed is a way for trailers and containers to "change trains" cheaply and quickly at interexchange points

Connecting "everywhere to everywhere" requires just a few exchange points, and makes use of all existing terminals

The aim is to make road/rail combined transport viable in both cost and time terms from 300 km upwards, using mainly existing infrastructure

Ocado Technology believe we have the solution, but it needs further study and development



# Solution

A steel Grid over an existing switchyard  
Example: 20 tracks, 40 cars per train  
Numerous Automatic Load Handlers,  
travelling X/Y on the Grid, moving trailers  
and containers between trains and to  
holding positions or road interface  
Entire train re-loaded in 15 minutes  
800 moves per hour, or more



Works with existing rolling  
stock

Would work even better  
with bespoke rolling stock  
High speed freight trains  
on high speed track?

Ocado patented and patent pending technology



Ocado runs thousands of  
similar but smaller load  
handlers in commercial  
production



# Project idea

## Phase 1 – Feasibility and Benefit analysis

- Conceptual design of Grid and Load Handlers
- Conceptual design of Freight cars with automated locking features
- Exchange point simulation based on conceptual design performance and real-world goods flow data
- Evaluation of cost/benefit of train speed and acceleration and its impact on slot availability
- Analysis of ideal first locations and required infrastructure investment
- Benefit calculation, financial and environmental
- Identify any regulatory issues which may need to be resolved
- Firming up scope and deliverables for Phase 2

Estimated cost €1-2m

## Phase 2 – Build a working demonstrator

Assuming a desirable outcome of Phase 1, the next phase could be:

- Select demonstrator site
- Design and build small Grid and 1-2 Load Handlers
- Design and build Freight car for automated securing of both trailers and containers
- Verify simulation parameters in the working demonstrator

Rough cost estimate €6-8m

# Partners sought

	Type	Skills	Roles
Ocado	Large company	Simulation, Control System	TBD
Crane technology	Large company and/or SME	Feasibility, cost and performance of Load handlers	
Rolling stock	Large company and/or SME	Feasibility, cost and performance of bespoke rolling stock	
Analysis	SME and/or Academic	Access to goods flow data, costs, regulations etc.	

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[Duncan.russell@ocado.com](mailto:Duncan.russell@ocado.com)



**E T N A**  
**2 0 2 0**

# **Networking groups (3)**

## **16:30 – 17:00**