



«Researchers for a greener Europe»

#EURegionsWeek

“Greening” Transport infrastructures through research-through-training programmes

Davide Lo Presti, Euro-PhD

Visiting academic UNOTT (UK) / Assistant Professor UNIPA (IT)

Why Me?



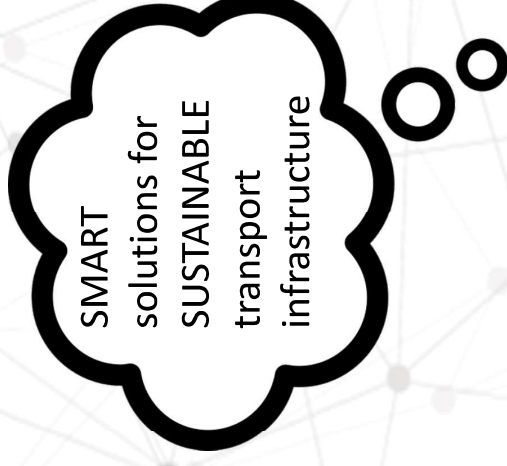
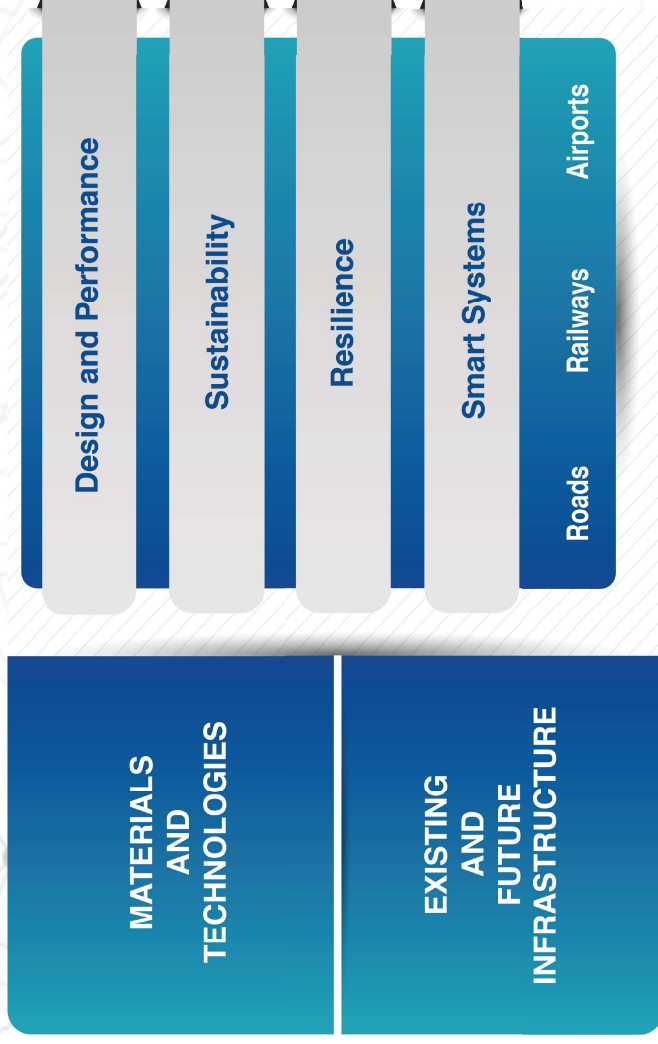
University of
Nottingham

Nottingham Transportation Engineering Centre

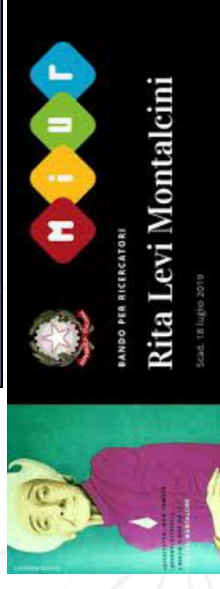


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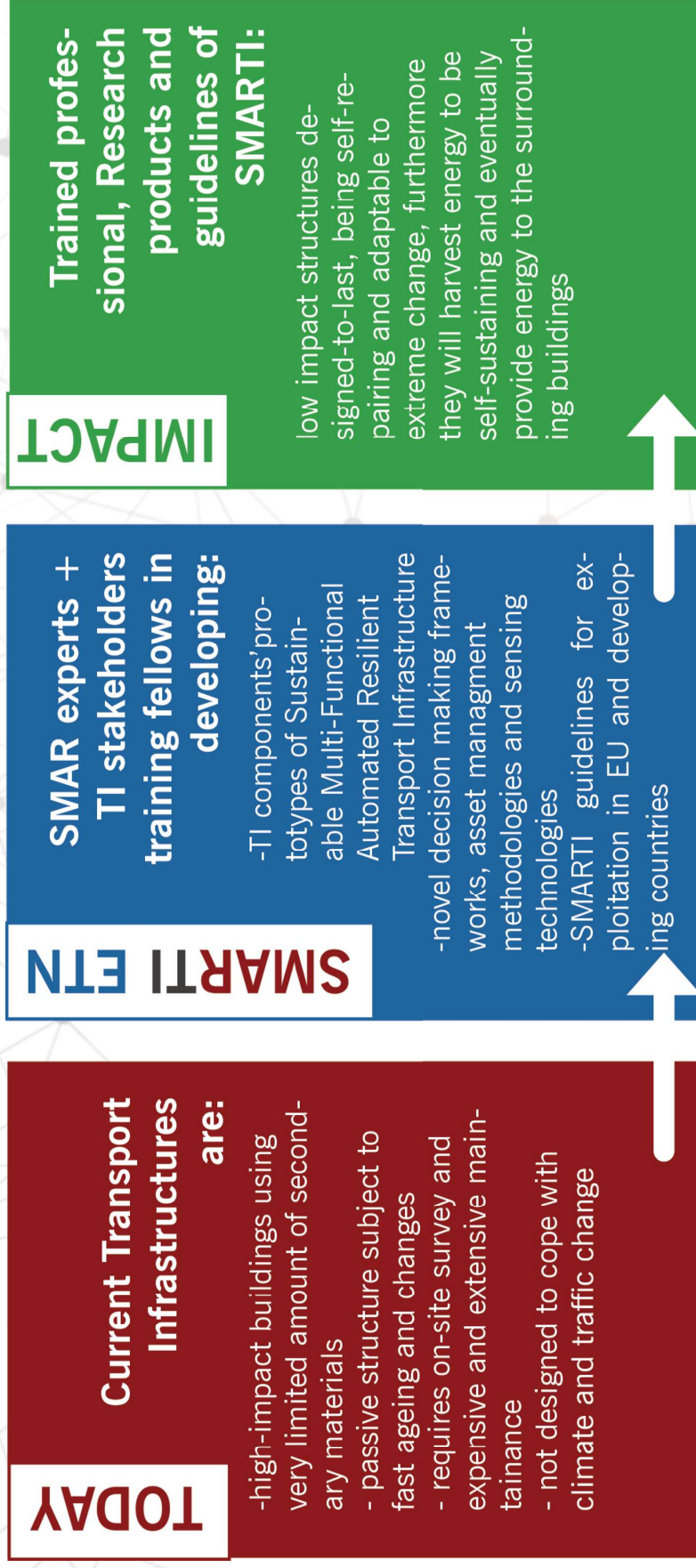


SMART
solutions for
SUSTAINABLE
transport
infrastructure



**multi-disciplinary, fundamental and applied Research and Education
for preserving existing transport infrastructure and shaping future transport systems**

Why SMARTI?



SMARTI ETN has received funding from the European Union's Horizon 2020 Programme under the Marie Curie-Skłodowska actions for research, technological development and demonstration, under grant n.721493.

Why SMARTI?

**SMART =
Elegant solutions
(SMART)**

*Engineering has no better choice than
investing in its sustainable development
embracing innovation and new technologies
to effectively support healthy society and
respecting the environment (Lo Presti, 2018)*

Cities/Province/regions

Infrastructure
network

Infrastructure component
(Road pavement)

Materials
(asphalt)

**(Transport) Infrastructure
Engineers EcoSystem**



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What is SMARTi?

S

Sustainable

M

Multi-Functional

A

Automated

R

Resilient

Transport Infrastructure

What is SMARTI ETN?

Sustainable
Multi-functional
Automated
Resilient
Transport
Infrastructures

SMARTI
European Training Network
2017-2021



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Who is in SMARTI ETN?



University of
Nottingham
UK | CHINA | MALAYSIA



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European Training Network
2017-2021

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THE ROAD FOR FUTURE TRAVEL

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Piezonix llc (PZNX)
GHT Photonics Srl (GHT)
 ELAB Srl (ELAB)
GreenDelta Gmbh (GD)
FIP Industriale (FIP)
 REPSOL (REPSOL)
University College Dublin (UCD)
University of California, Davis (UCDAVIS)
Ecole Polytechnique, Paris (LPCIM)
Polytechnic University of Hong Kong (HKPU)

University of NewCastle (UONAUUS)
Highways England Company Ltd (HE)
Società per l'Aeroporto Civile di
Bergamo-Orio al Serio (SACBO)
Conference of European Directors of
Roads (CEDR)
Smart Transport Alliance (STA)
Cardno IT Transport (CGNTV)
Comune di Palermo (MUNPA)
Research Driven Solutions (RDS)



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PARTNER ORGANISATIONS
of Infrastructure managers:
Roads, Railways, Airports



PARTNER ORGANISATIONS
Experts and trainers in SMARTening of
systems

BENEFICIARIES

Experts on Research and Education
Transport and Infrastructure stakeholder



15 FELLOWS AND RELATIVE INDIVIDUAL TRAINING-THROUGH-RESEARCH PROJECTS



SMARTI

Prototypes and Guidelines
for early exploitation and dissemination



Culture change through Innovation and Education →

Sustainable
Multi-functional
Automated
Resilient
Transport
Infrastructures

smartietn.eu



SUSTAINABLE TI:

design to last, maximise recycling, minimise
the impact

MULTI-FUNCTIONAL TI:

*conceived not for transport purposes only
and towards optimization of land use*

AUTOMATED TI:

equipped with sensors to allow pro-active communication towards a more intuitive use and a simplified management

RESILIENT TI:

*conceived to self-repair and be adaptable to changes
due to natural and anthropogenic hazards*



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Lo Presti D. 2020

Self-healing asphalts

- Better recovery of road quality
- Automated crack reparation
(avoiding traffic jams)
- Existence of environment-friendly
bitumen rejuvenators
- Quick response to the cracking
and roads' lifespan prolongation



The idea

Realize an hybrid system able to harvest energy from the sun



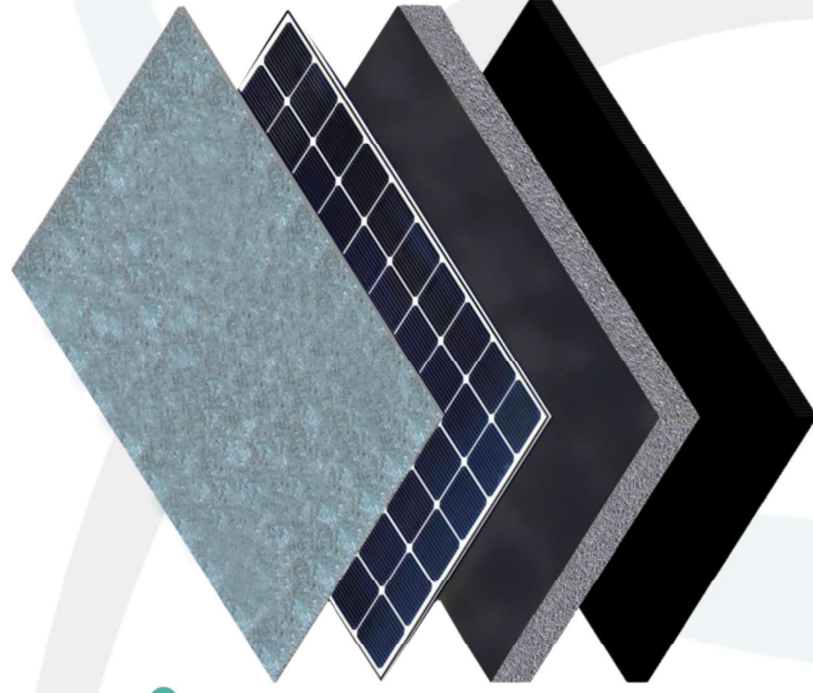
Domenico Vizzari

ESR 3

"RA2ROAD"



domenico.vizzari@ifsttar.fr



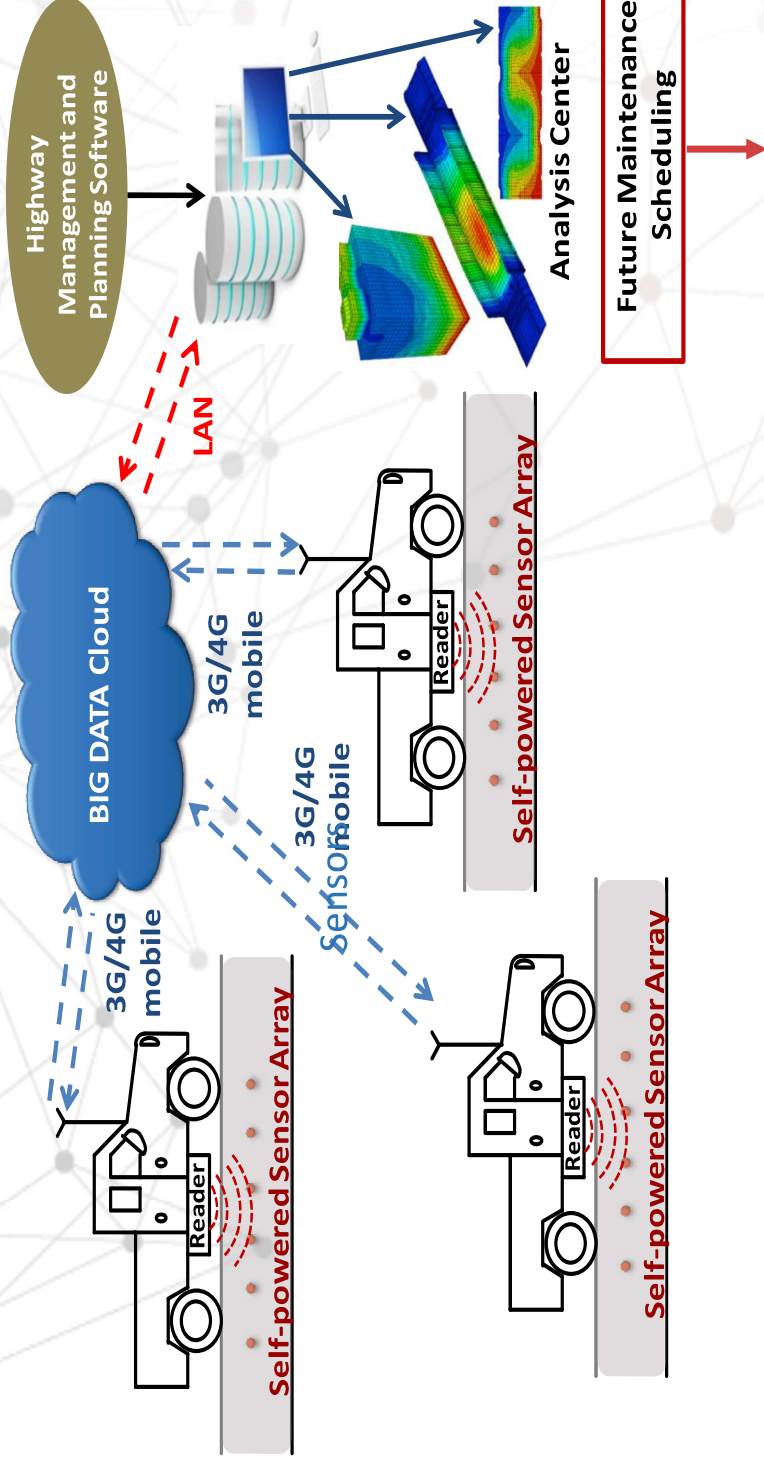
Semi-transparent top layer

Electrical layer

Porous layer

Base layer

SmartEcoPave/Track



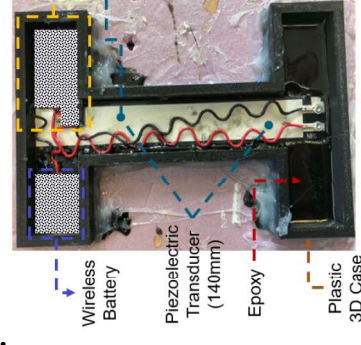
Mario Manosalvas Paredes

ESR 7

"SMARTECOPAVE"



Self-Powered Wireless Piezo-Floating-Gate (W-PFG) Sensor.



Developed by MSU Researchers

ResilRoad

Risk-based Resilience indicators for Roadway networks

WEB: smartietn.eu/research/smarti-guidelines/esr9/



Philippe Souhouenou - ESR9



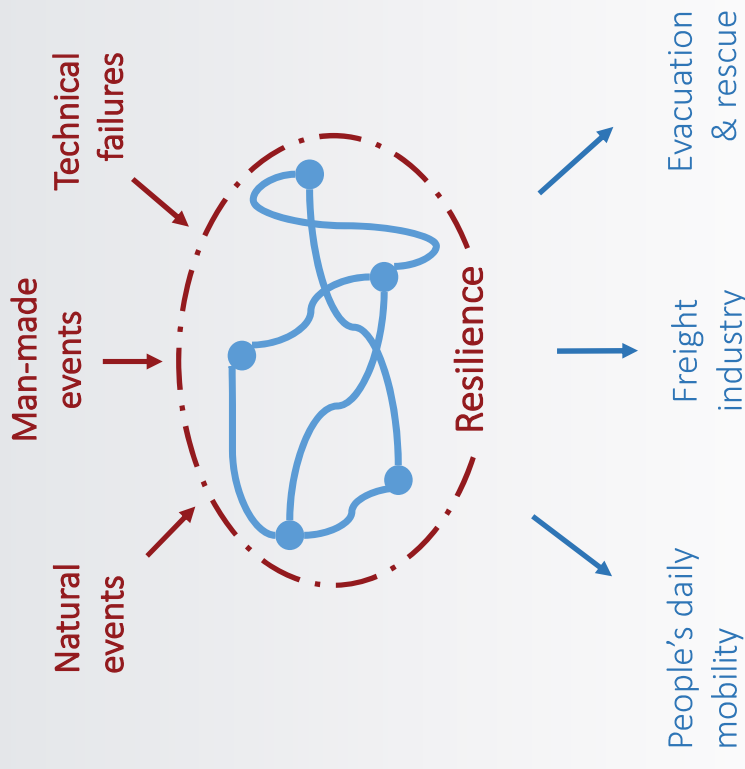
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linkedin.com/in/philippe-souhouenou/en



Training Platform

THEMATIC TRAINING WEEKS

The consortium combines and shares expertise, offering advanced scientific training structured into network-wide thematic taught modules. The Coordination has identified at least 6 thematic training weeks that will see the participation of worldwide renowned experts providing fellows with specialist lectures.



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Training Platform



“INTRODUCTORY WEEK ON TRANSPORT INFRASTRUCTURES” NOTTINGHAM, FEBRUARY 2018

In February (12th – 16th) we had the privilege to welcome 15 SMARTI ETN researchers and 30+ transport professionals on our first training event hosted by NTEC and University of Nottingham. This training was an excellent opportunity for them to get to know each other and the programme, and get the overall idea how the next 3 years will impact their lives and careers.



COMMUNICATION SKILLS TRAINING WEEK, NOTTINGHAM, MAY 2018

As part of the outreach training, NTEC and the University of Nottingham will organise Digital Marketing Training Week from 22 to 25th May 2018. Researchers will have the opportunity to present their projects, communicate their ideas, and learn from industry partners how to speak the “corporate” language.

[READ MORE](#)



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Training Platform

“SUSTAINABLE TRANSPORT INFRASTRUCTURE” – TRAINING WEEK

This September **University of Palermo** hosted the first SMARTIETN Summer School dedicated to one of the most important pillars of the **SMARTI** vision – **SUSTAINABILITY**.

[READ MORE](#)



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Summer School
Palermo
3rd - 7th September

NEW HORIZONS IN SUSTAINABLE TRANSPORT
INFRASTRUCTURE ENGINEERING
RESEARCH & EDUCATION



"The Journal of the training week wants to be a summary of the activities for the fellows and partners as well as a mean of communication to everyone else interested in the activities of the SMARTI ETN.

In this occasion the University of Palermo and the coordination at the University of Nottingham hosted a training week that focused the attention on the role that "Sustainability" could have on the SMARTI vision. This was done by providing the fellow with the latest research trends in Transport infrastructure engineering and by delivering a workshop aimed at brainstorming methodologies to introducing sustainability in education."

Davide Lo Presti, Project Coordinator

1st DAY - STRUCTURAL HEALTH MONITORING

Fabio Remondino (Fondazione Bruno Kessler) - How to monitor civil structures with 3D surveying systems and data processing

Alberto di Matteo (UNIPA) - How to monitor civil structures with traditional tools

Chiara Mammola (UNIPA) - How to monitor civil structures with advanced tools

Alberto Malinconico (UNIPA) - UAV - Geomatics applications with infrared thermography

Alessandro Scordo (ILAB) & **Laura Invernizzi** (UNIPA) - UAV - 3D surveying systems for pavement distresses analysis, data processing

1st Day of SMARTI ETN Palermo Summer School was focused on the structural health monitoring in transport infrastructures. Having an opportunity to see how the various techniques and equipment is used for the data collection and how the data is processed and analyzed, it was possible to understand the data behind their research is obtained and helped them understand its benefits and applications.

Maria Barone (ESBC), "I think that even if we are not going to use these techniques it is always good to have a general overview of techniques and reliable instrumentation, in my case the detection of pavement distresses."

Fabio Remondino from Fondazione Bruno Kessler opened the 1st day of the Palermo Summer School with a lecture on the importance of the 3D surveying systems for the monitoring of the civil structures and the impact of the infrastructure. We asked Fabio what he thinks about SMARTI ETN programme and how it can impact transport infrastructures. "SMARTI project is a good interdisciplinary network of experts and fellows in the field of transport and infrastructures. The project is very important in the light of bringing more accuracy to infrastructures, better monitoring strategies, new construction materials, sustainability, etc."

Ronald Roberts (ESR12): "Fabio is an top of his field, he is really good. All the papers that I am reading are written by him. So if you are going to hear somebody taking about 3D surveying he is the guy that you want to hear. So having him to start the day was fantastic."

During the workshop "UAV photogrammetry for pavement distress analysis" Laura Invernizzi (UNIPA) and Alessandro Scordo (ILAB), showed the fellows how to use a quadcopter drone (GoPro) to build a 3D model of the ground at the Mondello Palace Hotel, which could be used to recognize the distresses of the pavement and directly implemented in their research.





SMARTI ETN

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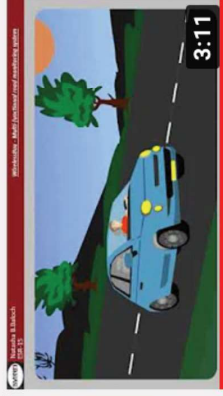
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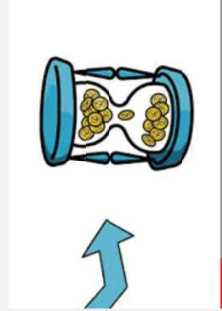
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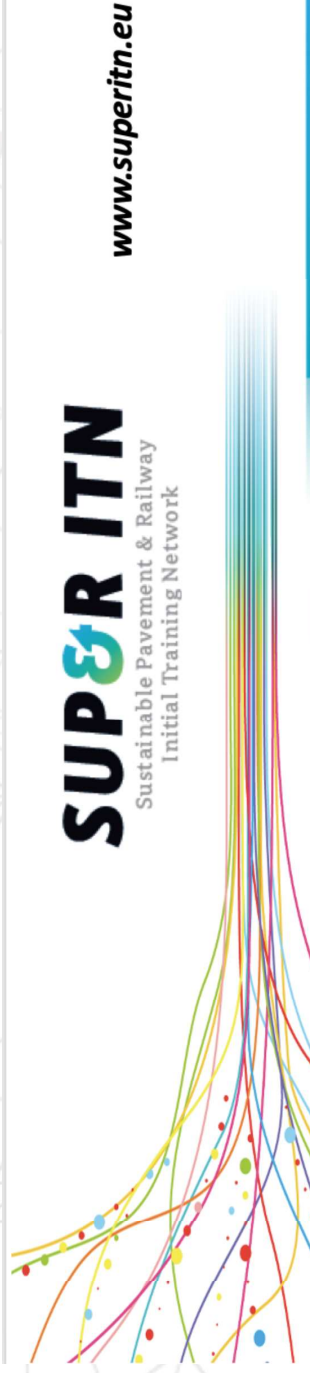


Introduction to SMARTI ETN project "SuRoMa" - ...

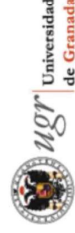
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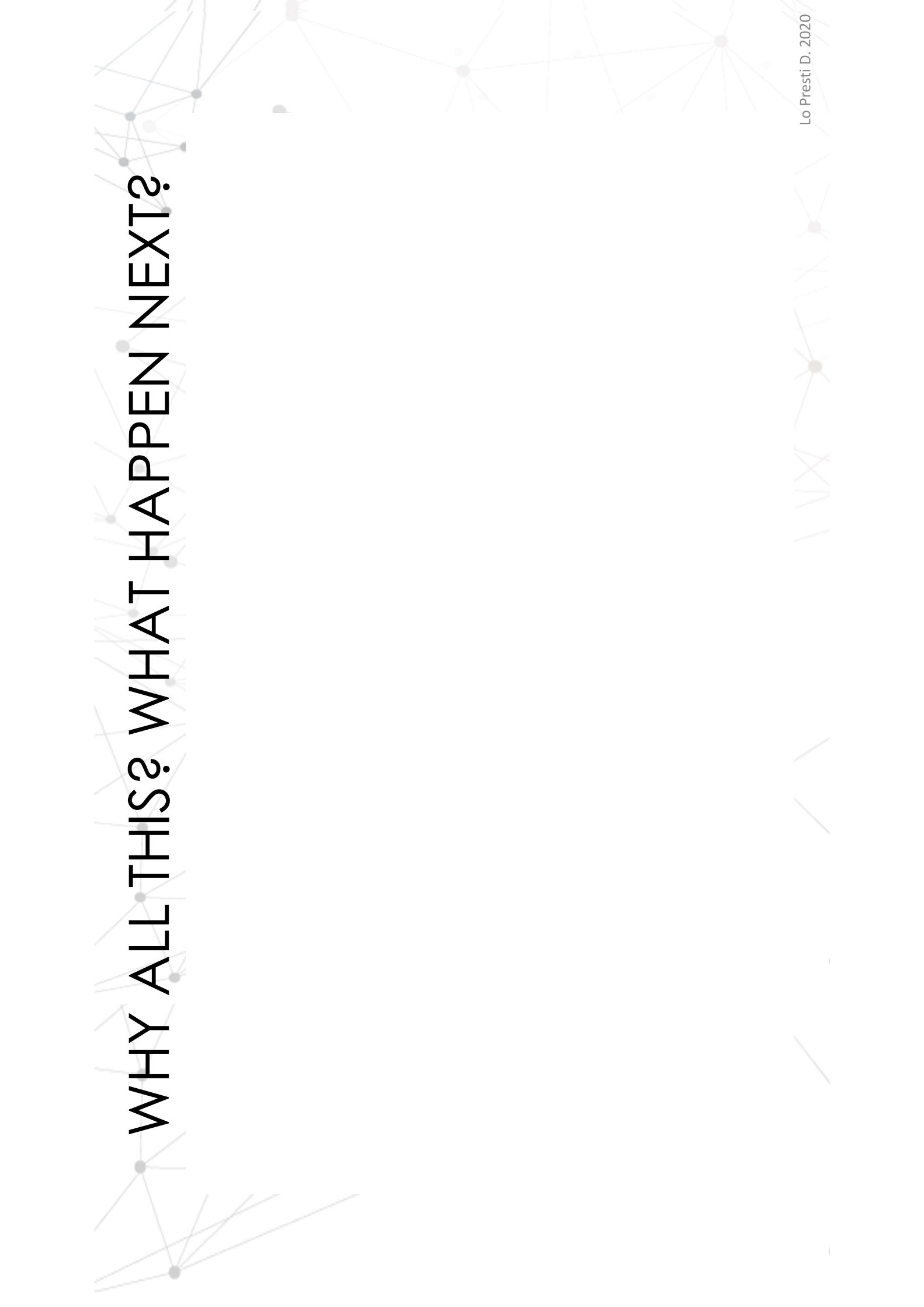
WHY ALL THIS? WHAT HAPPEN NEXT?



Sustainable Pavement & Railway Initial Training Networks 2013 - 2017

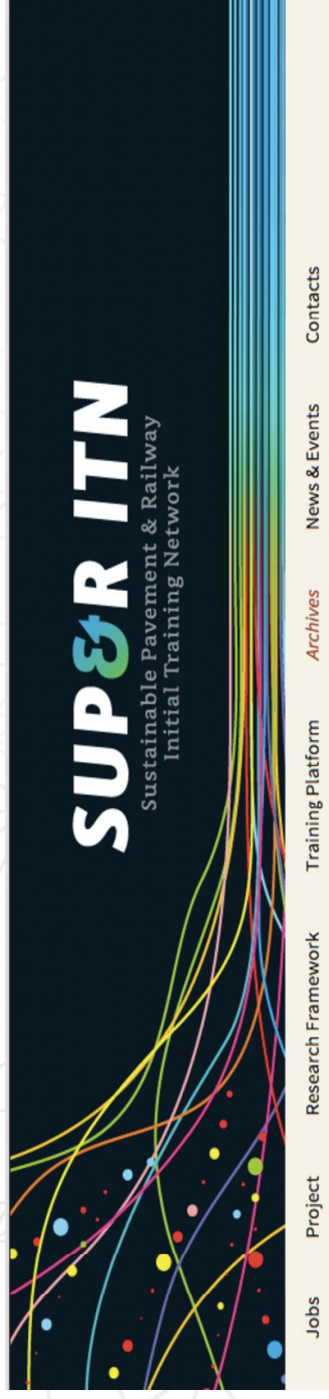


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WHY ALL THIS? WHAT HAPPEN NEXT?

WHY ALL THIS? WHAT HAPPEN NEXT?



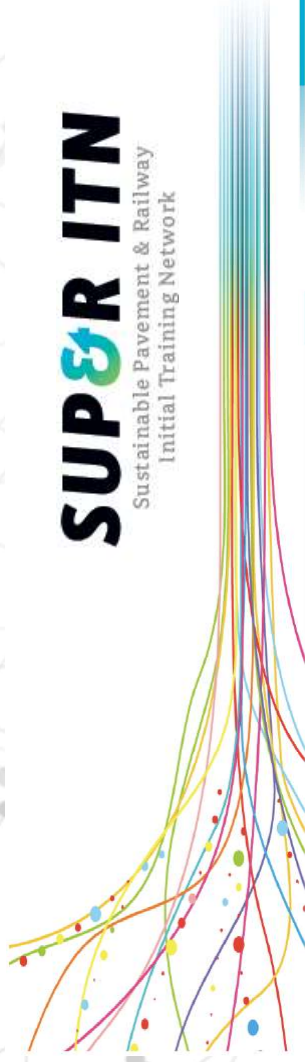
BLOGS on www.superitn.eu



SUP&R ITN 3
Sustainable Pavement & Railway
Initial Training Network

WHY ALL THIS? WHAT HAPPEN NEXT?

WP1 Sustainable Pavements



SUP&R ITN

Sustainable Pavement & Railway
Initial Training Network

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Design and characterization of Reclaimed Asphalt mixes with biobinders

Ana Jiménez del Barco Carrión



www.esr2.superitn.eu



UNITED KINGDOM • CHINA • MALAYSIA



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WP1 Sustainable Pavements



conventional solutions with petroleum bitumen. To do so, the research team provided an accelerated pavement testing facility. Performances will be evaluated using a binder with a high content of bio-binders and high content of RA in asphalt mixtures. The research team will investigate the binder physico-chemical mechanism (cracking, rutting, etc.) and impacts of the combined use of bio-binders and high-content of RA in asphalt mixtures. Obtained data will be used to perform a risk assessment, as well as a Life Cycle Assessment (LCA) of the proposed solution.



WHY ALL THIS? WHAT HAPPEN NEXT?

WP2 Sustainable Railways

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FEATURES

PIARC Prize "Road Design and Construction" - Opportunities and Challenges with Automation in Road Construction and Condition Monitoring in England

Illustrations © Authors

Manual handling of operations and data collection, mounting paperwork, and lengthy processes on approval systems are commonly found in construction projects. These can lead to substantial inefficiency which damage productivity and profit. The construction industry has realised the need to make the whole process leaner, safer, more efficient and cost effective, and thus is seeking to embrace the spirit of Industry 4.0. This revolution in the construction industry has involved a considerable shift from analogue to digital transactions (i.e. digitization) and improved real-time connectivity. This new revolution can radically improve productivity levels, quality and safety of the industry and help minimise impacts on the environment. A new concept called "Construction 4.0" has subsequently been introduced.

➤ [Automation in road construction in England](#)



Giacomo D'Angelo
PAVEMENT ENGINEER



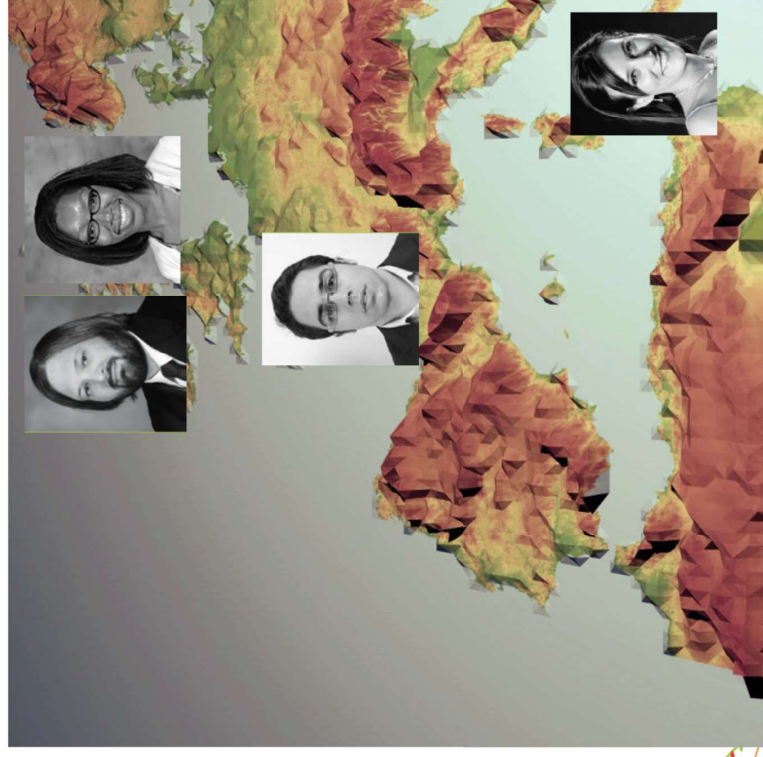
Robin Hudson-Griffiths
SENIOR PAVEMENT ADVISOR



Lo Presti D. 2020

WHY ALL THIS? WHAT HAPPEN NEXT?

WP3 Sustainability Assessment tool



WP3 leader:

DAVIDE

LO PRESTI

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James Bryce

ER1a – University of Nottingham

Stefanie Brodie

ER1b – University of Nottingham

Sara Bressi

ER2 – University of Palermo, IT

Joao Oliveira Dos Santos

ER3 – IFSTTAR, FR

SUPER ITN
Sustainable Pavement & Railway
Initial Training Network

16

WHY ALL THIS? WHAT HAPPEN NEXT?

≡ | UNIVERSITY OF TWENTE. > PEOPLE



ECTS CATALOGUE - UNIVERSITY OF PISA

VALUTAZIONE DELLA SOSTENIBILITÀ DEI PROCESSI COSTRUTTIVI

ALESSANDRO MARRADI

Academic year 2019/20

Course CIVIL INFRASTRUCTURES AND ENVIRONMENTAL ENGINEERING

Code 259HH

Credits 6

Period Semester 2

Modules

Area	Type	Hours	Teacher(s)
VALUTAZIONE DELLA SOSTENIBILITÀ DEI PROCESSI COSTRUTTIVI	ICAR/22 LEZIONI	60	SARA BRESSI unimap
			ALESSANDRO MARRADI unimap



ACKNOWLEDGMENTS

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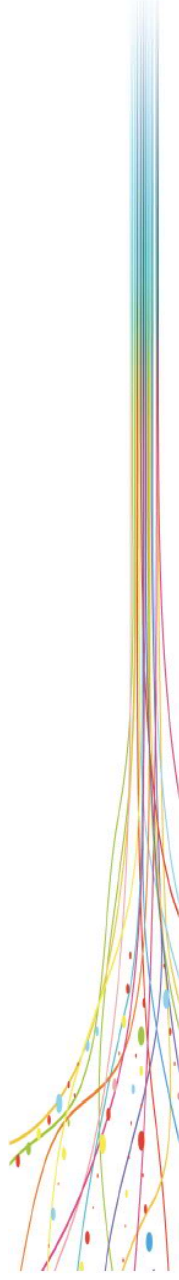


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#sustainablerailway/s

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SMARTI

European Training Network

For more information check smartietn.eu



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For information about **SMARTI ETN** program please contact:



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CONCLUSIONS

Marie Curie ETN Research-through-training programmes are the ideal platform to cope with the most important challenge of our time, such as greening Europe.

Their aim is to achieve cultural change by growing a new generation of professionals that will BE THE CHANGE



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[@NTECcomms](http://nottingham.ac.uk/ntec)

Thanks for your attention

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R^G



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