SUPSI

Research, Innovation & Mobility

Prof. Giambattista Ravano

Deputy Director Research and Innovation

SUPSI-Manno

Agenda

- Innovation ?
- Is mobility an Innovation driver?
- Why Switzerland is a strong contributor to Innovation
- Some Swiss Italian real projects and the next few year

Innovation ?

Innovation ?

An innovation is something new that fulfils a specific social benefits. This definition includes both goods and services as well as processes and structures in the economy and in other areas of society.
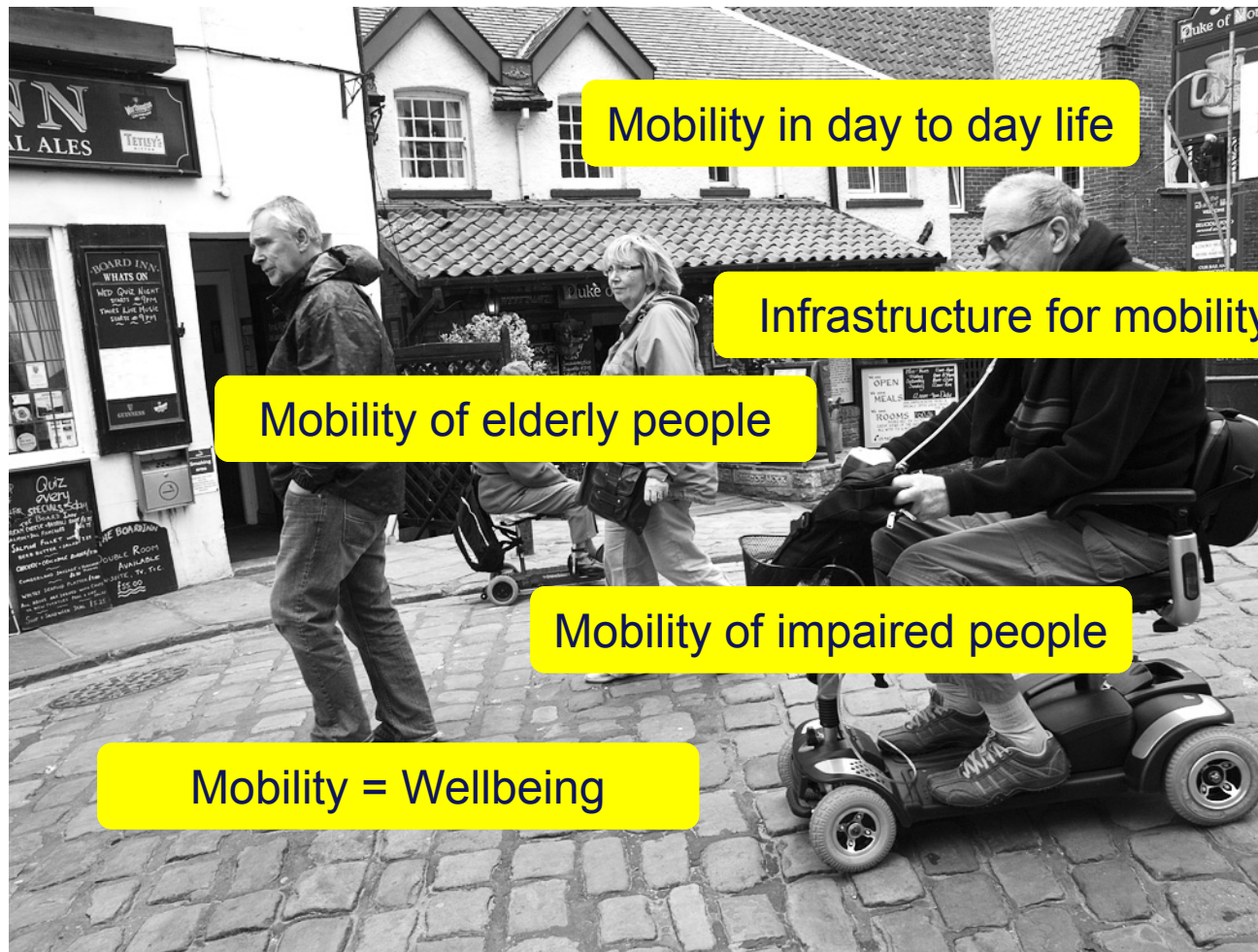
Is mobility an innovation driver?

Societal Challenges and Innovation (EU objectives)

- Health, demographic change and wellbeing;
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bio economy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, environment, resource efficiency and raw materials;
- A changing world - inclusive, innovative and reflective societies;
- Secure societies - protecting freedom and security of society and its citizens.

The Challenge

Health, demographic change and wellbeing

Mobility in day to day life

Infrastructure for mobility

Mobility of elderly people

Mobility of impaired people

Mobility = Wellbeing

19/10/2016

Project

Robot walker for elderly people in public spaces

A robot walker to guide elderly around shopping centres, museums and other public buildings, thus enhancing their autonomy.

19/10/2016

The Challenge

Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bio economy

The right thing at the right place
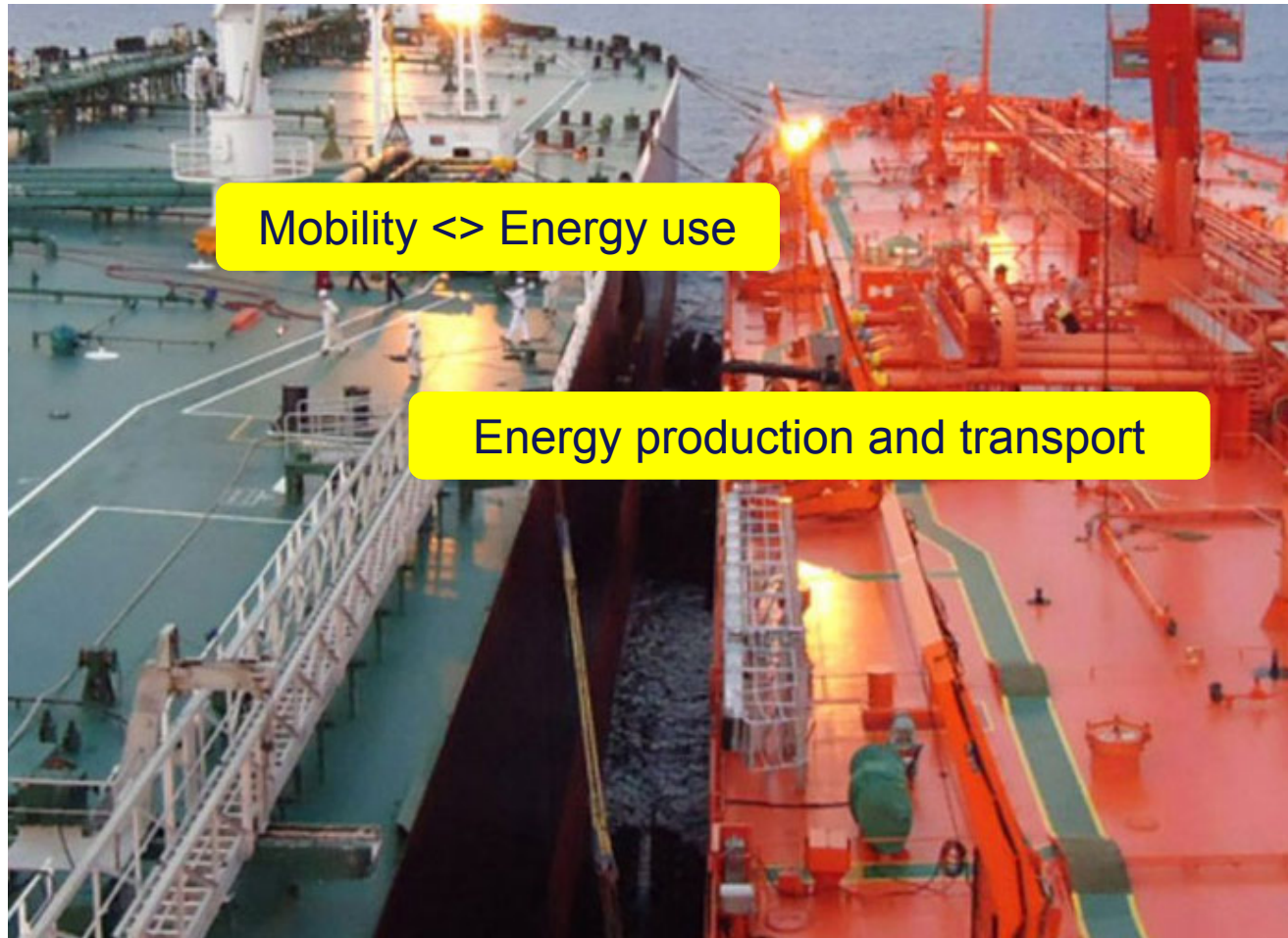
Resources mobility

19/10/2016

Project

Dynamics and interactions in food systems (from providers of farm inputs to consumers)

Evaluate transportation food paths, assess the notion of "food miles" to reduce GHG emission.

The Challenge

Secure, clean and efficient energy

Mobility <> Energy use

Energy production and transport

19/10/2016

Project

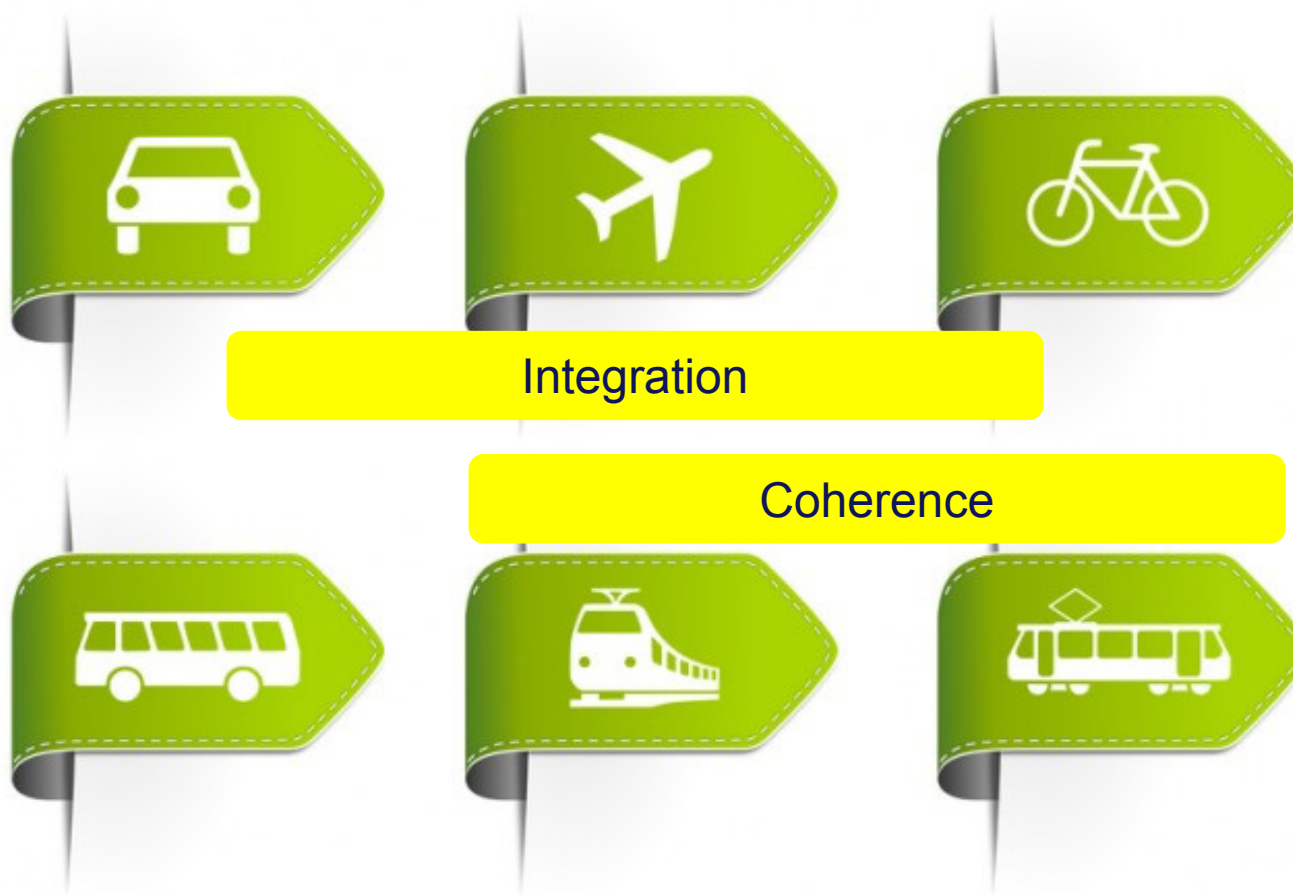# Hydrogen Mobility

Large-scale market test of hydrogen refuelling infrastructure, passenger and commercial fuel cell electric vehicles.

Energy
Infrastructure

Promoting a hydrogen society

Sustaina...
Mobility

Overcoming global environmental
and energy problems

The Challenge

Smart, green and integrated transport

Integration

Coherence

Project

Congestion Reduction in Europe : Advancing Transport Efficiency

Rigorously and systematically develop practical definitions of urban road congestion and of network performance, and identify factors influencing conditions in different cities.
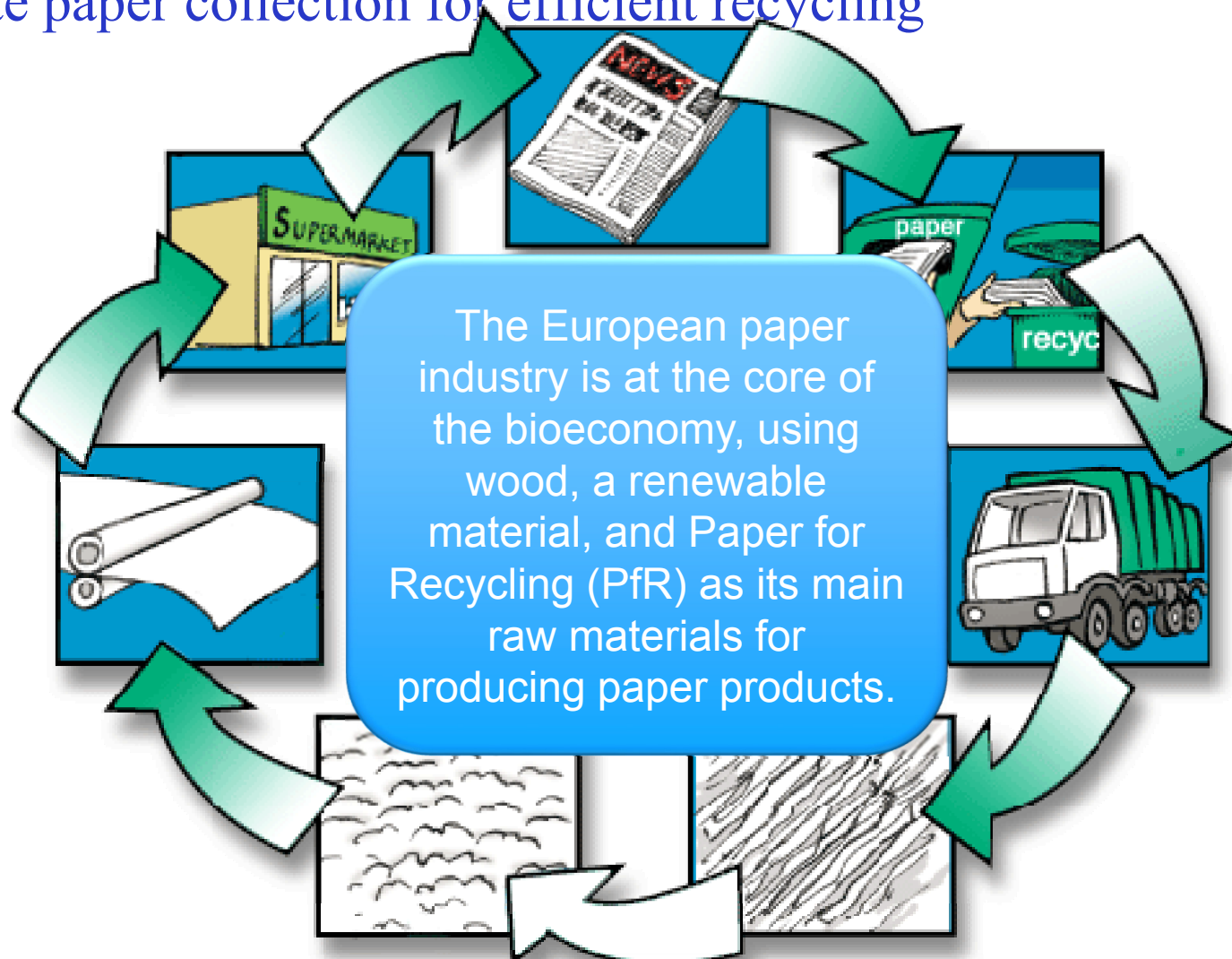
The Challenge

Climate action, environment, resource efficiency and raw materials

Logistics

Reuse

De/localization

Project

Separate paper collection for efficient recycling

The European paper industry is at the core of the bioeconomy, using wood, a renewable material, and Paper for Recycling (PfR) as its main raw materials for producing paper products.

The Challenge

A changing world - inclusive, innovative and reflective societies

Urban mobility

Professional mobility

Cooperation/collaboration

Project

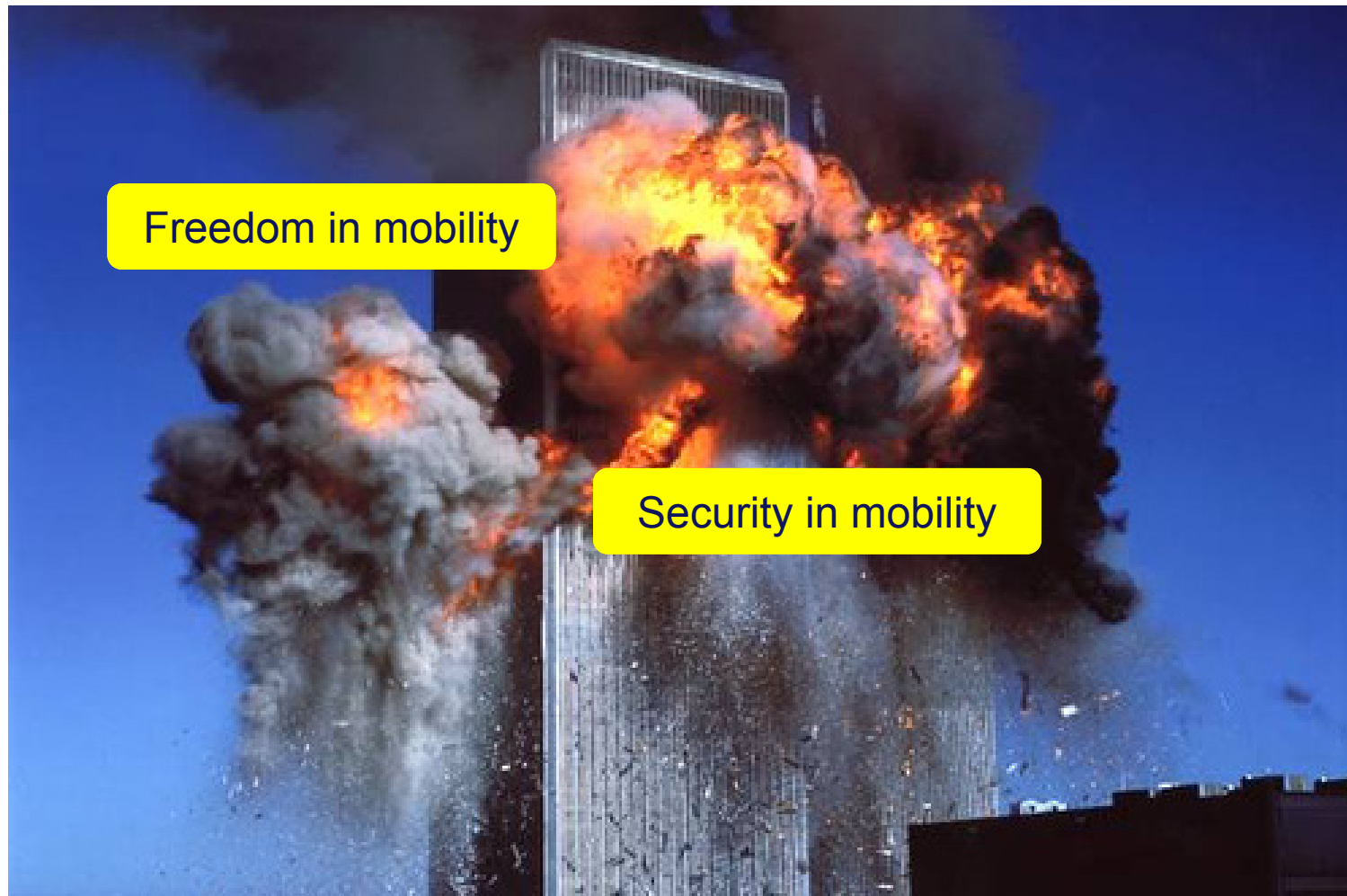Encouraging Lifelong Learning for an Inclusive and Vibrant Europe

Enhance the provision and take-up of learning opportunities for adults, leading to a more productive and innovative workforce, and reduced social exclusion
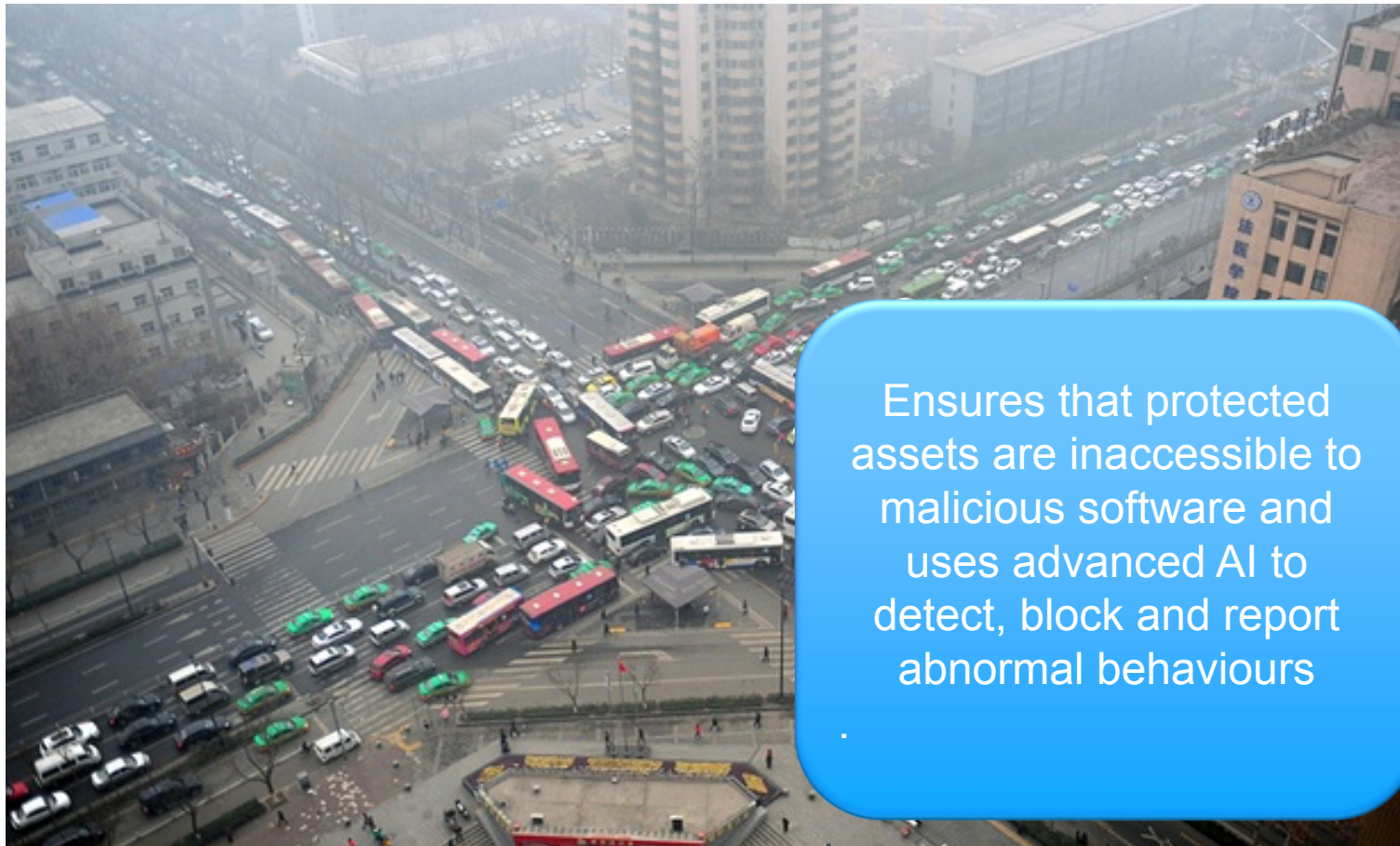
The Challenge

Protecting freedom and security of society and its citizens

Freedom in mobility

Security in mobility

Project

Critical urban infrastructure and soft target cyber attack protection

Ensures that protected assets are inaccessible to malicious software and uses advanced AI to detect, block and report abnormal behaviours
.

SUPSI

Why Switzerland is a strong contributor to Innovation

Innovation Indexes (The Global Innovation Index)

- Political stability and safety
- …..
- Expenditure on education
- QS University ranking
- ….
- ICT access
- Environmental participation
- .....
- Ease of getting credits
- Venture capital deals
- ….
- University Industry research
- Patents by origin
- …..

Policy

Education

Technology

Finance

Research

Switzerland nr. 1

- Political environment
- Government effectiveness
- R&D Companies and Universities
- Market capitalization
- Knowledge workers
- Patents
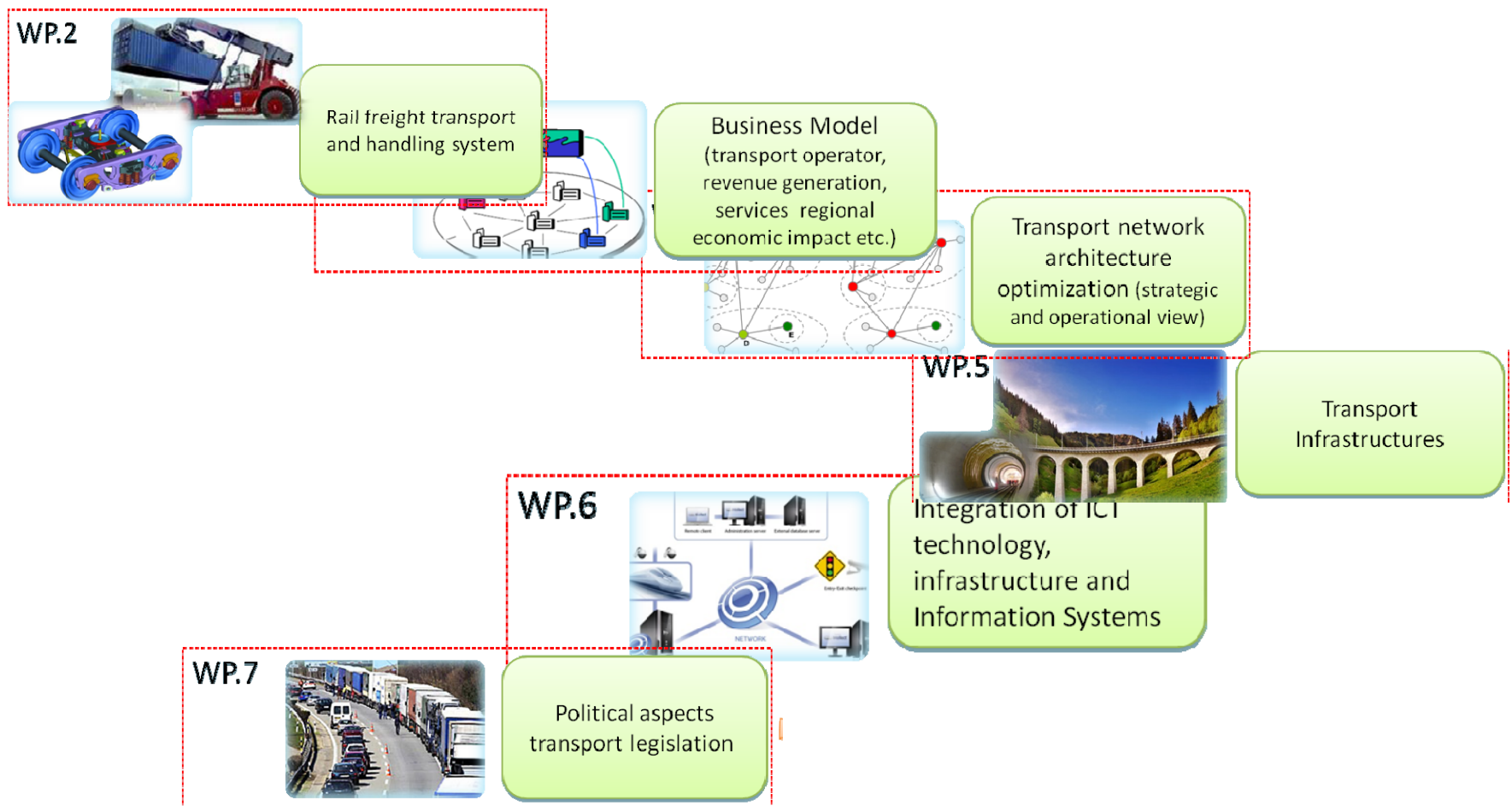
Research

Policy

Education

Finance

Switzerland and Innovation

- small country: **high degree of decentralisation**, short distances, geographical proximity, smooth-running formal and informal networks

- **diversity in the branches** and the size structure of businesses: a good mix of large global companies and a large number of SMEs with a high tendency to innovate

- highly flexible labour market, different ways to education, skills & grade mix, **low youth unemployment** and **good work discipline**

- high level of **international economic integration** in education and science, free movement of persons within the EU

- high **political stability**: moderate but continuing reforms; high ability to integrate various cultures
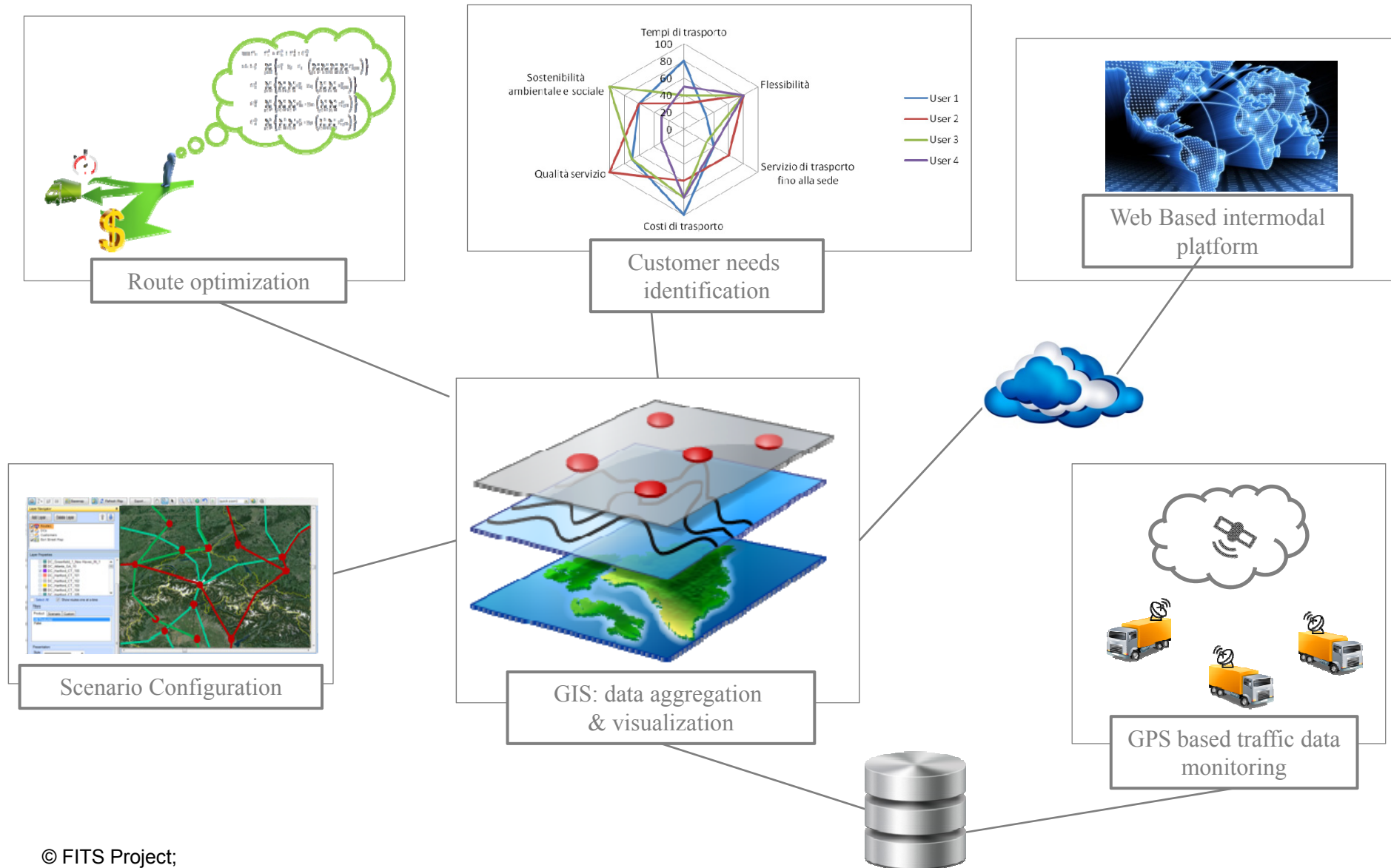
Some Swiss Italian real projects in the next few year

Flexible Intermodal Transport System
Prof. L. Canetta SUPSI

WP.2 — Rail freight transport and handling system

Business Model (transport operator, revenue generation, services regional economic impact etc.)

Transport network architecture optimization (strategic and operational view)

WP.5 — Integration of ICT technology, infrastructure and Information Systems

Transport Infrastructures

WP.6

WP.7 — Political aspects transport legislation

GIS based Intermodal Framework Decision Support System (IFDSS)

Route optimization

Customer needs identification

Web Based intermodal platform

Scenario Configuration

GIS: data aggregation & visualization

GPS based traffic data monitoring

Scenario definition and parameter setting

```
Road - rail          →    Rail              →    Rail - road         →    Transport
transhipment              transportation          transhipment            process
```

Solutions domain SC$_i$

Modalohr (Lohr Gruppe; France)	**T5 pocket wagon** (Ferriere Cattaneo SA)	**Modalohr** (Lohr Gruppe; France)
Megaswing (Kockums Industrier)	**Modalohr system**	**Megaswing** (Kockums Industrier)
Mobiler (Rail Cargo Austria)	**Megaswing** (Kockums Industrier)	**Mobiler** (Rail Cargo Austria)

Vehicles configuration

Tabs: Truck | Locomotive | Railcar | Train composition

Truck
String
road train
Articulated truck-EURO 5

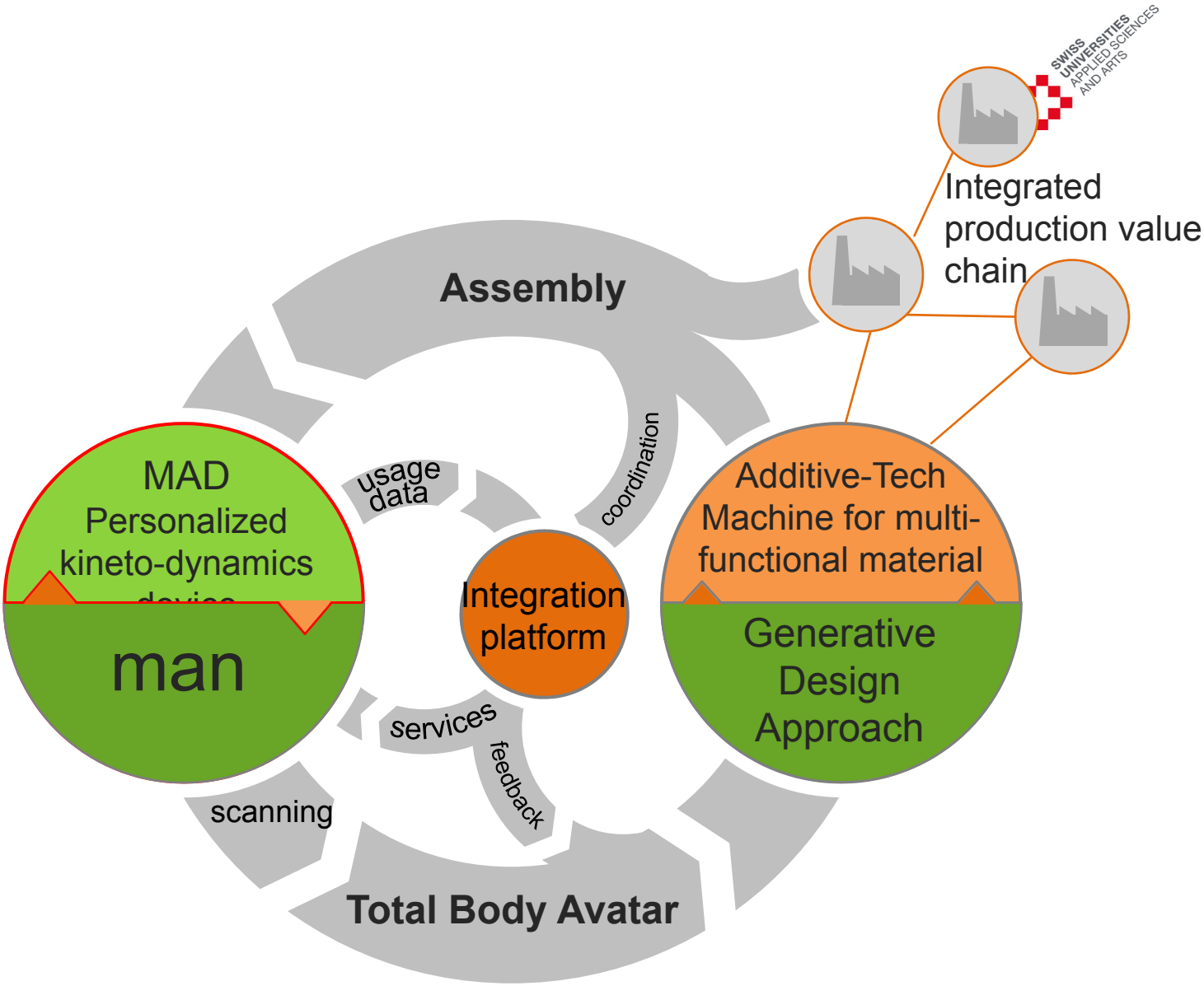| Field	Value	Field	Value
Name:	road train	Length (m)	18.25
Width (m)	2.5	Height (m)	4
HR (n°)	1	Salary (CHF/y)	80000
oil energy (l/h)	48	Elettric energy (KWh)	0
CO2 (g/Km)	1020	SO2 (g/Km)	356
NOx (g/Km)	2.7	PM10 (g/km)	0.02
Noise (dB)	38	Max speed (Km/h)	120
Min speed (Km/h)	15	Mean speed (Km/h)	83
Max load weight (KN)	400000	Min load weight (KN)	180000
Mean load weight (KN)	395000	Initial investment (CHF)	500000
Life time (Km)	400000	Maintenance (CHF/y)	35000
Disposal cost (CHF)	1234	Non direct cost (CHF)	123
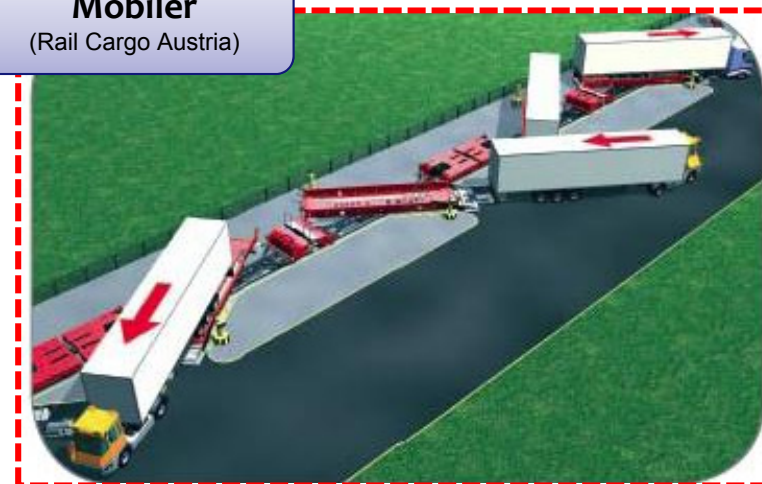
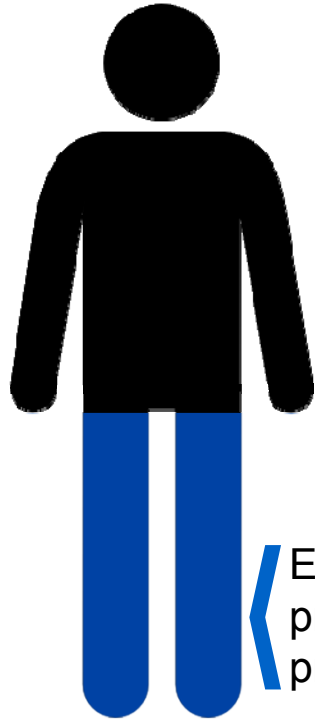**Resource configuration**: quantitative parameters estimated for scenario description and assessment

H2020 MovAiD
Prof. P. Pedrazzoli SUPSI

Sales & Services

Functionally Graded Biomimetic Parts

Embedded Sensors

Morphologically Tailored Custom Made Parts

Kineto-Dynamic Custom Made Parts

Scanning

Embedded Sensors

Total Body Avatar

Automatic Generative Design

Local Additive Machines
For custom made parts

Value Chain
For synchronized delivery and assembly of standard components

Service Platform

SUPSI

Integrated production value chain

Assembly

MAD
Personalized kineto-dynamics device

man

usage data

coordination

Integration platform

Additive-Tech Machine for multi-functional material

Generative Design Approach

services

feedback

scanning

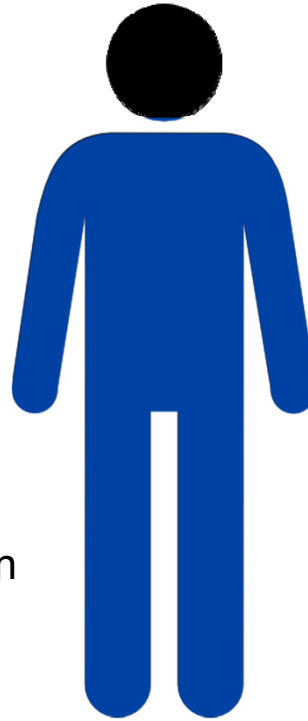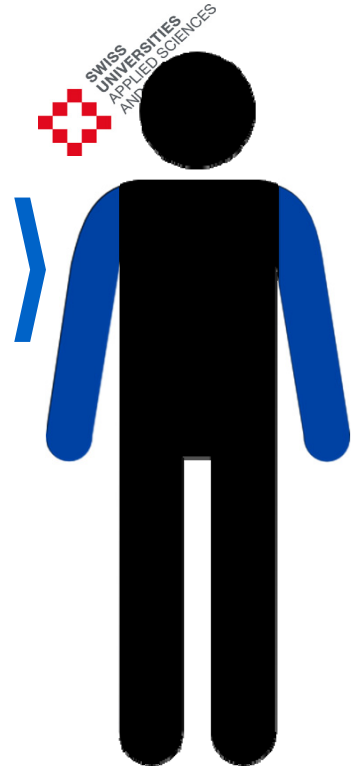Total Body Avatar

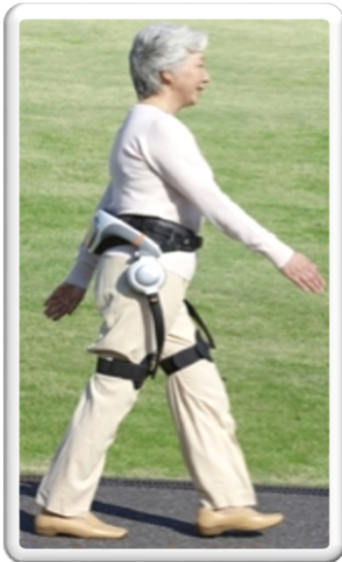SWISS UNIVERSITIES APPLIED SCIENCES AND ARTS

SUPSI

Worker with activities which entail severe risk injury and low job productivity >

Disabled children with uncontrolled motion or arthrogryposis >

Elderly with deambulation problems to reduce fall probabilities and injuries <

Innovative Thinking Is Fostering Sustainable Mobility

Thank you for your attention