"EU priorities for Transport research and international Transport research cooperation - the case of China"

5th Annual Conference : SCCER Mobility

SESSION II: EUROPEAN & SWISS MOBILITY RESEARCH LANDSCAPE

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Parts of the presentation - Sources:

PART I:

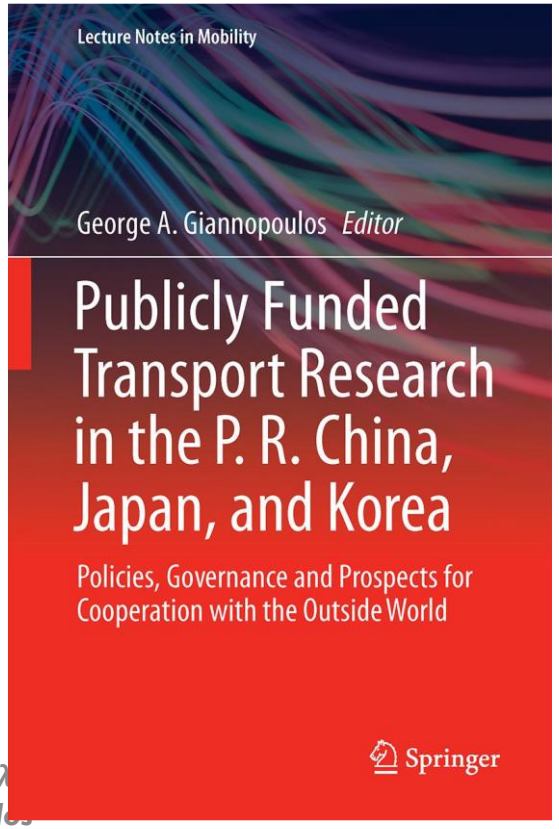
CHALLENGES AND PRIORITIES FOR EU TRANSPORT RESEARCH

- Recommendations of the (EC, DG RTD&I) Transport Advisory Group – TAG
- ETPs (Strategic Research Agendas).

PART II:

INTERNATIONAL TRANSPORT RESEARCH COOPERATION:

PROSPECTS AND EXPERIENCES WITH CHINA



PART I

EUROPEAN TRANSPORT RESEARCH: CHALLENGES AND PRIORITIES

The major challenges for the future:

1. *Effectively using / integrating, the **New technologies:** Autonomous cars (land or air), ITS, AI, 5G, IoT.*
2. ***Safety / security** (Minimizing Transport related loss of life).*
3. *Developing the next generation of **Mobility services**.*
4. *Reducing the **dependence of Transport on fossil fuels.***
5. *Transport sector **mitigation and adaptation to climate change.***
6. *Minimizing the adverse **health effects of Transport** and managing the impact of demographic trends.*
7. *Overhauling the system of **infrastructure maintenance.***
8. *Maximizing **resource utilization** across the Transport sector.*
9. *Collecting and managing **Big data**.*
10. ***Increasing the resilience** of the Transport system.*

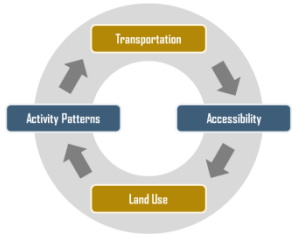
In short:

Create a transport system that is integrated, efficient, sustainable, safe, resilient, accessible and inclusive

The (ever elusive) goal of integration

A. Between the different dimensions of transport:

cross-modal *passenger - freight* *urban - interurban* *transport – land use*



Supply-side and demand-side

Technology ↔ Behaviour

hardware ↔ software / ICT

individual ↔ corporate ↔ governmental

vehicles ↔ infrastructure

Also, between different administrations or players:

Management administrations

Service providers

Governmental admins

Infrastructure owners and operators

Academic disciplines

What will be the impact of major technological developments?

Within the Transport Sector…

Hardware

Vehicles

- Low emission tech.
- Veh aerodynamics
- vessel 'scrubbers'
- platooning
- low resistance tyres
- autonomous vehicles

Infrastructure

- Climate proofing methods
- intermodal systems
- self-healing concrete
- Intel highway

Other

- Sensors
- modular packaging
- robotics

Software / ICT

- Crowdsourcing of traffic data
- Cloud computing
- Big Data
- Aircraft tracking systems
- Supply chain visibility
- Next generation telematics
- Physical internet

… Or external

3D printing

Augmented reality

5G Telecom

Decarbonisation of electricity generation

Internet of things

How will be the users react?
What behavioural changes to expect?

Within the Transport Sector…

Individual

- Switch from ownership to sharing
- new patterns of trip chaining
- teleworking
- adaptation to smart charging
- longer distance commuting
- education / awareness campaigns

Corporate

business travel

- Virtual conferencing
- Modal shift to rail
- Advanced travel planning and budgeting

logistics

- Night-time delivery
- JIT
- Horizontal collaboration
- Slow-steaming
- Cross-functional management
- Omni-channel co-ordination

Governmental

- Evidence-based decision-making
- re-ordered priorities
- emphasis on corridors
- standardisation initiatives

… Or external

- 'Aging' of the population
- Economic austerity
- Growing environmental awareness
- Social networking
- New governance & financing models

Themes and Topics for Transport research (1/3)

(1) NEW TRANSPORT TECHNOLOGIES AND THEIR IMPACT ON THE TRANSPORT SYSTEM

- *Automation*
- *Aerial vehicles*
- *Electromobility*

(2) NEW MOBILITY SERVICES

- Shift from owning to sharing of transport assets

- 'Door-to-door' Public Transport

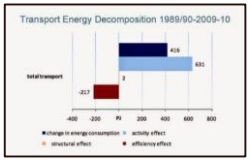
- Better utilisation of Transport capacity

- Achieving road safety's "zero vision"

Themes and Topics for Transport research (2/3)

(3) ECONOMIC AND COMMERCIAL ASPECTS OF TRANSPORT:

- New business models and markets
- Key external economic and commercial variables
- Utilisation of transport capacity
- Understanding the rebound effects
- Innovative financial instruments
- Public procurement and procurement documents



(4) RESILIENCE ISSUES IN THE TRANSPORT SYSTEM – CLIMATE CHANGE ADAPTATION

Risk assessment - Increasing the resilience of the transport system – Measures and policies for Transport system Adaptation

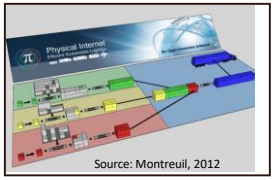
Themes and Topics for Transport research (3/3)

(5) ITS - Integration of systems and services

ITS for coordination of schedules and networks

Cooperative Transport services

Utilization of the 'physical internet'



(6) New materials and Maintenance issues of Transport infrastructures

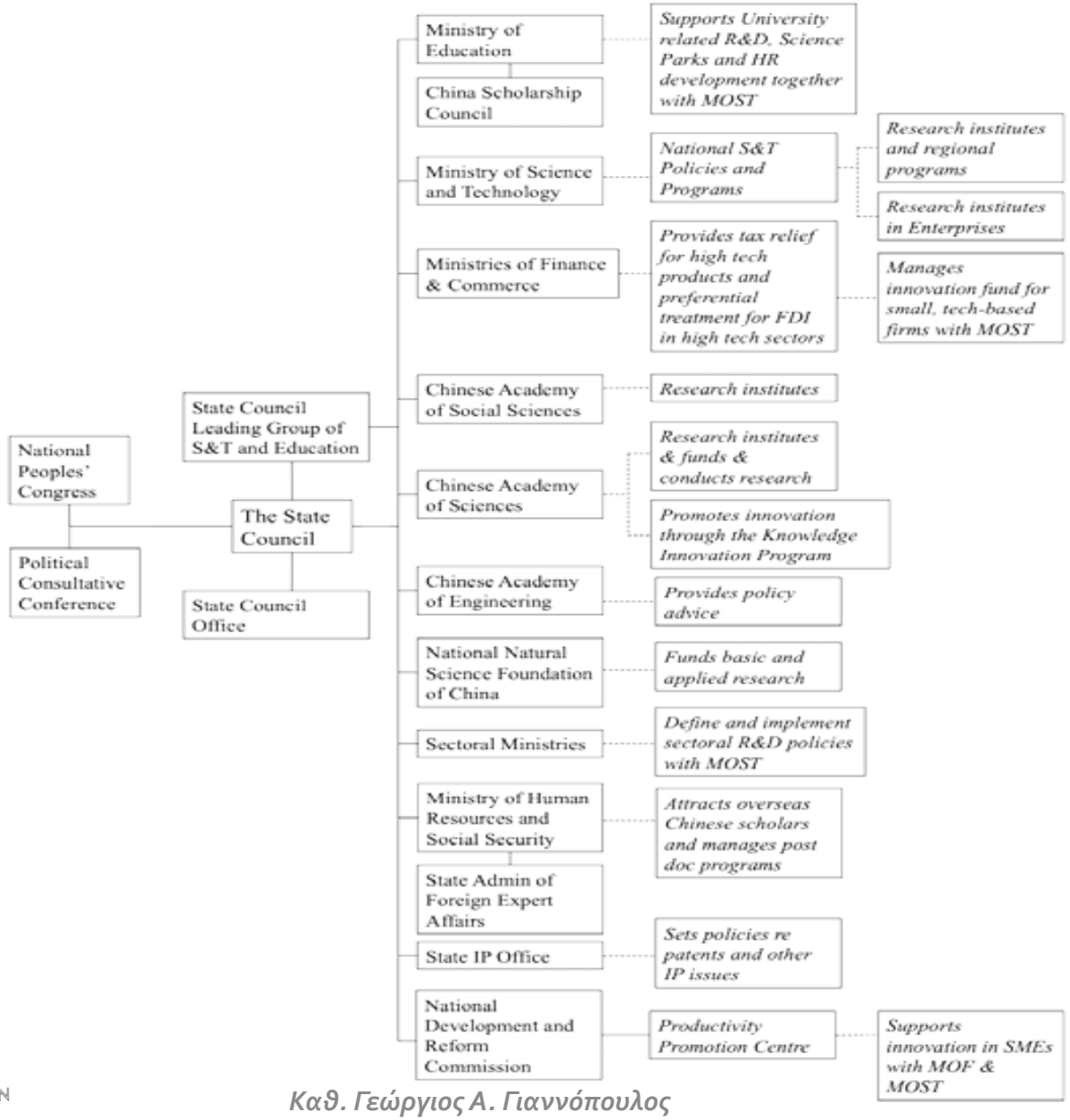
'Self-healing' transport road pavements

Planning - managing Transport infrastructure maintenance

PART II

INTERNATIONAL TRANSPORT RESEARCH COOPERATION:
PROSPECTS AND EXPERIENCES WITH CHINA

Organizations and authorities in Chinese RTD&I



CHINA's MAIN RTD&I POLICIES

The new Innovation and Entrepreneurship policy of the PRC foresees:

- *SMEs are encouraged to cooperate with innovative companies under favorable tax measures (Small-medium sized enterprises (SMEs) contribute 60% of China's industrial output and create 80% of China's jobs).*
- *National innovation programs are to consult companies to determine their needs, while continuing to consider "strategic needs".*
- *Research organizations will be helped to move inventions to commercialization and will be allowed to retain profits.*
- *Rules applying to foreigners with technological talent who seek permanent residence permits, will be relaxed and permits will be given more easily (They may be allowed to enjoy the same treatment as Chinese nationals when founding Science & Technology enterprises).*
- *All RTD projects to be chosen via peer review processes Chinese researchers will be further encouraged to participate in international RTD projects, as well as initiating such projects.*
- *A new legal and institutional framework will be created (due to be completed by 2020) that will enhance the free movement of talent, capital, technology and knowledge in order to encourage coordinated innovation and enhanced efficiency.*
- *Commitment to grow the number of per capita RTD researchers and to increase their outward look and interaction. Using 2008 as the baseline, will more than double by 2020.*

Main forms of cooperation with Chinese entities (Universities research centers)

I. *Calls under National bilateral agreements (funded by the two sides separately but the calls are fully coordinated and the evaluation procedures harmonized).*
II. *Calls under EU's H2020 or sequel FP9.*
III. *Exchanges of academic and research personnel (The Chinese government encourages international scientific training cooperation activities as expressed by the large number of Chinese scientists and engineers that are funded to go abroad).*
IV. *Limited Chinese funding for European teams under research contracts. Negotiations can take long times and final approvals can take months.*

The strong "top-down" structure of the Chinese technology transfer and innovation production model, constrains China's grassroots entrepreneurial and innovative forces, as things can change relatively quickly and without warning by a central decision.

The Horizon 2020 possibilities to fund international collaborastive porojects

- ✓ **General** :All projects can include international partners (participant or third party)
- ✓ **Targeted** : In certain Topics, inclusion of international partners may be encouraged or required
- ✓ **Flagship :** Projects specifically devoted to INCO

EU-China InCo

- ✓ *LC-MG-1-1-2018: InCo flagship on "reduction of transport impact on air quality"*
- ✓ *LC-MG-1-3-2018: Harnessing and understanding the impacts of changes in urban mobility on policy making by city-led innovation for sustainable urban mobility*
- ✓ *LC-MG-1-6-2019: Aviation operations impact on climate change (Aviation InCo flagship - bilateral)*
- ✓ *MG-2-9-2019: InCo flagship on "Integrated multimodal, low-emission freight transport systems and logistics"*
- ✓ *LC-GV-05-2019: InCo flagship on "Urban mobility and sustainable electrification in large urban areas in developing and emerging economies"*

Perceived priorities of important RTD topics by Chinese researchers

TOPICS (not prioritized):
Intelligent Transportation Systems
Materials R&D
One Belt, One Road Initiative
Intelligent Software
Environment
Pavements
Railways
Air Transport
Energy Efficiency
Emission Reductions
Transportation Policy
Climate Change
Advanced Inspection Techniques
Sustainable Transportation
Connected Vehicles
Infrastructure Management
Autonomous cars
Electric Cars

Key Chinese RTD&I programs

Three ***core*** programs are the:

- *National Key Technology* RTD&I Program (After 2006, the *Strategy Supporting Program*),
- *The 863 Program, and the*
- *973 Program*

(The 863 and 973 have invested in developing technologies to address economic, sectoral (e.g. transport) and social challenges),

- Programs to *assist companies by financing advanced manufacturing technology* development and new materials and techniques for product development.
- *National programs for environment building, industrialization or commercialization* such as the *Spark Program* and the *Torch Program* which are designed to develop industrialization and commercialization.
- The *Innovation Fund* (or *Innofund*) for technology-based SMEs and
- The *National Science and Technology Infrastructure Program* (of the MOST) have also been influential in the formation of a vibrant RTD&I culture.

SUMMARY OF MAIN SWOT FOR COOPERATION WITH CHINA

STRENGTHS	WEAKNESSES
• Existence of a myriad of transformational innovations that are ready to be incorporated into new transport systems • Reservoir of human resources with technical capabilities consistent with new transportation challenges • Existence of Chinese "Silicon Valleys" with large and small firms that have superior technical capabilities in transportation fields • Robust private sector in China. • Eagerness of Chinese academic centers of excellence to cooperate with Europe. • East Asia is known around the world for its entrepreneurial spirit and acumen.	• Powerful special interests that favor legacy transportation systems and technologies . • National research governance system that see international collaboration in political terms. • Growing demographic, cultural and technical impediments. • Incapacity or unwillingness to invest in a broad portfolio of basic scientific research activities that underlie future transportation innovations. • Variable economic health of the European or Asian economies that could influence investment in collaborative ventures.

OPPORTUNITIES	THREATS
• Legacy transportation systems worldwide are in need of structural reform • Costs of infrastructure renewal are demanding the use of transformative innovations to create greater efficiencies. • Climate Change and serious environmental, energy and health effects from air and water pollution could be mitigated through use of transport innovations such as EVs and AVs. • Growing consensus to pursue transformative innovations that require collaboration with nations with advanced innovation strength. • A growing number companies that are experienced with using Public-Private-Partnerships reduce investment costs.	• Recent trends in some major western countries away from globalism and towards protectionism • Potential for "zero-sum" collaborations that could poison the "will" for international cooperation. • Exogenous security threats and political / national conflicts in Asia that could derail international collaborative efforts and reprioritize national security over international cooperation. • Inadequate intellectual property protection regimes that increase uncertainties related to international collaboration • Political and institutional passivity and reactivity on a regional or global scale. • Stability of the international economy.

THANK YOU !!!