



TRA2016 Workshop:

***ACADEMIA AND JOB MARKET: HOW TO MATCH?
Building European transport academic excellence: which offer to students?
Which contribution to innovation?***

Warsaw, 20 April 2016

Organised by:

- ✓ ***The European Commission, DG MOVE (Directorate C - Innovative and sustainable Mobility) and DG RTDI***
- ✓ ***The European Transport Research Alliance (ETRA)¹***

SYNTHESIS REPORT AND MAIN FINDINGS

Brussels May 2016

¹ The *European Transport Research Alliance (ETRA)* is a partnership of five Transport Research Associations ECTRI, EURNEX, FEHRL, FERSI, and HUMANIST, which collectively they have 104 Transport research organisations as members from 37 countries. ETRA was formed in September 2012 to promote cooperation and to support the realisation of the *European Research Area* in the field of Transport (ERA-T). More info: info@etralliance.eu Web: www.etralliance.eu

Objectives and scope

The overall objective of this workshop was to discuss the issues involved and the needs for a more flexible and adaptive transport education system that is more harmonized with the needs in the professional job market. The idea was to bring together the main parties and stakeholders involved in educational and research activities in the transport field in Europe and maybe other parts of the world, and to investigate and evaluate the opportunities offered today by the relevant higher-level educational establishments in transport disciplines in Europe in relation to the job market.

The workshop also aimed to:

- ✓ Highlight the weaknesses, gaps, and basic characteristics of transport education in Europe today
- ✓ Outline the needs of the job market (i.e. the employers) for new transport specialists graduating from the European transport education establishments
- ✓ Identify the demand for new academic curricula in response to the emerging sectoral needs, and finally.
- ✓ Produce a list of desired actions and responsibilities for the main stakeholders involved in transport education
- ✓ Assess the desirability and viability of the creation of a European academic excellence network.

A clear intention of the organisers was to involve the young generation of transport academics and professionals in exposing the current gaps and difficulties for the young generation and making focused suggestions for the way ahead. With its “participatory” structure, the workshop aimed to provide an “arena” for discussion and interaction in which all the participants, especially the students and young professionals in the transport field would be able to express their concerns, experiences, and proposals. In the same line of innovatory action, the workshop also addressed specifically Europe’s need to create strong networks of academic excellence in the field of transport research and education centers by building on the lead created by existing such networks.

For the transport course graduates and young transport professionals, the strength of the workshop was that it addressed the future needs and the current weaknesses in offering the necessary skills to embrace a career in the transport field. It must be noted that many of the observations during this workshop are not unique for the transport sector and apply to other sectors as well.

Workshop organisation and introductory questions

The structure of the event provided the basis for achieving the above aims and objectives. It featured two keynote presentations, invited as an introduction to the theme and the main issues for the conversation “circles that followed”: an academic gave one of these presentations -

expressing the Academia's point of view - while an industrialist, representing the (transport) industry's point of view, gave the other.

Then all participants were split in three groups ("circles") for a fully interactive conversation session. The three "conversation circles" and their main issues, or debate questions, were the following:

Circle (a): Transport education

The emphasis in this "circle" was on the way that transport education takes place today in Europe, what are the current challenges (or are conceived to be as such) and what recommendations can be made for the future. The key elements of interest were the following:

- Courses and curricula taught
- Teaching methods
- Degrees given
- Examinations and evaluation methods
- Gaps and trends especially as regards trans-disciplinary education provision.

Issues / questions:

- ✓ Which "subjects" for the transport courses – what priorities and weight?
- ✓ Which differentiation / categorization of courses (primary subjects – secondary ones – Theses – practical stages with the transport industry, etc)
- ✓ How do transport education students see current transport education?
- ✓ What teaching methods? (Theory - practical examples – reports / essays - sandwich courses with "stages" of practical experience, other)
- ✓ Ways to improve the transport education procedures through, e.g. internships at industry, exchanges with other Universities, specific in-depth studies for transport professionals, summer Schools, and so on.

Circle (b): Professional profiles of the future

Focus on the desirable profiles for the transport professional of the future, i.e. what are the needs and demands of the transport industry for transport professionals. The aim was to delineate (to the degree possible) the needs of the transport industry and the views of transport practitioners as to what is the desired background of the transport education graduates and their qualifications today and in the future.

Issues / questions:

- ✓ What are the new types of jobs that the transport industry is expected to create?
- ✓ Which are the main profile shortages faced by industry (and the public sector)?
- ✓ How do the young graduates or professionals see their future professional engagement?
- ✓ How do the students themselves value their education for the future job market?
- ✓ Which are the training needs as perceived by the transport industry?
- ✓ How easy is it to enter a research career today and in the future?

Circle (c): Networking in transport research and education

Focus on transport education or research networks and how they can improve transport education in Europe. By “networks” are meant personnel, academia, or research organizations’ networks that are existing or possible to be created in the future. The issues of concern were the following:

Issues / questions:

- ✓ Existing experience and lessons from key education and training networks in the transport education sector (e.g. the H2020 Marie Curie network)
- ✓ Aims and benefits of networking
- ✓ How industry and academia can better liaise and network in the future?
- ✓ Linking networks to specializations or education subjects, i.e. the value of specialized / focused University networks
- ✓ Problems and bottlenecks in the development of networks
- ✓ The degree to which a better established and more statutory networking between Transport education and industrial establishments could remedy some of the gaps and inconsistencies that exist today between what the transport education provides and what the transport industry needs.

The detailed programme of the Workshop is given in the ANNEX.

Workshop Findings, conclusions, recommendations²

Cornerstone issues and considerations.

We are in the middle of a contextual evolution for education and training needs in the Transport sector that is evident not only within the EU but also worldwide. In the last decade or so, new demands are created for professional competences and skills in the Transport sector due to the:

- ✓ Growing demand for skilled personnel (e.g. in the logistics sector where a 2016 survey for the third party logistics sector found a 61% skills shortage in improving service quality)
- ✓ Economic turmoil and crisis introducing new fields of interest
- ✓ Needs for sustainable development and high level mobility services
- ✓ New and very specialized technological advancements
- ✓ New educational tools and paradigms in the Transport sector.

² Many of the ideas developed further in this document are inspired by the two insightful keynote speeches given during the workshop. The organisers would like to acknowledge the input provided by the two keynote speakers: Professor Dr. Alan McKinnon, Head of Logistics, Kühne Logistics University, Germany on “the point of view of the Academia” and Mr. Jean-Luc di Paola Galloni, corporate vice-president of Valeo and co-chair of the ERTRAC ETP on “the point of view of Industry”.

These new demands and requirements have – to a great extent - resulted in a “European paradox” in that in spite the persisting unemployment levels, the European transport industry lacks skilled personnel (including managers) and looks to other continents to cover this gap.

Key educational issues that remain perennial in Europe and applying to the Transport sector and the European experience are the following:

- ✓ *Specialist vs general content in curricula*
- ✓ *Acquisition of knowledge vs skills*
- ✓ *Individual vs group work*
- ✓ *Exams vs course assignments*
- ✓ *Class-room teaching vs self-study*
- ✓ *Number, duration and character of internships.*

The search for optimization and balance between the above pairs is continuous and reflects the specific philosophy and educational strategy of each specific higher education establishment. The result in each case makes the difference in terms of quality and attractiveness between the individual Universities or other educational establishments.

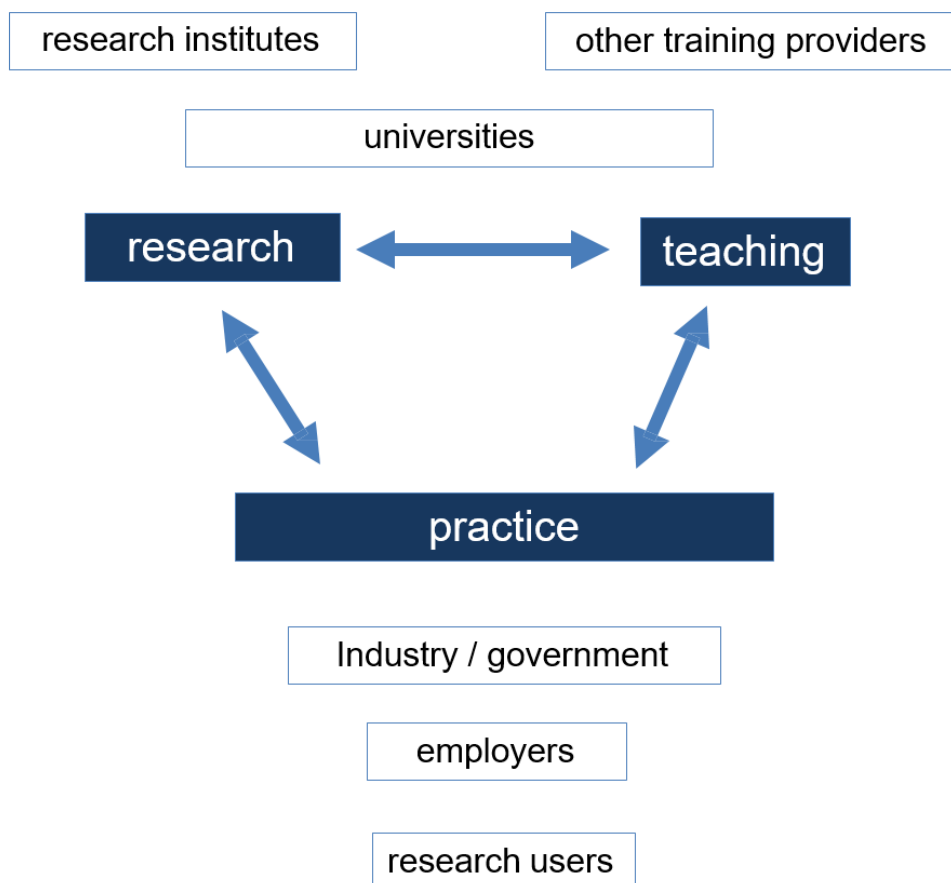


Figure 1: *The relations of Transport education – research – practice by activity and type of Organisation*

Three elements interact and define the notion of “Transport education” i.e. teaching, research, and practice (see Figure 1). A number of Organisations are involved and a number of interrelations between them define the whole picture. There are a number of issues to consider and basic tasks to fulfill, if we want to fully analyze, improve and move forward in terms of the issue of transport education in Europe. They include:

A) On the relation between Teaching and Practice:

- *Ensuring practical relevance of the teaching material*
- *Clarifying the role of industrial / practitioner advisory groups:*
 - *Involvement of practitioners in course accreditation processes: internal and external to the institution*
 - *Inclusion of guest lectures, internships, site visits, industrial case studies, company projects etc. The course proliferation and the growth in student numbers make it difficult to find enough industrial partners and projects*
 - *Incentivizing the practitioner community to support development and delivery of transport programmes*
- *Equipping students / managers with necessary skills*
- *Increasing the ‘employability’ of transport graduates*
- *Providing refresher courses for managers: life-long learning in the transport sector*
- *Finding the right business models for executive programmes that maximize synergies*
- *Optimum mix of specialist and generic skills: getting the balance right*
- *Interface between university courses and in-house company induction / training programmes:*
 - *courses designed in partnership with leading businesses*
 - *well paid summer internships and third-year placements*
 - *industry-led seminars and site visits*
 - *assigning to every student a company mentor throughout the course*
 - *At the end, secure for graduates a graduate-level job with one of the sponsoring companies.*

The above interfaces are well exemplified in the Huddersfield University’s Novus Programme (See: www.hud.ac.uk/uhs/novus/).

B) On the relation between research and teaching:

This should be a symbiotic relationship but unfortunately, various factors make this difficult to achieve (with reference to the field of Transport): e.g.

- *Uneven allocation of academic time, effort and resources*
- *Stronger incentives to excel in research than in teaching: promotion, esteem etc. They reinforce the natural inclination among many academics to be researchers more than teachers*

- Delays in incorporating research results into the teaching curriculum
- Speed at which the field is evolving – changing circumstances, policies, technology and practice
- Time-lags in the updating course material: lecturer ‘inertia’
- Accreditation cycles
- Delays in the paper publication process
- Failure to see students as a potential research resource.

C) *On the relation between research and practice:*

- Incentivizing academics to undertake practically relevant research
- Influence of practitioners in shaping research agendas and funding strategies
- Inclusion of ‘impact’ as criterion in research assessment processes
- Joint industry / government / academic research consortia: *formal collaboration, greater likelihood and speed of implementation...*
- Key role of ‘facilitating’ Organisations that network academics and practitioners
- Disseminating research results to the practitioner community
- Pressure on academics to publish in highly ranked journals – but:
 - higher ranked journals are generally more theoretical, less empirical, less practitioner-oriented
 - Transport journals generally have low rankings in social science listings
 - There is generally a spurious distinction between “relevance” and “rigour”
 - Practitioners generally do not read academic journal papers anyway.

The desired profile for the academic personnel

There is a need to ensure a healthy flow of high caliber Transport specialists into the Academic world. Figure 2 below, shows the attributes of an “ideal” academic.

It is of course difficult to find and recruit academic all-rounders with the skill set as shown in Figure 2 especially into senior posts. Salary differentials, quality of life, intellectual stimulation and university bureaucracy as well as tightening research criteria are denying able managers or policy makers’ access to academic posts.

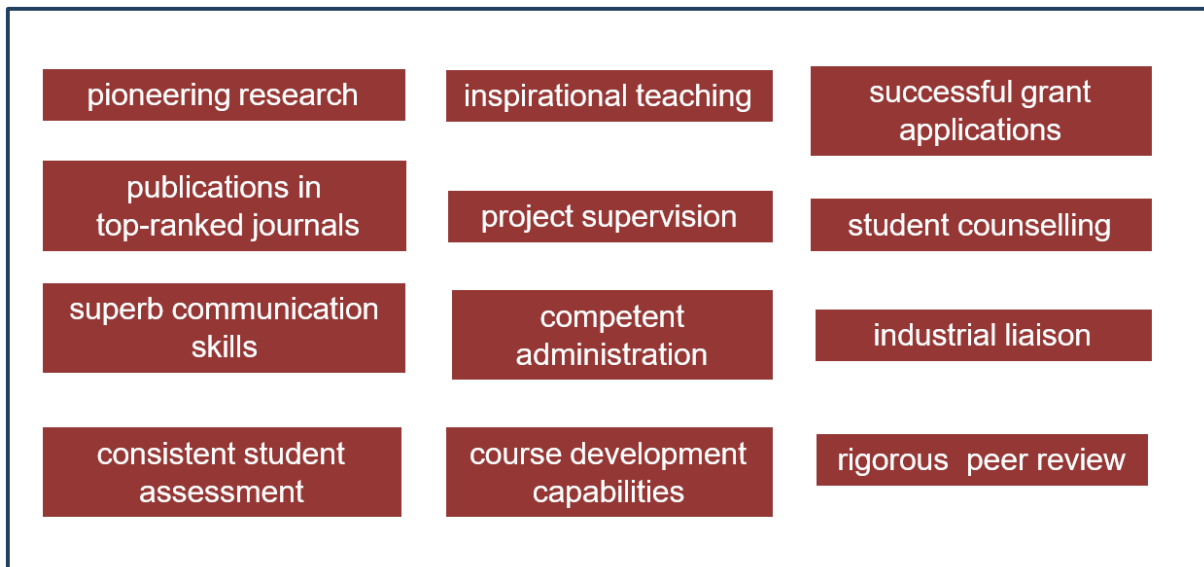


Figure 2: The Ideal Transport Academic: a combination of attributes

Our current transport education “business model” is based on the fact that Europe exports a great deal of transport hardware and services to the rest of the world. It now needs to see transport education itself as another major export sector. This will bring direct benefits in terms of income and the enrichment of taught programs, but also longer term indirect benefits in having EU-educated transport specialists in positions of responsibility, for among other things procurement, around the world.. The user – consumer should be the driver in this business model as he/she is affected and consequently creates impacts (the social disruption of technology).

Transport education provision

1. How should we organize Transport curricula and courses?

There was a consensus (including students) that the 3+2 Bologna higher educational model was appropriate wherein the first 3 years concentrate on the essential technical subjects such as mathematics, physics, chemistry, mechanics etc. in first year followed by theory in the core areas of structures, hydraulics and soil mechanics. Additionally critical is the question of when to specialize in transport – at undergraduate or post-graduated level. A need for some higher computer programming skills was also noted. In relation to this, the students present, raised the issue of their perceived lack of skills and educational input in basic science (i.e. maths, physics, statistics, computer programming) in the first years of their studies thus indirectly noting that the current model 3+2, (with the first three years more professionalizing), is not working. In their opinion, it could work better if the first step would be more oriented to gain expertise in the fundamentals, including informatics skills.

The 2nd phase of education provision, i.e. that of post graduate studies (two or one year Masters) would then allow the students to specialise in e.g. Transportation, Structural Design, Soils etc. or even to take a broader Civil Engineering Masters.

A clear preference for teaching soft skills (presentation, innovation, group work) through technical subjects was noted.

2. The issue of trans-disciplinarity:

In technical educational modules trans-disciplinarity should better be quite narrowly defined, e.g. the importance of understanding soil-structure interaction for a building means that even a specialist Master's course should consider both topics. In larger case study or capstone type of modules, where group work is involved, the notion of trans-disciplinarity could be extended (e.g. engineers working with planners, architects, social scientists etc).

The issue of promoting trans-disciplinarity was demonstrated by an interesting example of such development in Italy. It is the case of the High Polytechnic School (Alta Scuola Politecnica), which based on an agreement between the Politecnico di Torino and the Politecnico di Milano, selects the best students and gives them a special and tailored training focused on interdisciplinarity (aside the different specializations). The same school is providing also for interdisciplinary projects based on the collaboration of students with different expertise (engineers, architects, designers, urban planners, computer engineering).

3. The importance of life-long learning:

It was noted that given the propensity for employers to prefer to run the majority of ad-hoc training in-house and the numerous online resources, the role of the Universities in providing life-long learning courses (at least in the Transport sector) was unclear. Here the question of how to manage the interface between university courses and company in-house programs should be addressed (e.g. - to what extent do companies feel the need to develop / expand their in-house training because universities are not delivering graduates with the required skill-set? -)

Today we witness a visible trend towards a high level of flexibility in jobs and careers: young transport professionals that are in their 20s today will be likely to change two or three jobs or even more during their working life. This is a point to be taken into account as it highlights the need to create constant education and training opportunities for life-long learning, available for all professionals in the Transport sector.

4. The need to continue and improve on student mobility opportunities across borders:

This practice should be encouraged since the current experience is very positive.

Aside from the existing Erasmus, Marie Curie, COST, and other relevant programs, the need can be justified for more focused programs related to the internalization of the student's profile and their specializations in the transport field.

Professional profiles and needs for harmonization with the human resource needs of the industry

Human Resource (HR) Strategies are needed in transport businesses because:

- a. It makes the business successful in a competitive environment
- b. Every organization needs a strategy to align the daily work with a (long term) objective
- c. It is a cornerstone enabling an organization to achieve results.

The conceptual framework of a HR strategy from the industry's point of view comprises four main elements:

1. Quantity – personnel planning
2. Competencies
3. High Performance Culture
4. Compensation & benefits.

Furthermore, the growing complexity of projects, in system engineering, the ability of working in a team is essential for tomorrow's transport engineer.

Key messages coming out of the relevant "conversation circle" include:

- The mismatch between "university supply" of "transport graduates" and "industry needs" can be related to the differences in values, paradigms and cultures in both types of Organisations: what is important and valued by universities is not the same as in industry (and vice-versa).
- Universities and enterprises have often, different time perspectives: sometimes universities are more advanced (e.g. undertaking research on topics that are not yet mainstream) but often they also lag behind in terms of providing recent content and knowledge that young graduates should have when entering industry.
- We should not forget that many people who work in the transport sector, do not have transport related degrees and qualifications (some of the most disruptive developments in transport are being driven by entrepreneurs without a formal training in the subject); also, many transport graduates find a job outside the transport sector. This reality has to be taken into account when defining needs of transport industry (it actually asks for consideration of courses on transport topics for people without degrees in transport).
- More attention should go within universities to development generic skills that professionals need when they enter the labour market. In particular: *problem-solving skills, teamwork skills and creativity*.
- Most young people seem to have no idea of what they want to become later. They have little or no knowledge about the types of jobs and careers that are available. Their expectations are more linked to "*doing something that they like to do*" or "*doing something they are interested in*". None of the young respondents seemed to have the ambition "to change the world" or start themselves something new. This would call for more entrepreneurship training within university courses.
- In order to improve the interface and the transitions between universities and industry, it is recommended that mixed careers are encouraged, i.e. that after graduation people

spend part of their career in university and part in industry. The same should be encouraged for scholar careers. However, this is becoming more and more difficult because of tightening career expectations on both sides of the university/industry divide.

- Young researchers may not be aware of the possibility to have a “research career” within industry and this possibility must be further developed and promoted.
- There was finally some discussion on whether transport programmes should be (very) multidisciplinary or rather more focused on a particular topic. The provisional conclusion was that focus is important since it requires someone to go deep into a particular theme. However, one should realise that this is more meant as a learning exercise and that in later stages one is likely to be involved in completely other topics and that other perspectives should be brought in to get the full understanding of a transport problem.

However, a number of questions remain unanswered:

1. Where, when, and how many people do we actually need? / What measures to take to gain global competitive cost advantages?
2. What are the competencies with potential to differentiate from competitors and critical for business success? / How do we close a competency gap?
3. How can we achieve leadership excellence? / How do we identify and develop talents? / How can we promote a High Performance Culture?
4. How do we optimize the development of personnel cost and gain competitive cost advantages? / How to design material and immaterial incentive systems to motivate and ensure strategy implementation?

In relation to the need to stay close with the industry and harmonize further the transport education provision with the needs of the industry, the discussion in one of the “circles” also touched upon the subject of how transport research can better be implemented and approach the society and the market in a more standardized and productive way. New ideas and innovative approaches to research implementation were therefore briefly discussed during the workshop. Of particular interest was the presentation concerning project *e-gomotion* (www.e-gomotion.eu) which is demonstrating an innovative approach to mobilizing the academia, the industry, and the administration sectors in Italy and a number of other European countries in order to bring transport research results closer to implementation and the market.

In conclusion...

...the transport engineering education needs to encourage:

- A strongly multidisciplinary education
- Expert level knowledge in few technological fields
- Broad but less specialized knowledge in all ICT relevant technologies
- Become experienced in interdisciplinary teamwork (e.g. internship and thesis).

In addition...

... the transport industry needs to support universities in setting up future transport education courses by:

- Giving universities a proper access to industries
- Involving universities in publically funded programs
- Taking a share in teaching at universities and vice versa
- Participation in advisory groups and the course accreditation process.

Networking in transport research and education

Networking in the field of transport education can provide the basis for more collaboration and exchanges of students and personnel towards higher harmonization of curricula and teaching methods. It can also provide a necessary “critical mass” of educational establishments that can more easily introduce innovatory educational methods and attract more cooperation with practitioners and the industry.

Furthermore, by networking, higher education establishments can provide collectively the necessary interdisciplinarity as well as pooling of resources for the provision of high-tech or new-tech based education, e.g.:

- E-learning
- Web-based learning - Virtual learning
- Virtual learning environments (VLE)
- Multi-media learning
- Blended learning
- Technology-enhanced learning
- Instructional technology
- Computer-based instruction
- Ubiquitous learning

Networks of transport educational establishments do exist today but they are few and limited in their size and scope. The experience from their existence and operation so far is positive.

As regards Transport research Networks these are more pronounced and usually based on the Transport Research Associations that are formed between Research providing Organisations be they Universities or Research Centers and Institutes. There are numerous such Associations, which within their scope and objectives include creating cooperation and networking activities between their members. A first attempt, at European level, to create a second tier of networking in the transport sector, i.e. between transport research Associations, was the creation – in 2012 – of the European Transport Research Alliance – ETRA.

In relation to the existing Networks for both research and / or education provision, the discussion revealed the following points:

1. The provision of adequate funding for networking is crucial. The mechanisms for such funding today are programmes such as Erasmus, COST, Marie Curie, European research projects, etc. Their operation and impacts are generally judged as positive but subject to further improvement and more focus on the Transport sector.
2. Promoting bottom-up co-operation always works better than top-down imposed networking.
3. Avoid bureaucracies
4. The role of the local mentor in stimulating the co-operation is important.

5. Confidentiality often needs to be guaranteed when (young) researchers are sent to work in and with companies. A balance with the possibility of disseminating research findings needs to be found.
6. Network of young staff / researchers automatically increases with age.

ANNEX

DETAILED PROGRAMME OF THE WORKSHOP

<i>Title</i>
<p style="text-align: center;">Academia and Job Market: How to Match? <i>Building European transport academic excellence: which offer to students? Which contribution to innovation?</i> (3.45 – 6.15 pm / Wednesday, April 20th, 2016 Room: Business Club B - West)</p>
<i>Organizers</i>
<p>European Commission (DG MOVE, DG RTD&I) – European Transport Research Alliance (ETRA)</p>
<i>Workshop set up and chairs</i>
<p>The Workshop comprised of 2 keynote speeches at the beginning (one from an academician and one from an industrialist) followed by in-depth discussions of a number of 'hot issues' between the various stakeholders present in the room. The conversations took place in three groups or “Conversation Circles”.</p> <p>In addition, each of the five ETRA partner Organisations was asked to prepare a poster with the issues at stake, the bottlenecks and the solutions from their point of view. These posters were hung in the Workshop room as a reminder of the issues and the viewpoints of the ETRA partners while a set of key questions posed for the discussants in the “Conversation circles” were continuously projected in the screens across the room.</p> <p><u>Session co-chairs:</u></p> <p>Prof. George A. Giannopoulos, Chairman ETRA - Arch. Maria Cristina Marolda, EU DG MOVE</p>

Programme

Part 1 ***Opening and Keynote speeches*** *(30 minutes)*

Introduction by the organizers (The European Commission and the European Transport Research Alliance)

1st introductory keynote speech: Professor Dr. Alan McKinnon, Head of Logistics, Kühne Logistics University - The KLU, Hamburg, Germany. "The point of view of Academia"

2nd introductory keynote speech: Mr. Jean-Luc di Paola Galloni, corporate vice-president of Valeo and co -chair of ERTRAC ETP (the European Road Transport Advisory Council). "The point of view of Industry"

Part 2 *Three "CONVERSATION CIRCLES" on:* ***STAKES, CHALLENGES, SOLUTIONS AND RECOMENDATIONS*** *(1 hour 15 minutes)*

Participants were asked to join one of three "**conversation circles**" as follows (they were also asked to change circles after a 20 minute stay at one):

(a) *Transport education*

Moderator: Prof. Ken Gavin, Professor of Subsurface Engineering, TU-Delft

Conversation facilitator: Prof. Cristina Pronello, Politecnico di Torino

Interuniversity Department of Regional and Urban Studies and Planning, Torino, Italy.

This circle hosted conversation on curricula / methods / degrees /gaps and trends in trans-disciplinary education provision, current challenges and recommendations for the future.

Indicative issues for the discussion: Which subject matters and combination of subjects are the most appealing for students? How do student value their education for the future job market? Which are the training needs that are not found in Universities? How could the education procedure be completed (internships at industry, exchanges with other Universities abroad, specific in depth studies via e.g. Summer Schools)?

(b) *Professional profiles of the future*

Moderator: Dr. Wouter Van den Berghe, Research Director, Belgian Road Safety Institute (BRSI), Chairman of the HUMANIST Association.

Conversation facilitator: Mr. Pietro Perlo, CEO Interactive Fully Electrical Vehicles, I-FEVS.

This circle hosted conversation on potential new profiles for the transport professional of the future, needs and demands of the market for transport professionals.

Indicative issues for the discussion: How is the transport industry creating the new jobs of the future? Which are the main profile shortages faced by industry/public sector? What do the young professionals or students see as their future professional engagement? How easy is to enter a research career today and in the future? Which are the training gaps perceived by the industry?

(c) Networking in transport research and education

Moderator: Prof. Barbara Lenz, Institute Director, DLR Transport

Conversation facilitator: Prof. Thierry Vanelslander, Department of Transport and Regional Economics, University of Antwerp, member of the University network Transportnet.

This circle hosted conversation on transport education networks and how they can improve transport education in Europe. By “networks” are meant personnel networks, academia networks (existing and possible new ones) within Europe and outside it, partnership between Academia and Industry. What are the gaps and bottlenecks, what transport education complementarity exists between European and other international educational establishments, liaison between networks and education subjects, etc.?

Indicative issues for the discussion: How to link networks with research topics? How can industry and academia better link? What role/option for students?

A note on the operation of each “Circle”:

- *Each “circle” conferred concurrently with the others at different parts of the room*
- *The moderator engaged in conversation all participants starting with the “facilitators”.*
- *The conversation in each circle addressed its specific topic from all possible angles e.g.: the “stakes” involved, the challenges and problems faced, the solutions and recommendations that could be made regarding transport education in Europe, and so on.*
- *At the end, the moderator and/or one of the “facilitators” drew the conclusions and the main points made during the conversations.*
- *As a rule, after 20’ of conversation in each circle the participants were encouraged to move to another ‘circle’ to engage in the other conversation theme. Moderators and facilitators remained in the same circle in order to keep continuity and absorb/activate the new comers.*

Part 3

CONCLUSIONS (in plenary)

(40 minutes)

Presentation of the conclusions of each “circle of conversation” by each “circle” moderator.

Overall conclusions and closure by the workshop co-chair, **Prof. G. A. Giannopoulos.**

End of the Workshop