

CAMERA

A data-driven approach to mobility assessment



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A data-driven approach to mobility assessment

CAMERA 2nd Workshop presented the results of the CAMERA Mobility Report (MR1) and evaluated its methodology, partly based on artificial intelligence techniques (natural language processing algorithms).

The goal was also to identify new ways of presenting and summarising mobility research, and new focus areas for further exploration.

Transport stakeholders and experts, European Commission representatives, members of relevant European Technology Platforms (ETPs) and Joint Technology Initiatives (JTIs) attended this workshop and participated in the exercises.

The discussions were driven to enrich and complement CAMERA's data-driven methodology for mobility assessment (topic modelling on FP7 and H2020 research projects) with an expert-informed approach.

AGENDA

- **Presentation:** Introduction and workshop objectives.
- **Presentation:** MR1: results and methodology.
- **Exercise 1:** Artificial vs human language processing.
- **Exercise 2:** Prioritising investment in mobility.
- **Presentation:** Wrap-up & final remarks by EC Officer.

On the next pages we outline some high-level results, that will be further elaborated in future reporting.

Key questions addressed:

- How well can artificial intelligence describe and categorise vast volumes of research projects?
- What design features would be desirable in a future knowledge hub of European research?
- What are the priority areas for research in mobility, driven by the current apparent gaps?

The participants were given the opportunity to:

- Discover the latest results from the CAMERA project, its first Mobility Report (MR1), and future planning
- Gain insights into the use of artificial intelligence in mapping and exploring large research datasets
- Participate in group exercises to help identify future mobility priorities, and get involved in CAMERA's programme



RESULTS of the MORNING SESSION

The objectives of the morning session were to:

- Inform participants about CAMERA objectives and mobility goals, the artificial-intelligence (AI) methodology for the assessment of European research initiatives and the preliminary results described in the Mobility Report (MR1).
- Refine the criteria for the selection of mobility-relevant projects through natural language processing algorithms.
- Classify “by hand” a sample of mobility projects across nine topic clouds (cf. p. 6) and compare the results of the AI assessment with the expert-informed approach.
- Devise an initial design of a future knowledge hub of EU-funded research projects (in mobility).

Description of the results.

On a sample of 39 projects, participants selected 29 as relevant for CAMERA. For comparison, the algorithmic approach labelled 21 of those 39 projects as mobility relevant.

“Relevant” projects were evaluated against the nine topic clouds identified by the AI algorithm (p. 6): the more a project relates to a topic, the higher weight is associated to that topic. This evaluation imitates the algorithm output, which assigns to each project a probability distribution across nine topics.

Finally, participants gave feedback on the algorithmic approach and suggestions on how to improve it and generate a future AI-based knowledge hub of EU-funded research projects in mobility. Such a system would enable methodological and intelligent exploration of a large dataset of research projects.

Key findings:

- The analysis of the abstract only is sometimes not sufficient to assess whether project objectives align with the goals of CAMERA.
- Many projects selected as relevant by the participants had been discarded by the algorithm, which might therefore be too conservative.
- Introducing humans into the loop when building AI-based systems is of indispensable value. The expert-informed evaluation, together with ideas and feedback will be used to improve the algorithm.



RESULTS of the AFTERNOON SESSION

Three break-out groups of participants agreed on a prioritisation of high-level objectives for mobility in Europe and assessed how they related to the topic clouds generated by the natural language processing algorithms, as explored during the morning session.

Description of the results.

For each discussed topic, the following objectives were prioritised:

1. **User needs:** provide integrated ticketing options, implement solutions that foster on-demand mobility, and increase personalisation of the travel experience through data-driven customer profiles.
2. **Infrastructure:** improve airport accessibility, provide real-time itinerary information, data sharing, disruption management for passengers during the entire journey, and enable digital biometrics solutions to facilitate and reduce bag drop processes, boarding times, etc.
3. **Mobility performance:** enable passenger journeys within four hours from door to door, provide seamless passenger processes, including the reduction of process, waiting, boarding and (inter-modal) connection times, and enable more efficient and faster solving of disrupted itineraries and solution delivery to affected passengers.

These objectives were then mapped to the CAMERA topic clouds considered most likely to support their delivery. Each group allocated spending to the intersection of these topic clouds and the CAMERA mobility layers (see MR1 page 14). Fairly good agreement was found between 'desired' spending and the 'actual' research activities so far captured by CAMERA during its mining of the CORDIS website. Research activity in the resilience and re-configuration mobility layer was conspicuous by its absence, as was the case for the environmental impact, socio-economics and freight transport topic clouds.

Key findings:

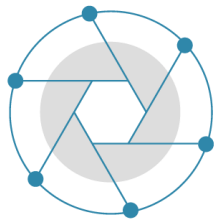
- Necessary priority research activities were identified for the following intersections of topic cloud with mobility layer:
 1. **User needs** – socio-economics with customer demand, inter-modality with customer supply.
 2. **Infrastructure** – intermodality with resilience and reconfiguration.
 3. **Mobility performance** – intelligent transport with resilience and re-configuration.
- The fields of resilience, re-configuration, environmental impact, socio-economics and freight transports have been so far insufficiently researched.

CAMERA TOPIC CLOUDS

#	TOPIC CLOUD	DESCRIPTION
1	Air transport technologies	Concepts, policies, infrastructures and technologies crucial for developing an integrated, efficient, and sustainable air transport system. Focus is on supporting and promoting actions to implement technological solutions.
2	Ground transport	Connection between ground transport modes, and to other modes of transport. Primary focus is on the role of ground transport and its interconnection with air transport.
3	Intelligent transport	Creating a better match between services provided by transport systems and travellers' needs. Designing more intelligent transport systems, with a greater focus on co-modality.
4	Freight transport	Challenges arising from the need for sustainability, future demographic changes and environmental needs (green freight); technology innovations to deal with such challenges.
5	New concepts in transport	Less developed concepts, such as connectivity problems in regions with underdeveloped networks, new (ITC) platforms for more efficient collaboration. More affordable, accessible and energy-effective systems.
6	Environmental impact	Focus on environmental impacts of transport, including health issues arising from these.
7	Socio-economics	Examples here include societal developments influencing demand for regional flights, transport needs of an ageing society, creation of job opportunities due to specific innovations in transport.
8	Intermodality	Tools, policies and technologies needed to achieve seamless, multi-modal services.
9	Urban mobility	Mobility of people for business and leisure purposes; urban deliveries, freight transport, service trips and other types of travel that occur in urban environments. Includes sustainability, cost-effectiveness, efficiency and societal needs.

CAMERA MOBILITY LAYERS

#	MOBILITY LAYER	DESCRIPTION
1	Mobility - customer demand	Definition of customer profiles and expectations, including passenger experiences and mobility choices. Socio-political acceptance of mobility, e.g. impact of transport projects. Incentives for innovation in new technologies/products/services.
2	Mobility - performance	Assesses KPIs for the full door-to-door journey, including economic and environmental considerations. Used for travel process management, monitoring and forecasting flows. Benchmarking for new technologies and services.
3	Resilience and reconfiguration	System recovery from unexpected and undesirable circumstances such as: bad weather, external attack, crisis, ATC strike or simply a bottleneck in a transport process. Propagation of delay through the system. Trip reconfiguration, information management, and transfer between transport modes.
4	Air traffic management	Improvement of air traffic management within required safety bounds through advances in both its technical and operational aspects. These affect the availability, duration, cost, and thus mobility choices the passenger. Accessibility of the airspace to other vehicles, e.g. remotely-piloted aircraft.
5	Mobility - customer supply	Includes the integration of air transport infrastructure with other modes, to achieve an intermodal network and related processes. Includes new (air) mobility concepts and technologies.



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