Intelligent Transport Systems

- ITS are based on innovation in communication and computer technologies - fast evolving field
- Despite positive developments, infomobility today remains highly complex
  - ITS should lead to a more efficient use of vehicles and infrastructure
  - Link rail, ground, air and urban transport towards a truly seamless multimodal future
Some ITS trends

❖ Enhance the user experience
  ❖ Quality of services and information lie at the core of this paradigm
  ❖ Transport-related information being delivered anytime, anyplace, any media
  ❖ Interactive mapping, real-time information and Voice Interfaces (not only for accessibility but usability in general)
❖ Multimodal door-to-door journeys
Some ITS trends

❖ “Standardize” transport networks
  ❖ electronic fare management and data exchange
❖ Door-to-door Wi-Fi connectivity
  ❖ the daytime commute is set to become less of a ‘down time’ for users
❖ Aggregated use of many types of ‘big data’ - machine to machine data, ticketing data, crowd sourced data
❖ Crowd sourced data and Social Network Analysis (SNA)
Some believe that Open Data initiatives have catalysed more innovation throughout the industry than any other factor in the last three decades.

At European level:
- European Commission Open Data Portal (http://open-data.europa.eu/)
- Publicdata.eu - pan-European data portal from the LOD2 project (FP7)
- DataCatalogs.org, is a list of open data catalogues in the world, including different European countries, regions and cities
Big data

- Big Data - In addition to sensor data from infrastructure, vast amounts of mobility and social data are generated by smartphones, communication among and between vehicles and end users with location-based services, etc...

- Offers an important source of information to promote sustainable mobility, in the sense that
  
  A. operators can better understand the mobility needs of different users
  
  B. users can make better/informed trip decisions based on up-to-date analysis of real-time data sets
On-going projects

❖ Demand Modelling for Flexible Transport systems using digital footprints
  ❖ rather than working to predefined routes and timetables, flexible services create them in real time to meet users’ needs. Journeys are planned in real time with an algorithm that compares vehicle availabilities with users’ requests optimising routes and maximising the load capacity factor
  ❖ demand modelling: understand user’s short term land use patterns, with a careful analysis of available data, coming from collaborative platforms like Twitter and Foursquare
    ❖ Social Network Analysis
      ❖ Friendship, Important locations, Ties strength
    ❖ Choice Set division
    ❖ Multinomial logit model
  ❖ some interesting results are being produced
On-going projects

❖ A Robust Clustering-Based Algorithm with Constraints for Detection of Meaningful Places from GPS Traces

❖ Create a robust spatio-temporal clustering algorithm for discovering intentional stops from the trajectories of users

❖ GPS devices generate a large amount of trajectory data

❖ do not contain the user-level notion of “place” (home, work, etc)

❖ Location-based Social Networks (LBSN), like Foursquare and Twitter, support hundreds of millions of user-driven footprints (unique opportunity to model human activity)

❖ Clustering enables us to detect intentional stops and, thus, to model mobility patterns

❖ incorporate background geographic information - enriched with semantic labels gathered from Foursquare - to create a physical representation for the discovered intentional stops
On-going projects

❖ Data gathering and urban activities classification - urban routes & POIs
  ❖ The established view on semantic organisation of space is based on an aggregated perspective of the use of an area (“land use” concept)
  ❖ A more disaggregated and dynamic view is now possible due to availability of new techniques and technologies
    ❖ The wide deployment of pervasive computing devices (cell phone, smart card, GPS devices…) provide unprecedented digital footprints, enabling (for instance) the accurate timing of urban transport services provisions
  ❖ Tasks
    ❖ Data collection (GPS traces)
    ❖ Incorporate background urban geographic information
    ❖ model POIs and urban routes
Air transport is seen in 2050 at the heart of an integrated seamless diffused European multimodal system, taking passengers from door-to-door (Flightpath 2050).

FlyD2D project aims to develop integrated services in which high-quality information is provided to air passengers for better decisions and risk-free door-to-door travel experience.

The concept is supported on dynamic, real-time, information provided by open and crowd-sourced data plus data from various stakeholders (in particular, from airports).

This information will be available to the passenger on an “information follows me” concept, accessible before and during the trip experience.

By monitoring passengers’ journeys and travel experiences, airports and other air transport providers will develop tailored passenger-centric services and disruptions will be managed free of risk or stress from the passenger.
FlyD2D consortium

List of participants

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<td>1 (Coordinator)</td>
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<td>Brussels Airport</td>
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<td>Consorzio Milano Ricerche - CMR</td>
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<td>Deutsches Zentrum für Luft- und Raumfahrt - DLR</td>
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Advisory Board

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<td>Koninklijke Luchtvaart Maatschappij N.V. (Royal Dutch Airlines)</td>
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Conclusions

❖ The mindset has to change from quick fix solutions with ITS to a whole of city integrated approach encompassing public transport, traffic, soft modes, etc, and further integrated with energy efficiency, security and land use.

❖ New mobility patterns are being induced by the increasing use and social integration of new technologies.

❖ The paradigm is shifting to more user-oriented transport services.

❖ Open Data/Big Data and Crowd-Sourced Data are very important assets.

❖ Ingredients to be successful
  ❖ users’ needs and user-friendly interfaces
  ❖ data availability
  ❖ it is important to have an holistic approach, reconciling competitiveness with sustainability, being both technological and socio-economic relevant.
Thank you!!

Rui Gomes, Carlos Bento