Transfer of intelligent transport systems (ITS) innovations to the market

6th ECITL, Zaragoza, 23.10.2013, Susanne Kellberger
Fraunhofer and Fraunhofer CML

The project T-TRANS

- General Information
- Research results
  - 3.1 Development of an Intelligent Transport System ontology - linking applications and technologies across different transport modes
  - 4.1 Success and failure factors of past innovations
• Founded in 1949
• Largest organization for applied research in Europe
• Contract research of direct utility to private and public enterprise and of wide benefit to society
• 1.9 billion Euro research budget
  ◦ 2/3 is derived from contracts with industry and from publicly financed research
  ◦ 1/3 is contributed by German federal and state governments in the form of institutional funding
• 80+ research institutions
• 22,000 employees (predominantly scientists and engineers)
• General Information
  ◦ Founded 2010 in Hamburg
  ◦ Located at the campus of TU HH
  ◦ Applied research in maritime logistics

• Competences in:
  ◦ Port and terminal planning
  ◦ Assessment and optimization of maritime logistics processes
  ◦ Maritime forecasts, studies and market analysis
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Problem: ITS innovations often do not even enter the market in Europe.
- How are the innovation chains?
- How can the market deployment be facilitated?

Duration: 27 months (01.09.2012 - 30.11.2014)

Total budget: 1.7 Mio € (EC funding: 1.5 Mio €)

Coordinator: UAB (ES)

Partners: LGI (FR), ATOS (ES), Fraunhofer CML (DE), SERNAUTO (ES), UNITS (IT), INTELSpace (GR), KEMA (NL), TTI (LV)
• **Phase 1:** Compilation of information and analysis of innovation chains

• **Phase 2:** Strategies for technology commercialization and identification of good practices to promote innovation transfer to the market

• **Phase 3:** Establishment of an Innovation Network for ITS (pilot regions Central Macedonia, Galicia, Latvia)
• Analysis of the innovation chain in transport and ITS, along four predefined case studies:
  
  o **CS 1 Smart grid**: connection, charging and energy storage (Intelligent control systems for network management for EVs)
  
  o **CS 2 Revenue management technologies for freight transport** (Transport prices reflect the demand like for passenger flight tickets)
  
  o **CS 3 Revolution in intermodal transport units**: Intelligent intermodality (The intelligent container)
  
  o **CS 4 Rail network**: technological system wide approach (Increasing the rail network capacity)

**Phase 1:**
Analysis of innovation chains
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• Change in ITS applications + evolution of ICT = make it necessary to have an overview of the whole range of ITS

• From an **application point of view** the technological combinations are most likely to be neglected

• From a **technological point of view** the multifaceted possible fields of applications are not considered sufficiently.

→ An ontology in the ITS area is proposed to highlight the relationship among all concepts
- Review of commonly and occasionally used ITS areas and subareas
- Scientific literature
- Practical sources
- ITS areas
- ITS subareas
(ITS) area: ITS applications are classified into different ITS areas (example: ‘information services’)

(ITS) subarea: In between applications and areas some subareas pool applications (example: ‘public transport information’ or ‘individual traveler information’)

**ITS concepts and classification: (Sub) Areas**
• **(ITS) application:** The combination of technologies to fulfil user requirements related to a transport mode on a certain market is a so-called *application* (example ‘freight tracking’)

**ITS concepts and classification: Applications**
ITS Ontology

- An ontology enriches, with respect to a “simple” classification, the information available on these items (van Rees (2003)).
- An ontology is a specification of a conceptualization (Gruber (1993))
- Here exemplarily CS 3 applications:
- **(ITS) technology**: These are technologies that can be applied in the context of transport and that are predominantly information and communication technologies (example: ‘digital camera’)

- **(Technology) functions**: certain technologies are classified by their functions. (example: ‘Sensors’ or ‘Identification technologies’).
**ITS concepts and classification: ITS ontology (basic)**
Extract of the ITS Ontology in T-TRANS:

- All of applications that are applied by T-TRANS case studies are combined with the used technologies.
- The technologies have been aggregated to their functions here.
- The numbers in the cells represent the case study number.

<table>
<thead>
<tr>
<th>ITS Applications</th>
<th>Communication technologies</th>
<th>Hardware infrastructure</th>
<th>Software infrastructure</th>
<th>Algorithms</th>
<th>Positioning technologies</th>
<th>Sensors/monitoring and detection</th>
<th>Identification technologies</th>
<th>Energy related technologies</th>
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</table>
T-TRANS ITS Ontology

Area 1: Information Services
- Vehicle Diagnostics
- Transit Management System (TMS)
- Safety Information Exchange
- Computer Aided Dispatching (CAD)

Area 2: Security, Safety and Control
- Collision Avoidance
- Advanced Driver Assistance System (ADAS)
- V2I
- V2G
- Grid Management
- Fleet Management System (FMS)

Area 3: Freight and Logistics
- Freight Transport Booking
- Capacity Management (CM)
- Overbooking
- Demand Forecasting (DM)
- Capacity Forecasting (CF)
- EV Booking / Payment

Area 4: Booking, Payment and Pricing
- Individual Traveller Information

Area 5: Traffic Management

<table>
<thead>
<tr>
<th>Area 1: Information Services</th>
<th>CS 1</th>
<th>CS 2</th>
<th>CS 3</th>
<th>CS 4</th>
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<td>Area 2: Security, Safety and Control</td>
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<td>Area 4: Booking, Payment and Pricing</td>
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<td>Area 5: Traffic Management</td>
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</tbody>
</table>
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How to overcome the chasm?
5 Types of success

- **Organisational success:** Good coordination between suppliers, partners and public government or even with its internal departments.

- **Social success:** The innovation covers the current needs of the society.

- **Business success:** Business planning, technical marketing strategy and communication strategy are harmonised with one another.

- **Technological success:** The new product technically works.

- **Policy and Normative success:** Public entities have set the a normative environment into the market to adopt the innovation.
Drivers for success

- Coordination of R&D and marketing
- Public financial support
- Adapted public policies & governance
- Standards helped commercialisation
- Good IP management
- Low innovation costs
- Product quality
- Perfect product environment
- Competitive alternative technology
- Previous market research
- Good relationship suppliers & distributors
- Ease of use
- Perfect time to launch
- Adapted financial resources
- High market demand
- Good marketing approach
Drivers for failure
<table>
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<th>Success</th>
<th>Failure</th>
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<tbody>
<tr>
<td><strong>Transport</strong></td>
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<tr>
<td>Public bicycle sharing system</td>
<td>Segway</td>
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<tr>
<td>Automatic Vehicle Location</td>
<td>Maglev</td>
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<tr>
<td>Geographic Information Systems</td>
<td>Electric cars in the beginning of the 20th century</td>
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<td>Cargolifter</td>
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<td><strong>ICT</strong></td>
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<td>Personal Computer</td>
<td>Minitel</td>
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<td>Cloud computing</td>
<td>MiniDisc</td>
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<td>Identification cards</td>
<td>Video 2000</td>
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<tr>
<td>Voice over Internet Protocol</td>
<td>Satellite telephones</td>
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<td>Microchips</td>
<td>HD-DVD</td>
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<tr>
<td>Barcode</td>
<td>Microsoft Zune</td>
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<td>Smart meter</td>
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</table>
Drivers for success (Transport + ICT)

- Good coordination of R&D and marketing
- Good public financial support
- Previous market research
- Adapted public policies and governance
- Standardisation
- Good IP management
- Low innovation costs
- Good product quality
- Perfect product environment
- Competitive alternative product
- Good marketing approach
- Adapted financial resources
- High market demand
- Perfect time to launch
- Ease of use
- Good relationship with suppliers and distributors
Drivers for failure (Transport + ICT)

- Poor coordination of R&D and marketing: 5
- Lack of public financial support: 4
- Lack of market research: 3
- Problems with suppliers and distributors: 2
- Product too complex: 2
- Wrong time to launch: 1
- Poor financial resources: 1
- High innovation costs: 1
- Poor product quality: 1
- Missing market demand: 1
- Lack of product environment: 1
- Marketing weaknesses: 1
- Better alternative product: 1
- Not adapted public policies and governance: 1
### Ranking of top five factors for success and failure (transport + ICT = ITS)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Success</th>
<th>Failure</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Perfect product environment</td>
<td>Better alternative product</td>
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<tr>
<td>2.</td>
<td>Public financial support</td>
<td>Marketing weaknesses</td>
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<td>3.</td>
<td>Ease of use</td>
<td>The lack of product environment</td>
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<td>4.</td>
<td>Good marketing approach</td>
<td>The lack of market research</td>
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<tr>
<td>5.</td>
<td>Standards</td>
<td>Problems with suppliers and distributors</td>
</tr>
</tbody>
</table>
1. Increase public investment in R&D.
2. Reform policies to increase research and innovation efficiency.
3. Increase autonomy of universities.
4. Create a sound level of competition.
5. Support the internationalisation of research.
7. Develop financial incentives.

Recommendations to public authorities
1. Create partnerships between universities and companies.
2. Fail often, fail early, fail cheap.
3. Incorporate the user in the process as soon as possible.
This project is funded by the European Union Seventh Framework Programme (FP7/2007-2013). 

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Dissemination and set-up of the innovation network
Thank you for your attention!

Do you have any questions?