

Fostering ITS Policy

An event organized jointly by TTS Italia and the Policy Committee on Intelligent Transport Systems of the International Road Federation (IRF)

Professional Capacity building and Master degree education in ITS

Wednesday 5 December 2012
Savoia Hotel Regency, Bologna, Italy

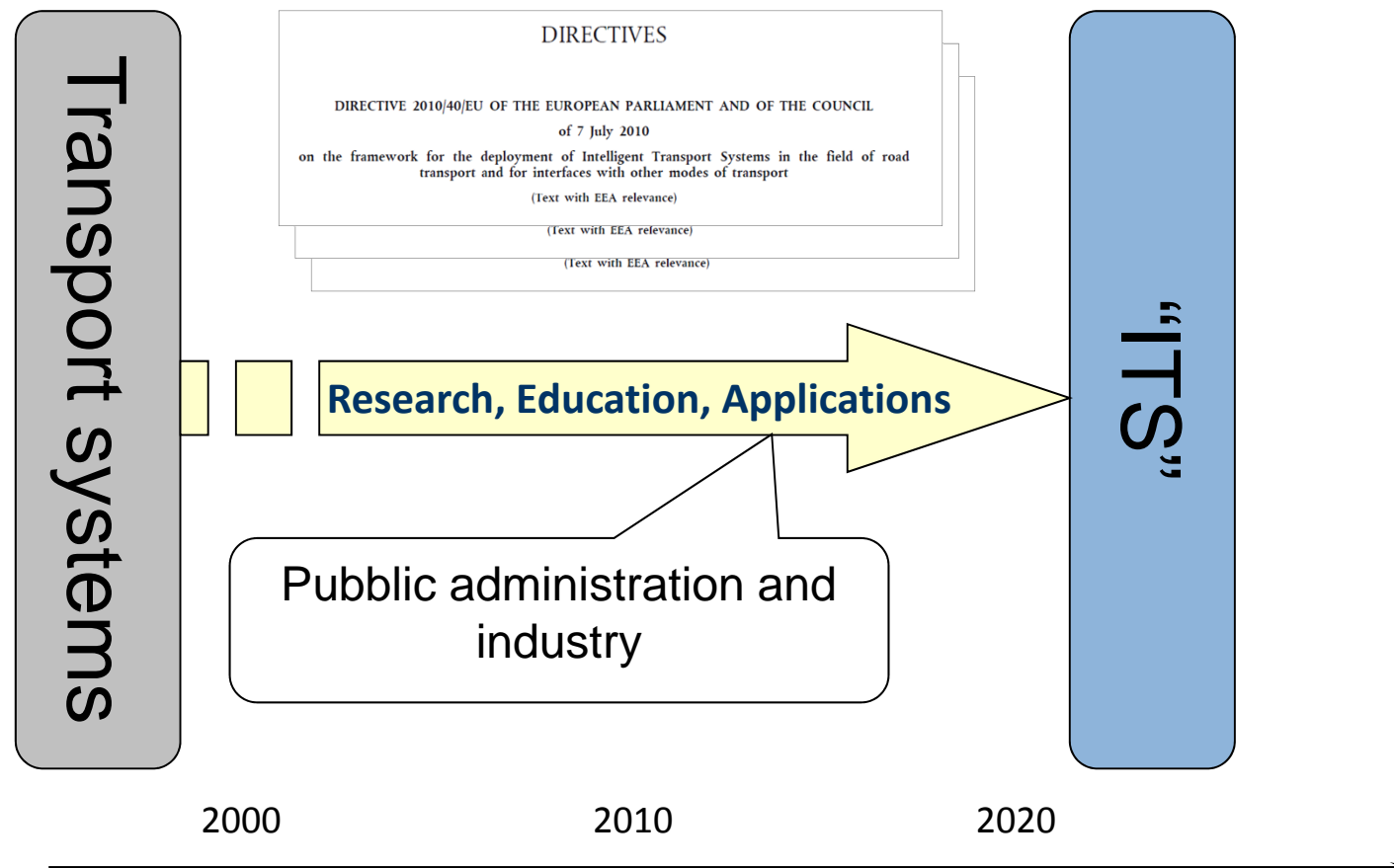
POLITECNICO DI TORINO



**An overview of ITS education in Europe and Italy:
discussion on strengthening of international connections**

International networking among universities in the ITS EDUNET:
new courses, textbooks and educational instruments

Bruno DALLA CHIARA
ass. prof. at the Politecnico di Torino, Transport Engineering - Italy



Definition

- ⊕ *Intelligent Transport Systems (ITS)* integrate telecommunications, electronics and information technologies - in short, 'telematics' - with transport engineering in order to plan, design, operate, maintain and manage transport systems.
- ⊕ This integration aims to improve safety, security, quality and efficiency of the transport systems for passengers and freight, optimising the use of natural resources and respecting the environment.

Source: ITS-EDUNET, 2009

Definition

- ⊕ To achieve such aims, ITS require **procedures, systems and devices** to allow the **collection, communication, analysis and distribution of information** and data among moving subjects, the transport infrastructure and information technology applications.
- ⊕ Specification about related terms: as far as ITS deal with information technologies and mobility of people, may also be defined as “**Infomobility**”; it may involve road transport or any other mode as well as their interactions.

[ITS-EduNet, 2009]



- Sharing of experiences
- Preparation of educational material
- Shared participation to events
- Short courses
- Exchange of students for theses
- Contribution in lessons for M.Sc. courses and PhD.
- Participation to EU or international projects



Programme/Course: MSc in Transportation Systems

fully in English language, held in Munich
M.Sc. in "Civil Engineering" is only in German
M.Sc. In "Transport and Logistics" is held in Singapore

Technische Universität München (TUM) M.Sc. in Transportation System - Curriculum Overview				
Semester 1	Semester 2		Semester 3	Semester 4
Module 1 Transport Economy and Sociology 6 ECTS	Module 4 Project Appraisal and Planning Processes in Transportation 6 ECTS	I N T E R N S H I P (6 ECTS)	Field of Study I Design of Transportation Networks 6 ECTS	M A S T E R S T H E S I S (30 ECTS)
Module 2 Analysis Methods 6 ECTS	Module 6 Concepts for Public and Freight Transport 6 ECTS		Field of Study II Intelligent Transportation Systems 6 ECTS	
Module 3 Land Use and Transport – Strategies and Models 6 ECTS	Module 7 Infrastructure Planning 6 ECTS		Field of Study III Transportation Demand Management 6 ECTS	
Module 5 Transport and the Environment 6 ECTS	Module 8 Traffic Management 6 ECTS		Project 10 ECTS	
Module 9 Soft Skills 2 ECTS	Elective Modules 6 ECTS		Elective Modules 9 ECTS	
Elective Module 3 ECTS				

Programme/Course: MSc in Environmental Engineering

ITS-related topics:

- Traffic Control and Management
- Traffic Flow Theory and Simulation
- ITS System Architecture
- Intelligent Vehicles
- Navigation Systems

Further transportation-related topics:

- Environmental Effects of Transportation (Theory and Modelling)
- Project Appraisal and Evaluation
- Construction of Infrastructure
- Spatial Planning and City Planning
- Demand Modelling

Field of Study 1:
Urban
Environments
and
Transportation

Field of Study 2:
Environmental
Hazards and
Resources
Management

Field of Study 3:
Environmental
Quality and
Renewable
Energy

Field of Study 4:
Energieeffizienz
und
Nachhaltigkeit
von Gebäuden

Cross Cutting Methods, Technologies and Fundamentals

Study Project

Master's Thesis

Programme/Course: MSc in Transportation Planning and Engineering

Notes

- Students select 2 modules from the 3 options
- All modules have some element of ITS. Those with significant actual/potential ITS content are marked*

Module	Status in the Programme	Contact hours	Total hours	ECTS
Transportation Planning practice	Compulsory	36	150	7.5
Transportation Planning: Policies and methods	Compulsory	36	150	7.5
Transportation Engineering: Analysis and Design*	Compulsory	36	150	7.5
Transportation Engineering: Transport Management*	Compulsory	36	150	7.5
Transport Economics	Compulsory	36	150	7.5
Transport data and analysis	Compulsory	36	150	7.5
Highway Engineering*	Option	36	150	7.5
Passenger and Freight Transport*	Option	36	150	7.5
Transport, Energy and Environment*	Option	36	150	7.5
Individual Research project (Dissertation)*	Compulsory	~30	900	30
TOTAL			2100	90









Programme/Course: MD in “Technology in Transportation and Telecommunications”, study field “Intelligent Transport systems”.)

	Mathematics & Physics	Informatics	Technical	Economical & Environmental	Transportation	Special ITS	Projects	Optional
semester 1st	ITS Mathematical Tools Theoretical Physics in Transportation	Information Security Signals and Codes	Control and Reliability Theory in Transportation	Energy Analysis of Land Carriage	Traffic Flow Theory	Telematic Systems and their Design	Master's Project	Specialized Language I Specialized Language II
semester 2nd	Pattern Recognition	Data Processing	Technological Aspects of Quality Artificial Intelligence and Expert Systems in Transport	Economy and Management of ITS Projects Risk Analysis and Management	Analysis and Prevention of Traffic Accidents Traffic Modeling and Simulation Identification Systems	Telecommunications in ITS Intelligent Vehicle and Safety	Master's Project	Specialized Language I Specialized Language II
semester 3th	Mathematical Models and their Applications	Systems Engineering	Special Materials and Technology (<i>facultative</i>)	ITS Effectiveness Assessment Transport and Environment	Railway Interlocking Systems (<i>facultative</i>) Vehicle Control Systems (<i>facultative</i>) Road Safety Audit	Geographical Information, Localization and Navigation Systems Modelling of "Human - Machine" Interface Advanced Telematic Applications (<i>facultative</i>) Safety Critical Applications in Transport (<i>facultative</i>)	Master's Project	Specialized Language I Specialized Language II
semester 4th	Master's Thesis						Master's Project	Specialized Language I Specialized Language II

A typical base of Engineering: Maths, Physics, not the Chemistry, rather Mechanics and Electrotechnics in this case

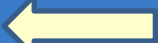

Programme/Course: MSc in “Mechanical-industrial Engineering ”, study field "Transport Systems”

Transport systems





Academic Term	Code	Language	Course	ECTS	Vincoli	Professor
1	01NLONE		<u>Automation in transport systems/Rolling stock mechanical design</u>	10		<u>V.Viktorov</u>
			<ul style="list-style-type: none"> •  Automation in transport systems (<u>V.Viktorov</u>) •  Rolling stock mechanical design (<u>N.Bosso</u>) 			
1	01NLYNE		<u>Models and technologies for traffic and transports</u>	8		<u>F. Deflorio</u>
1	01NIPNE		<u>Transport systems engineering and operation</u>	10		<u>B. Dalla Chiara</u>
2	16EBGNE		<u>Stage</u>	6	Yes	
2	06CPFNE		<u>Transportation Techniques and Economics</u>	6		<u>C. Pronello</u>
2	01OHHNE		<u>Thermal measurements and controls</u>	6		<u>A. De Marchi</u>
2	01IHENE		<u>Electric traction</u>	6		<u>A. Tenconi</u>

Programme/Course: MSc in “Intelligent Transport Systems and Logistics (TSL)” [2 yrs, 120 ECTS Cred.]

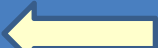
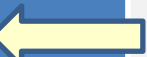
The first semester contains the following courses:

- **Transport and Logistics Systems, 6 ECTS** 
- **Traffic Safety Management, 6 ECTS** 
- **Geographical Information Systems for Transportation, 6 ECTS**
- **Computer Networking, 6 ECTS**
- **Optimization, 6 ECTS**

The 2nd semester :

- **Mobile Communication and Networks, 6 ECTS**
- **Traffic Planning and Simulation, 6 ECTS** 
- **Logistics Networks and Transports, 6 ECTS** 
- **Traffic Demand Modelling*, 6 ECTS** 
- **Logistics Resource Planning*, 6 ECTS** 
- **Wireless Communication Systems*, 6 ECTS**
- **Scientific and Academic Writing*, 4 ECTS**

The 3rd semester :

- **Project Management, 6 ECTS**
- **Positioning Systems, 6 ECTS**
- **Traffic Engineering and Control*, 6 ECTS** 
- **Applied Optimization I*, 6 ECTS**
- **Analysis of Communication and Transport Systems, 6 ECTS** 
- **Applied Optimization II*, 6 ECTS**

* Elective courses

Plus: 5-year engineering programme in “Communication, Transport and Society” (for Swedish speaking students) leading to a master’s degree in Transportation Engineering. The courses offered in the ITS master’s programme is a subset of the courses offered in year 4 and 5 of this programme.

Programme/Course: MD in “Intelligent Transport Systems”

Modules	Czech Technical University in Prague	ECTS credits	UAS Technikum Wien	ECTS credits	Linköping University	ECTS credits
Module 1 Transportation Systems	Analysis and Prevention of Traffic Accidents	2	Transportation Systems	1.5	GIS for Transportation	6
	Energy Analysis of Land Carriage	2	Public Transport	1.5		
	Identification Systems	2	Technologies in Transport	4.5		
Module 2 Intelligent Transport Systems	Telematic Systems and their Design	6	ITS in Rail, Water and Airborne Transportation	4.5	Intelligent Transport Systems	6
			Traffic Telematics	3		
Module 3 Automated Data Acquisition and Processing	Pattern Recognition	3	Sensorics	3	Traffic Demand Modelling	6
	Data Processing	3	Algorithms and Data Structures, Soft Computing	3		
Module 4 ITS Management Skills	Economy and Management of ITS Projects	3	Management and Leadership Training	3	Project Management (takes place in the 3 rd semester)	6
	Technological Aspects of Quality	2	Law	3		
Module 5 Mathematical Tools	ITS Mathematical Tools	4	Discrete Mathematics	3	Optimization	6
	Theoretical Physics in Transportation	3	Operational Research	3		
Module 6 Required Elective Module	Artificial Intelligence and Expert Systems in Transport	2	Required Elective Module	6	Computer Networking	6
	Intelligent Vehicle and Safety	2				
	Risk Analysis and Management	2				
Module 7 Traffic Modelling and Simulation	Traffic Modelling and Simulation	4	Transport Modelling and Simulation	6	Traffic Planning and Simulation	
	Traffic Flow Theory	3				
Module 8 Telecommunication	Telecommunications in ITS	3	Telecommunications	3	Mobile Communication	6
	Signals and Codes	4	Mobile Telecommunication and Network Technology	3		
Module 9 Specialization in ITS 1	Control System Theory and Reliability in Transportation	4	Embedded Control Systems	4.5	Data Communication and Internet	6
	Information Security	2	Distributed Systems	1.5		
Module 10 Specialization in ITS 2	Master's Project 1	2	ITS Project I (Select one of the following: Autonomous Driving, Intelligent on Board Sensors for Vehicles, Traffic Data Acquisition, Cooperative Systems)	6	Human Systems Interaction/ Road Safety Audit	6
	Master's Project 2	2				

Italy

A textbook, in final preparation

- prof. Gennaro Nicola BIFULCO, Università degli studi di Napoli
- prof. f.r. Giovanni CORONA, Ing. Benedetto BARABINO, Università di Cagliari
- prof. Gaetano FUSCO, Università di Roma La Sapienza
- ing. Riccardo ROSSI, Università di Padova
- ing. Luca STUDER, Politecnico di Milano

and my self....





The Essentials of ITS

– get a comprehensive insight into state-of-the-art methods, technologies and into the benefits of ITS on an academic level

Date:

Saturday, October 20, 2012 (1200-1730hrs)

Sunday, October 21, 2012 (0900-1430hrs)

Location:

University of Applied Sciences Technikum Wien

Target group:

Practitioners, academics, local authority officers, decision makers and industry leaders related to ITS or to the transport sector. Open also to a limited number of students.

Timetable (preliminary):

Sat., 1245-1415, Prof. Dr. Bruno dalla Chiara (Politecnico di Torino, Italy):

A Survey on ITS: Definition, Aims and Applications

Sat., 1430-1600, Prof. Dr. Martin Fellendorf (Graz University of Technology, Austria):

Inter-Urban Traffic Management

Sat., 1615-1730, Dr Nick Hounsell (University of Southampton, UK):

Urban Traffic Management

Sun., 0900-1030, Dr. Friedrich Maier (ITS-EduNet, Germany):

From Data to Information

Sun., 1045-1215, Dipl.-Ing. (FH) Dietrich Leihs PhD, Univ. of Applied Sciences Technikum Wien (A):

Quantifying outcomes, technical and economic benefits of ITS

Sun., 1300-1430, Prof. Dr. Fritz Busch, Technische Universität München (Germany):

Quality in ITS & Closing

Course organiser:

Dipl.-Ing. (FH) Dietrich Leihs PhD, University of Applied Sciences Technikum Wien (Austria)

New courses, textbooks and educational instruments” are aspirations of ITS EduNet, yet limited to date, with some exceptions

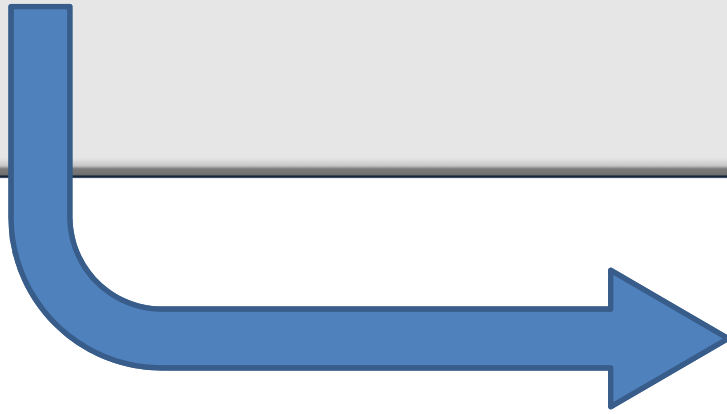
What practitioners want and how we could supply it.



Short course on
ITS in Vienna,
October 2012

In 2012:

- Nearly 85 presences: **participants** coming from Municipalities, Provinces, Regions, some Companies, Ph.D. students.
- Starting day, in presence, in April;
- then 3-4 months available for using the **e-learning platform**; final meeting in July.



POLITECNICO DI TORINO
DIPARTIMENTO DITIC - TRASPORTI

ITS
Intelligent Transport Systems

HOME | News | FAQ | Forum | Glossary | Privacy

Versione Italiana

Homepage

- Registration
- Access to courses
- List of subjects
- Search for subjects
- Subscription to subjects
- Technical documents
- Information
- Contacts
- Copyrights
- System requirements

con il supporto ed il contributo di:
MINISTERO DEI TRASPORTI

Telematics for transport: basic definitions

The transport system is nowadays utterly congested and calling for information, in terms of both space and time. The energy resources employed - sometimes in excess - and the emissions that derive from them, call for the capacity to manage complex networks and systems which resort to shared vehicles and transport systems as much as possible in order to considerably improve the efficiency in the displacement of both people and goods. An essential tool to meet such objectives is the use of Information Technology and telematics, i.e. the so-called Intelligent Transport Systems (ITS).

Technological innovation and telematics for transport (ITS, Intelligent Transport Systems) deal with the procedures, systems and devices to allow - through the collection, communication, analysis, and distribution of information - enhancement in the transport and mobility of passengers as well as in the logistics of freight together with the evaluation and quantification of the gained results

(Bruno Dalla Chiara, 2004)

By the term infomobility we mean the use of devices, systems, services and applicative solutions based on Information Technology and telecommunications - in short, telematics - in order to allow the collection, marshalling and exchange of information and/or data between one or more moving subjects and one or more information technology applications.

Said moving subjects may be people, goods, transport means or vehicles; the concept of mobility is more appropriate for those who can move autonomously (i.e. people), whilst terms such as transport and handling better suit freight, logistics - on the other hand - should be employed when referring to the related organizational activities. The applications that can be employed may be databases - e.g. to collect information concerning a place, the status of a delivery, etc. - and applications for transactions, maps for localisation, tracing, tracking, etc.

The transmission of information may both be active - i.e. conveying information or a request of information from the moving subject - and passive, i.e. by the automated reception of any information, reading of a label when passing close to a gateway, etc.

Advanced technology and, in particular, telematics applied to transport can mitigate several issues and inefficiencies which affect the system, with particular reference to mobility. Sound results have already been achieved, even though the users are not always acquainted on the actual and spread use of many of such applications. A momentous transformation is thus in progress, as related to the way of conceiving mobility and whatever is related to it, including the tele-presence.

Infomobility may involve road, rail, maritime, aerial, inland navigation and intermodal transport.

18

In 2010 was the 1st course, mainly addressed to the public administration; 1st and last days at the Politecnico di Torino-I, Italian language was preferred:

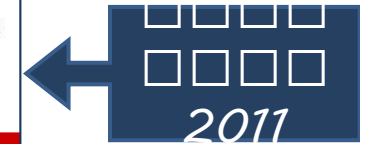
ITS ITALIA Associazione Italiana della Telematica per i Trasporti e la Sicurezza

POLITECNICO DI TORINO
1859 1906

DEPT. DITIC - TRANSPORT ENGINEERING

TRANSPORT TELEMATICS

SHORT COURSE AND E-LEARNING ON "ITS"



20th of June 2011 →

e-learning from April until November → 15th of November 2011

BASICS of ITS



Answers to questions, debate



1st
day



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SYNTHETIC INDEX OF SUBJECTS AND OF THE VOLUME

1. THE EVOLUTION OF NEEDS IN THE TRANSPORT FIELD AND DEFINITIONS
2. TECHNOLOGICAL INNOVATION AND TRANSPORT TELEMATICS: CONSTITUTING ELEMENTS
 - 2.1 CONSTITUTING ELEMENTS OF TRANSPORT TELEMATICS
 - 2.1.1 Telecommunications and transport systems
 - 2.1.2 Automatic location systems (AVLS)
 - 2.1.3 Automatic Identification systems (AIS)
 - 2.1.4 Geographical Information Systems (GIS)
 - 2.1.5 Electronic Data Interchange (EDI)
 - 2.1.6 Instruments for traffic flow monitoring and data collection in vehicles
 - 2.1.7 Instruments for automatic passenger counting (APC)
 - 2.2 APPLICATIONS AND BENEFITS OF INTEGRATION OF TELEMATIC SYSTEMS INSIDE TRANSPORTS
 - 2.3 APPLICATION OF TECHNOLOGIES IN ROUTE CHOICE AND IN THE MANAGEMENT OF SHIPMENTS
 - 2.4 ROLE OF TELEMATICS IN MULTIMODAL TRANSPORT
3. "ITS" ARCHITECTURE
4. AUTOMATIC VEHICLE AND FLEET LOCALISATION SYSTEMS
5. AUTOMATIC PASSENGER COUNTING AND
6. GENERAL CONSIDERATIONS ON TEND

New textbook

"ITS" E-LEARNING

TRANSPORT TELEMATICS

**INTRODUCTION TO
INTELLIGENT TRANSPORT SYSTEMS:
BASIC TECHNOLOGIES**

Telematica
per i trasporti



egal

In order to promote the knowledge and the development **of ITS and transport telematics** in Italy, the POLITECNICO DI TORINO has organised - in collaboration with the Association “TTS Italia” - a **short course**, lasting one day, with the subsequent distance-learning based on a multimedia platform, interactive, original and unique in this context.

The **distance learning** may be utilised by way of a personal computer, **whenever preferred**, during the months following the day when the short course will start.

Since “ITS” is, as a matter of fact, a **transversal discipline** – within which cultures, traditionally different, converge – the platform for the e-learning is organised in the way to allow the user to deepen his appraisal according to his previous knowledge and his preferences on the covered themes.

The multimedia instrument offers **simulations**, **visuals supports** and written text – also read automatically, with a vocal synthesiser, wherever a comment has been considered useful – since we are dealing with “new applications” of ITS for which a major part of people have not an experience yet.

The user is allowed to enter, after the first day in the classroom, the distance learning **platform**, to **monitor constantly his achieved level of appraisal** and to revise the material related to lessons already covered.

The screenshot displays the ITS learning platform interface. The top banner features the logos of the Politecnico di Torino, ITS (Intelligent Transport Systems), and the European Union. The main content area is divided into three sections:

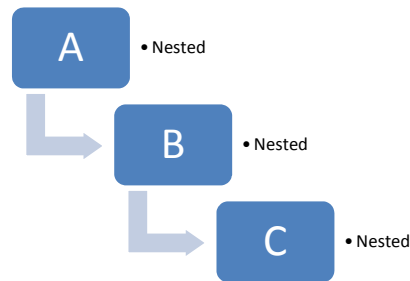
- Left Sidebar (Table of Contents):** Lists 23 items under "Livello : 1 - Level 1". Items 1-10 are numbered, while 11-23 are labeled "Questionario di fine livello".
- Center Document Viewer:** Displays a document titled "Intelligent Transport Systems" with a table of contents and a text snippet about ITS research experience.
- Right Panel:** Contains the "COMMISSION OF THE EUROPEAN COMMUNITIES" logo and text regarding a "COMMISSION RECOMMENDATION" of 22 December 2006 on safe and efficient in-vehicle information and communication systems.

Below the document viewer, a questionnaire is displayed:

- Course :** POLI5 - English Version
- Level :** - English Version
- Questionnaire :** Questionario di fine livello **Current question:** 1 (Total questions: 2)
- Question:** The inertial navigation systems are:
- Options:**
 - ☐ Others
 - ☐ System based on the triangulation on the ground
 - ☒ Accelerometers and gyroscopes

The bottom right corner shows a "Logout" button and the page number "23".

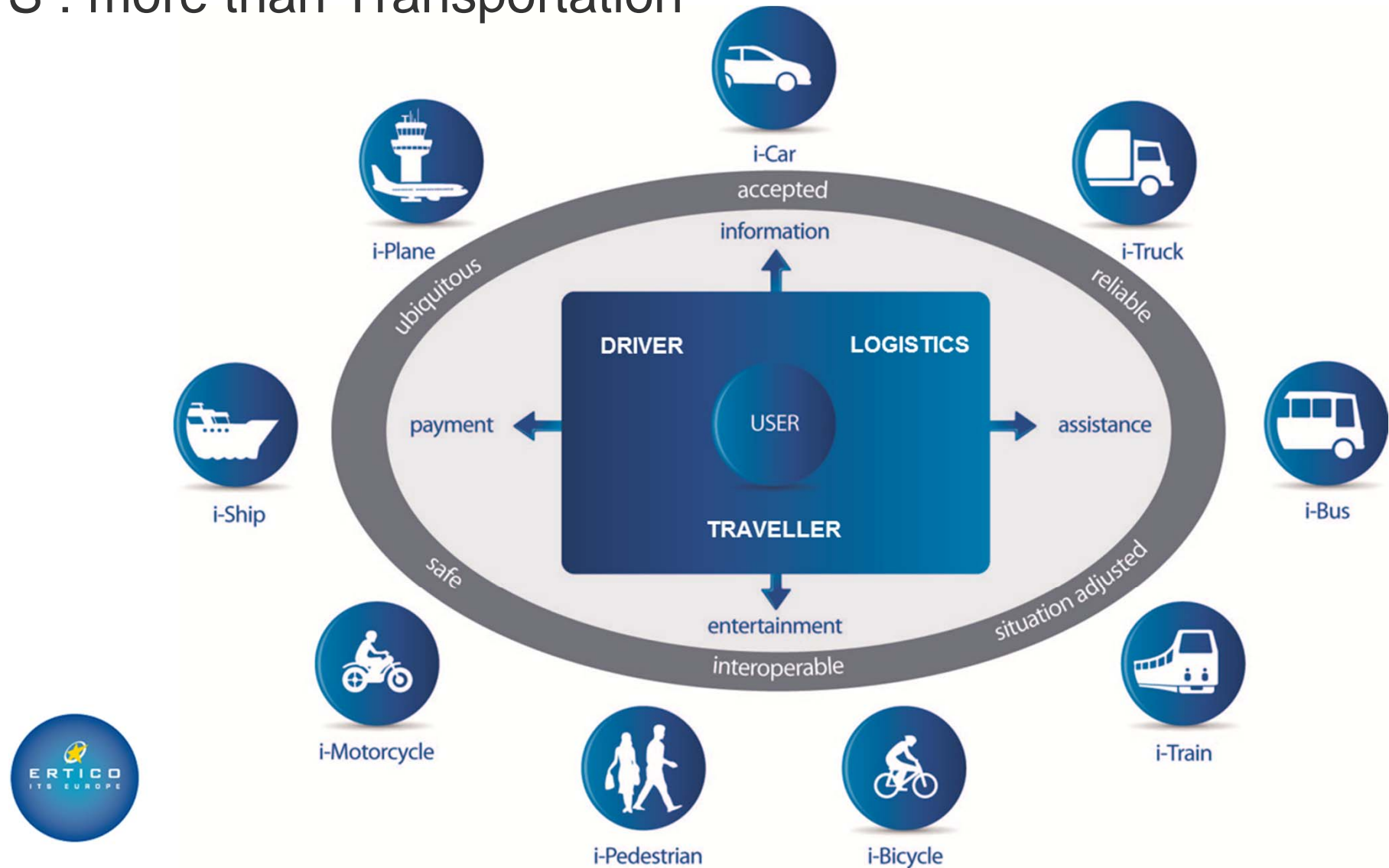
The distant learning is structured in various **consecutive levels**, which represent equivalent phases of the appraisal process. It is consequently necessary to complete the lower level for being allowed to enter the upper and subsequent one; passing **shorts questionnaires** is a necessary condition to be admitted to follow the subsequent steps of the course.



In order to complete the appraisal, some **official documents**, concerning normative and technical aspects on the treated subjects and a **little printed volume**, for introducing to the subject in a general and technical way, are made available for each participant; the volume deals with the technologies for ITS, in order to allow the study of the mentioned subjects also with the traditional reading.



ITS : more than Transportation



Challenges to qualification and capacity

- Interdisciplinary domain
 - International and global business relations
 - Rapid changes even in “classical” areas of transportation
 - Technology
 - Mobility behavior
 - Market composition
 - Organizational structures
 - Rules and standards
 - Heavily related to most global trends
- Transportation and ITS belong to the currently most important topics of societies, in every nation

Do we need to do more in the ITS area?

➤ **YES!**

Due to the dynamic situation in the transportation and mobility “market” and the resulting strong requirements to professionals
there is clearly a need for more offers of efficient capacity building
– directly targeted to ITS!

Important aspects hereby are:

- A harmonized, consolidated view on the key ITS areas, main subjects and terminologies
- An efficient quality management for professional training and capacity building measures
- Standardized levels of qualification, certification of trainers and training institutions
- A dense international network of relevant organizations active in that field
- Easy and cost-efficient access to information, media and training



Fostering ITS Policy

An event organized jointly by TTS Italia and the Policy Committee on Intelligent Transport Systems of the International Road Federation (IRF)

Wednesday 5 December 2012
Savoia Hotel Regency, Bologna, Italy

M.Sc. in Transport and Logistic – Curriculum

TUM ASIA M.Sc. in Transport and Logistics		
Semester 1	Semester 2	Semester 3
Compulsory Modules	Electives	M A S T E R S T H E S I S
Module 1 Cross-discipline (covering 5 subjects)	Module 5 Transportation Specialisation (covering 4 subjects)	
Module 2 General Topics for Trans- portation and Logistics (covering 2 subjects)	Module 6 Logistics specialisation (covering 4 subjects)	
Module 3 Transportation (covering 3 subjects)	Internship	
Module 4 Logistics (covering 3 subjects)		