



Application of Satellite Navigation & Communications in the View of the Czech Industry

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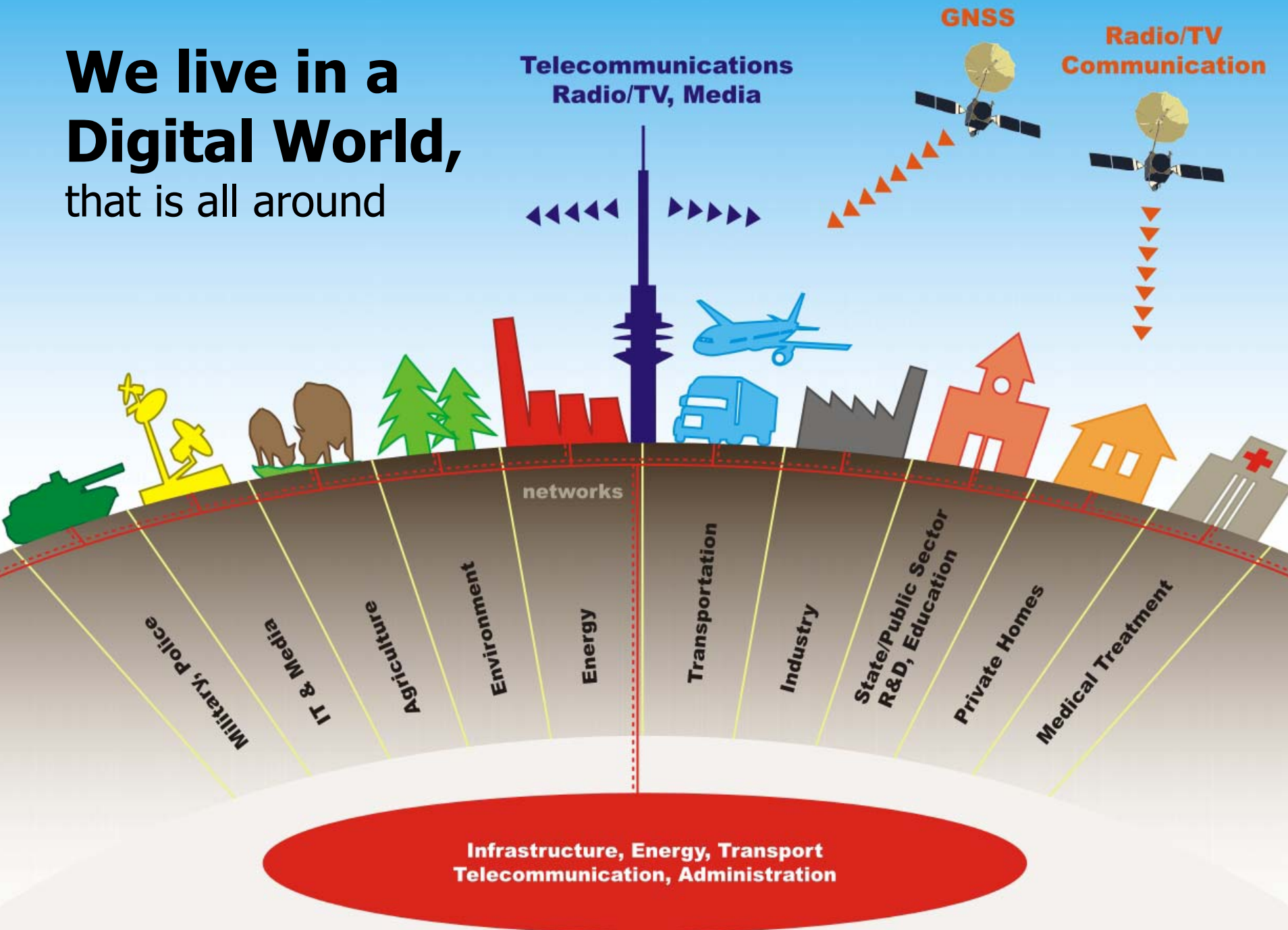
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Content

- Digital World – quite vulnerable
- Global Navigation Satellite Systems
- Satellite Communications
- Intelligent Transport Systems
- ITS&S Czech Republic
- Galileo Opportunities & Success Conditions

We live in a Digital World, that is all around



Measures of the digital world



- Computing = **GB** (usual PC)
- Electronic Communications
(SDH: STM-16 = 2488.32 Mb/s = **2.5 Gbps**)
- Wireless Communications
(3G – 1.8GHz, DVB-S - **12 GHz**)
- **1 GHz, 1 Gb => 1 ns**
(length of bit, pulse)

How reliable?

„Glory and Misery“

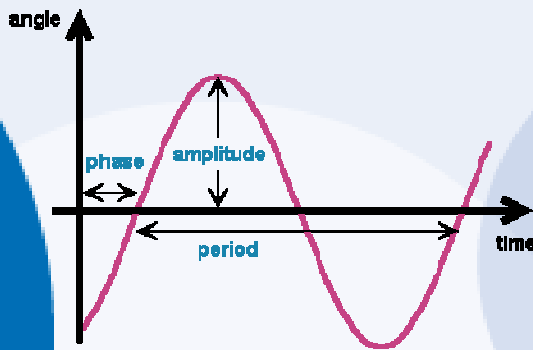
of the digital world



Depend!
Vulnerable!



A little Example?
We fully depend on a production and distribution of the precise time and frequency!



Czech etalon of time and frequency

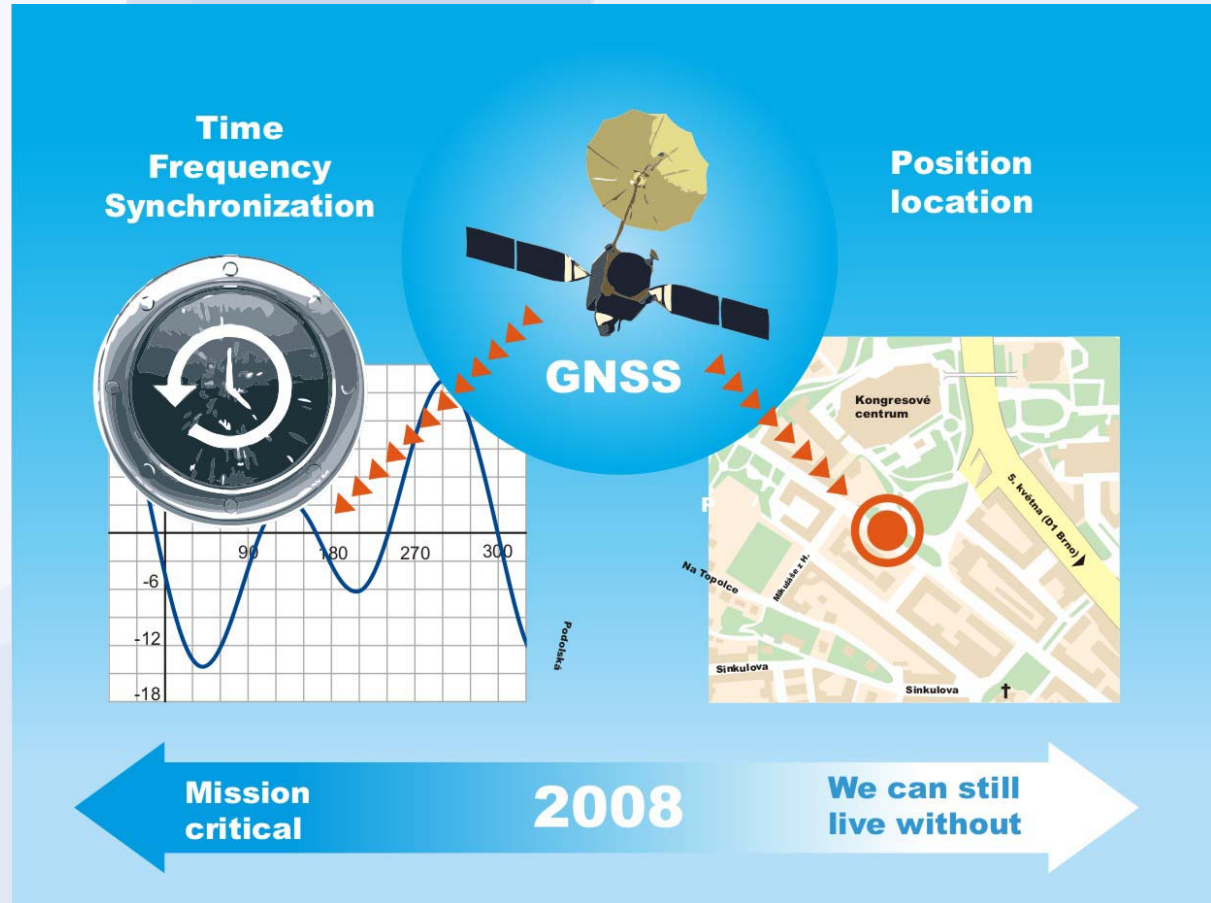
- Primary network reference time (Academy of Science and Telefónica, 1993) – cesium generator
 - Synchronisation with International Bureau of Weights and Measures (BIPM) – **GPS**, 0,1 ns
 - Spare time generator = **GPS**
- Time and frequency distribution
 - Terrestrial **private networks** – Telefónica O2 CZ (former state owned telco incumbent)
 - Space technologies segment - GNSS: GPS, GNSS

Satellite Navigations: what is really critical?

We all depend on a digital world

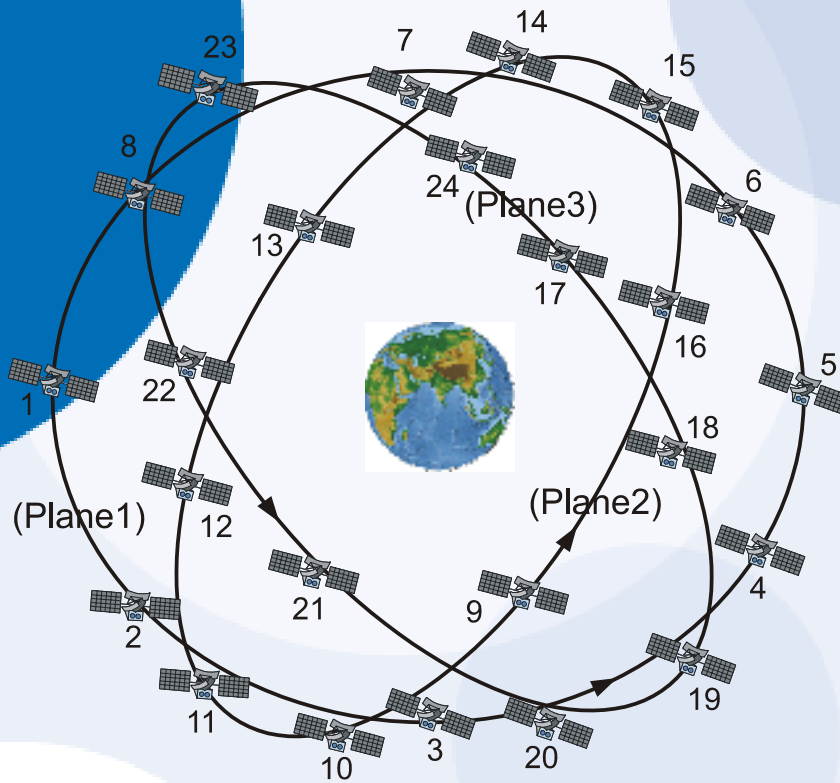
Czech digital world depends on a technology, that is **out of public/state control.**

European digital world depends on technologies **out of the European control.**



**We should not ignore this fact,
may push for change.**

European Satellite Navigation Future



History

- Year 1973: NAVSTAR (NAVigation Satellite Timing And Ranging global positioning system)

Present time

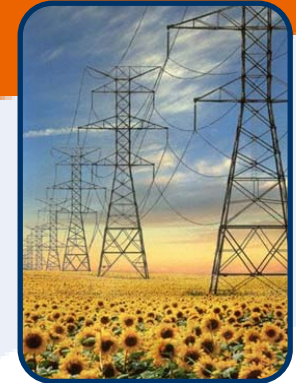
- „their“ GPS, „their“ Glonass

„Our Tomorrow“

- „our“ Galileo

GNSS in Economy

- **Time & Frequency:**
 - electronic communication networks & media
 - energy production, transmission & distribution
 - industry & manufacturing – regulation, management
- **Geodetic receivers**
 - GIS and construction
- **Navigation receivers**
 - and their integration in many applications of the whole economy



GNSS

User terminals



- User GNSS functionality
 - Precise time and frequency
 - Precise position
- GNSS receivers are not universal, but specialized according to their purpose.
 - Receivers for time synchronization
 - Navigation receivers – military & civil (land, maritime, aircraft, space navigation),
 - Geodetic receivers (geodetic measurements, GIS)

This must be taken into the account when any architecture, system, services or application integration is considered.

Satellite communications



Satellite communications

fragment of terrestrial capacity

History

- **1945: Arthur C. Clarke:** "Proposed to use satellites for communication".
 - 1957- 63: experimental satellites (ECHO)
 - 1965: INTELSAT Early Bird (Intelsat 1)
 - 1971: INTERSPUTNIK
 - 1978: EUTELSAT, TELSTAR
 - 1980: INMARSAT
 - 1990: regional systems
 - **1995 – 2000:** big success of GSM and fibre optical networks
- decelarated**
development of satellite communications

Fixed networks

- INTELSAT, GEO, max. 100 Mbit/s
- EUTELSAT, GEO, max. 55 Mbit/s
- ASTRA BBI , GEO, max. 38 Mb/s
- INMARSAT, GEO, max. 32 kb/s
- DirecPC, GEO, max 3Mb/s
- New ICO , MEO max. 384 kb/s
- Astrolink, GEO max. 110 Mb/s
- SpaceWay, GEO, 108 Mb/s
- Euro SkyWay, GEO, 32 Mb/s
- Teledesic, LEO 64 Mb/s
- private satellites/**VSAT** networks

Mobile services

1. generace: Inmarsat & Euteltrack
2. generace: **IRIDIUM**, Globalstar, Thuraya
3. generace: Inmarsat R-BGAN, S-DBM (144kbps), S-UMTS systems

? Time of change

Satellite vs. Terrestrial communication opportunities

Satellite Communications	Developed, urban regions	Sparsely populated r.	Low developed regions	Terrestrial Communications	Developed urban regions	Sparsely populated r.	Low developed regions
Entertainment & Media Broadcasting	Mass DVB-S	Mass DVB-S	Yes	Entertainment & Media Broadcasting	Mass DVB-T	No	No
Fixed communications	No	Yes	Yes	Fixed communications	xDSL Fibre	Wireless Broadband	Microwave, P-P
Mobile communications	No	S-UMTS	Yes	Mobile communications	3G/4G T-UMTS	2,5G-3G	2,5G
Special appl. (military, rescue, recov.)	Yes	Yes	Yes	Special appl. (military, rescue, recov.)	TETRA TETRAPOL	TETRA TETRAPOL	No
Aircraft communications	Yes	Yes	Yes	Aircraft communications	No	No	NO

We live in a Digital World,
that has been integrated already.



Let's improve the functions to achieve better:

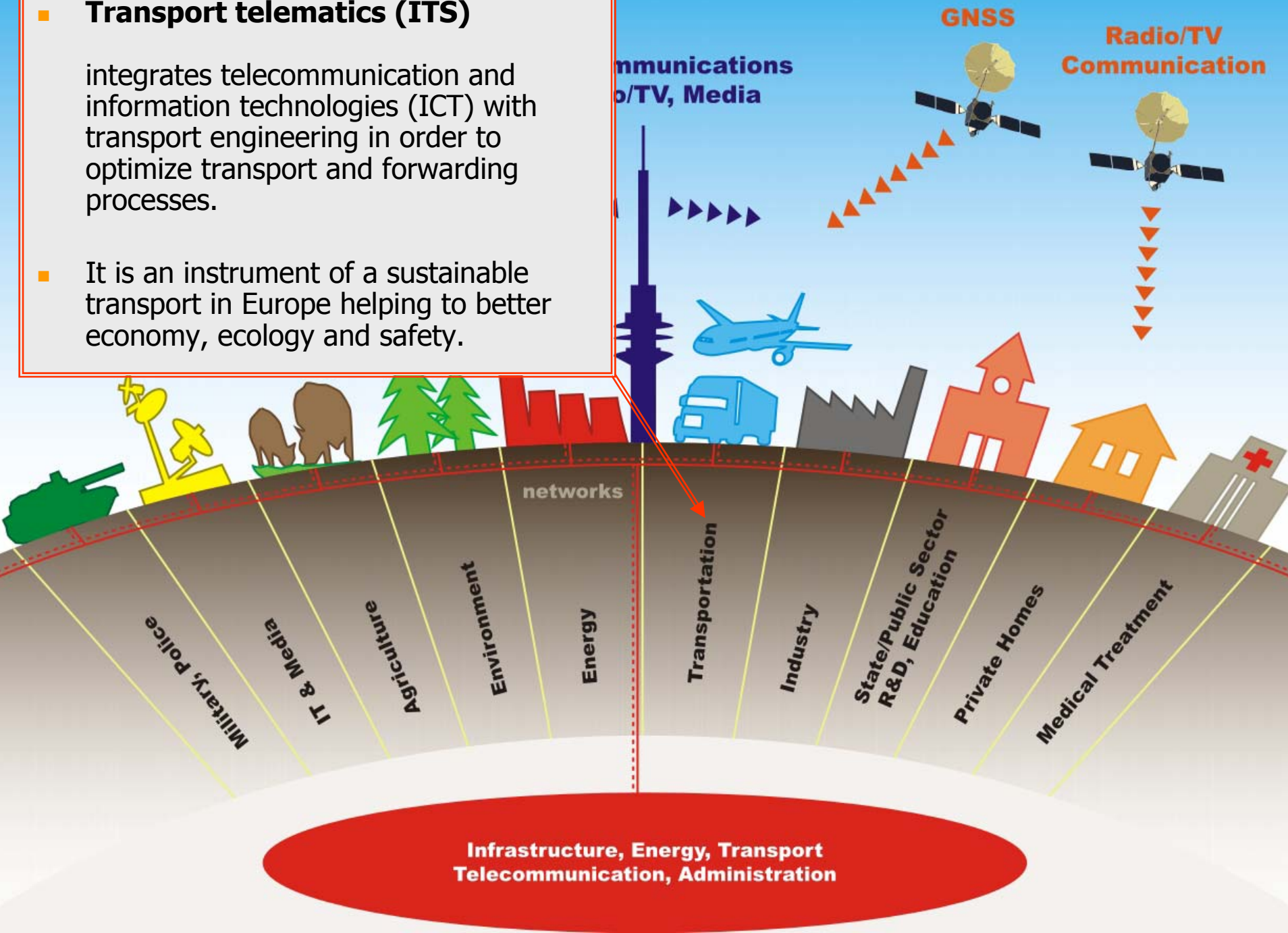
**Infrastructure, Energy, Transport
Telecommunication, Administration**

safety & quality of people's life and clean environment.

■ Transport telematics (ITS)

integrates telecommunication and information technologies (ICT) with transport engineering in order to optimize transport and forwarding processes.

- It is an instrument of a sustainable transport in Europe helping to better economy, ecology and safety.



Innovating ideas for practice

■ Intelligent Service

- On-line Traffic management
- Co-modality
- Smart logistic
- Travel assistance
- Safety services (like E-Call)
- Security
- Infotainment

■ Intelligent Infrastructure

- Sensors, actors
- Visualisation
- Beacons & Gates
- GNSS infrastructure
- Control & Management systems

■ Intelligent Vehicles

- Wide range of advanced automotive electronics
- V2V, V2I on-board EQs
- Eco-driving, trip planning
- Security & Safety features

About ITS&S Czech Republic



- ITS&S CZ (Sdružení pro dopravní telematiku ČR) is a **successful sector cluster**
- in the area of transport telematics with a multiyear tradition
- Representing Czech Transport Telematic Industry in the Czech Republic and also abroad
- Founded 2000
- **75 companies**, institutions on board
- Representatives with a legal power: president and Vice-president: prof. Miroslav Svítek, Roman Šrp
- 3 other presidium members



Structure

ITS&S Czech Republic

- **Public sector** Prague city hall, Road & Highway directorate
- **Universities, R&D** CTU Prague, CDV, UDI, Telematix
- **Domestic consulting** KPM Consult, BAPTIE,, PBA, TRANIS, TECHNOLOGIES&PROSPERITY
- **System integrators** PVT, XT Card, ČD Telematika
- **Transport operators** Prague, Brno
- **Car manufactures** Škoda Auto
- **Domestic suppliers** AŽD Praha, CEDA, Camea, Cross, ELTODO, FCC, Mikroelektronika, Princip, Spell, VARS, Značky Praha
- **International corp.** Alcatel, Kapsch, Navteq, Siemens
- **Telco** O2 Telefonica, Radiocomunications, T-Mobile CZ
- **Construction comp.** Metrostav, VIS

Representing Czech Telematic industry over Europe

- **Sensors & actors:** gate crossing signals, cameras, active and passive detectors, radar
- **Communications:** GSM-R, GSM, GPRS, EDGE, DSRC, RFID, WIMAX, CALM
- **Positioning:** GPS, Glonass, Galileo, EGNOS, gantry systems
- **Data processing:** GIS, billing, management, expert systems
- **End user devices:** on-board units, chip-cards, user terminals
- **Services:** technical, financial consulting

Priorities

- **Promote** members' activities over Europe
- **Educate** and train ITS professionals and users
- **Support** new associations in Eastern Europe, 2007
- **Co-operate** with international organizations (EC, ERTICO, ITS national platforms)
- Projects support via **working groups**
- Strategic marketing, product development and **co-ordination** of member's projects outside the Czech Republic

Action samples

- Education of domestic market
- Czech industry promotion in Slovakia & Bulgaria
- Lobby & media support of electronic hybrid tolling principles
- Interoperability of electronic ticketing in public Transport in the CZ
- **Supporting Galileo project in the CZ**

Galileo opportunities

EU/Czech Republic

- Europe owned global timing & positioning & com. infrastructure
- Fulfill high demand on precision, integrity and availability
- Shared infrastructure under international control
- **No dependence on the USA and others...**
- Employment
- Economic growth

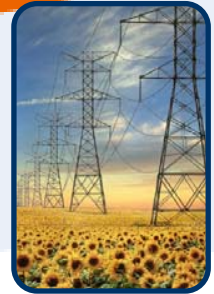


Czech Industry

- Continue in the Czech industry tradition
- **Participation on R&D, deployment and operation the of GNSS**
- Development & production of GNSS user segment
- GNSS integration over the Czech economy
- Export of the products and services

General Conditions of Czech Industry Success in Galileo

- Active involvement of national governments on an international level
- Have a common understanding within industry
- Integration of the national industry (no fragmentation any more!)
- Set up an intensive co-operation between industry & state administration
- Empower the role of professional associations
- Looking for partners abroad, establish cross border co-operations
- Support international networking
- Develop new marketing strategies for Galileo to obtain a broad public support
- Efficient public relation policy



Looking forward to our co-operation!



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