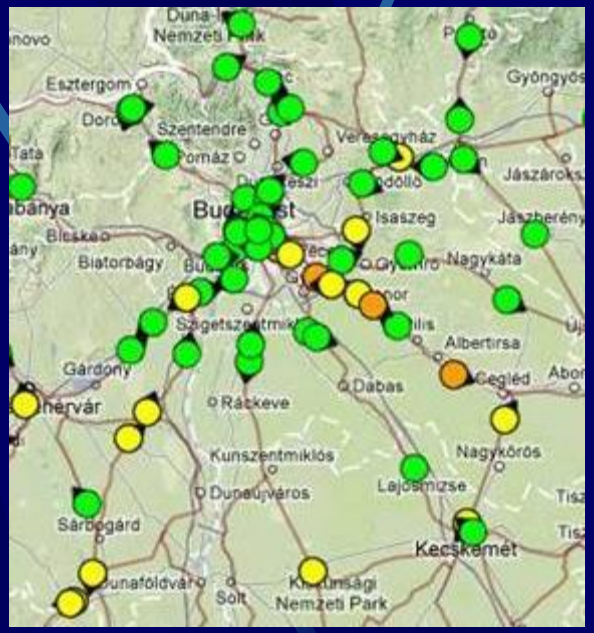
Intelligent transport systems



Urban Transport 13.
András Gulyás PhD habil
associate professor

Content

- Definition of intelligent transport systems (ITS)
- EU basic ITS regulation
- EU strategic elements, priority areas
- Connect, EasyWay and Crocodile projects
- Urban ITS solutions in road traffic
- Urban ITS solutions in public transport

Definition of intelligent transport systems (ITS)

„Intelligent Transport Systems" or „ITS" means systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport.

Source: EU ITS Directive, 2010

Definition of intelligent transport systems (ITS)

The information can be:

- **by source: static, dynamic,**
- **by user: collective, individual,**
- **by space: roadside, in vehicle,**
- **by time: before trip, during trip,**
- **by control: point-like, section-like, area-wide.**

Providers of information:

- **sensors, traffic control centre,**
- **road users, connected vehicles.**

Definition of intelligent transport systems (ITS)

The traditional approach, construction of new infrastructure, is not able to provide necessary results in due time according to its challenges.

There is a need for innovative solutions to achieve quick development in solving traffic problems.

The intelligent transport systems have a role in real results and increased efficiency of transport.

In the future system integration, interoperability, co-ordination among road operators will be important.

Definition of intelligent transport systems (ITS)

There will be general travel services available for everyone at all time by different media tools (Internet, mobile apps, navigation systems etc.).

Road users and public transport users gain advantage of ITS as well as cyclists.

Standardisation of various technical solutions help to achieve interoperability and co-operation.

Connected vehicles, road and vehicle interaction will become wider in the near future.

EU basic ITS regulation

DIRECTIVE 2010/40/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport.

Action plan for the deployment of Intelligent Transport Systems in Europe (2009. december).

EU strategic elements, priority areas

Priority areas for the development and use of specifications and standards :

- **Optimal use of road, traffic and travel data**
- **Continuity of traffic and freight management ITS services**
- **ITS road safety and security applications**
- **Linking the vehicle with the transport infrastructure**

EU strategic elements, priority areas

Priority actions:

- **the provision of EU-wide multimodal travel information services,**
- **the provision of EU-wide real-time traffic information services,**
- **data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users,**
- **the harmonised provision for an interoperable EU-wide eCall,**

EU strategic elements, priority areas

Priority actions (continued):

- **the provision of information and reservation services for safe and secure parking places for trucks and commercial vehicles.**

Strategic elements:

- **ITS applications in up-to-date road operation, traffic management plans**
- **Traffic control systems and traffic information systems of the high-speed road network**

EU strategic elements, priority areas

Strategic elements (continued):

- **Traffic control centres**
- **Road user information centres**
- **Multimodal travel information: real time information systems**
- **Electronic tolling**
- **Electronic payment in public transport (e-ticketing)**
- **Freight and logistics services**
- **Traffic safety enhancement, *e*Safety systems (eCall)**

Connect, EasyWay and Crocodile projects

Connect - 2004-2009 „euro-regional” project mainly for the new member states.

Participants: **Czech republic, Poland, Hungary, Slovakia, Slovenia, Austria, Germany and Italy.**

ITS system planning

and deployment

Connect, EasyWay and Crocodile projects

EasyWay – European co-ordination of ITS systems and services between 2007-2014.

Participants: 27 European countries (mainly EU member states).

The EasyWay vision:

- **well informed traveller – information systems,**
- **well operated network – traffic management system,**
- **efficient and safe truck traffic and freight,**
- **excellent info-communication infrastructure**

Connect, EasyWay and Crocodile projects

Connect, EasyWay and Crocodile projects

The EasyWay „Deployment Guidelines” are a basic result of the project covering all areas and issues of ITS technologies finished in 2014.

The Deployment Guidelines define service levels, provide recommendations and best practice examples.

The Deployment Guidelines contain functional, organisational and technical harmonisation and compliance requirements.

Connect, EasyWay and Crocodile projects

CROCODILE - Cooperation of Road Operators for COnsistent and Dynamic Information LEvels

- **Project management and information dissemination**
- **Cross-border co-ordination activities, information services**
- **Data acquisition, data processing, data exchange (DATEX II)**
- **Data access at national and European level**
- **Services for end users**

Connect, EasyWay and Crocodile projects

Co-ordination with neighbouring countries

Automated data exchange – national access point (Single Point of Access)

Increased traffic safety especially in case or road works

Development of on-line devices

Development of services:

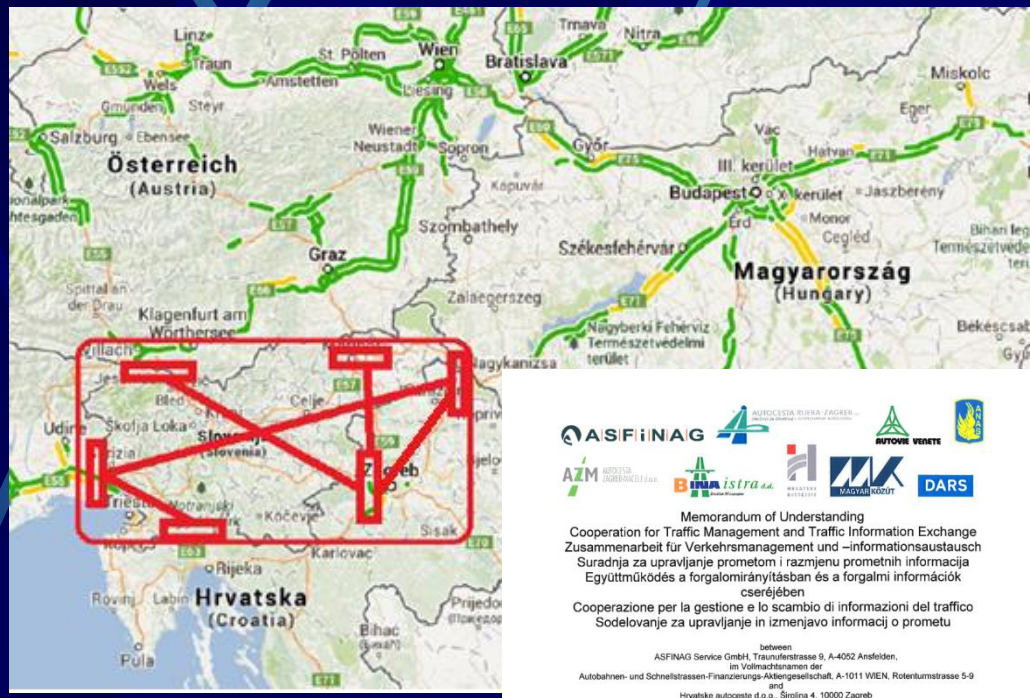
- **Traffic information systems (TIS)**
- **Information of truck parking (ITP)**

Connect, EasyWay and Crocodile projects

Existing co-operations to be further developed

Planned co-operations

ooo



ASFINAG · AUTOCESTA RIJEKA-ZAGREB · AUTOVIE VENETE · AZM · BINA istra · MAGYAR KÖZÚT · DARS

Memorandum of Understanding
Cooperation for Traffic Management and Traffic Information Exchange
Zusammenarbeit für Verkehrsmanagement und –informationsaustausch
Suradnja za upravljanje prometom i razmjenu prometnih informacija
Együttműködés a forgalomirányításban és a forgalmi információk cseréjében
Cooperazione per la gestione e lo scambio di informazioni del traffico
Sodelovanje za upravljanje in izmenjavo informacij o prometu

between
ASFINAG Service GmbH, Traunuferstrasse 9, A-4052 Ansfelden,
im Vollmachtsnamen der
Autobahnen- und Schnellstrassen-Finanzierungs-Aktiengesellschaft, A-1011 WIEN, Rotenturmstrasse 5-9
and
Hrvatske autoceste d.o.o., Širolina 4, 10000 Zagreb
and
Autocesta Rijeka-Zagreb d.d., Širolina 4, 10000 Zagreb
and
Bina-Istra d.d., Zrinščak 57, 52426 Lupoglav
and
Autocesta Zagreb-Macelj d.o.o., Velika Ves 116/a, Lepajci, 49000 Krapina
and
Magyar Közút Nonprofit Zártkörűen Működő Részvénytársaság, H-1024 Budapest, Fényes Elek utca 7-13. (Magyarország)
and
S.p.A.Autovie Venete, via Locchi 19 – 34123 Trieste (Italia)
and
ANAS S.p.A. Compartimento della Viabilità per il Friuli - Venezia Giulia (Italia)
and
DARS, Družba za avtoceste v Republiki Sloveniji, d.d., Ulica XIV. divizije 4 SI-3000 CELJE

(English version)

The signatories agree to commit themselves to the following objectives to be achieved in common endeavour:

- To elaborate and implement procedures and means of communication for a mutual manual

Connect, EasyWay and Crocodile projects

Enlargement of on-line traffic counting network

Installation of traffic monitoring cameras

Main action areas:

M1 motorway and Budapest agglomeration

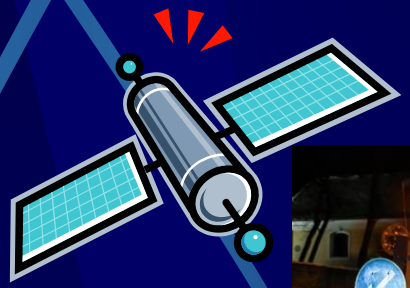
Connect, EasyWay and Crocodile projects

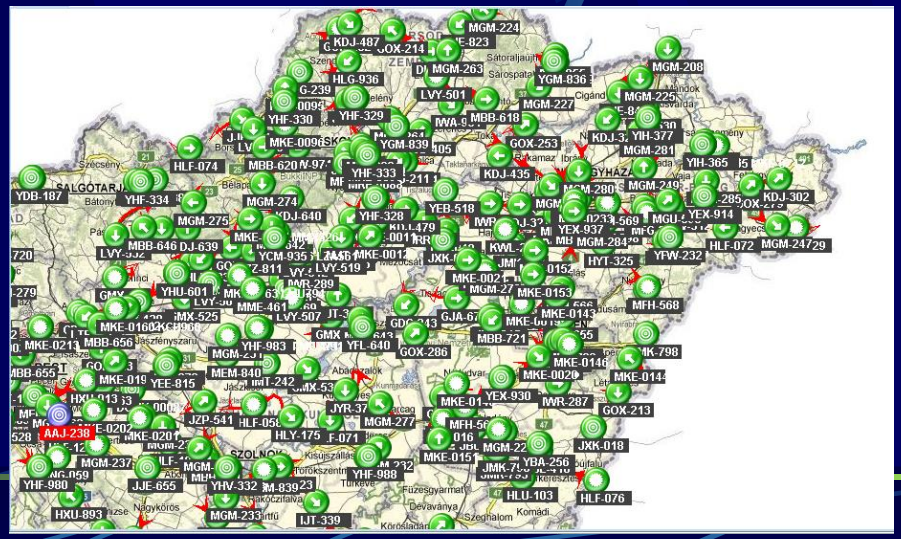
National access point

- **Organisation of collected data and information into one central database (Data Portal)**
- **Automated (DATEX based) data exchange with partners**
- **Co-operation of data owners**

Connect, EasyWay and Crocodile projects

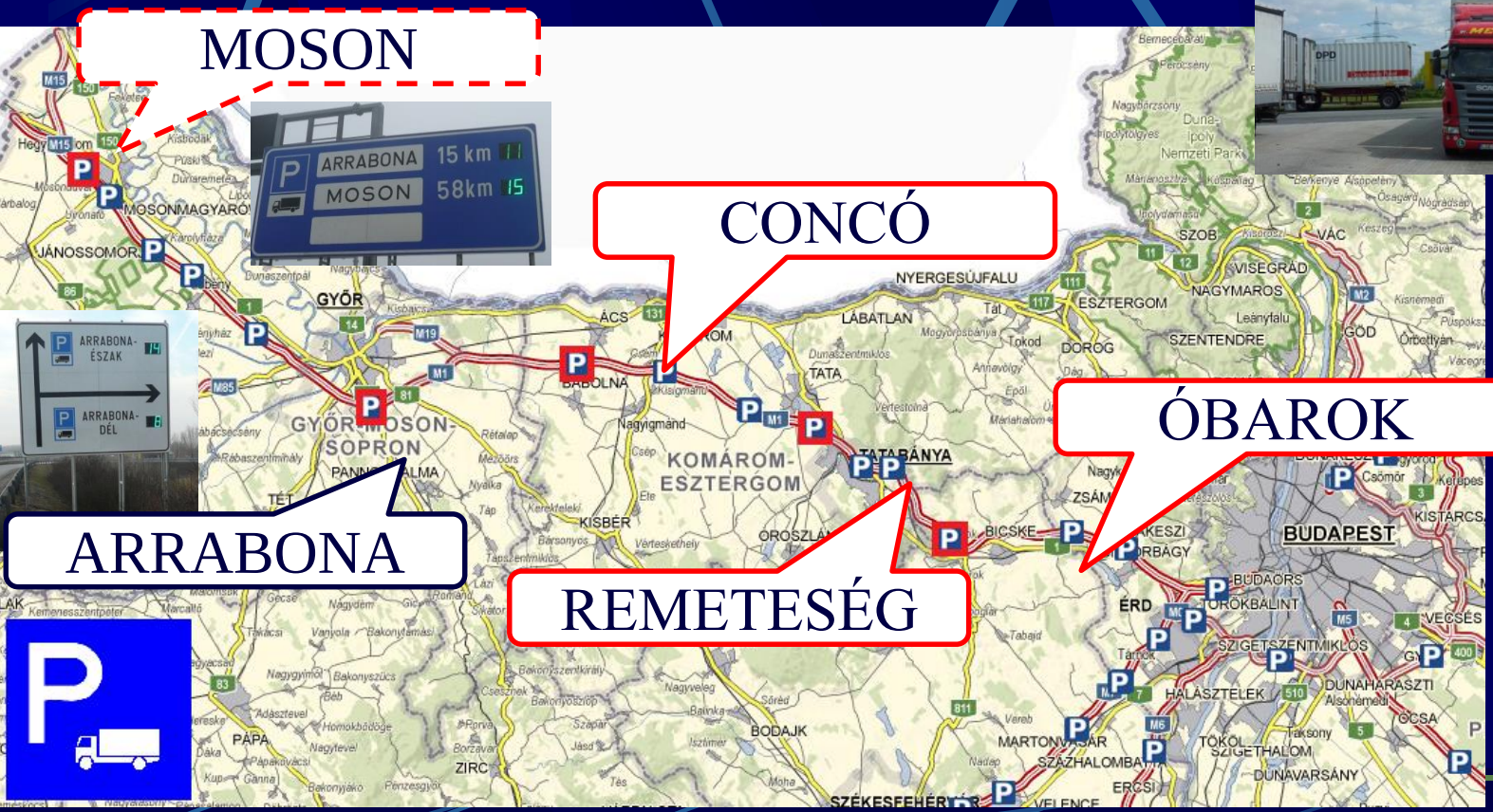
Dynamic database of road works (actual position and supplementary data)
Co-operative pilot system (direct in-vehicle warning)



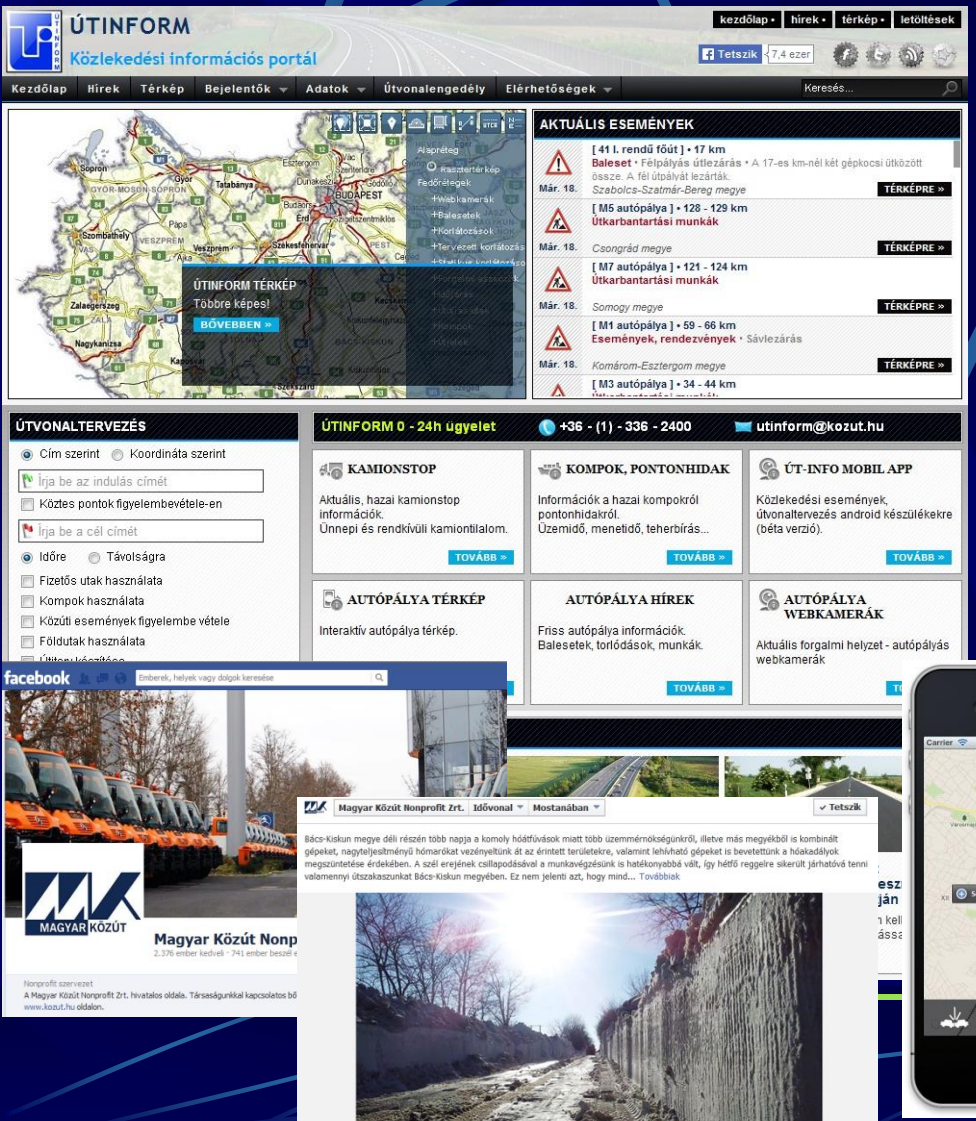


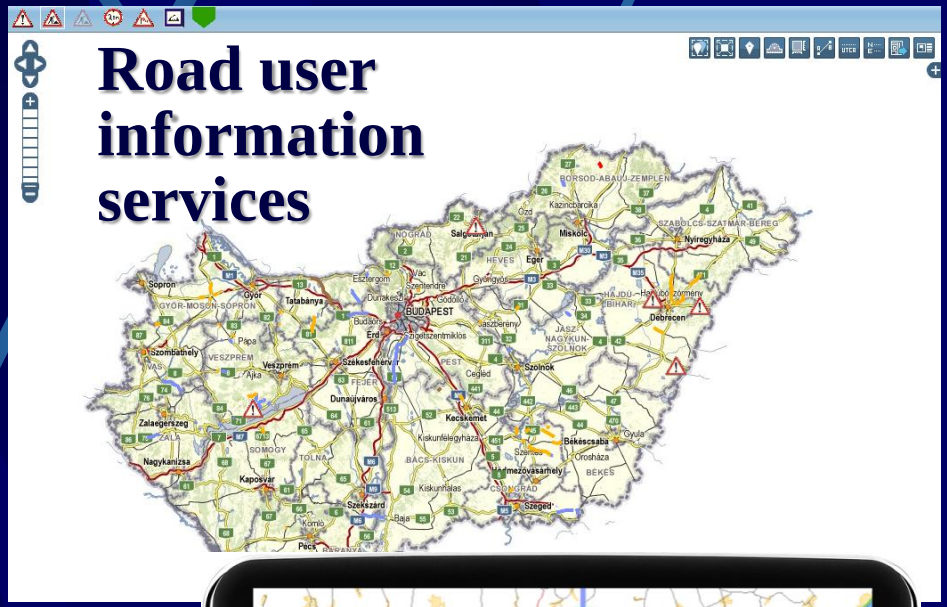
Connect, EasyWay and Crocodile projects

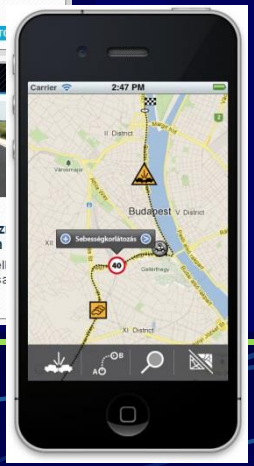
Truck parking information system on the M1 motorway



Connect, EasyWay and Crocodile projects







Urban ITS solutions in road traffic

Signalised traffic control

Parking management

occupation

tolling

Restricted entry areas

control

enforcement

Surveillance

monitoring

functions

Traffic safety

control

management

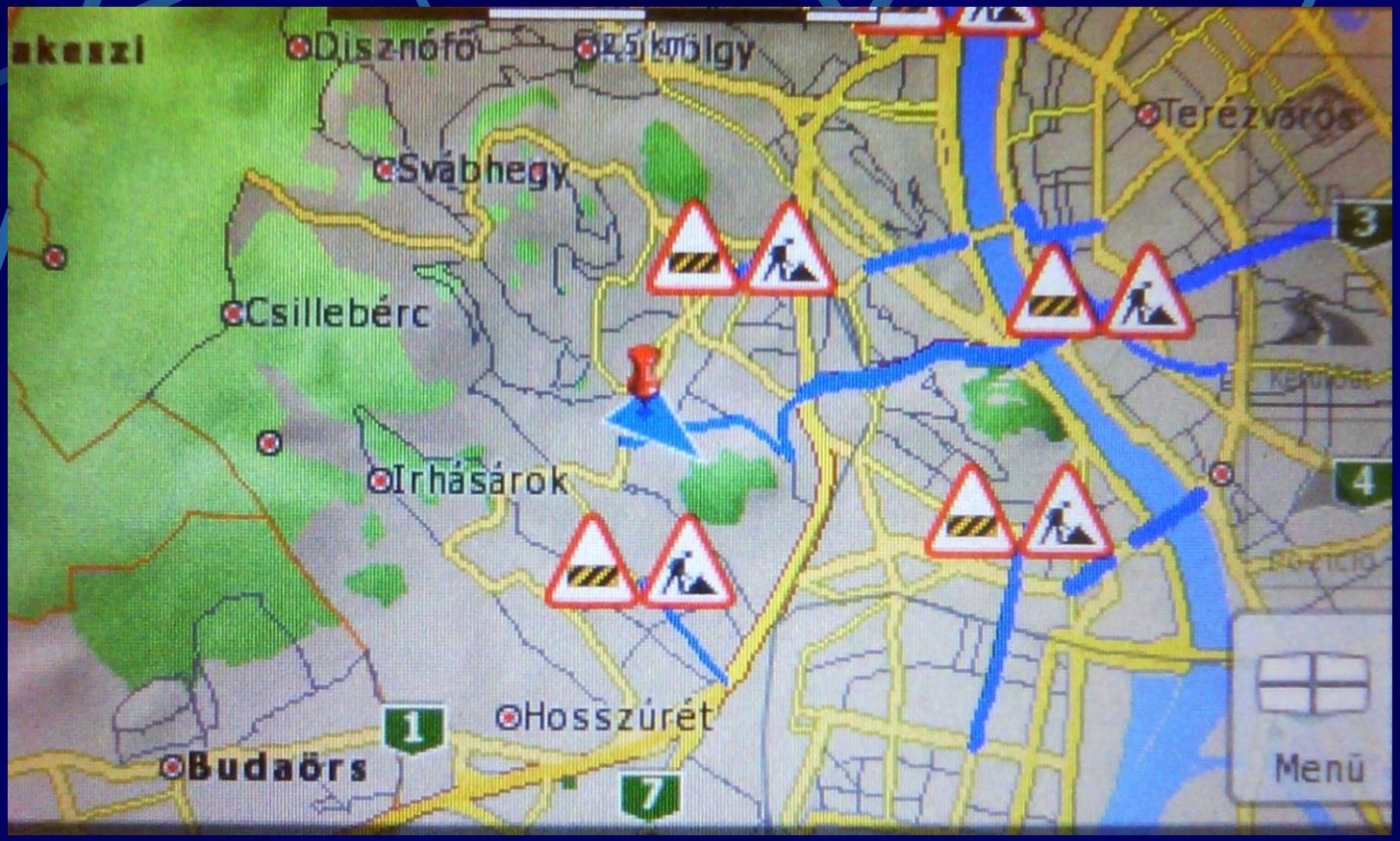
Urban ITS solutions in road traffic

Dynamic traffic maps including congestions for mobile apps or in-car navigation systems.

Real-time information on traffic incidents (radio based Traffic Message Channel, TMC)

The reliability and authentication of information by adequate organisations (i.e. road operator, police) is very important. Although road users may provide useful information, the verification of such information is indispensable.

Urban ITS solutions in road traffic



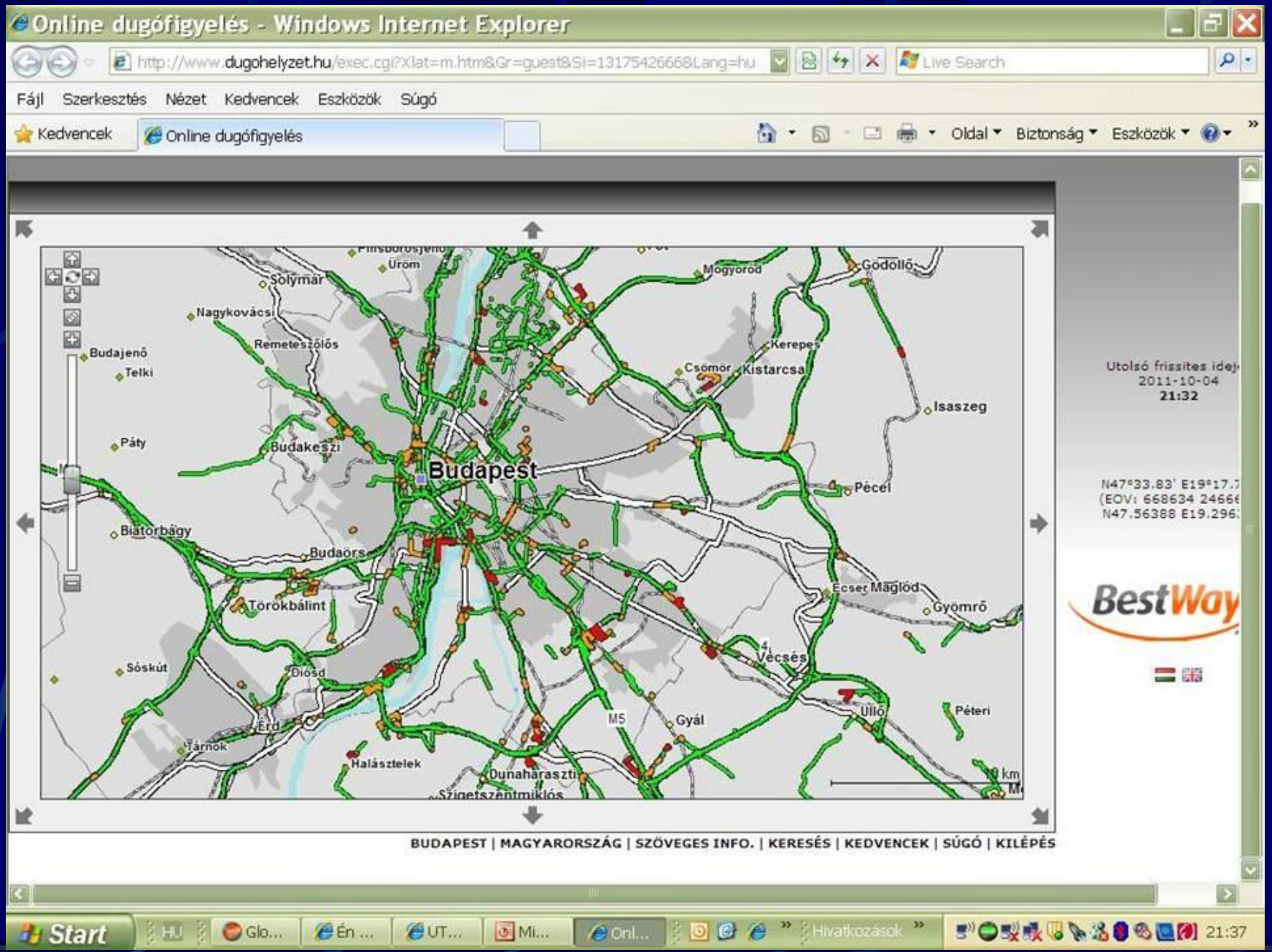
Urban ITS solutions in road traffic

Sources of real-time traffic data:

- **floating car data – from vehicles moving in the traffic (i.e. taxis in Vienna),**
- **surveillance or monitoring cameras,**
- **road users using mobile apps.**

Usual updating interval is 2 min, data content concerns the previous 15 min.

Example: traffic congestion maps of Budapest


Online dugófigyelés - Windows Internet Explorer
http://www.dugohelyzet.hu/exec.cgi?Xlat=m.htm&Gr=guest&Si=13175426668Lang=hu
Live Search
Fájl Szerkesztés Nézet Kedvencek Eszközök Súgó
Kedvencek
Online dugófigyelés
Oldal Biztonság Eszközök
Budapest
Budajenő
Telki
Páty
Budakeszi
Biatorbágy
Budaörs
Törökbálint
Sóskút
Diósd
Érd
Tárnok
Halásztelek
Dunaharaszti
Szigetszentmiklós
Solymár
Nagykovácsi
Remeteszőlős
Üröm
Mogyoród
Gödöllő
Csomór
Kistarcsa
Kerepes
Isaszeg
Pécel
Ecser
Maglód
Gyömrő
Vecsés
Gyál
M5
Üllő
Péteri
Utolsó frissites idej
2011-10-04
21:32
N47°33.83' E19°17.7
(EOV: 668634 2466
N47.56388 E19.296
BestWay
BUDAPEST | MAGYARORSZÁG | SZÖVEGES INFO. | KERESÉS | KEDVENCEK | SÚGÓ | KILÉPÉS
Start
HU
Glo...
Én ...
UT...
Mi...
Onl...
Hivatkozások
21:37

UTV.HU - Közlekedési képinformációs portál - Windows Internet Explorer

http://www.utv.hu/dugoterkep

Fájl Szerkesztés Nézet Kedvencek Eszközök Súgó

Kedvencek | UTV.HU - Közl... | Best Way Traffic ... | .:. MODugófigyel...

Aktív dugóterkép

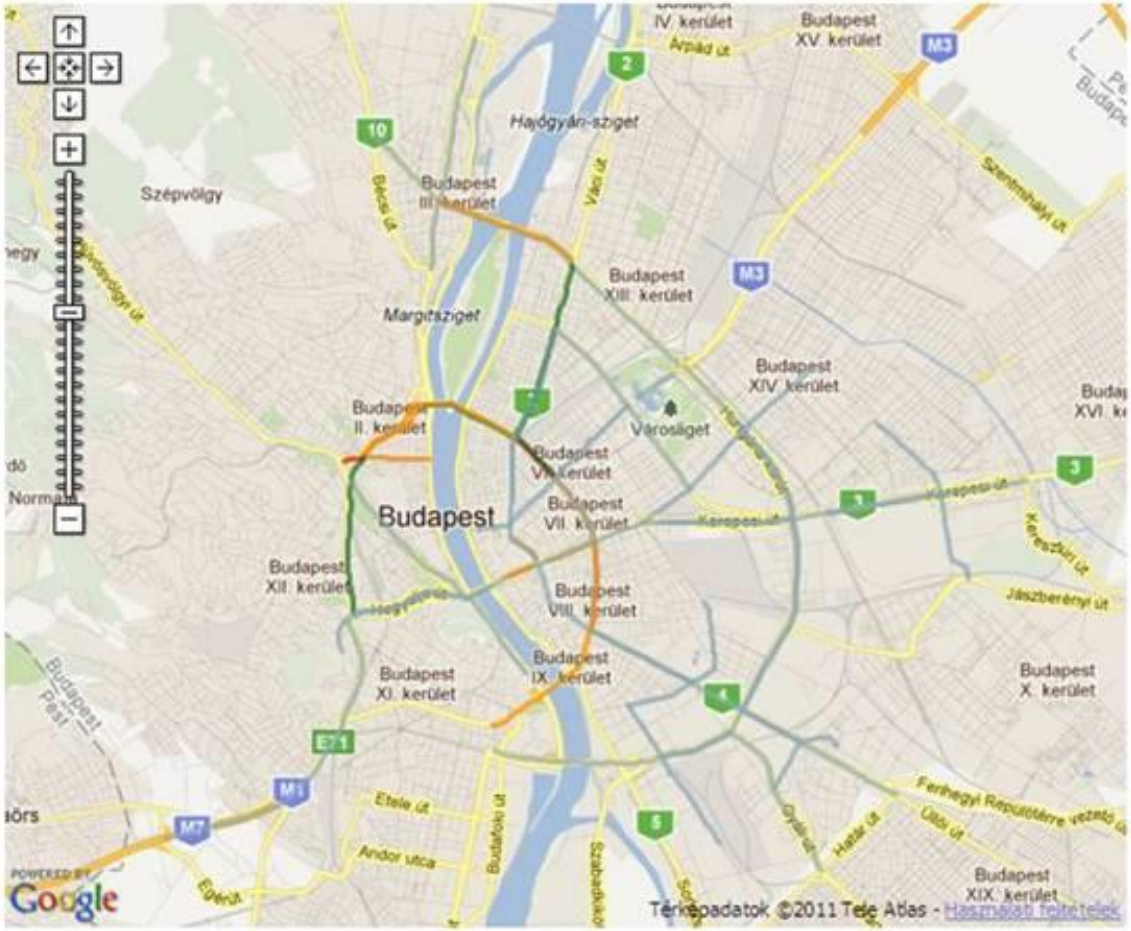
A térképen látható forgalmi adatok 5 percenként frissülnek, így a legpontosabb aktuális képet adják a közlekedési helyzetről.
PIROS jelöli a bedugult, SÁRGA a nehezen járható, ZÖLD a jól járható útszakaszokat.

Kamerák a budai oldalon

- Flórián tér
- Döbrentei tér
- Margit híd budai hídfő
- Széna tér
- BAH csomópont
- M1-M7 bevezető

Kamerák a pesti oldalon

- Árpád híd pesti hídfő
- Astoria
- Örs vezér tere
- Oktogon
- Nyugati tér
- Üllői út - Ferenc krt.
- Hősök tere
- Erzsébet híd pesti hídfő
- Hungária krt. - Kerepesi út
- Blaha Lujza tér
- Könyves K. krt. - M5
- Könyves K.krt. - Mester u.
- Hungária krt. - Thököly út
- Üllői út - Ecseri út
- Erzsébet tér
- Nagyvárad tér



Felhasználó:

Jelszó:

Start | HU | Glo... | Én ... | UT... | Mi... | Onl... | Hivatkozások

Urban ITS solutions in road traffic

Intelligent speed adaptation (ISA)

In urban areas strengthens the speed reduction signs at different levels of influence:

- **advice or warning to driver,**
- **influence of car engine, which the driver may override,**
- **obligatory influence of car engine (braking),**

Results: decrease of average speed, similar travel times, reduced accident risk.

Urban ITS solutions in road traffic

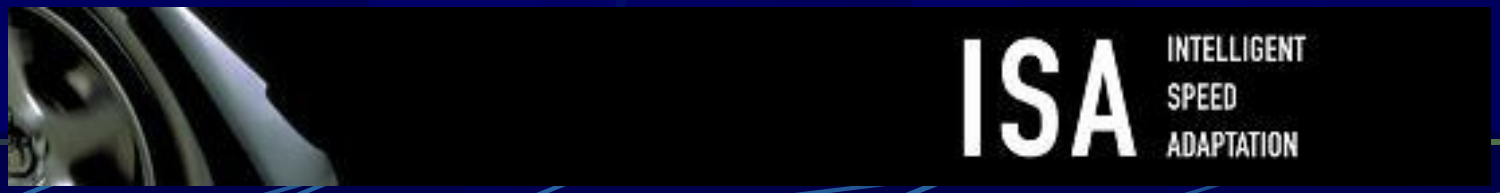
ISA experiments: Sweden, Australia

In Sweden in 1999-2002 in 4 cities including 5000 vehicles, all three types of influence.

Measurable decrease of speed and accident risk.

New-South-Wales in 2008-2009 on a network of 2500 km including about 100 vehicles, providing advice incorporated into the navigation software.

No visible result in case of driver under 25 years.

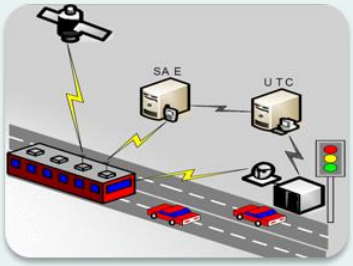


Urban ITS solutions in road traffic

ISA accident risk reduction in Lund, Sweden

70 km/h	50 km/h	30 km/h
13%	12%	11%

Urban ITS solutions in public transport



Fleet management

Passenger information

Ticketing

Supporting co-modality

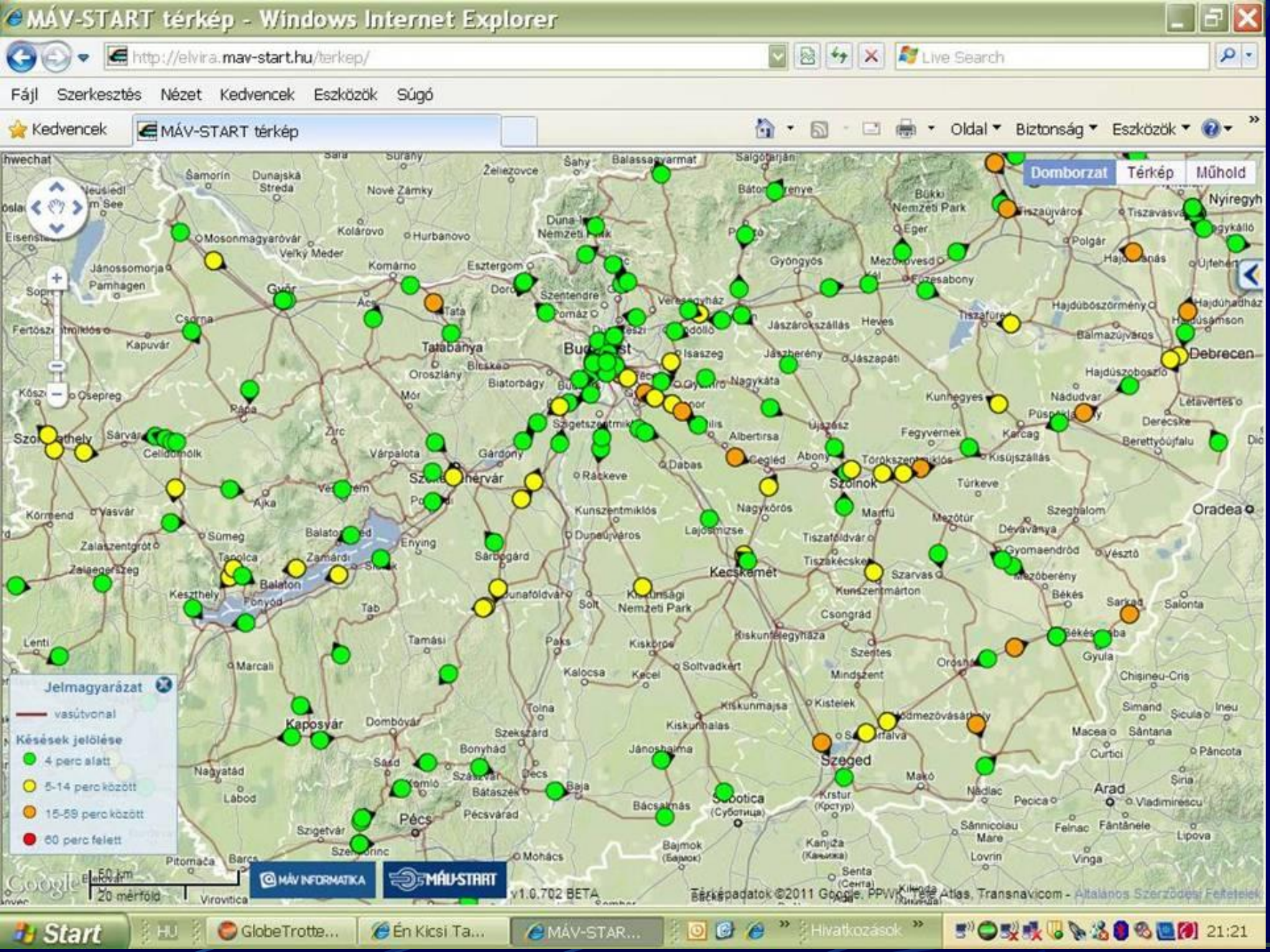
Urban ITS solutions in public transport

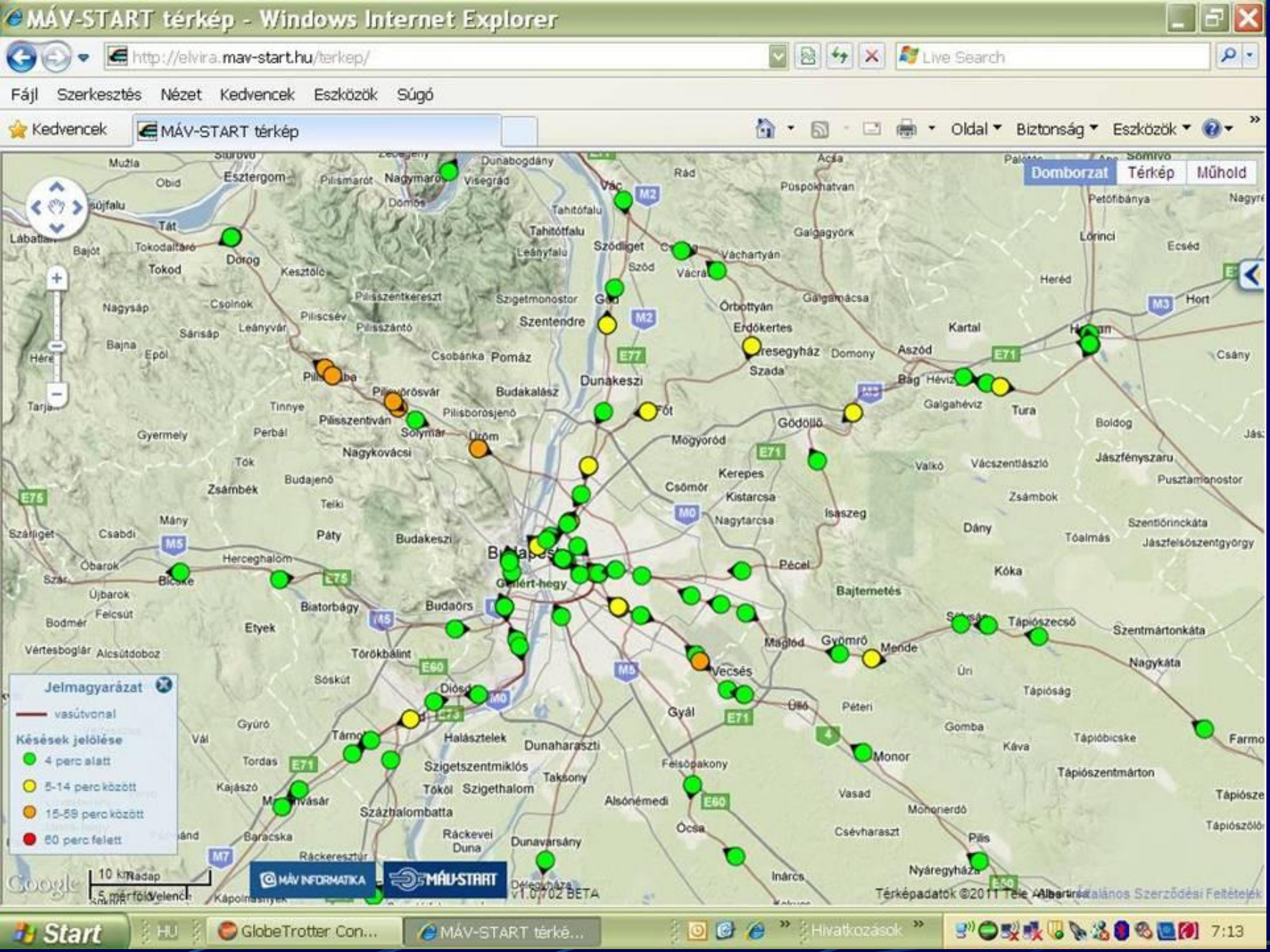
The level of service of public transport is increasing when there is information of expected arrivals and possible delays.

Displaying waiting times in bus stops is more or less already usual – visual or even audio-visual.

Railway train monitoring system including delay warnings on the Internet nation-wide since 2011.

Examples: national evening situation, Budapest agglomeration morning situation.


MÁV-START térkép - Windows Internet Explorer
http://elvira.mav-start.hu/terkep/
Live Search
Fájl Szerkesztés Nézet Kedvencek Eszközök Súgó
Kedvencek
MÁV-START térkép
Oldal Biztonság Eszközök
Domborzat
Térkép
Műhold
Jelmagyarázat
vasútvonal
Késések jelölése
4 perc alatt
5-14 perc között
15-59 perc között
60 perc felett
MÁV INFORMATIKA
MÁV-START
v1.0.702 BETA
Térképadatok ©2011 Google, PPWK, Tele Atlas, Transnavicom - Általános Szerződési Feltételek
Start
GlobeTrotte...
Én Kicsi Ta...
MÁV-STAR...
Hivatkozások
21:21


MÁV-START térkép - Windows Internet Explorer
http://elvira.mav-start.hu/terkep/
Live Search
Fájl Szerkesztés Nézet Kedvencek Eszközök Súgó
Kedvencek
MÁV-START térkép
Oldal Biztonság Eszközök
Domborzat
Térkép
Műhold
Jelmagyarázat
vasútvonal
Késések jelölése
4 perc alatt
5-14 perc között
15-59 perc között
60 perc felett
MÁV INFORMATIKA
MÁV-START
v1.0.702 BETA
Térképadatok ©2011 Tele Atlas
Általános Szerződési Feltételek
Start
HU
GlobeTrotter Con...
MÁV-START térké...
Hivatkozások
7:13

Urban ITS solutions in public transport

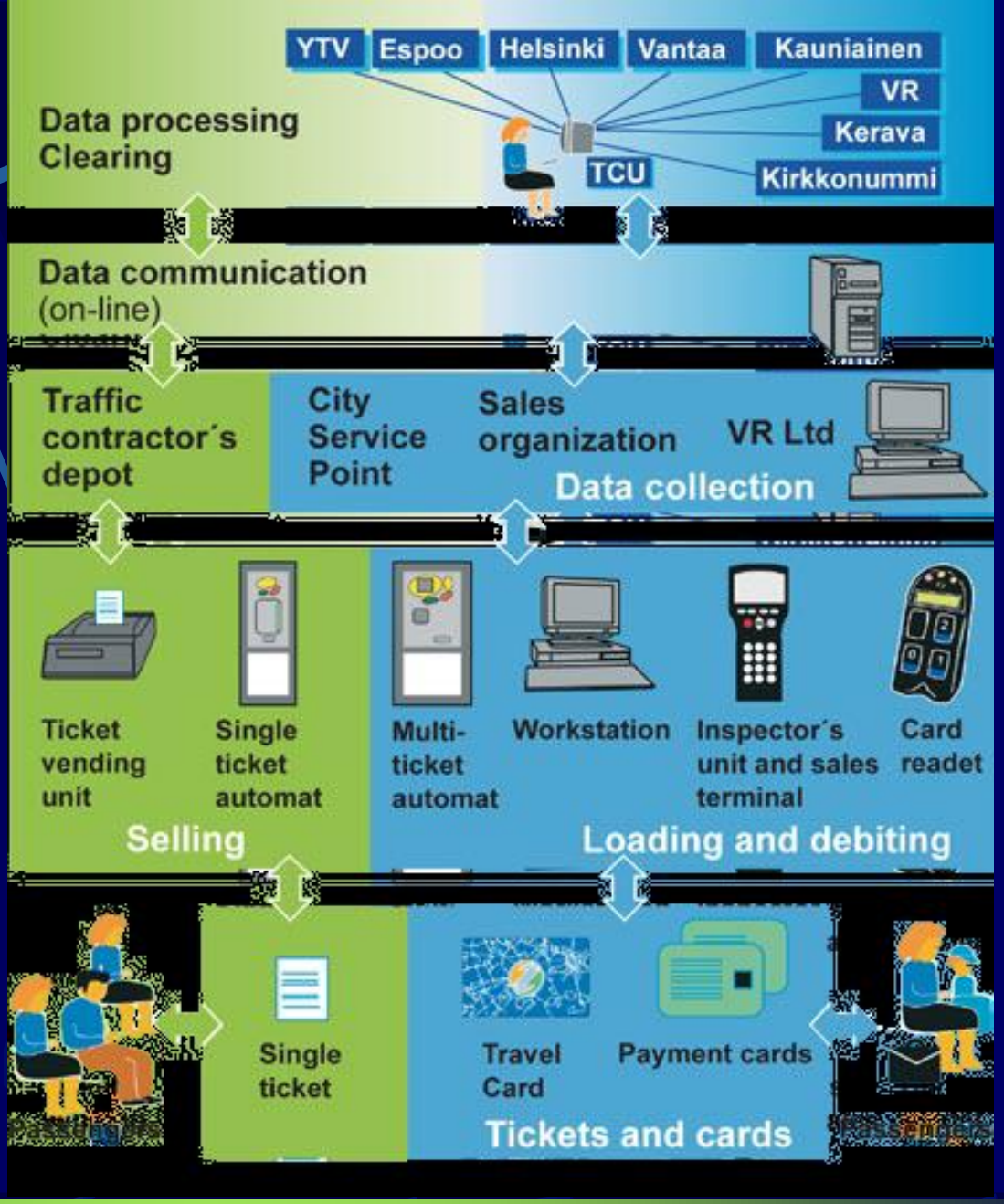
e-ticketing advantages:

- **prevention of fraud (cut),**
- **flexible tariff,**
- **integration and interoperability among modes and operators,**
- **distribution of fees especially in case of private operators,**
- **passenger surveys,**
- **quicker and more comfortable passenger movements,**
- **more efficient operation.**

http://www.emta.com/IMG/pdf/EMTA-Ticketing.pdf

Electronic ticketing in public transport

Four levels of interoperability in Helsinki



http://www.emta.com/IMG/pdf/EMTA-Ticketing.pdf

Summary

The deployment of intelligent transport systems results in:

- **Better traffic safety,**
- **Less environmental pollution,**
- **More efficient traffic flows,**
- **Reduced travel times,**
- **Less fuel consumption,**
- **International co-operation.**

ERTICO video: ITS-Eddie.wmv

Thank you for your attention!

András Gulyás
associate professor
e-mail: gulyasandras@hotmail.com