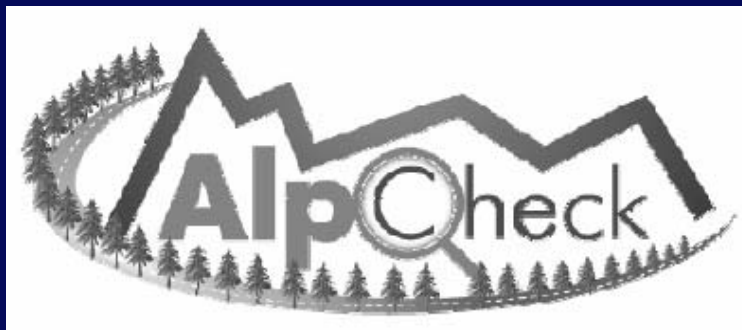


ALPCHECK

WP 6 - Information System: Design and Implementation

Authors: Ing. Ernesto della Sala (NETHUN)
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Ing. Michael Schedl (PARADIGMA)

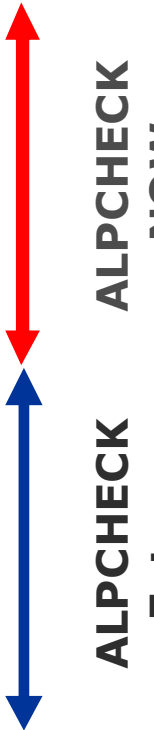


WP6-Objective

- Statement from ALPCHECK WP5:
 - *AlpCheck is undertaking the ambitious task of initiating a process which should eventually lead to the establishment of an **informative system** for transport through Alpine area. Such an informative system will only be created through close co-operation of all Alpine countries and the European Commission.*
- WP6 design and implementation – aims to:
 - Design system
 - Road map
 - system architecture
 - technology (peripheral, central)
 - Software (central)
 - Develop system
 - Implement (pilot projects)

WP6 – road map

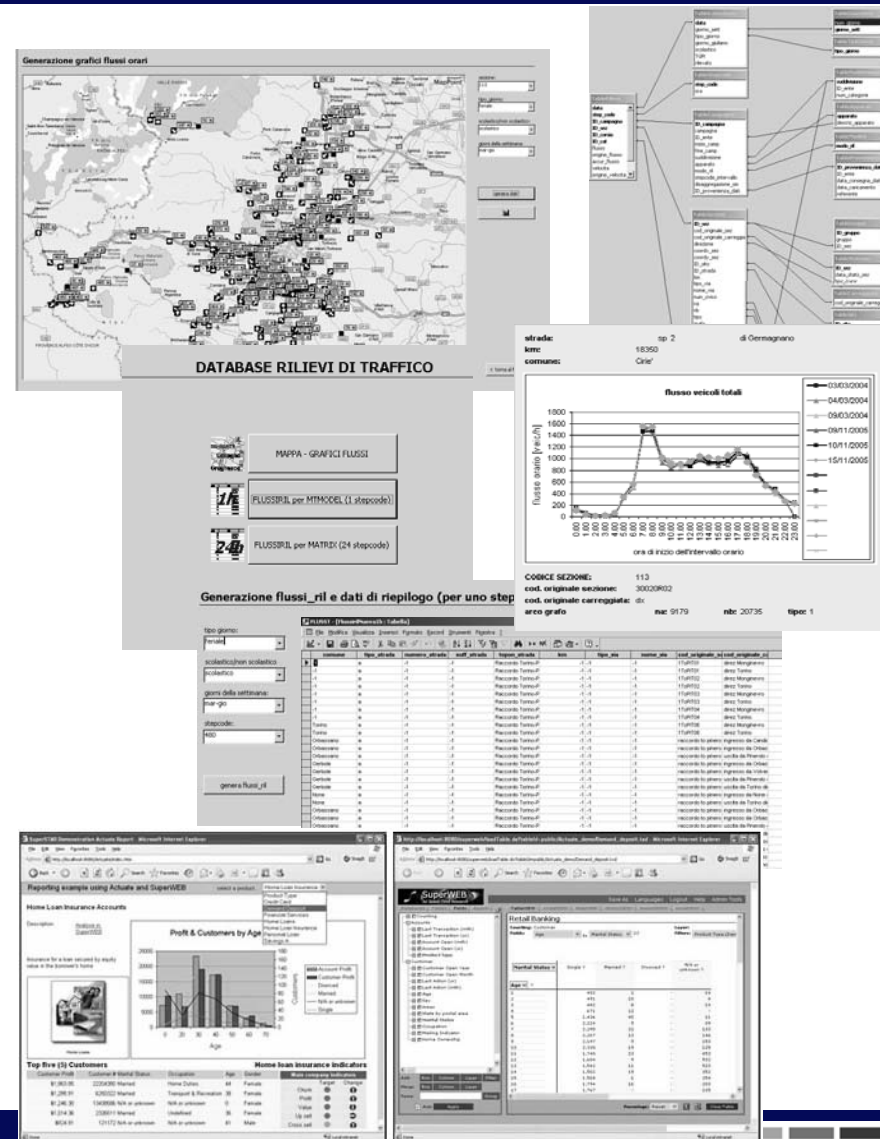
- Road map (Datawarehouse DWH)
 - First step (data base) Data transformation
 - extraction from feeder systems (ad hoc interface)
 - Transformation / normalisation
 - Data preparation and storage
 - Data interpretation and analysis (query and analysis)
 - Intermediate step (Decision Support System)
 - Data interpretation and analysis (+ traffic model)
 - Data presentation (georeferenced user interface)
 - Final step (Infomobility)
 - Dynamic acquisition of traffic data (including real time events)



WP6 – road map

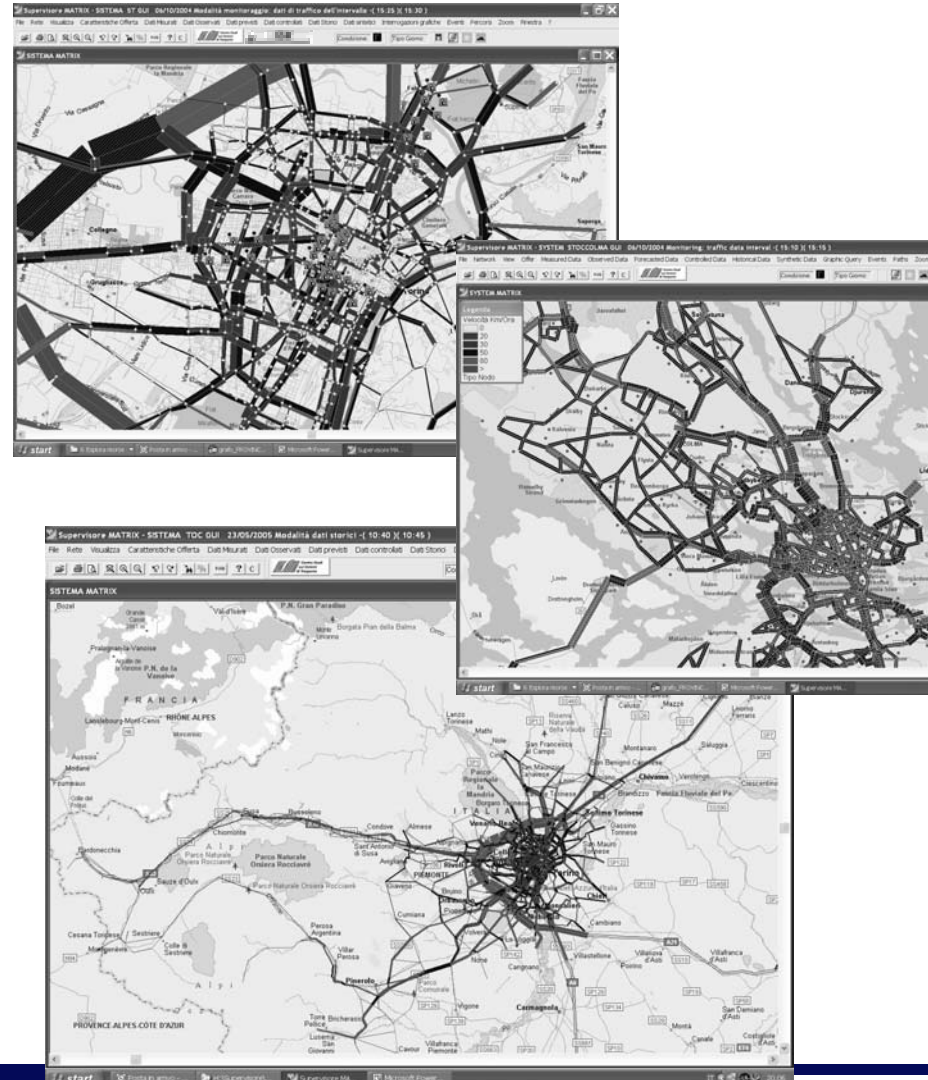
- Road map
 - First step (data base)
 - Collect traffic data from different sources
 - From data to information (Harmonize, normalize)
 - Information manipulation (query and analysis easy and flexible)
 - Data presentation (reporting)

Business intelligence tools+web application



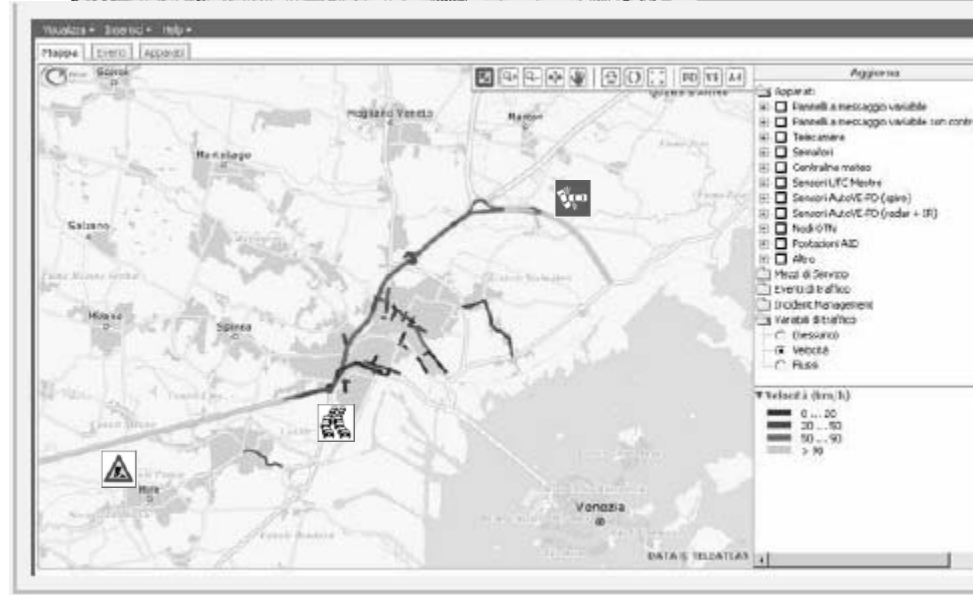
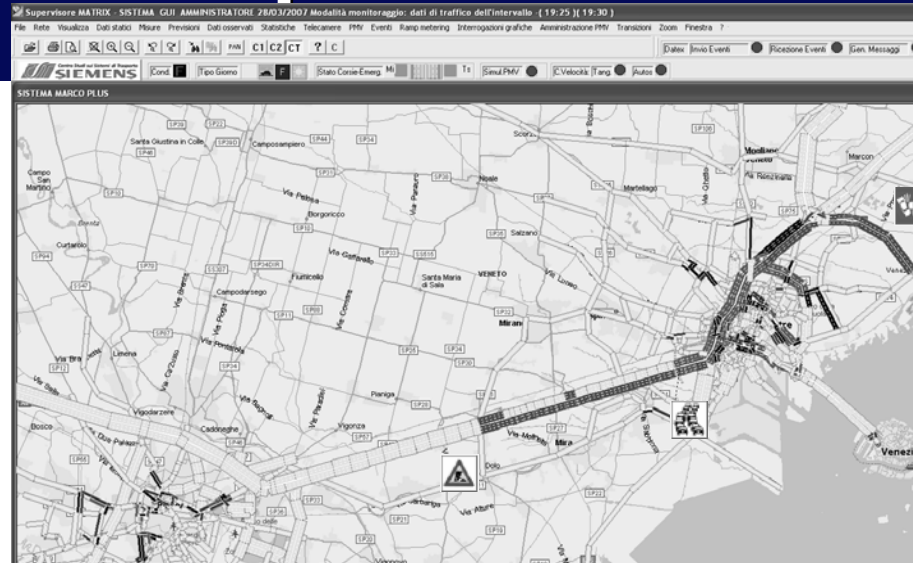
WP6 – road map

- Road map
 - intermediate step (DSS)
 - Build transport models chain
 - Offer (road network) model
 - Demand model (OD matrix time dependent)
 - Behavioural model (modal split and assignment DUE, SUE, etc)
 - Georeferenced GUI
- Model platform (dynamic)



WP6 – road map

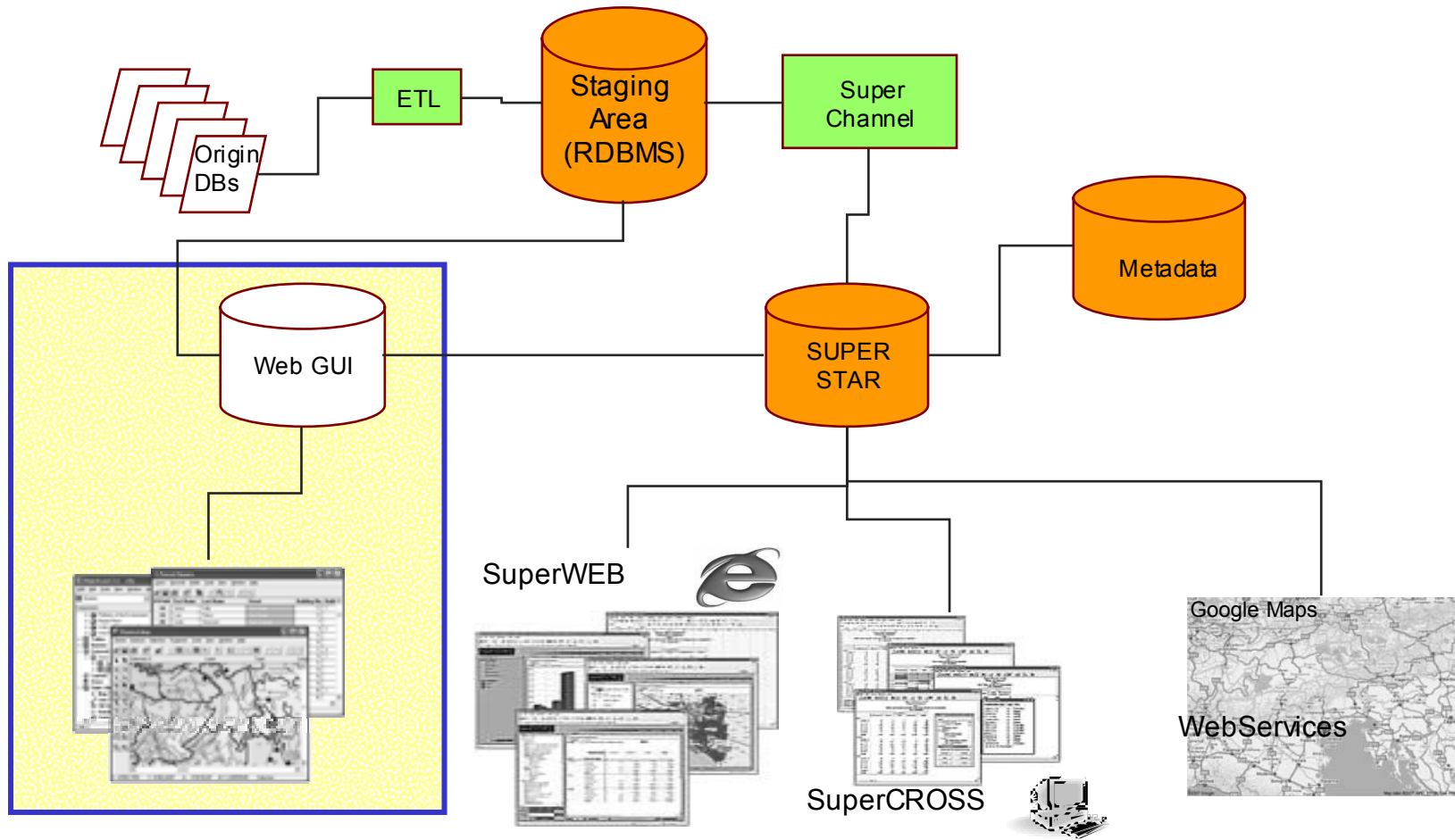
- Road map
 - Final step (infomobility)
 - Build tool working in real time
 - collecting traffic data and events,
 - making forecast on traffic evolution,
 - Generating suitable information for road users
 - Web interface
- Traffic Management & infomobility platform



WP6 – Develop System (I)

- Datawarehouse DWH (APV)
 - Selection of Tool
 - Super Star
 - Training course
 - Selection of sources
 - Traffic data so far identified
 - Pilot projects
 - Sources interfaces
 - Transformation / normalisation
- Web application (CSST)
 - Design
 - Traffic data model
 - GUI interface
 - development

System architecture



WP6 – data normalisation

- Data to be normalised
 - Road Traffic (section, stretch)
 - Flow
 - Speed/Travel time
 - Vehicle classification
 - OD (zone)
 - Intensity
 - Type
 - Passengers
 - Freight
 - Pilot project

WP6 – data normalisation

- normalisation
 - Have common view of data from different sources
 - Suitable organisation of data including “support” data = DB “tables”
- Critical issue in normalisation:
 - Time resolution
 - Vehicle classification
 - Freight classification
 - Approach:
 - “Minimum common” among data
 - Minimum level of details + common group

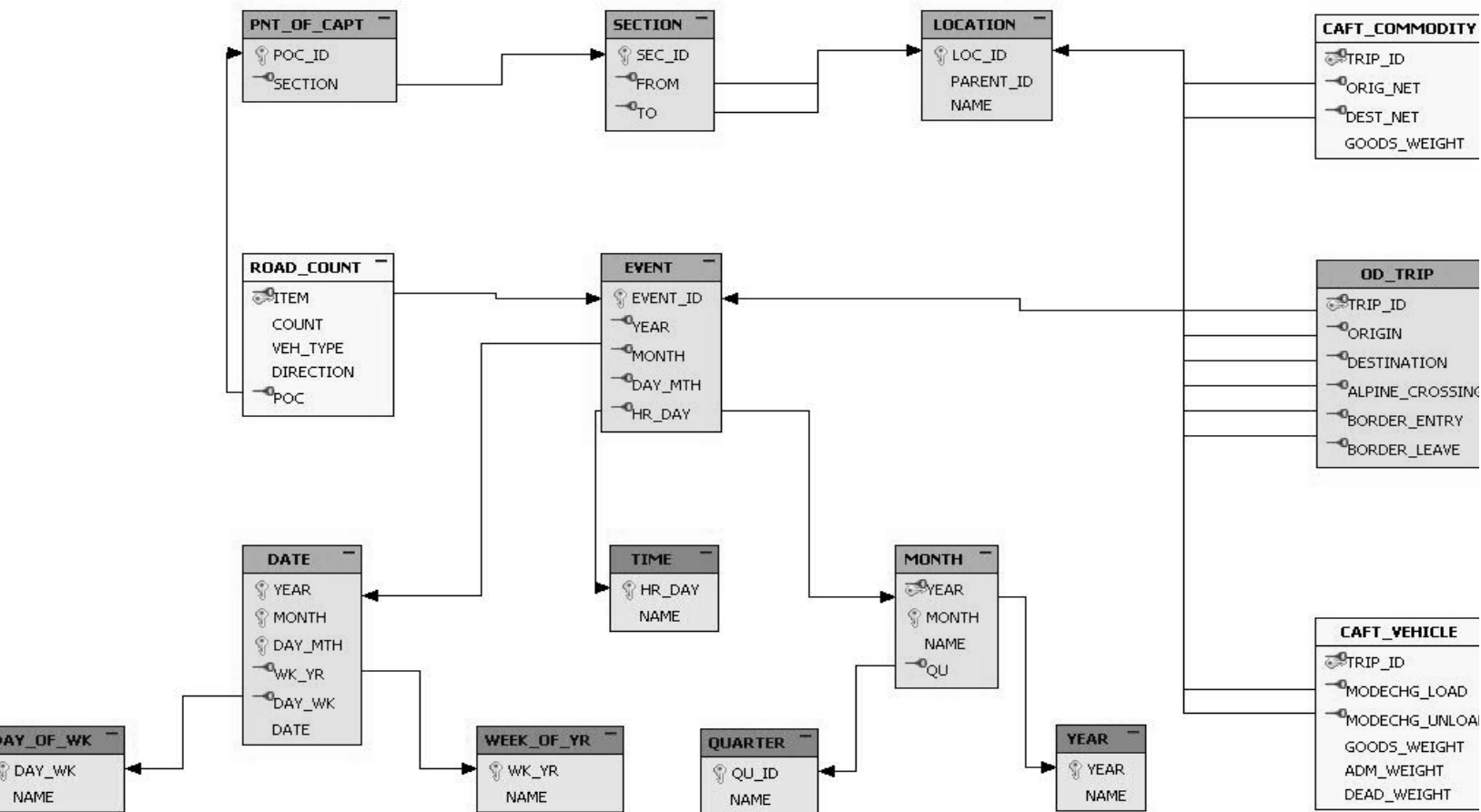
WP6 – data normalisation

- Tables
 - Static tables:
 - Source information
 - Data owner
 - Type of Vehicle classification
 - Type of freight classification
 - Time resolution
 - Data collection method
 - Traffic data
 - Section/stretch list (anagraphic info)
 - Road list
 - Calendar
 - Section group (user defined)
 - OD data
 - Zone list (NUTS, other)
 - Relation category (passenger, freight, vehicle/freight classification)

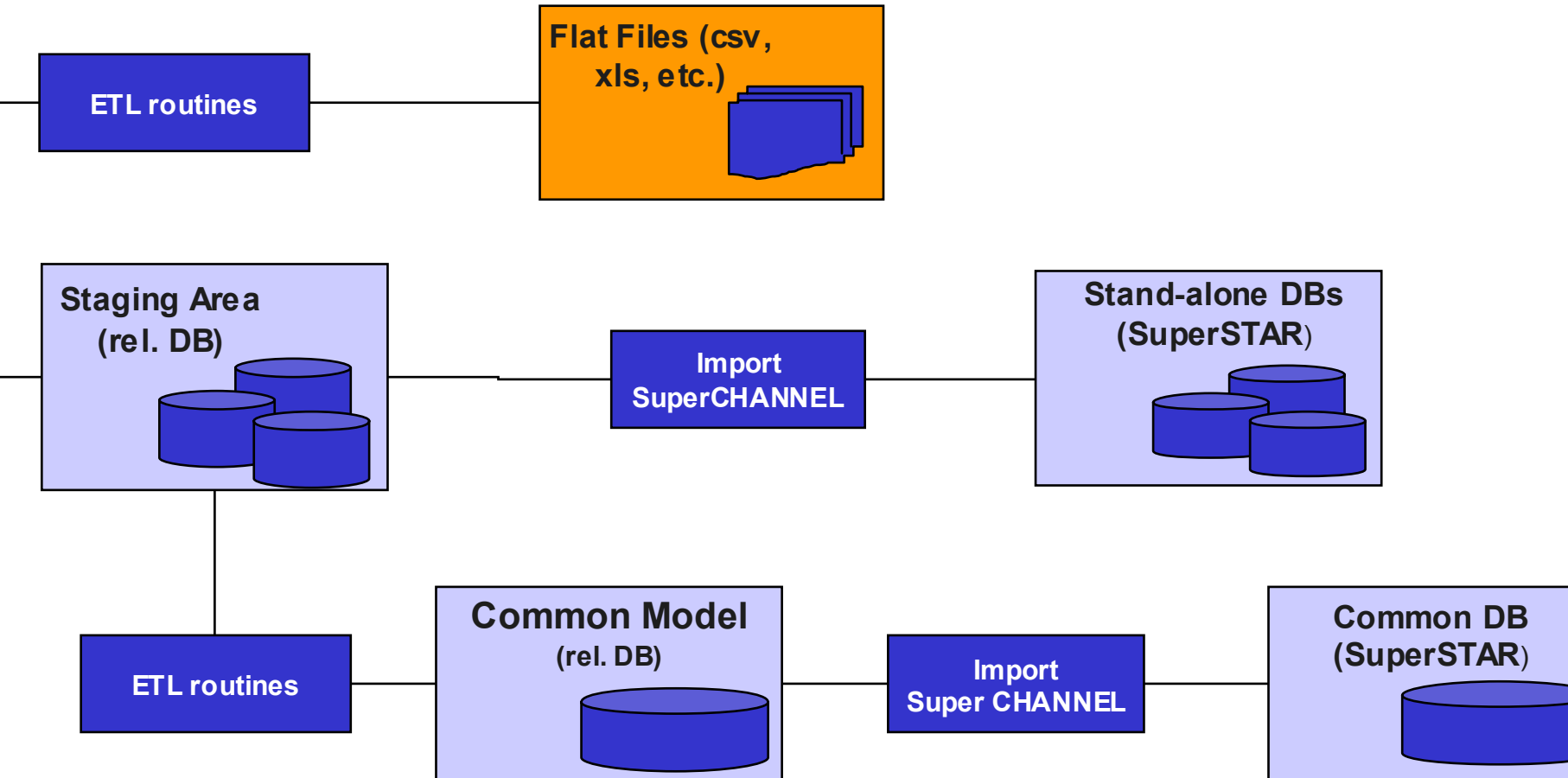
WP6 – data normalisation

- Tables
 - Dynamic table
 - Traffic data (5min/hour Resolution, per direction)
 - Flow (per vehicle category)
 - Speed (Harmonic average)
 - Type of data (measured, estimated)
 - Accuracy
 - OD data (hour/day resolution)
 - Flow (passenger/freight)
 - accuracy

WP6 – common Data model



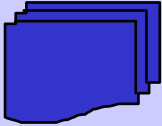
WP6 – ETL and load process design



data sources – status

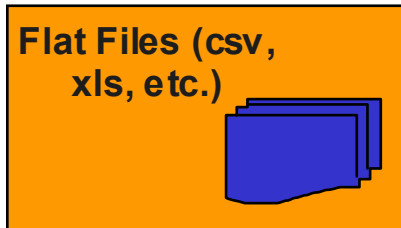
Flat Files

(csv, xls, etc.)



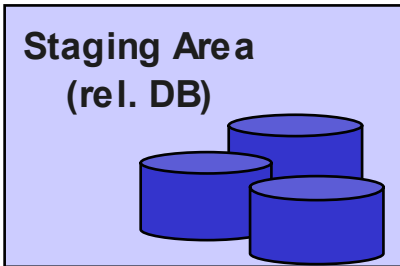
Cross Alpine Freight-Transport/BMVIT	loaded
ASFINAG	loaded
Frejus tunnel	loaded
Mont Blanc	loaded
Gran San Bernardo	loaded
Autostrade per l'Italia	loaded
Veneto Region	work in progress
Permanent automatic counting stations in Germany	loaded
Ventimiglia	loaded
Slovenia Pilot Project	loaded
Venice/Stuttgart Pilot	work in progress
IREALP - SLALA Pilot Project	work in progress
Vienna Pilot Project	no data
Val d'Aosta Pilot	no data

data sources



- Flat files
 - different formats (csv, MS Access, MS Excel)
 - Mostly well-documented
 - Some improvement in documentation possible

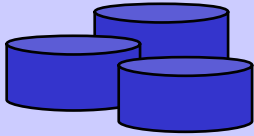
Staging Area



- One DB for each data source
- Intermediate storage for source data
- Starting point for:
 - Loading the Common Design
 - Generating separate SuperSTAR databases
- Relational databases

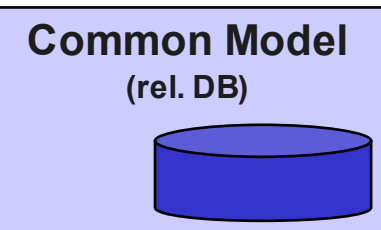
SuperSTAR databases

Stand-alone DBs
(SuperSTAR)



- One DB for each data source
- User-accessible databases
- Used to create reports for stand-alone data sources
- Registered with SuperSTAR server

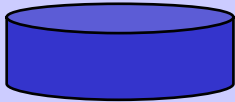
Common Model



- One DB design combining the different data sources in the dimensions
 - Time
 - Location (counting stations, O/D)
 - Vehicle type
- Intermediate storage for common SuperSTAR DB
- Relational database

Common Database (SuperSTAR)

Common DB
(SuperSTAR)



- User-accessible database containing the common model
- Used to create reports across and combining several data sources
- Registered with SuperSTAR server

Common Database (SuperSTAR)

Common DB

(SuperSTAR)



- Estimated goods distribution
Brenner 2004-06

	Annual No. of Vehicles	Estimated No. of Vehicles 2004	Estimated No. of Vehicles 2005	Estimated No. of Vehicles 2006	Annual Goods Weight	Estimated Goods Weight 2004	Estimated Goods Weight 2005	Estimated Goods Weight 2006	% Diff of Vehiclecount 2004
Agricultural products and live animals	271.982	279.876	283.437	294.185	4.922.025	5.064.892	5.129.338	5.323.832	2,9
Foodstuffs and animal fodder	369.590	380.318	385.157	399.762	7.247.737	7.458.110	7.553.008	7.839.403	2,9
Solid mineral fuels	1.965	2.022	2.048	2.126	46.424	47.772	48.380	50.214	2,9
Petroleum products	5.991	6.165	6.243	6.480	119.001	122.455	124.013	128.715	2,9
Ores and metal waste	26.981	27.764	28.117	29.183	538.510	554.141	561.192	582.471	2,9
Metal products	151.272	155.663	157.643	163.621	3.115.545	3.205.977	3.246.770	3.369.881	2,9
Crude and manufactured minerals, building materials	141.675	145.787	147.642	153.241	2.941.815	3.027.204	3.065.722	3.181.968	2,9
Fertilizers	5.888	6.059	6.136	6.368	131.193	135.001	136.718	141.902	2,9
Chemicals	155.198	159.703	161.735	167.868	2.872.562	2.955.941	2.993.553	3.107.062	2,9
Machinery, transp. equip., mfg articles, misc. and unknown	807.402	830.837	841.409	873.313	10.780.573	11.093.490	11.234.645	11.660.640	2,9
unknown	140.960	145.052	146.898	152.468	69.331	71.343	72.251	74.991	2,9
Total	2.078.904	2.139.246	2.166.466	2.248.614	32.784.716	33.736.325	34.165.590	35.461.080	2,9

Import process (I)

Import
SuperCHANNEL

- Relational source database
- SuperSTAR target database
- Definition of facts (counting variables)
- Definition of classifications (category variables)
- Defined with SuperCHANNEL

Import process (II)

Import
SuperCHANNEL

commodity.xml - SuperCHANNEL

File View Source Target Tools Help

New Open Save Source Attributes Logs Type Map Preferences Target Grouping Build All Update All Resu

Source View

Source Attributes

Database

Label:

Name:

Location: jdbc:db2://dementia:50000/caft

Username: db2inst1

Driver: IBM DB2 JDBC Universal Driver Ar

Target View

Commodity Records

Fact Tables

Classifications

Plain Tables

ALPCRO

AXLCEC

AXLCF

BODYVEH

COMMOD

COMMODITY

DANG_T

DANG00

FURALP

LAU2

MODALP

MODINI_TERM

NUTS0

NUTS1

NUTS2

NUTS3

COMMODITY

ALPCRO

COMMOD

FURALP

LAU2

MODALP

MODINI_TERM

NUTS0

NUTS1

NUTS2

NUTS3

```
<TABLE NAME="COMMOD" LABEL="COMMOD" USAGE="CLASSIFICATION">
  <COLUMN NAME="CODE" LABEL="CODE" USAGE="CODE" KEYSEQ="1" VISIBLE="Y"
  <COLUMN NAME="NAME" LABEL="NAME" USAGE="NAME" VISIBLE="Y" PRIMARYKE
</TABLE>
<TABLE NAME="ALPCRO" LABEL="ALPCRO" USAGE="CLASSIFICATION">
  <COLUMN NAME="CODE" LABEL="CODE" USAGE="CODE" KEYSEQ="1" VISIBLE="Y"
  <COLUMN NAME="NAME" LABEL="NAME" USAGE="NAME" VISIBLE="Y" PRIMARYKE
</TABLE>
<CLASSIFICATION NAME="VERSION" LABEL="VERSION" TABLE="COMMODITY" COL
</DATABASE>
```

ETL process

ETL routines

- Relational source database or flat files
- Relational target database
- Extraction of data from source format (file formats, DB design)
- Transformation in target design (stand-alone, common designs)
- Loading of data to the target
- Defined with KETTLE

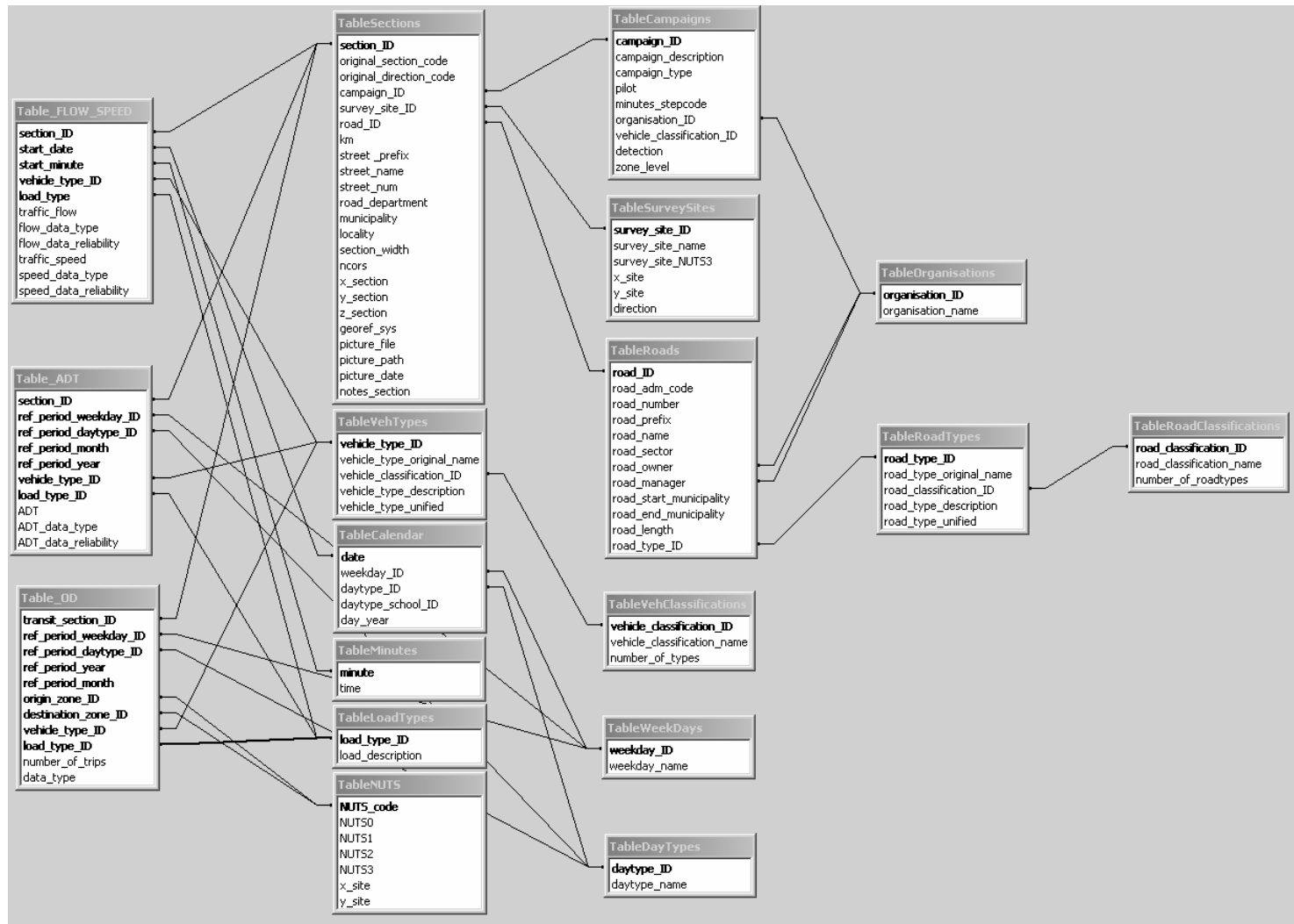
WP6 – Web application

- Objective:
 - Develop a tool which allow user to see (on a map) and offer possibility to extract (download) normalised data from DWH using Internet.
- Main requirements:
 - Data have to be georeferenced (suitable map)
 - user profile:
 - Very simple representation of data, few interaction with the system

main characteristics of the web GUI database (1/2)

- Microsoft Access format (possibly converted to db2 format)
- ready for encompassing any type of traffic information databases
- 18 tables hosting information on:
 - georeferenced OD relations and traffic measures at different time steps
 - sections of measurement
 - vehicle types and classifications
 - load types
 - measurement campaigns and responsible entities
 - road types and classifications
- feeded through dedicated procedures for data conversion from Alpcheck DWH (according to the fields correspondence resulted from the origin DBs analysis)

main characteristics of the web GUI database (2/2)



Main characteristics of the web GUI (1/3)

- Web application with map interface based on Google Maps (Javascript - PHP)
- Data extraction based on combo boxes and "cascade" selections
- Four data families:
 - day-based traffic
 - year-based traffic
 - ADT along years
 - OD matrices (NUTS0 to NUTS3 level based)

Main characteristics of the web GUI (2/3)

AlpCheck

Traffic Counts(day profile) Traffic Counts(year profile) AADT AADT per Origin/Destination

Map interface

Selection boxes

Data families (one sheet each)

Site
Campaign
Day Type
Weeks Day
Vehicle type
Load Type

result

© 2001-2006 INTERREG IIIIB Alpine Space Programme
Community Initiative Programme funded by the European Regional Development Fund

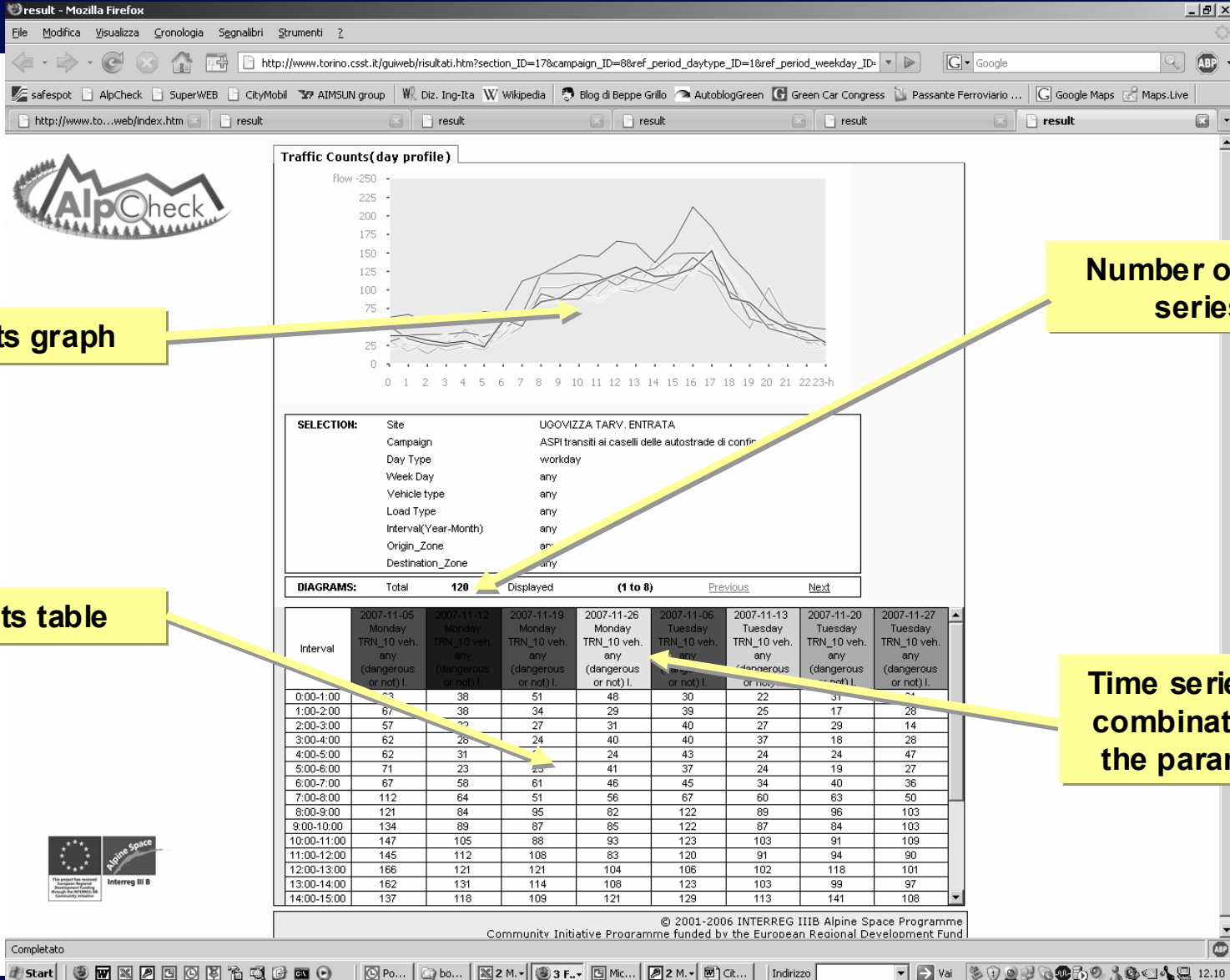
Main characteristics of the web GUI (3/3)

- Selectable parameters:
 - measurement site
 - data origin (measurements campaign)
 - day type (working day / holiday, etc.)
 - day of the week
 - vehicle type (aggregated according two macro types “light” and “heavy” vehicles)
 - load type (where available)
- Only the choices with available data are proposed to the user, avoiding “no data” results from the query
- Results request can be launched at any stage of the selection

Output (1/3)

- The results of the data inquiry are shown to the user in form of:
 - tables
 - graphs
 - map-based representations
- The result data series are disaggregated according to the available combinations of the selectable parameters
- The “dimension” of the results (number of time series, rows and columns of the OD matrices) varies according to selection stage at which the inquiry is launched

Output (2/3)



Output (3/3)

result - Mozilla Firefox

File Modifica Visualizza Cronologia Segnalibri Strumenti ?

http://www.torino.csst.it/guiweb/risultati.htm?section_ID=26&campaign_ID=1&ref_period_daytype_ID=0&ref_period_weekday_ID=...

safespot AlpCheck SuperWEB CityMobil AIMSUN group W Diz. Ing-Ita Wikipedia Blog di Beppe Grillo AutoblogGreen Green Car Congress Passante Ferroviario ... Google Maps Maps.Live

http://www....index.htm result result result result result

AlpCheck

AADT per Origin/Destination

Map data ©2008 AND, Tele Atlas - Tutti i diritti sono riservati

SELECTION:

Site	Mont-Blanc tunnel
Campaign	CAFT
Day Type	undefined
Week Day	Monday to Sunday
Vehicle type	2
Load Type	generic not dangerous
Interval (Year-Month)	2004
Origin_Zone	ITC1
Destination_Zone	FR71

DIAGRAMS: Total 3 Displayed (1 to 3) Previous Next

	Is	Loire	Rhone	TOT_RIG
Cuneo	1.0	2.0	3.0	7
Torino	2.0	7.0	3.0	12
Vercelli	1.0	3.0	3.0	7
TOT_COL				

Completato

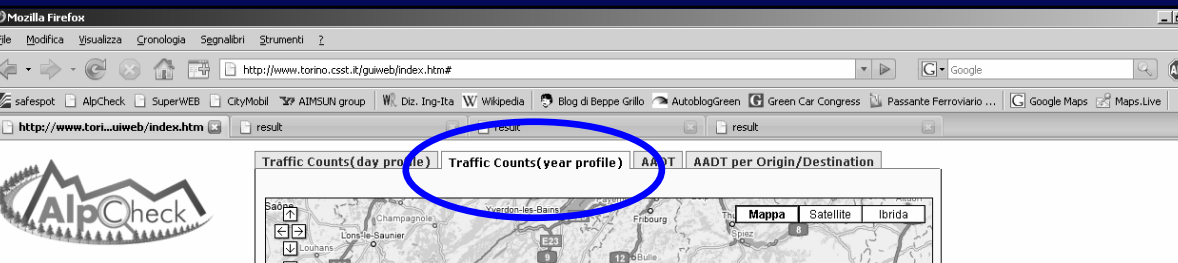
© 2001-2006 INTERREG IIIB Alpine Space Programme
Community Initiative Programme funded by the European Regional Development Fund

Start Po... bo... 2 M... 3 F... Mic... 2 M... Cr... Indirizzo Val 12.18

Results map

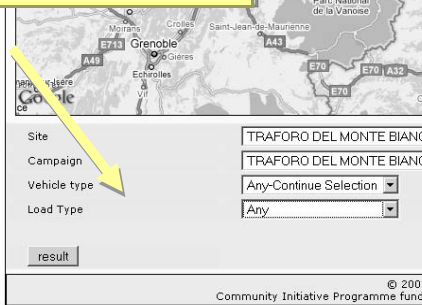
Results table
(OD matrix)

Selection example: day-based traffic (vehicles per hour)

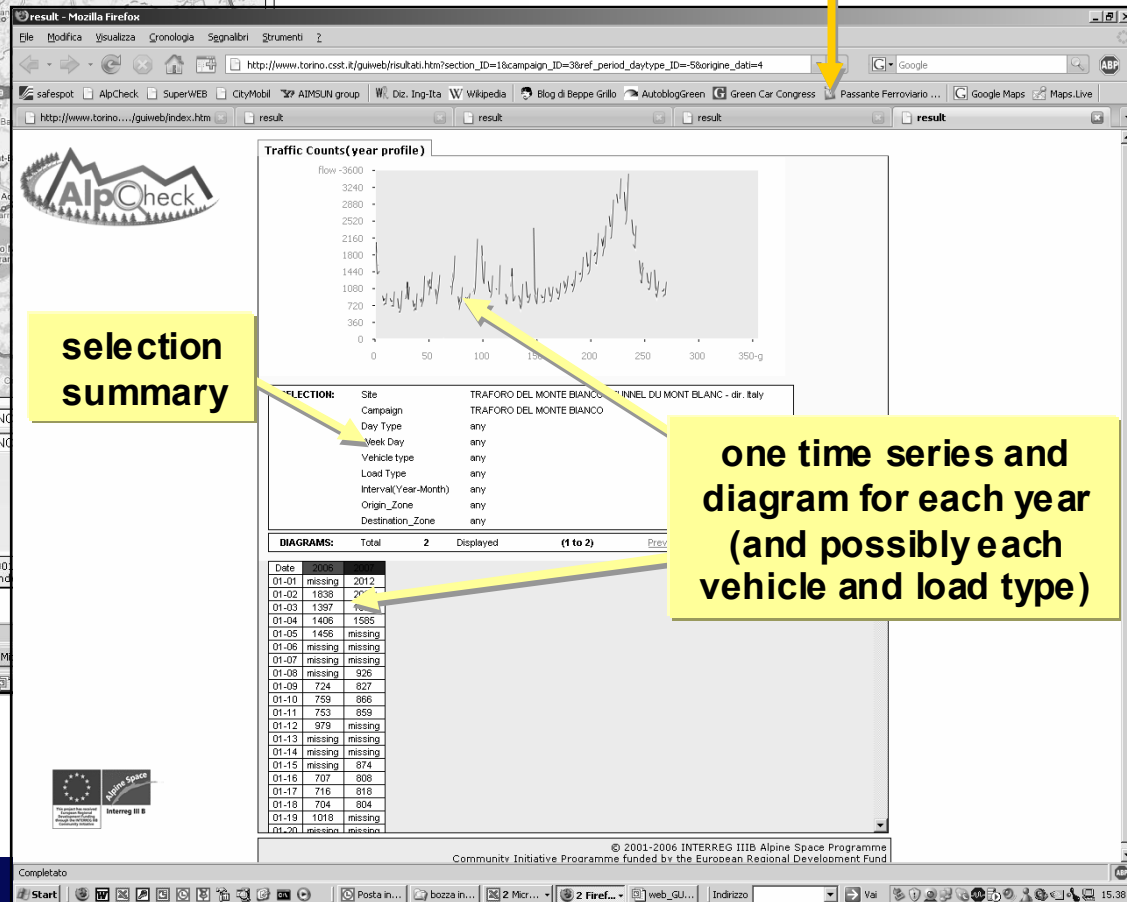


selection by:

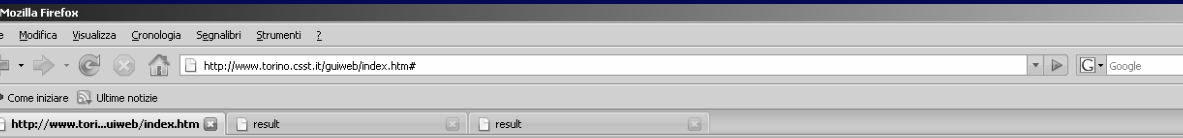
- section and direction
- data origin (campaign)
- vehicle and load type



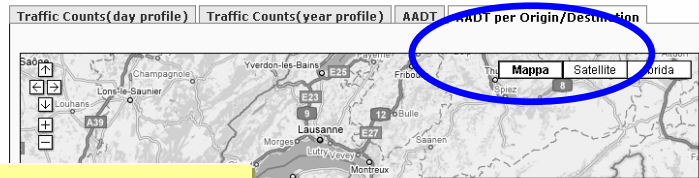
Selection window



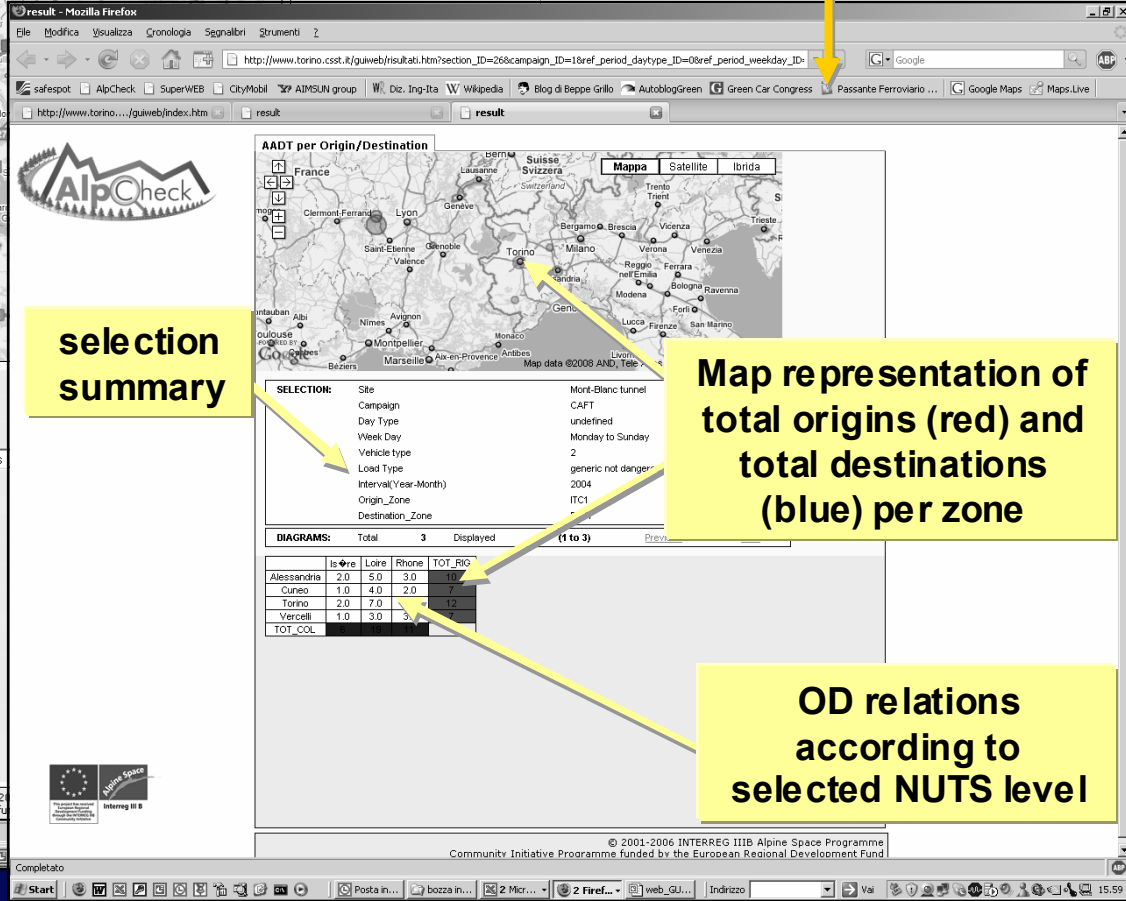
Selection example: OD Matrices



Selection by:
 Selection
 Data origin (campaign)
 Vehicle and load type
 Origin and destination zone
 High versatility for NUTS
 level choice)



Results window



selection
summary

Map representation of
 total origins (red)
 and total destinations
 (blue) per zone

OD relations
 according to
 selected NUTS level

Selection window



WP6 Web Application - Remarks

- a. The selection scheme is thought as a “cascade selection”, where the selection options for a certain category (scroll-down window) include only those for which the dat base effectively contains data. This assumes that for every selectin a query is automatically launched in order to extract the available items for the following selection in the sequential “selection tree”.
- b. The selection options (windows and buttons) in step 2 and 3 may be activated or inhibited according to the chosen display mode, for representation clearness or conceptual reasons. For example: the “distinct category” option for the data source selection is not selectable for the ADT per Origin/Destination display mode; the ADT survey month, day and day type windows are inhibited if the ADT per year or per Origin/Destination has been selected.

WP6 – Web Application

- WB application now available on ALPCHECH Server for ALPCHECK community at:

<http://dh.alpcheck.eu/guiweb/index.htm>

Thank You for attention