



This Project is co-funded by the European Union  
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## HIGH-TOOL session at ETC

29 September 2015, Frankfurt, Germany

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A New Generation of User-Interface  
for Advanced Models



# Agenda

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- 1) Conceptual Approach
- 2) User-interface Design Principles
- 3) Technological Solution
- 4) Software and Hardware Requirements

# Conceptual Approach

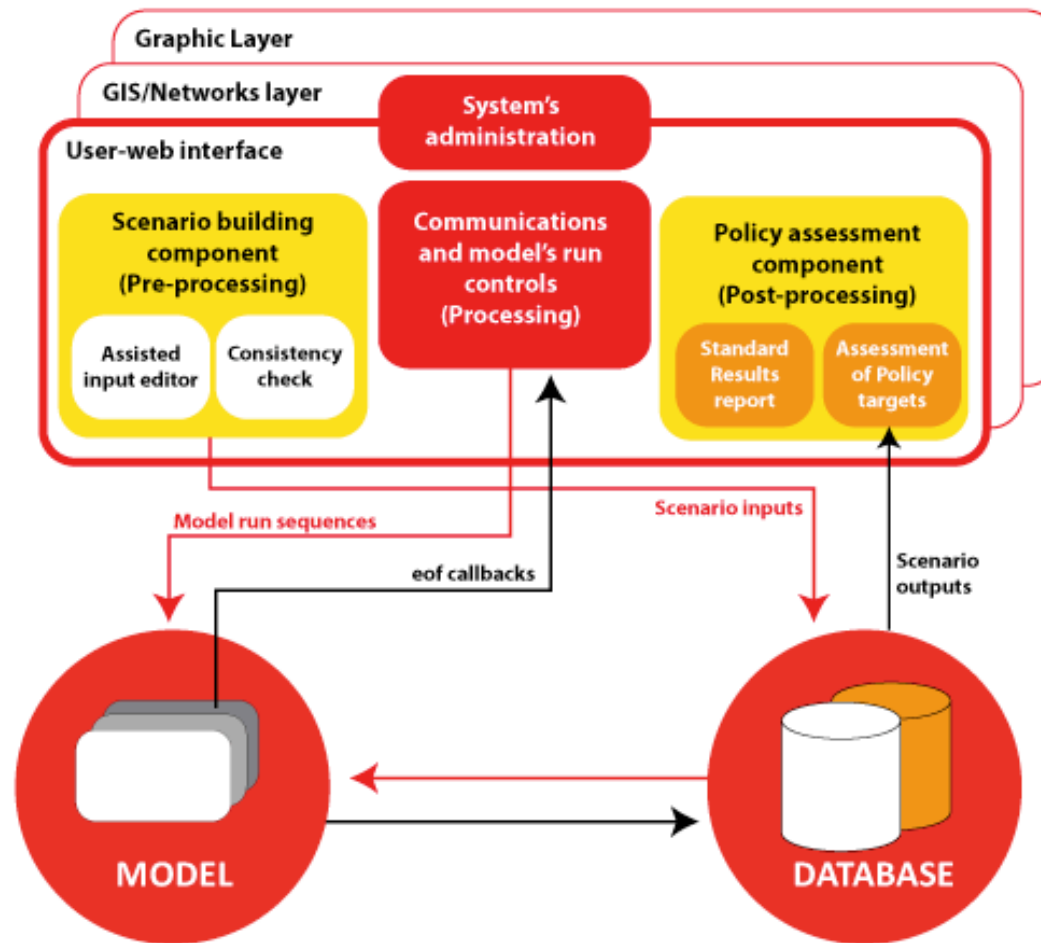
## *A Decentralised Highly Interconnected System*

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- **Pre-processing** module (Scenario-building)
- **Processing** module(Running conditions)
- **Post-processing** module (Outputs)
- **System's Administration**
- **Common Database**
- **Model** (A modular architecture)

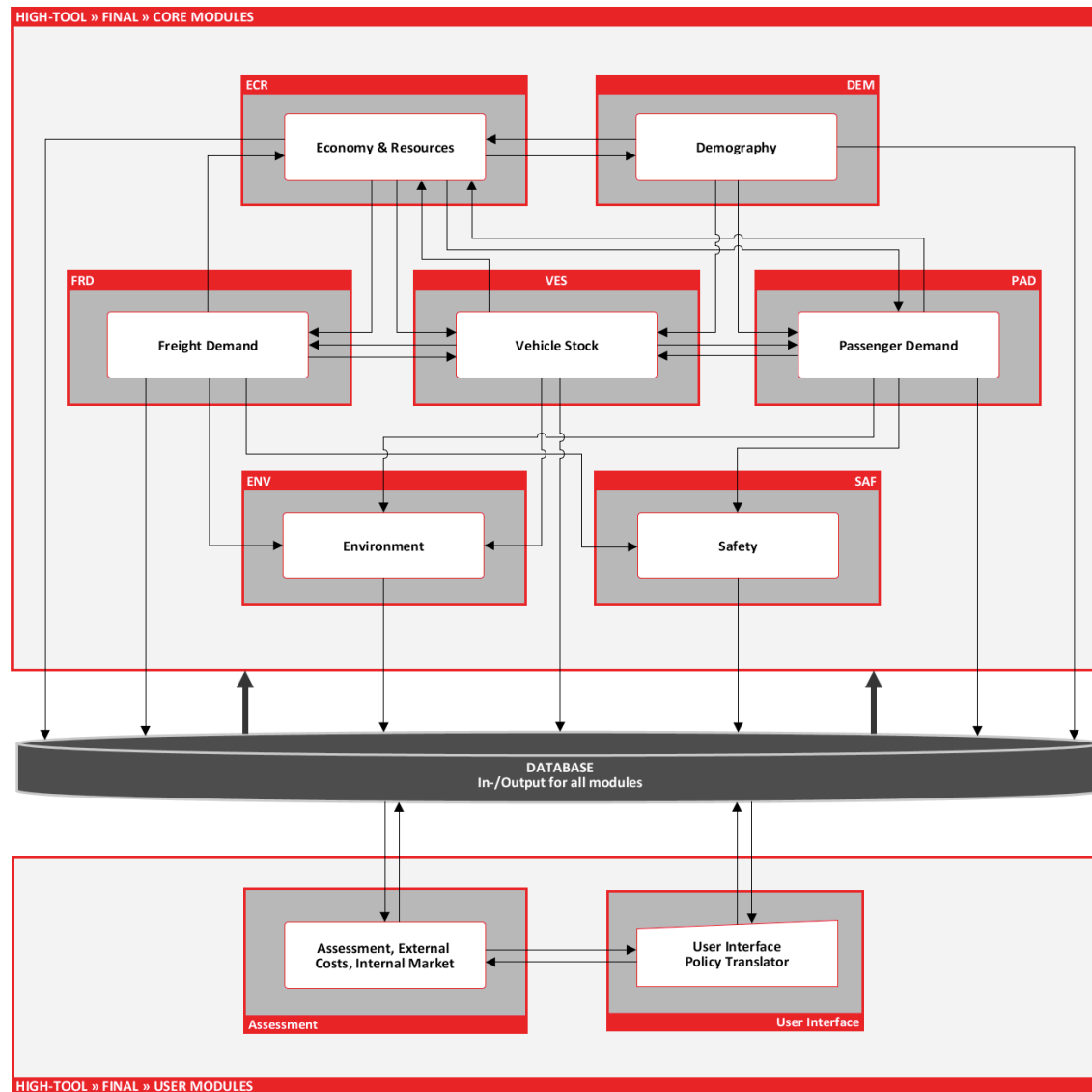
# Conceptual Approach

## *A Decentralised Highly Interconnected System*



# Conceptual Approach

## *A Modular & Integrated Architecture for the Model*



HIGH  
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# User-interface Design Principles

## *A User-Centric Interface*

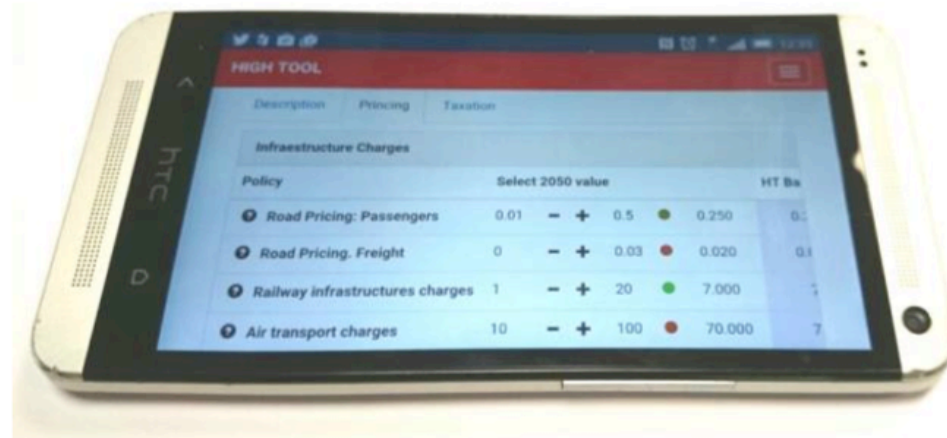
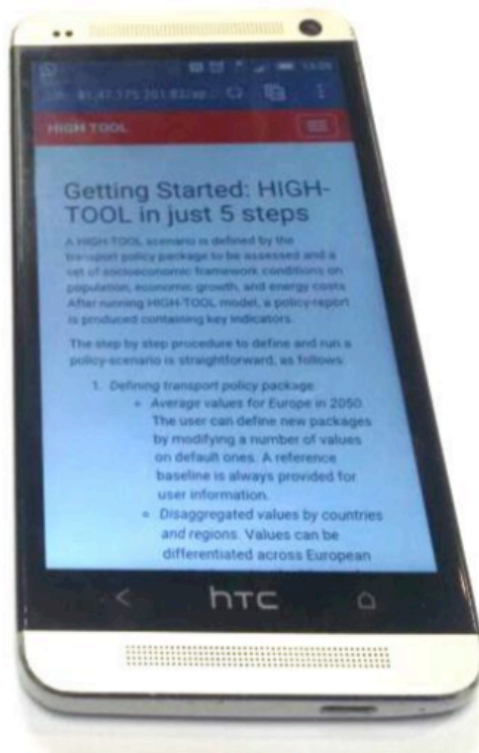
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- **Intelligence:** Supporting Scenario-building
- **Learnability:** Allows for a quick learning curve
- **Friendliness:** Visibility, Intuitive Navigation
- **Productivity:** Reduce low added-value tasks

# User-interface Design Principles

## *Multiplatform accessibility*

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# User-interface Design Principles

## *User-friendly User Definition of Transport Policies*

HIGH TOOL
Framework Conditions
Policy Measures
Scenario
Run
Policy Reports
Hi Cristian

Policy measure: "Transport Pricing and Taxation"
« On market pricing regulation On technology On transport supply On transport demand »

Description
Pricing
Taxation

Vehicle and service taxation

Policy	Select 2050 value	HT Baseline	Unit	Time	Map
Vehicle Exercise Duty	30  500	230.000	€ / vehicle-year		
VAT level on transport	0  0.27	0.140	% VAT in trip fare		

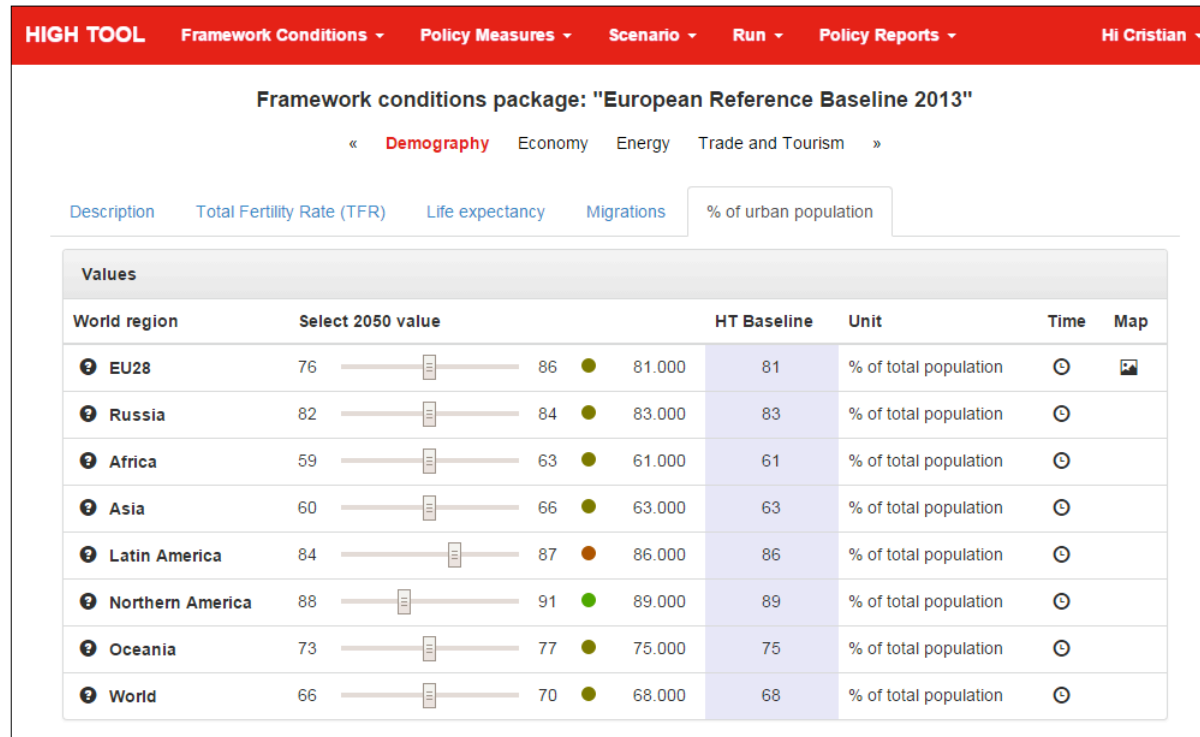
Internalisation of External Costs

Policy	Select 2050 value	HT Baseline	Unit	Time	Map
Hydrogen taxation	0  0.5	0.100	€ / kg Hydrogen		
Electricity taxation	0  0.5	0.100	€ / kWh Electricity		
Diesel taxation	0  0.5	0.100	€ / l Diesel		
Gasoline taxation	0  0.5	0.100	€ / l Gasoline		
CNG taxation	0  0.5	0.100	€ / kg CNG		
IPG taxation	0  0.5	0.100	€ / l LPG		
B taxation	0  0.5	0.100	€ / l Bioethanol		
Kerosene taxation	0  0.5	0.100	€ / l Kerosene		
CO <sub>2</sub> taxation.	0  48	24.000	€ / CO <sub>2</sub> tonne		
NOx taxation	0  2893	1400.000	€ / NOx tonne		



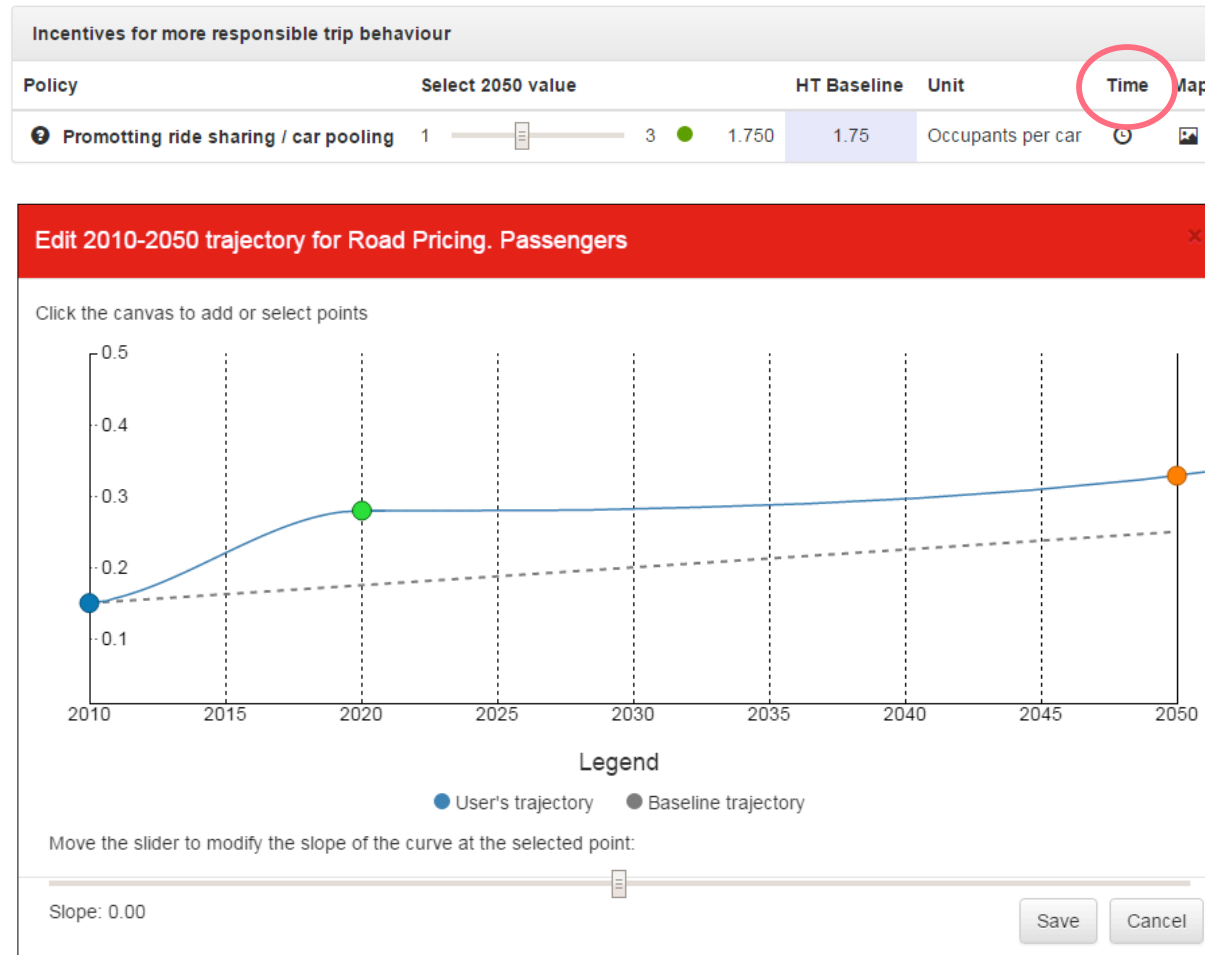
# User-interface Design Principles

## *User-friendly Definition of Framework Conditions*



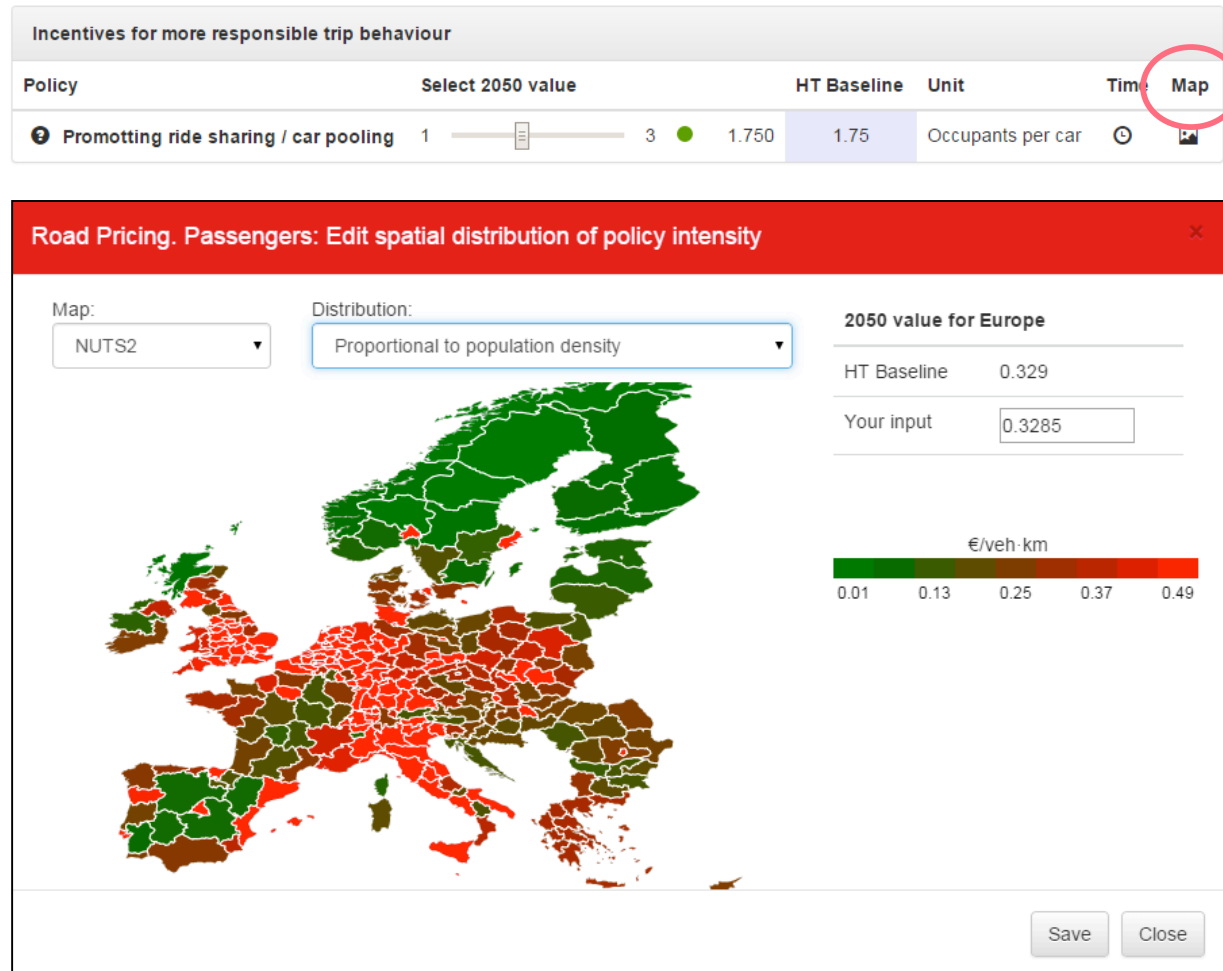
# User-interface Design Principles

## *Graphical introduction of 2010-2050 trends*



# User-interface Design Principles

## *Graphic introduction of regional inputs*



# User-interface Design Principles

## *Definition of Scenarios*

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The screenshot displays the HIGH TOOL web application interface. At the top is a red navigation bar with the following elements: 'HIGH TOOL' logo, 'Framework Conditions' dropdown, 'Policy Measures' dropdown, 'Scenario' dropdown, 'Run' dropdown, 'Policy Reports' dropdown, and a user profile 'Hi Cristian' dropdown. The main content area is divided into three sections:

- Road Pricing with reference Framework Conditions**: This section contains a rich text editor with a toolbar (undo, redo, formats, bold, italic, text color, background color, bulleted list, numbered list, link, unlink) and the following text:

This packages envisage to explore the impact of pricing measures under a reference evolution of economy and demography in Europe.  
It is based on the EU Reference Baseline, and the application of a pricing and taxation package of policy measures.  
Expected results include decrease of road transport in congested areas, and modal change to rail up to a certain extent.
- Framework Conditions: European Reference Baseline 2013**: This section contains a link '[European Reference Baseline 2013](#)' and a button '[Change the package](#)'.
- Policies: Transport Pricing and Taxation**: This section contains a paragraph of text: 'This scenario is about enhancing European regulation and investing strategically on high socioeconomic return transport infrastructure to increase the overall efficiency of the European transport sector.' and a button '[Change the package](#)'.

# User-interface Design Principles

## Running a Single TPM (Transport Policy Measure)

**HIGH TOOL** Framework Conditions ▾ Policies ▾ Scenario ▾ Run ▾ Policy Reports ▾ Export ▾ Hi High Tool Test user ▾

Select Transport Policy Measure

« On market pricing regulation On technology On transport supply On transport demand »

Predefined Transport Policy Measures in baseline conditions  
Full customized scenario

Taxation Internal market

**TEN-T** Run

Variable	Select value	Suggested value	Unit	Time	Map
i_er_infra_invest	0	0	EUR	⌚	🗺️
i_pd_imp_net_dist	98	100	(100=baseline)	⌚	🗺️
i_pd_imp_net_time	95	97	(100=baseline)	⌚	🗺️
i_vs_nf_rof_cst_othr	90	95	(100=baseline)	⌚	🗺️
p_fd_load_time	90	95	(100=baseline)	⌚	🗺️
p_fd_speed	90	98	(100=baseline)	⌚	🗺️
p_fd_unload_time	90	95	(100=baseline)	⌚	🗺️
p_fd_wait_time	90	95	(100=baseline)	⌚	🗺️

**TIS Traffic information** Run

Variable	Select value	Suggested value	Unit	Time	Map
i_vs_cap_tech	95	97.5	(100=baseline)	⌚	🗺️
p_fd_speed	80	90	(100=baseline)	⌚	🗺️
i_pd_imp_delta_los	-0.03	-0.01	Absolute change	⌚	🗺️
		99	(100=baseline)	⌚	🗺️

81.47.175.201:82/#/runTPM

**STEP 1**

**STEP 2**

**STEP 3**

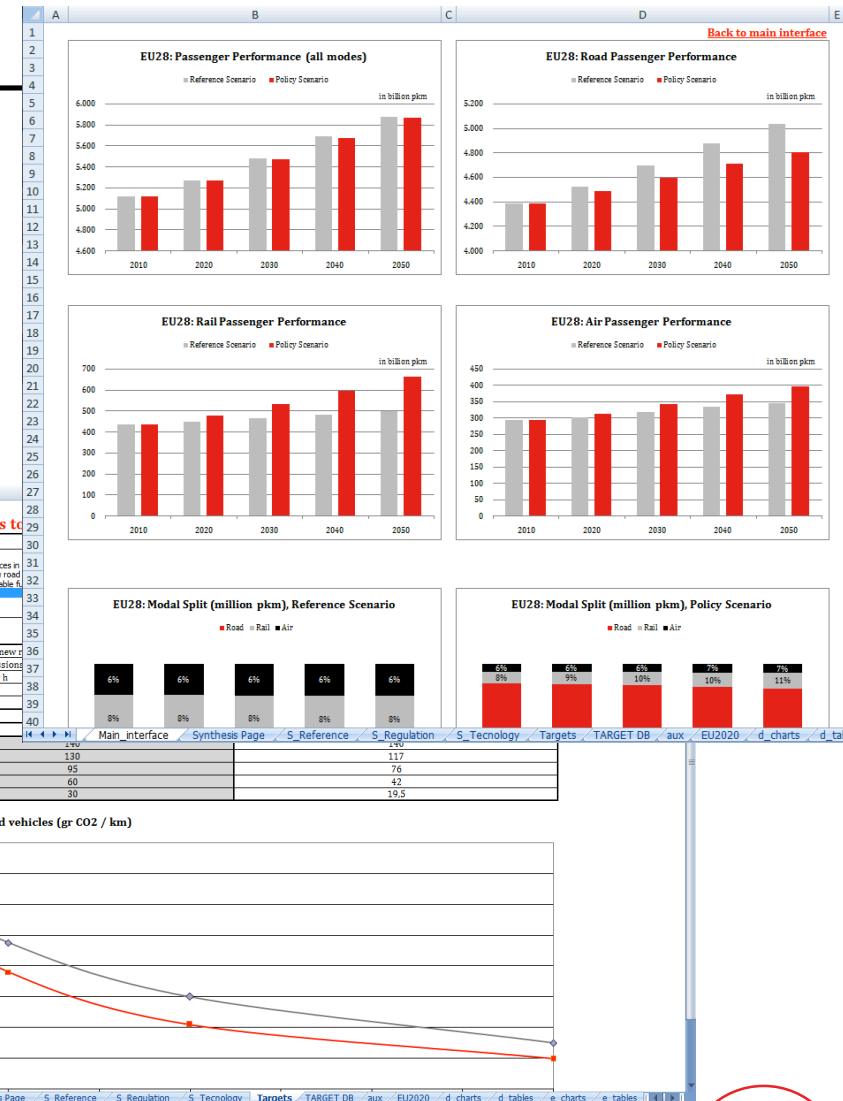
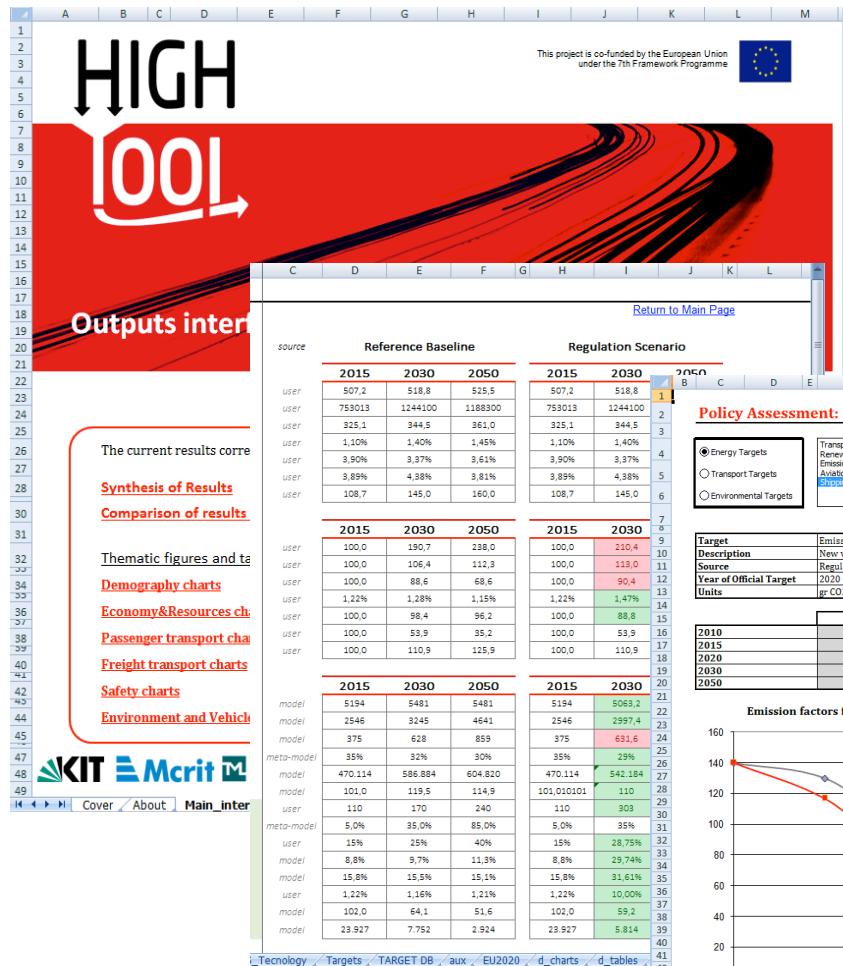
# User-interface Design Principles

## *Key Output Indicators, Policy Assessment*

HIGH TOOL Framework Conditions Policy Measures Scenario Run Policy Reports HI Cristian								
« Framework Conditions Transport Policies <b>Simulation Results</b> »								
Download Policy Assessment Report								
Item	Source	Unit	Run result			HT Baseline		
			2015	2030	2050	2015	2030	2050
Passenger transport performance	Model	Bn pkm	5194	5063.2	5037.4	5194	5481	5481
Freight transport performance	Model	Bn tkm	2546	2997.4	4265.2	2546	3245	4641
Aggregated cost of the transport system	Model	Bn €	375	631.6	866.3	375	628	859
Cost generated by inefficiencies	Meta-model	%	35	29	27	35	32	30
Energy consumption by the transport sector	Model	Bn TOE	470114	542184	555906	470114	586884	604820
Emissions of particulates (PM)	Model	1990=100	101.01	110	106	101	119.5	114.9
Network extension	User	2010=100	110	303	428	110	170	240
CO2 urban logistics	Meta-model	% urban distribution served with RES	5	35	85	5	35	85
Airport and port connections	User	% of core airports&ports connected to rail	15	28.75	46	15	25	40
Rail Modal split – passengers	Model	%	8.8	29.74	35.34	8.8	9.7	11.3
Rail Modal split – freight	Model	%	15.8	31.61	31.5	15.8	15.5	15.1
Share of RES in transport	User	%	1.22	10	20	1.22	1.16	1.21
CO2 emissions from transport	Model	1990=100	102	59.2	47.4	102	64.1	51.6
Transport fatalities	Model	Total	23.927	5.814	2.193			

# User-interface Design Principles

## Policy Reports (MS EXCEL)



# Software and Hardware Requirements

## *An Open Source Solution*

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- Stand-alone online application based on AngularJS and SailsJS, in JavaScript (ECMAScript v6)
- A web client application in AngularJS
- A Node.js server application developed in SailsJS
- PostgreSQL + PostGIS database
- A Java Virtual Machine (JVM) capable of running Java v8 code



# Software and Hardware Requirements

## *An Open Source Solution*

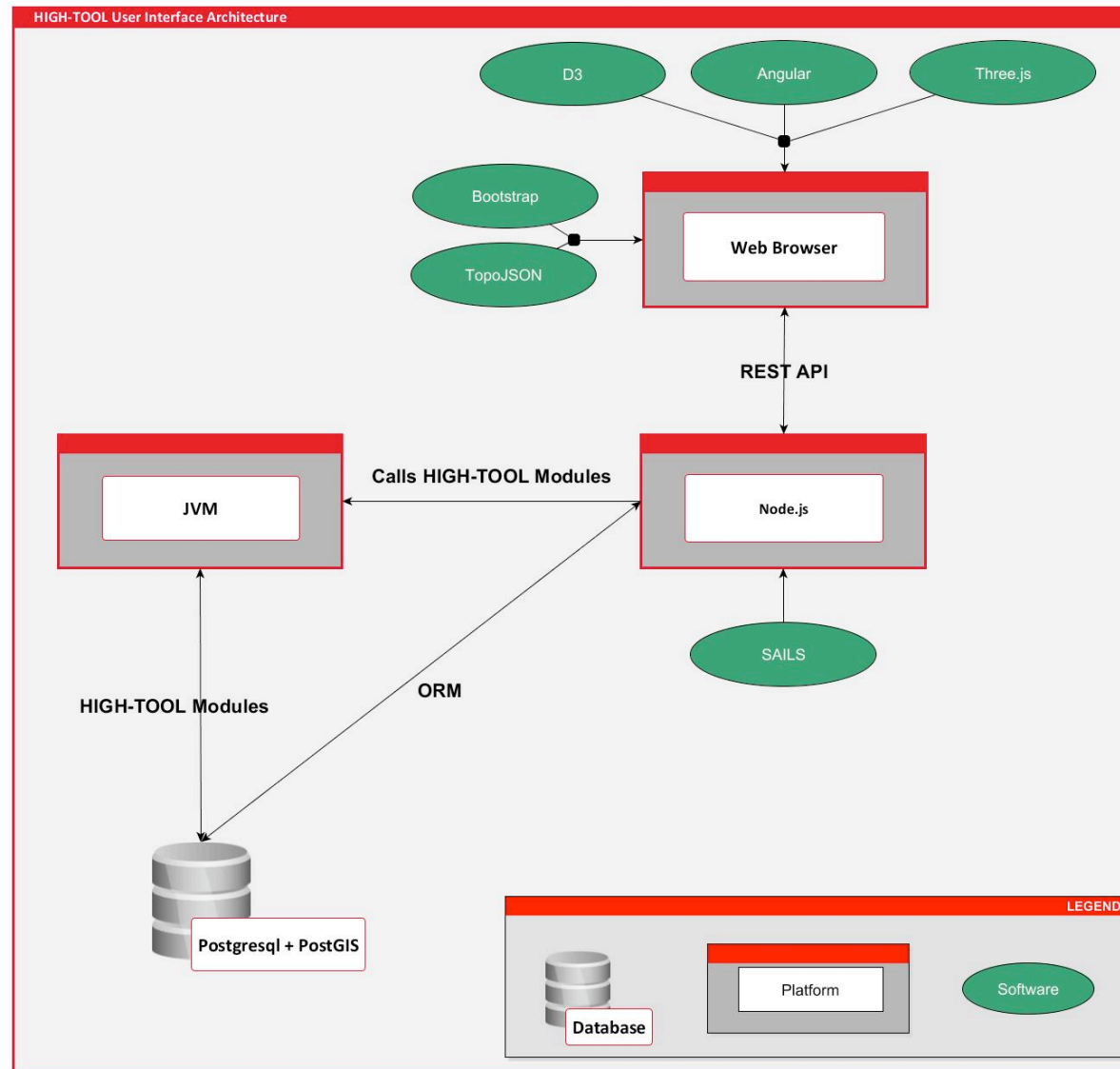
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- HIGH-TOOL modelling components are in **Java**
- HIGH-TOOL **software environment is as follows:**

Solutions	O.S.	System manager	Client user-interface	Database	GIS/graphics
<b><i>Proprietary solution (1)</i></b>	MS Windows Server 2008R2	Weblogic (Java)	API ArcGis (Javascript)	ORACLE or SQL Server	ArcGis Components ESRI SDK for Javascript, Flex, html5
<b><i>Open Source solution (2)</i></b>	Linux	Node.js- SailsJS server application (Javascript)	Angular (Javascript)	PostGreSQL and PostGis	Open Layer (Javascript), API Google Maps (**), Map Server or Geo Server. D3 (javascript)

# Software and Hardware Requirements

## *An Open Source Solution*



**HIGH  
TOOL**

# Software and Hardware Requirements

## *An Open Source Solution*

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- A server with Linux OS / Apache
- Intel® Xeon® processor E5-1620 (3.60GHz Turbo, 10MB);
- 8GB (4x2GB) 1600MHz DDR3 ECC RDIMM memory, potentially 16GB;
- 1TB 3.5" Serial ATA (7200 rpm) High speed HD hard drive, potentially SSD2.

# HIGH

# 100!

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**Thank you for your attention**