A Modelling Approach to Assess Regional Economic Impacts of Transport Infrastructure Projects and Transport Initiatives at European Scale

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Colloque scientifique sur les observatoires autoroutiers et d'Infrastructures linéaires: incidences environmentales et socio-économiques, à partir du cas d'A39
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Presentation

- **Background and Theory**
- Model Description
- Simulation Results: Accessibility, GDP, Cohesion
- Conclusions

Complex Relationship

- Many of the ***most economically successful*** regions are located in the ***European core***.
- But there are also ***centrally located*** regions suffering from ***economic decline***.
- As expected, many of the ***poorest regions*** are located in the ***European periphery***.
- But also many ***peripheral regions*** belong to the most ***economically prosperous ones***.
- Moreover, some of the ***fastest growing regions*** in Europe are located in the ***European periphery***.

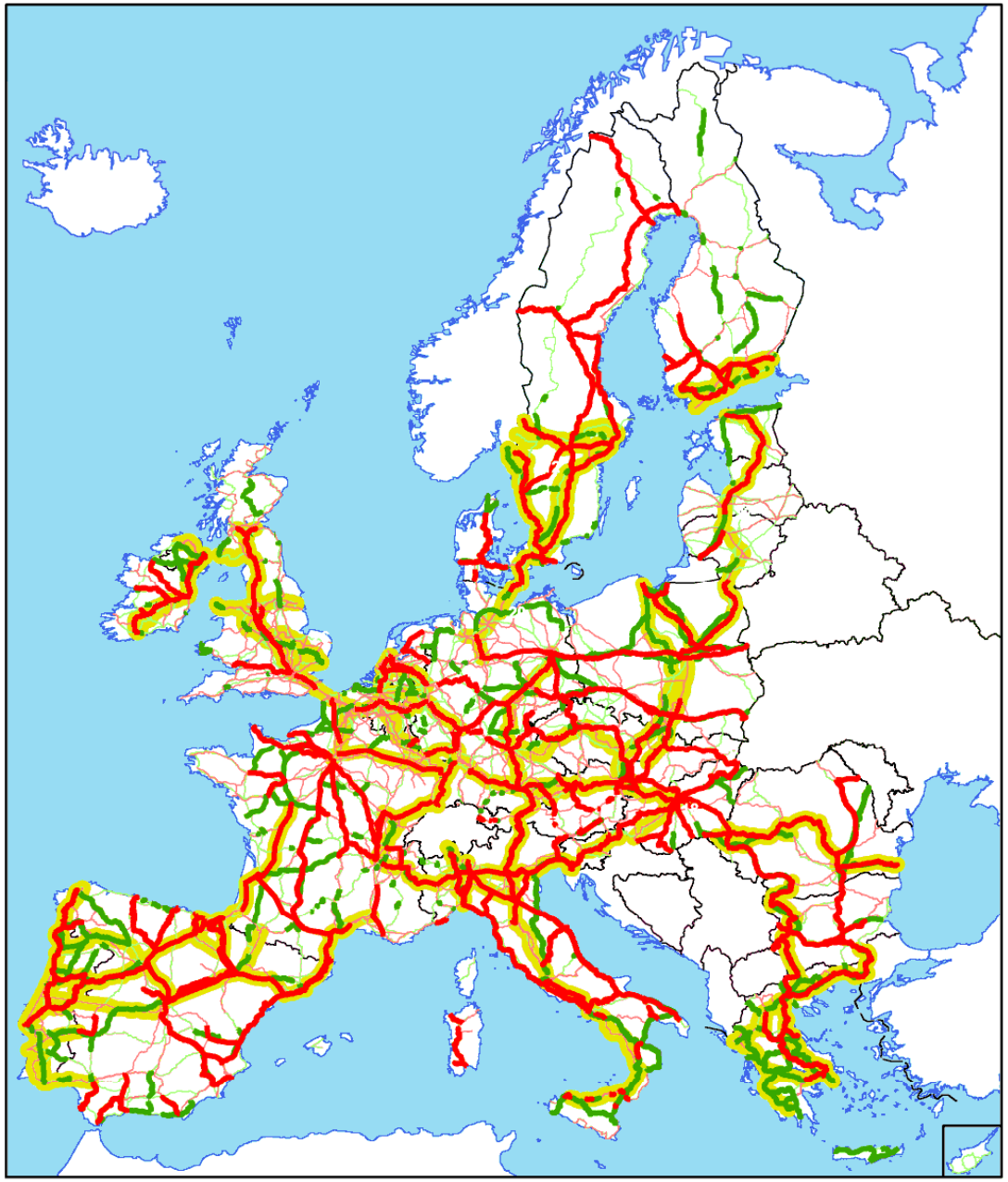
Trans-European Transport Networks

The ***Trans-European Transport Networks (TEN-T)*** are one of the ***most ambitious initiatives*** of the EU since its foundation.

The ***masterplans*** for rail, roads, waterways, ports and airports require public and private investment of ***400-500 billion €*** until the year 2016.

The EU hopes that the TEN-T will contribute to ***reducing*** the ***disparities*** between regions and ***strengthening the competitiveness*** of European regions.

Outline Plans



Rail network: TEN/TINA project
Road network: TEN/TINA project
Other TEN/TINA rail network (without construction work)
Other TEN/TINA road network (without construction work)
Priority projects corridor

Role of Infrastructure

The important role of transport infrastructure for regional development is one of the fundamental principles of regional economics.

Hypothesis:

Regions with better access to input materials and markets will be more productive, competitive and hence more successful than remote regions.

But:

TEN-T = Cohesion?

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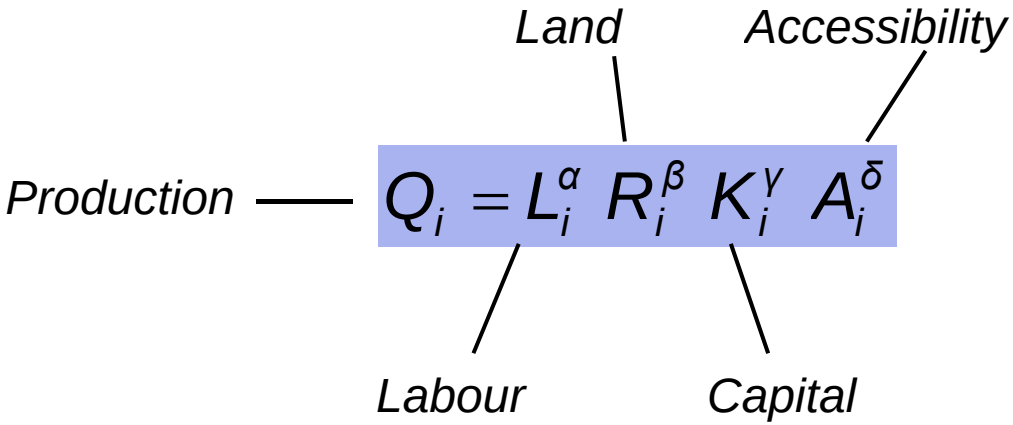
Approach: Regional Production Function

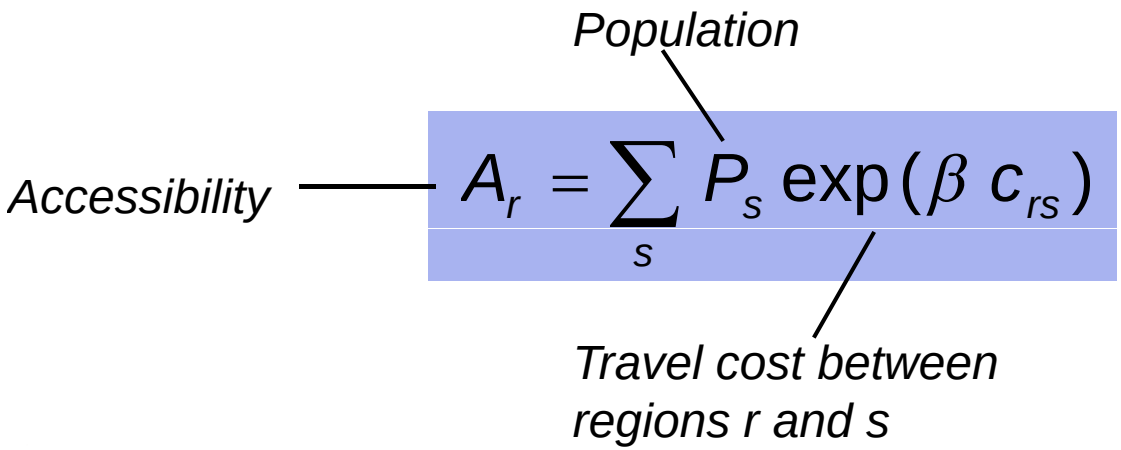
In an extension of the theoretical approach of the production function, an additional production factor ***accessibility*** is incorporated into the production function:



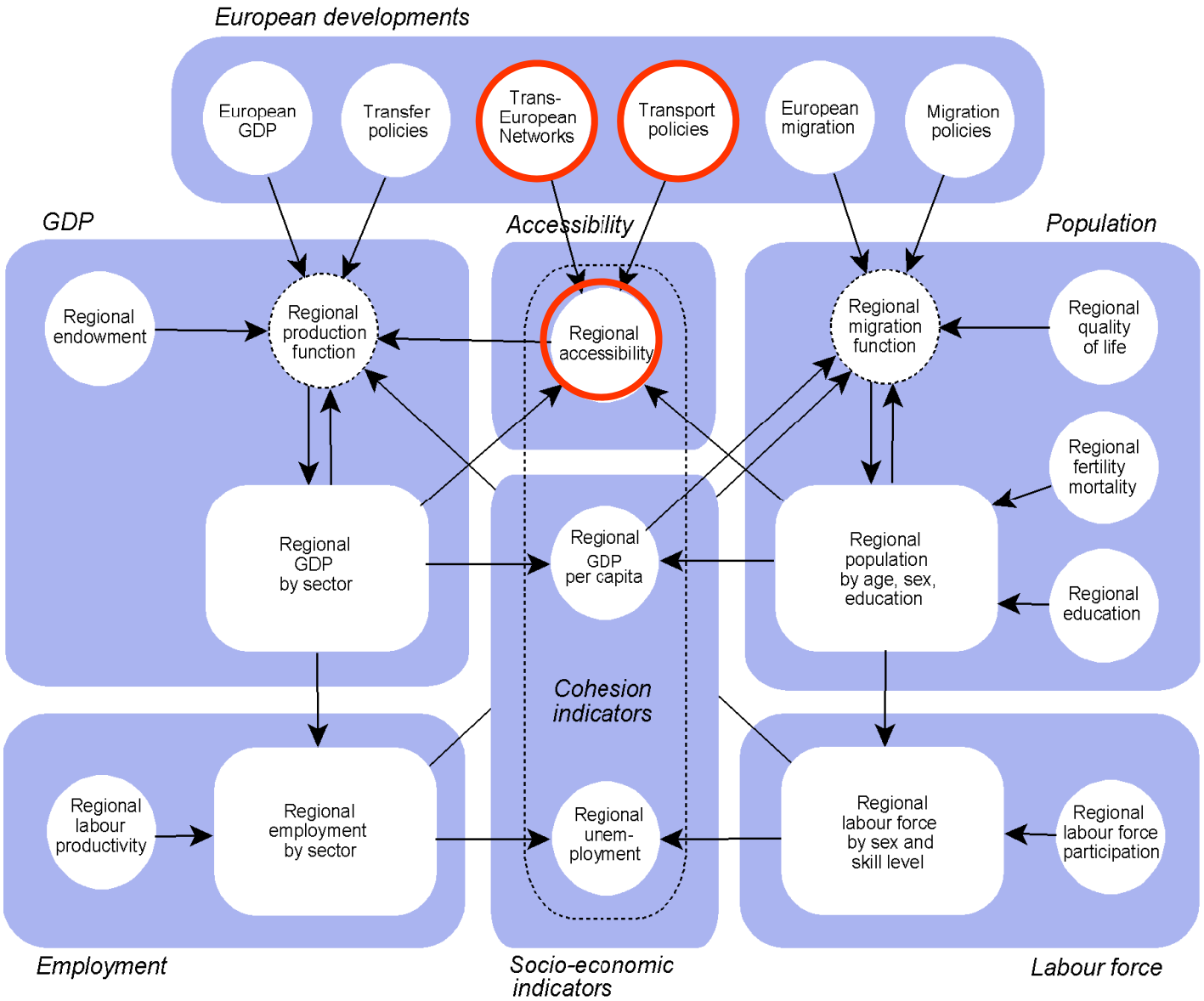
Potential Accessibility

Accessibility indicators measure the ***location*** of a region with respect to ***other regions*** and the ***transport connections*** to reach them.

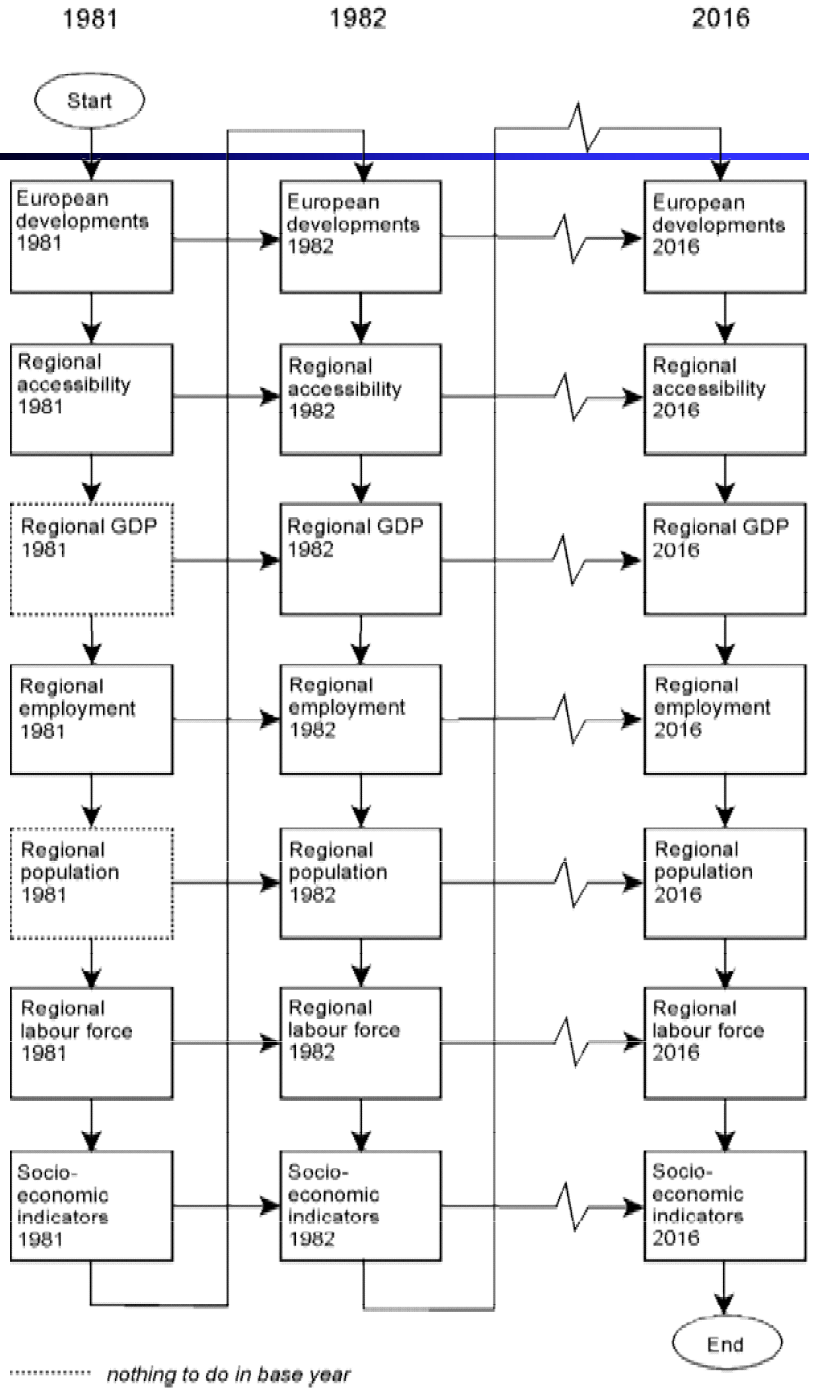
There are ***many different ways*** to calculate accessibility indicators. The most frequently used is the ***potential accessibility***:



Model Structure



Recursive Organisation



Scenarios Simulated to date

Type	Code	Scenarios
Base	000	Reference scenario
Network scenarios	**A1**	**TEN Priority Projects (Essen list)**
	A21	High-speed rail priority projects
	A22	Conventional rail projects
	A23	All road priority projects
	A24	All rail priority projects
	A3	**All TEN/TINA projects**
	A4	All TEN projects
	A51	New list of priority projects
	A52	New list of rail priority projects
	A53	New list of road priority projects
	A61	A3 + additional projects in CC12
	A62	A3 + extended number of projects in CC12
Pricing scenarios	**B1**	**SMC pricing of road freight**
	B2	**SMC pricing of all modes travel/freight**
	C1	A1 + B2

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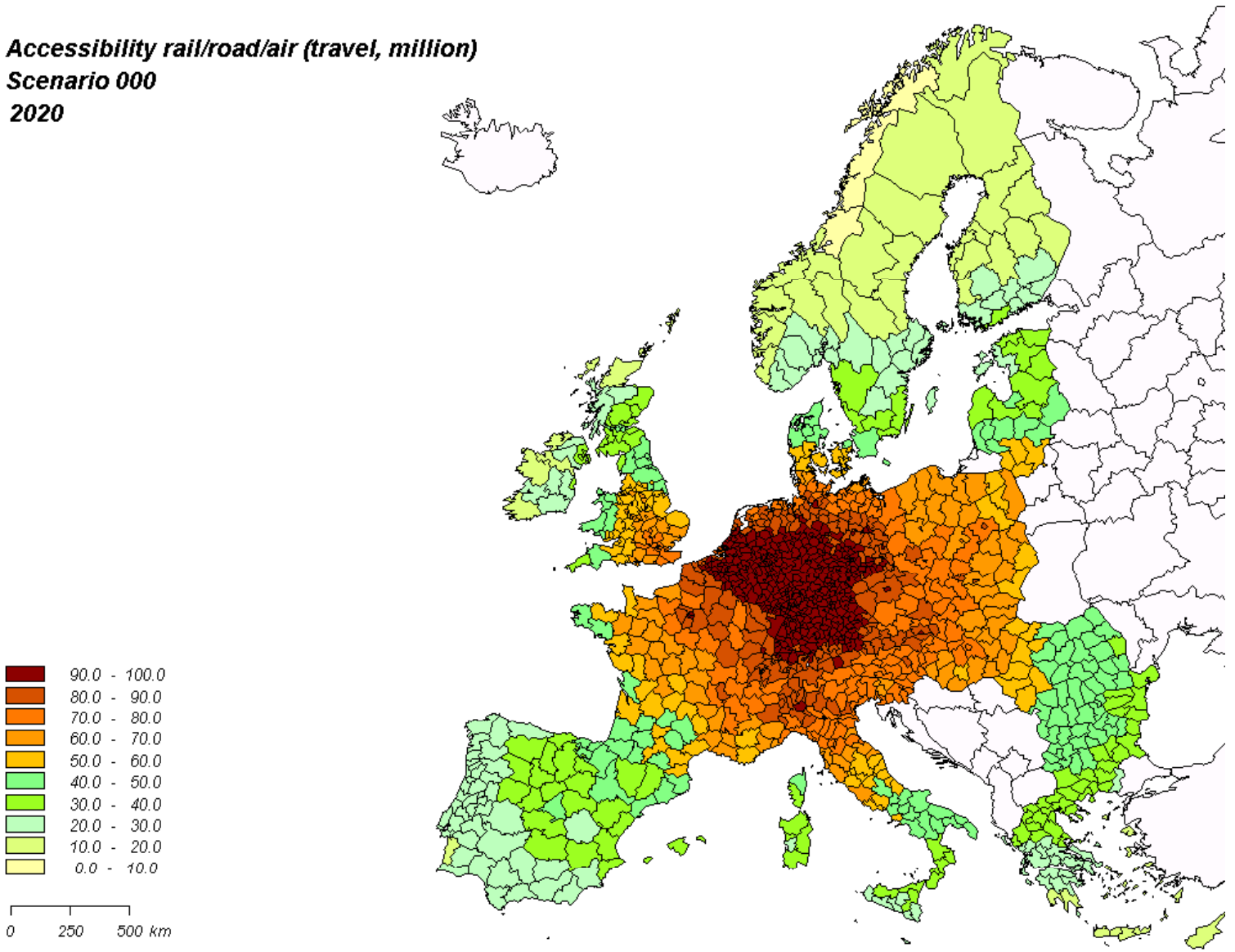
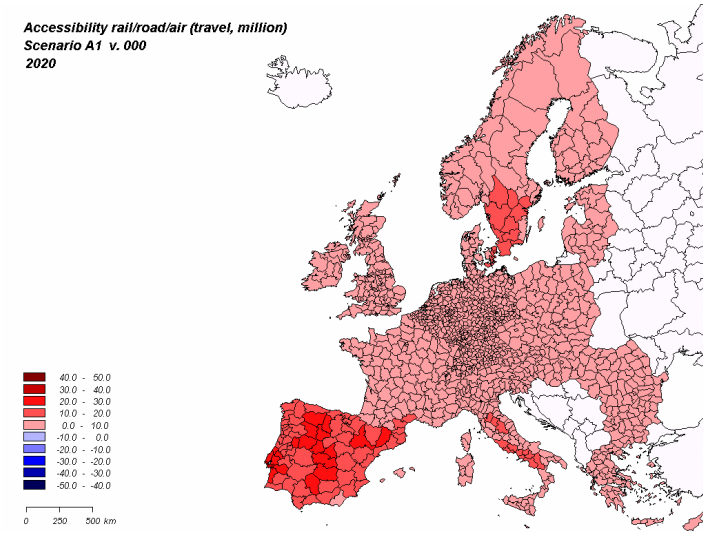
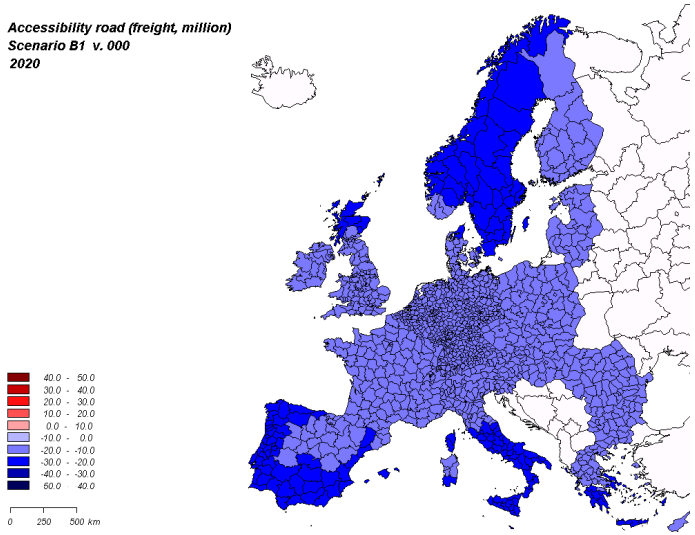
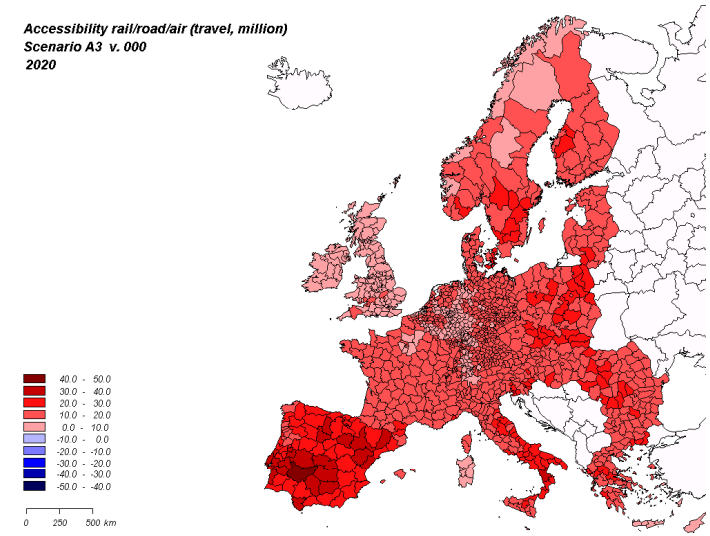
Accessibility Reference Scenario 2020

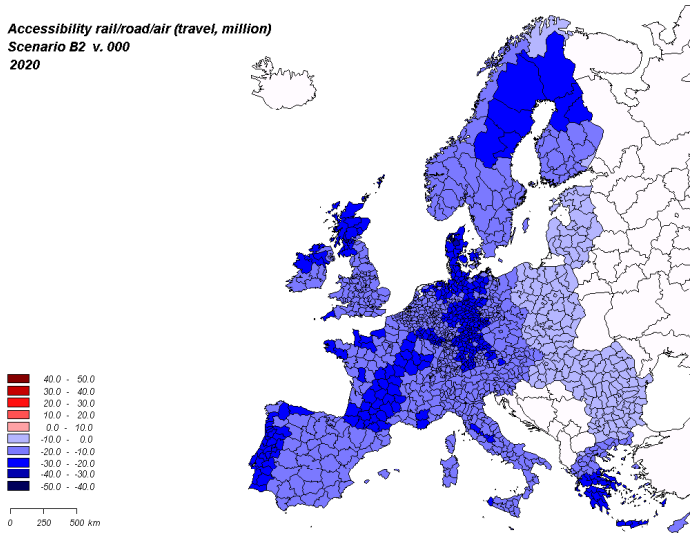


Changes in Accessibility: A1, A3, B1, B2

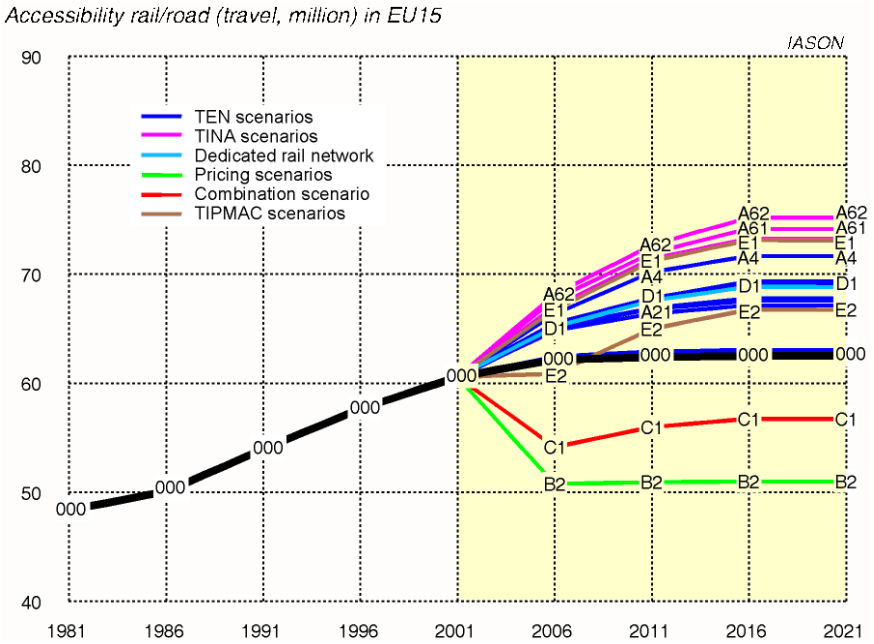


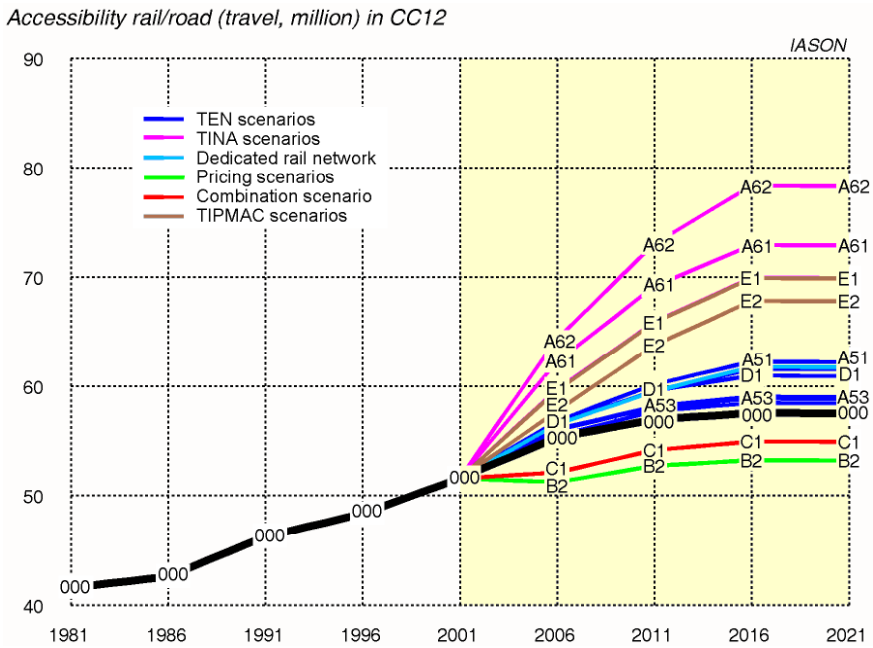




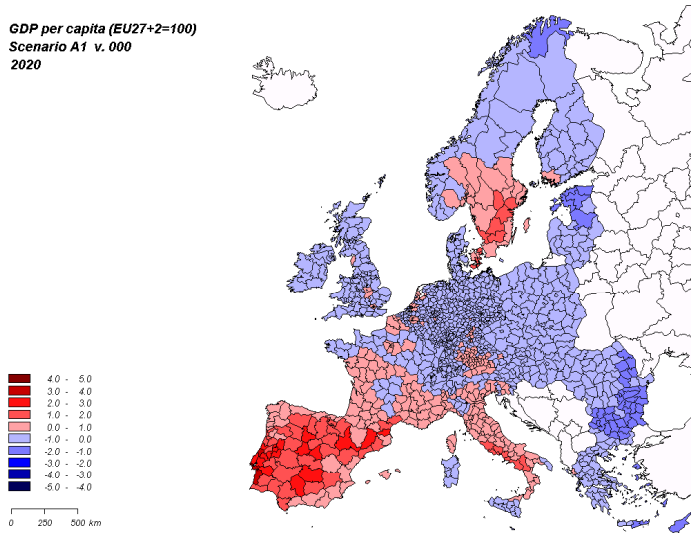


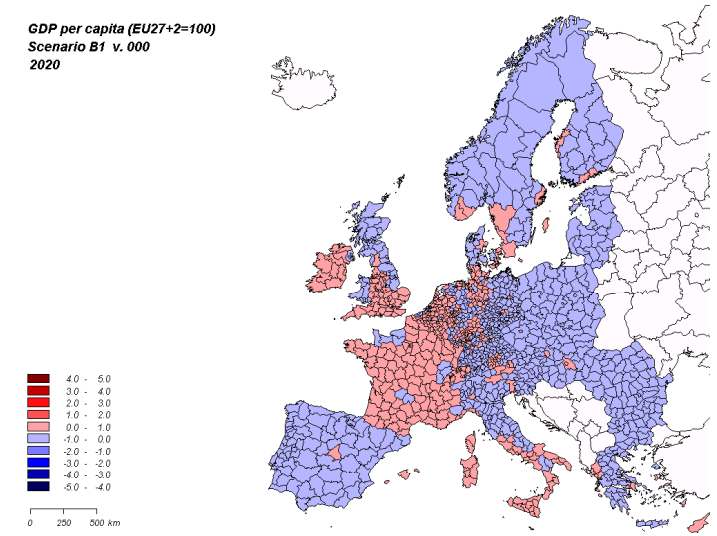
Accessibility: Development over Time

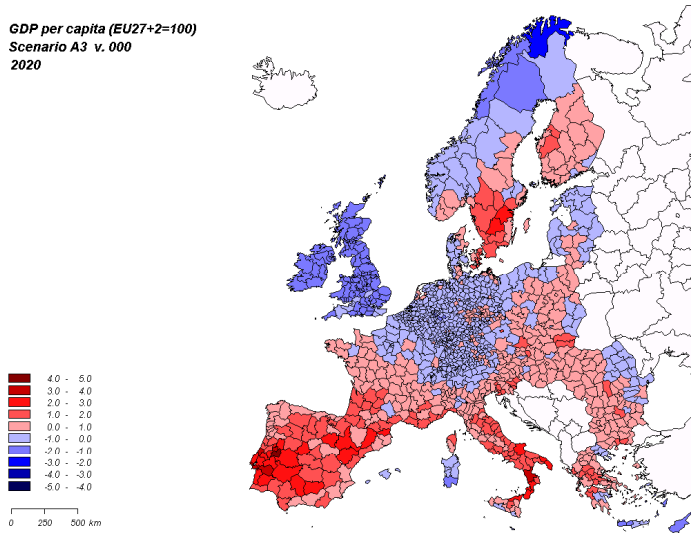


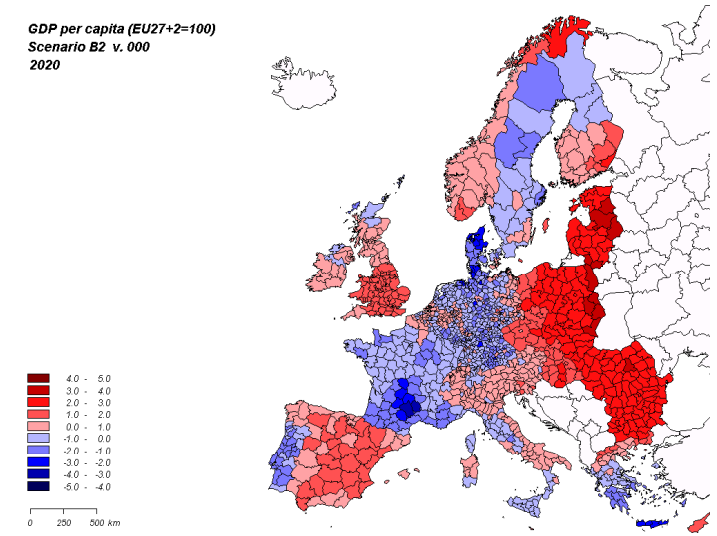


Changes GDP/capita: A1, A3, B1, B2

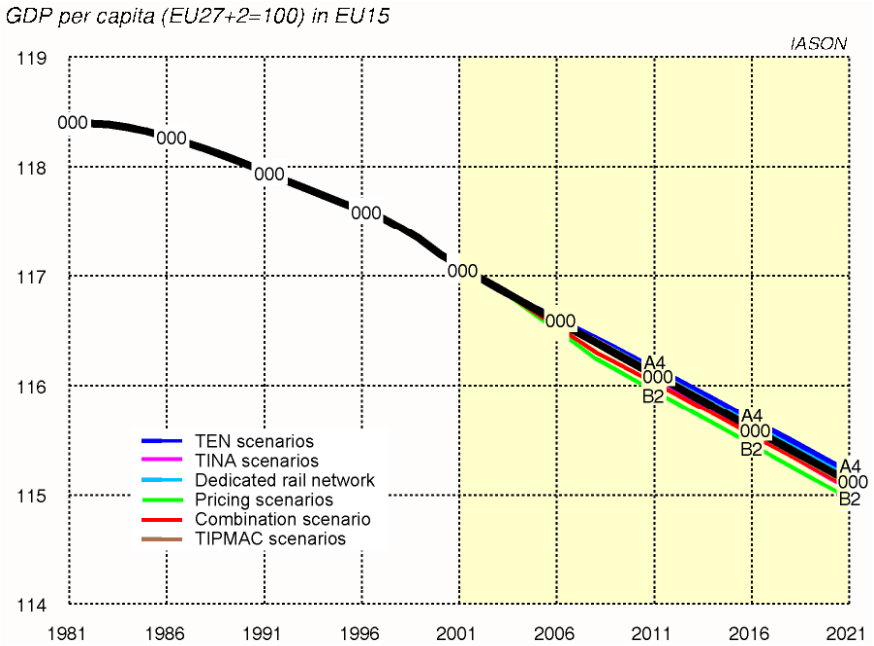


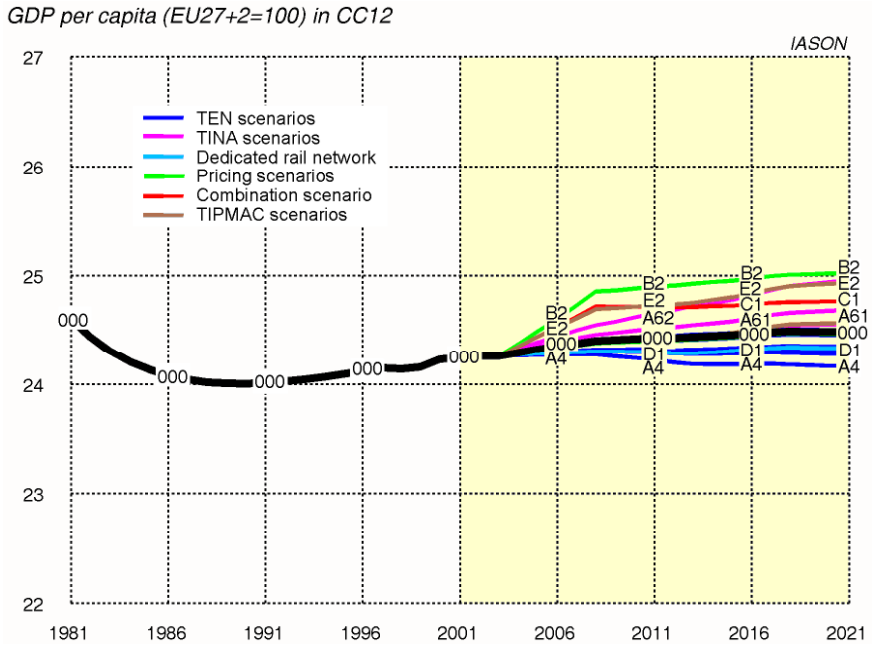






GDP/capita: Development over Time





Cohesion Indicators: Accessibility, GDP/capita

Scenario	Accessibility cohesion effects (+/-)					GDP cohesion effects (+/-)				
	CoV	Gini	G/A	RC	AC	CoV	Gini	G/A	RC	AC
A1	+	+	++	+	–	+	+	·	–	––
A21	+	+	+	+	–	+	+	·	–	––
A22	+	+	+	+	+	+	+	·	–	–
A23	+	+	+	+	+	–	–	·	–	–
A24	+	+	+	+	–	+	+	·	–	––
A3	++	++	++	++	–	+	+	·	+	––
A4	+	+	++	++	–	+	+	–	–	––
A51	+	+	++	++	–	+	+	·	–	––
A52	+	+	++	+	–	+	+	·	–	––
A53	+	+	+	+	+	–	–	·	+	–
A61	++	++	++	++	–	+	+	+	+	––
A62	++	++	++	++	–	+	+	+	+	––
B1	–	–	–	––	++	–	–	·	––	++
B2	–	–	–	–	++	+	+	+	++	++
C1	+	+	+	+	++	+	+	+	+	++

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Conclusions (I): Summary of Findings

	Network scenarios	**Pricing scenarios**	**Combination scenarios**
Accessibility	All regions improve acc.	All regions become less accessible	Some regions improve acc., other become less accessible
Accessibility disparities	Reduction in relative terms but increase in absolute terms (except: conventional road and rail projects)	Increase in relative terms but decrease in absolute terms	The pro-cohesion effects of network scenarios are stronger than anti-cohesion effects of pricing

Conclusions (II): Accessibility and GDP

- ***Large*** changes in ***accessibility*** lead to only ***small*** changes in ***GDP per capita***.
- Convergence (divergence) in ***accessibility*** does ***not*** always lead also to convergence (divergence) in ***GDP per capita***.
- The ***direction*** and ***size*** of ***cohesion effects*** strongly depend on the ***cohesion indicator*** used.
- Socio-economic ***macro trends*** have much ***stronger*** impacts on regional development than transport policies.

Summary: Main Model Characteristics

- ***20 years backcasting***, ***20 years forecasting*** on a ***year-by-year*** basis at ***NUTS-3 level***
- ***6 economic sectors*** considered
- Forecasting ***distributive effects*** (not generative)
- Incl. ***all relevant modes*** (road, rail, air, seaways)
- Modelling both ***economy and demography***
- Suitable to simulate ***both infrastructure and pricing*** scenarios, and both overall ***programmes*** or individual ***projects***
- Wide ***range of output variables*** available, presented in different formats (maps, 3D, difference plots, charts, tables)

Further Information

IASON Homepage:
http://www.inro.tno.nl/iason/

SASI Homepage:
http://irpud.raumplanung.uni-dortmund.de/irpud/ pro/sasi/sasi.htm

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