



**HAL**  
open science

## Functional indicators computation tool

Timothée Giraud, Nicolas Lambert, Hadrien Commenges, Amel Feredj,  
Marianne Guérois, Isabelle Salmon

► **To cite this version:**

Timothée Giraud, Nicolas Lambert, Hadrien Commenges, Amel Feredj, Marianne Guérois, et al..  
Functional indicators computation tool. [Contract] ESPON. 2014. hal-03594264

**HAL Id: hal-03594264**

**<https://hal.science/hal-03594264>**

Submitted on 2 Mar 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

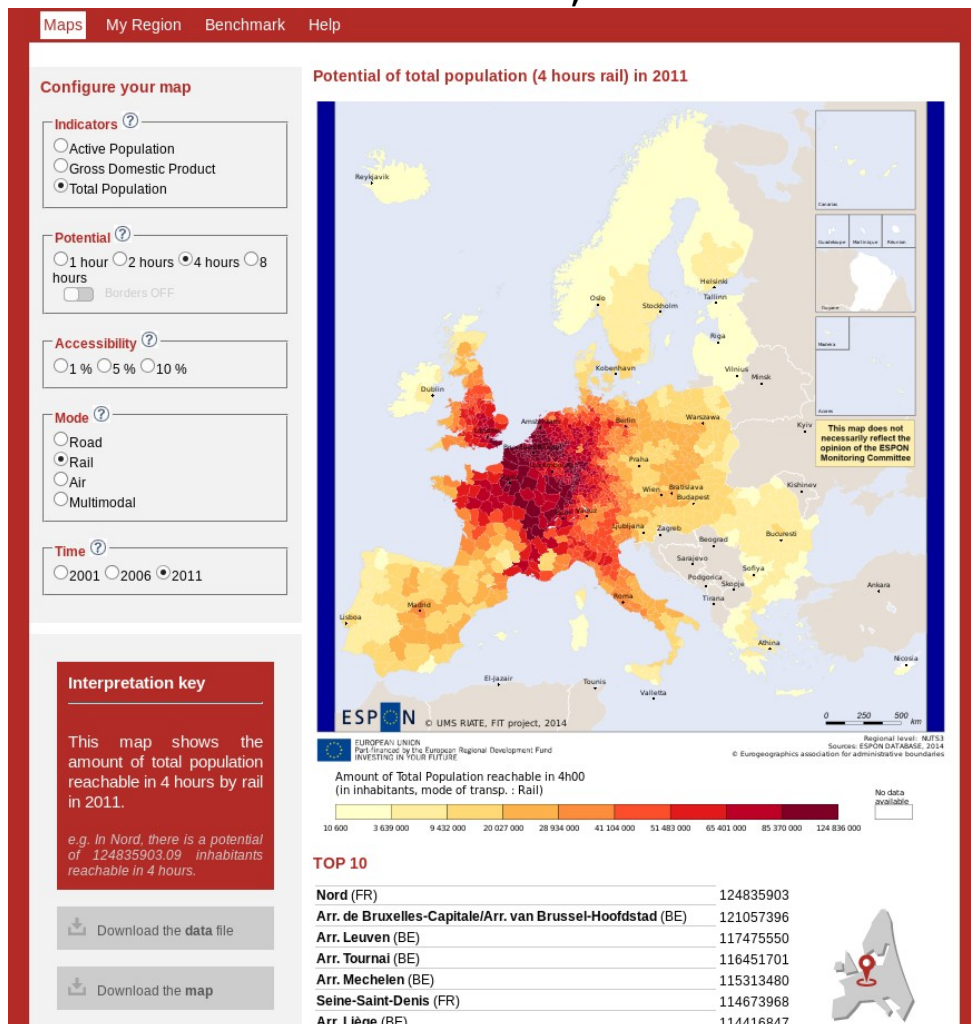
L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



# Functional indicators computation tool

## FINAL REPORT

December 19, 2014



EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

## FIT – Final Report - December 19, 2014

This final report represents results of a research project conducted within the framework of the ESPON 2013 programme, partly financed through the INTERREG III ESPON 2013 programme.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU25, plus Norway, Switzerland, Iceland and Liechtenstein. Each country and the Commission are represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON Programme and projects can be found on [www.espon.eu](http://www.espon.eu)

The web site provides the possibility to download and examine the most recent document produced by finalised and on-going ESPON projects.

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg.

**List of contributors to**  
**the FIR**

**UMS RIATE (FR)**

Timothée Giraud

Nicolas Lambert

Hadrien Commenges

Amel Feredj

Marianne Guérois

Isabelle Salmon

**TABLE OF CONTENT**

**Introduction (p-5)**

**I. Results of the testing (p-6)**

**II. Proposal on the improvements and change to be implemented in the final version (p-9)**

**Conclusion (p-11)**

**Annex (p-12)**

## FIT – Final Report - December 19, 2014

### **Introduction**

This final report outlines, in chronological order, how each task included in the terms of reference of the Functional Indicators Tool was delivered and summarise the overall implementation of the project. Each of the deliveries submitted are annexed. This report also describe on which points the service contractor has deviated from the terms of reference or decided to adopt an alternative approach.

The report is organised following the four deliveries of the project.

**I. Delivery 1 – Interim report**

**The first delivery is an Interim Report (14<sup>th</sup> July) that summarises the outcomes of tasks 1 and 2.**

**a. Task 1 - Gathering, completing and harmonising inputs to develop the tool**

During the first month of the project we gathered all the primary datasets to be integrated and processed into the tool.

As Lead Partner of the ESPON M4D project, RIATE relied on the ESPON Database as unique source of data in order to feed the tool. Originally the data comes mainly from Eurostat. However data may also come from national statistical institutes and some are simple estimation and correction used to obtain harmonised datasets. The overall quality of the datasets is rather good but it is worth remembering that task 1 is distinct from the construction of the tool. Indeed, the back office is conceived with the possibility to update or to add data as soon as new data is available.

Datasets are **Total Population, Gross Domestic Product and Active Population.**

All datasets cover the whole ESPON area in the NUTS 2010 version. Total Population and Gross Domestic Product are at NUTS3 level whereas Active Population is at NUTS2 level.

At the end of November we received the **travel time matrices** from Spiekerman & Wegener (S&W) Urban and Regional Research. Three modes of transportation (**road, rail and air**) and a **multimodal** computation are available.

We had to aggregate ourselves NUTS3 matrices to produce the NUTS2 matrices. Travel times between NUTS2 regions are averages of their sub-NUTS3 regions.

A point was made by ESPON CU to ask why Population Density and datasets for 1995/1996 have not been selected. Those datasets were not part of the Terms of Reference not of the Technical Proposal. Nevertheless, population density is a ratio and due to its statistical nature, it cannot be processed by algorithms to construct functional indicators. Therefore it is impossible to use this input. But if 1995/1996 time distance matrices become available it will be possible to include 1995/1996 datasets in the tool.

**b. Task 2 – Preparing a proposal on a list of potential indicators with policy relevance in the field of Territorial Cohesion to be included in the tool**

Choices of indicators displayed via the tool are made in order to address multiple thematic such as neighbouring regions, discontinuities of GDP or complementarities in the labour market. To demonstrate the policy relevance we confront their variants to the

## FIT – Final Report - December 19, 2014

European Commission thematic objectives. A selection of brief and demonstrative examples have been used to illustrate the added value of each family of indicators:

<b>Examples</b>	<b>Policy relevance toward EC thematic objectives</b>
A comprehensive measure of the global benefits of transportation investments: access to total population by train	Objective 6 - Environmental protection and resource efficiency. Objective 7 - Sustainable transport and removing bottlenecks in key network infrastructures. Objective 11 - Institutional capacity building and efficient public administrations
A context-aware picture of the localized output of economic activities: access to GDP	Objective 8 - Employment and supporting labour mobility. Objective 9 - Social inclusion and combating poverty. Objective 11 - Institutional capacity building and efficient public administrations.
How close is “far away”: calibrating the functional indicators	Objective 3 - Competitiveness of Small and Medium-sized Enterprises (SMEs). Objective 8 - Employment and supporting labour mobility. Objective 10 - Education, skills and lifelong learning.
What are the benefits of a full territorial integration: playing with the scope parameter	Objective 11 - Institutional capacity building and efficient public administrations
Measuring potential employment areas: access to active population	Objective 3 - Competitiveness of Small and Medium-sized Enterprises (SMEs). Objective 6 - Environmental protection and resource efficiency. Objective 7 - Sustainable transport and removing bottlenecks in key network infrastructures. Objective 8 - Employment and supporting labour mobility. Objective 9 - Social inclusion and combating poverty.

The detailed illustrative examples can be found in Annex 1.



**II. Delivery 2 – Prototype version of the Functional Indicators Tool**

**The second delivery (22<sup>nd</sup> September) contains a prototype of the interface, a short report on the technical solutions used, a testing plan of the tool and a draft version of the back office module. It addresses tasks 3 and 4.**

**a. Task 3 – Built up a user-friendly and simple interface for computation and visualisation of the indicators selected under Task 2 and a back office module**

A short report was provided outlining the **technical solutions** used to create the back office and to build the interface (Annex 2).

Choices regarding technical solutions are based on the ability to respond to computational problems, sustainability, user-friendliness and the quality of display of the tool.

We remind that only open source technologies are used to develop the tool.

We can distinguish three main functional modules in the FIT application which correspond to distinct technological solutions.

The three modules are:

- Geo-statistical processing. This module processes indicators and matrices to create functional indicators, maps and graphics. It uses the R software that allows to deal with a variety of inputs and outputs and to perform geo-statistical operations.
- Back Office. This module wraps the geo-statistical processing to let the administrator use it without too much computer literacy and technical installations. It uses a virtual machine solution that eases the installation of a complex software environment and keeps a relatively short run-time of the indicators and maps processing.
- Front Office. The front office displays the outputs of the geo-statistical processing on a website in a user-friendly way. This module uses a very standard solution that ensures a fast display of the interface and an easy maintenance of the tool.

A test version of the tool was provided to let test-user respond to a testing plan.

A draft version of the **back office and its user manual** was also delivered. The final version of the back-office administrator guide is part of this delivery and is provided in **Annex XX**. The final back office module is also part of this delivery, it is downloadable through our ftp server.

ESPON is currently in the process of developing a 'Functional Indicators Tool' (FIT) and is seeking selected candidates amongst our network of policy-makers and scientists for

## FIT – Final Report - December 19, 2014

their support in testing the prototype which has just recently been delivered by our service provider.

### **b. Task 4 - Testing the prototype version of functional indicators tool with a limit number of test drivers and use of the results of the testing to finalise it**

The following user test aims to assess how understandable the tool is and to improve the user experience. The first part intends at presenting the tool and explaining how to get started. The second part will confront users to real-like using situations. The third part is a survey to collect your opinion and the improvement we may implement to the tool.

Please note that at this stage, the tool is still a prototype under construction and uses very approximate distance matrices. Accurate and final time-distance matrices will be integrated in the final version of the tool.

The full test is provided in **annex XXX**.

The prototype of the interface of the FIT is available by clicking the following link: <http://www.ums-riate.fr/test/>

A short document which aims to assess how understandable the tool is and to improve the user experience, as follows:

The first part presents the tool and explaining how to get started.

The second part will confront users to real-life scenarios in using the tool.

The third part is a survey to collect users' opinion and the improvement we may implement to the tool.

The document is an editable PDF. As the more feedback we get, the better, we would very much appreciate if you would be in a position to assist us in testing the FIT and to complete the attached survey. This should take no longer than 15-20 minutes.

**III. Delivery 3 – Results of the Testing of the Prototype version of FIT**

**The third delivery (29<sup>th</sup> October) details the results of the testing phase of the FIT (task 4). It also provides the proposal on the improvements and changes to be implemented in the final version.**

A meeting has had been set in Luxembourg (13<sup>th</sup> November) to discuss the outcomes of the survey and the suggested improvements.

**a. Results of the testing of the prototype version of the FIT**

The overall result of the case-scenarios is that the navigation of the tool is efficient as all users/testers managed to find easily where the answer is and 26 out of 30 answers are correct. We also note that minor clarification and improvement in the interface still need to be implemented.

Major assets according to the qualitative survey are user friendliness, ease of use and ease of learning. This part of the test also showed some issues to be resolved prior implementing the tool: users need detailed information and precise guidance. It is important to remain very simple to allow users with no background on the topic of accessibility to use the tool. The way Map navigation is implemented seems to trouble some users. We will work on a common, simpler and standard navigation feature.

Testing the web interface of the FIT application is an important step in the project lifetime. The evaluation of the user-friendliness and practicability of the tool, as well as the degree of autonomy during the use of the tool is very satisfying.

Answers to scenarios demonstrate that the tool, its purpose and its navigation are well understood by all testers. The qualitative test assesses its user-friendliness, its ease of use and learning. As pointed by comments and suggestions, some minor changes have to be implemented and some new feature added.

These improvements are entirely in line with the aim of our work to deliver a comprehensive and efficient tool.

**b. Improvements and changes to implement in the final version of the FIT**

The major change to implement in the Map tab is the map navigation feature. The solution is to use a more common and intuitive mode of navigation.

The possibility to select a region will be improved through the use of two drop-down menus. The first drop-down menu will allow selecting a country as the second one is intended to select a region within that country.

## FIT – Final Report - December 19, 2014

A new tab, called "Benchmark", will be created. This tab will allow the user to compare indicators for several regions on a same charts.

The "F.A.Q." page will be renamed "Help" and will be largely enriched by a detailed documentation and a user guide and a guided tour (as in the survey).

**IV. Delivery 4 – Final version of the FIT, tool management and future development**

The fourth delivery (19<sup>th</sup> December) consists mainly in the delivery of the final version of the FIT. The back office module, its associated guidance for a tool administrator, a report on the changes made since Delivery 3 and considerations on the future development of the tool are also provided.

**a. Final version of the FIT**

The FIT is now on-line and features all its functionalities and guidance. Its address is <http://www.addressOfTheFIT.com>.

**b. Back Office module**

The lfkjzh lz

**c. Changes made since Delivery 3**

All the changes considered uin the delivery3 are opé

**d. Future Development**

DB, RIMAP

**V. Annexes**



# Functional indicators computa- tion tool

## INTERIM REPORT

July 13, 2014



EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

## Annex 1 - FIT – Interim Report – July 13, 2014

This interim report represents the first results of a research project conducted within the framework of the ESPON 2013 programme, partly financed through the INTERREG III ESPON 2013 programme.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU25, plus Norway, Switzerland, Iceland and Liechtenstein. Each country and the Commission are represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON Programme and projects can be found on [www.espon.eu](http://www.espon.eu)

The web site provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg.



**List of contributors to**  
**the FIR**

**UMS RIATE (FR)**

Hadrien Commenges

Amel Feredj

Timothée Giraud

Marianne Guérois

Nicolas Lambert

Isabelle Salmon

## **TABLE OF CONTENT**

**Introduction (p-5)**

**I. Gathering, completing and harmonising inputs to develop the tool (p-6)**

**II. List of potential indicators with policy relevance in the field of Territorial Cohesion to be included in the tool (p-7)**

**III. Next steps (p-14)**

**IV Annex – Current development of the interface (p-15)**

## Annex 1 - FIT – Interim Report – July 13, 2014

### **Introduction**

The Functional Indicator Computation Tool project started officially on June 13, 2014.

All project partners are already working towards the achievement of the project and performing the task to be accomplished.

Tasks 1 and 2 (*Gathering, completing and harmonising inputs to develop the tool and Preparing a draft proposal listing all potential indicators, that are policy relevant in the field of Territorial Cohesion to be included in the tool*) are completely finalised and the implementation of task 3 (*Built up a user-friendly and simple interface for computation and visualisation of the selected indicators under Task 2 and a back office module*) is currently ongoing and expected to be completed on time.

**I. Gathering, completing and harmonising inputs to develop the tool**

During the first month of the project we gathered all the primary datasets to be integrated and processed into the tool.

As Lead Partner of the ESPON M4D project, RIATE relied on the ESPON Database as unique source of data in order to feed the tool. Originally the data comes mainly from Eurostat. However data may also come from national statistical institutes and some are simple estimation and correction used to obtain harmonised datasets. The overall quality of the datasets is rather good but it is worth remembering that task 1 is distinct from the construction of the tool. Indeed, the back office will be conceived with the possibility to update or to add data (indicators, matrixes) as soon as new data is available (in particular those from the Filling the gap in the ESPON Database project).

Datasets are:

- Total Population (2000 - 2013)
- Gross Domestic Product (2000 - 2011)
- Active Population (2000 – 2013)

All datasets cover the whole ESPON area (EU + EFTA countries) in the NUTS 2010 version. Total Population and Gross Domestic Product are at NUTS3 level whereas Active Population is at NUTS2 level.

We contacted Spiekerman & Wegener (S&W) Urban and Regional Research in order to obtain time travel matrices. As soon as we will receive all matrices, all datasets will be finalised.

**II. List of potential indicators with policy relevance in the field of Territorial Cohesion to be included in the tool**

To demonstrate the policy relevance of the potential indicators we confront their variants to the European Commission thematic objectives.

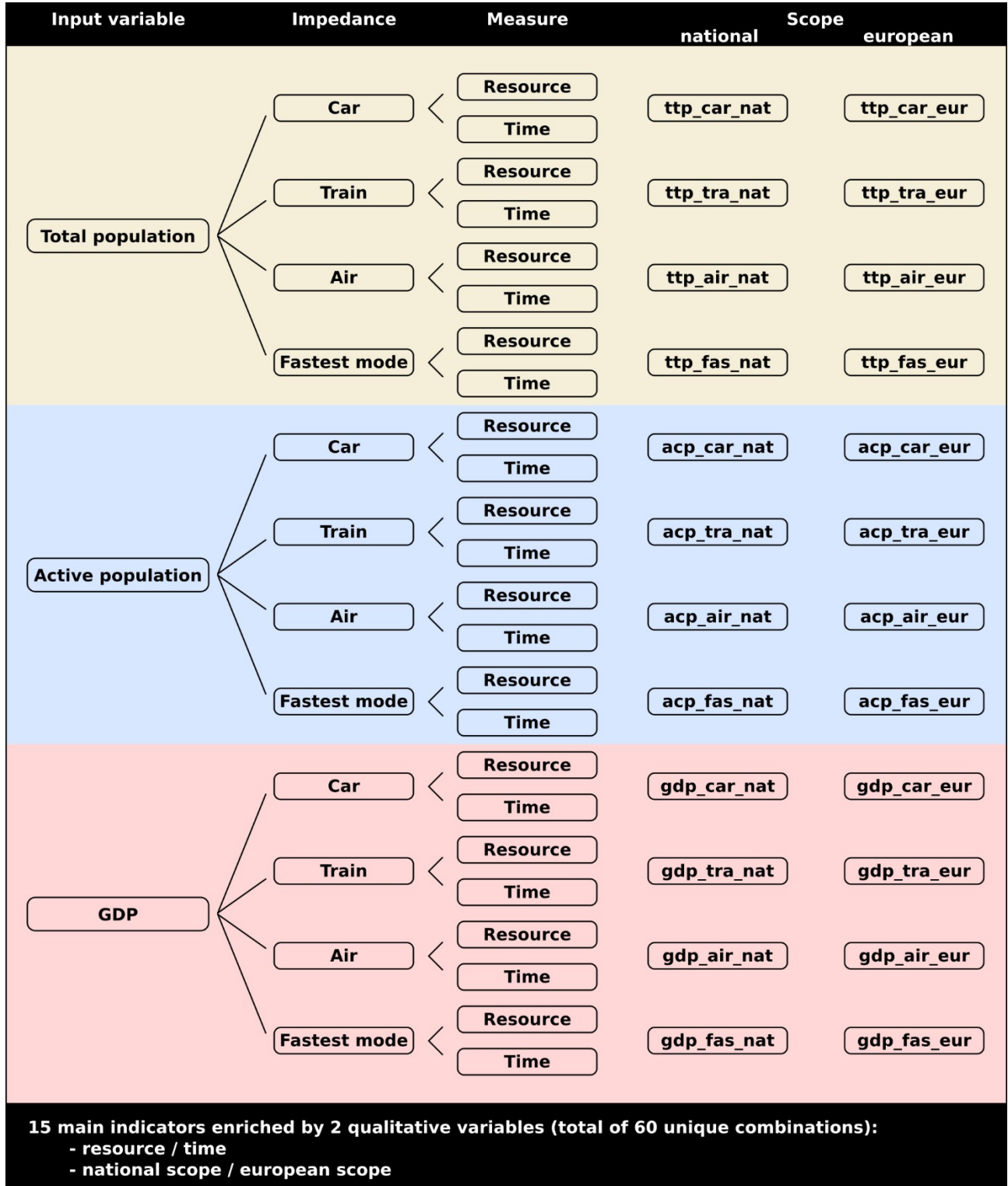
**EC thematic objective and investment priorities:**

1. Research and innovation.
2. Information and communication technologies (ICT).
3. Competitiveness of Small and Medium-sized Enterprises (SMEs).
4. Shift towards a low-carbon economy.
5. Climate change adaptation and risk prevention and management.
6. Environmental protection and resource efficiency.
7. Sustainable transport and removing bottlenecks in key network infrastructures.
8. Employment and supporting labour mobility.
9. Social inclusion and combating poverty.
10. Education, skills and lifelong learning.
11. Institutional capacity building and efficient public administrations.

**Indicators variants:**

- Input variables: Population / Active population / GDP.
- Impedance matrices: time matrix by car, by train, by air and by the fastest mode. Euclidean distance matrix.
- Measure: resource (what time is needed to access to a given resource) and time (what resource can be reached within a given time).
- Scope: national scope (measure of accessibility within national boundaries), European scope (measure of accessibility without national boundaries).

**Figure 1 Indicator variation tree**



**A comprehensive measure of the global benefits of transportation investments: access to total population by train**

*Objective 6 - Environmental protection and resource efficiency.*

*Objective 7 - Sustainable transport and removing bottlenecks in key network infrastructures.*

*Objective 11 - Institutional capacity building and efficient public administrations.*

Considering accessibility as the main benefit produced by transportation systems, it is crucial to take into account its spreading nature. Accessibility and potential indicators help to understand how transportation investments shape the global access from any point to any other; they may enrich static economic evaluations.

The functional indicators with total population as input variable and train as impedance matrix are useful to assess which NUTS have received the benefits of the rail investments between two periods (2001-2006-2011). Indeed, the benefits received by a given NUTS in terms of accessibility are not necessarily related with an investment received by this NUTS. A new high speed rail line may generate an increase of accessibility in surrounding NUTS not directly involved by the infrastructure. For example, NUTS ES412 (Burgos) and ES414 (Palencia) had a huge gain in accessibility by train between 2001 and 2006 (S&W, RGG 2007) while they received no specific European investment and have no high speed rail line. That is the reason why both indicators should be used in an economic evaluation of transport investments.

**A context-aware picture of the localized output of economic activities: access to GDP**

*Objective 8 - Employment and supporting labour mobility.*

*Objective 9 - Social inclusion and combating poverty.*

*Objective 11 - Institutional capacity building and efficient public administrations.*

The efficiency of public administrations mostly relies on the quality and precision of their previous information. Public policies promoted by the EC, moreover public policies aiming to achieve territorial cohesion need a robust and sound basis to calibrate policies and investments. In this case, static indicators are not sufficient because they focus on territories without taking into account their close environment. Functional indicators help to consider a territory as a spatial unit embedded in a specific territorial context.

The functional indicators with GDP as input variable and one of the impedance matrices indicators show a smoothed context-aware picture of the localized output of economic activities. Public policies aiming to enhance territorial cohesion and investment guidelines aiming to increase economic performance should take into account crucial differences between the NUTS with low GDP. Some of them have weak economic outputs within a weak economic environment, for example Eastern Portugal (PT166 to PT169). Others have weak economic outputs within a strong economic environment, for example Eastern Belgium (BE331, BE334, BE336, BE342).

Functional indicators to GDP may give additional information to static GDP information by taking into account the NUTS's GDPs within their territorial context.

**How close is “far away”: calibrating the functional indicators**

*Objective 3* - Competitiveness of Small and Medium-sized Enterprises (SMEs).

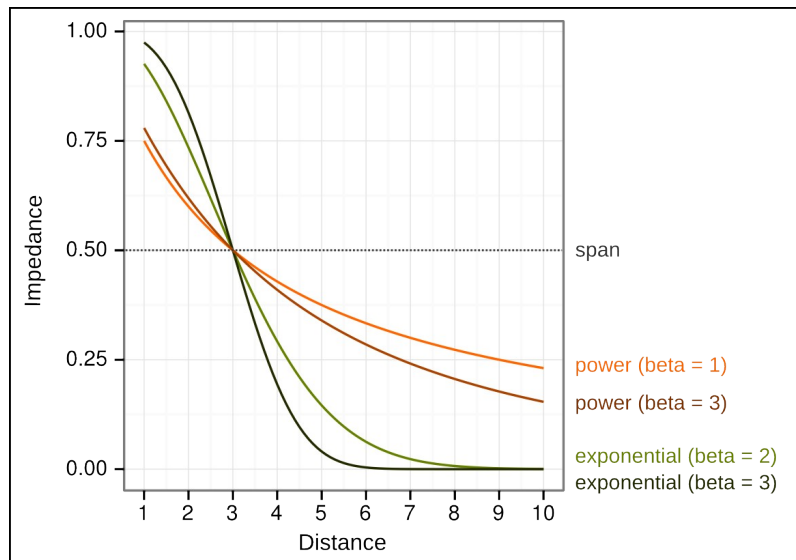
*Objective 8* - Employment and supporting labour mobility.

*Objective 10* - Education, skills and lifelong learning.

The functional indicators are designed through a spatial interaction function. Two crucial choices have to be taken to calibrate this function: choice of the distribution function and choice of its parameters. Part of this decision is taken in order to propose a user-friendly application; part of this decision is let to the user so that he/she could adapt the functional indicators to his/her needs.

The two main distribution functions used in spatial interaction models are the power function (pareto) and the exponential function. In the field of transportation modeling, exponential functions are the most widely used because they fit better to trip length distribution in an urban context (Evans 1970a, 1970b). Power and exponential functions may also be combined for a better fit to empirical data (Ortúzar & Willumsen 2011).

**Figure 2. Comparison of impedance functions**



Transportation modelers calibrate their models with a specific dataset within a specific urban context. In the FIT project, we need a versatile solution which may give a decent approximation of spatial interactions in a wide range of contexts and applications. We choose the exponential function: this choice is consistent with the state-of-art in transportation studies, spatial interactions modeling and spatial interpolation approaches (Isaaks & Srivastava 1989, Grasland *et al.* 2000)

The user of the FIT application will be able to adjust the span parameter, which is the value where the probability of interaction is divided by 2 as regard to the level of interaction at the point of observation. The choice of different span values is useful to inspect different assumption of mobility that can reflect people's behavior. As a first attempt, we propose to



## Annex 1 - FIT – Interim Report – July 13, 2014

define the span of interaction with the following semantics related to simple concepts which don't need mathematical literacy:

- Daily interaction : reduction of opportunities by two at road distance of 1 hour
- Weekly interaction : reduction of opportunities by two at road distance of 2 hours
- Monthly interaction : reduction of opportunities by two at road distance of 4 hours
- Yearly interaction : reduction of opportunities by two at road distance of 8 hours

The choice of the span value reflects the assumptions made by the observer on the level of mobility of actors involved in the observed phenomena. For example, if we are interested in labor market and daily travel to work, we can consider an initial parameter of 1 hour which indicates that the interest of an opportunity of job is maximal (100% where distance equal to 0) at the initial location but is divided by two when the job is located at one hour (probability of 50% for an opportunity located at a distance of 60 minutes).

### **What are the benefits of a full territorial integration: playing with the scope parameter**

*Objective 11 - Institutional capacity building and efficient public administrations*

The FIT application proposes an interesting parameter called "scope": by choosing the "national scope", the application returns accessibility values considering that national borders are impassable; by choosing the "European scope", the application returns values considering that national borders are transparent, i.e. they is no constraint on human mobility.

Many obstacles are still at works that reduce the mobility of actors across national borders inside the EU territory. Legal barriers are still active in many fields of activity that limits the opportunity for an individual or a firm to establish in a foreign region or cities. For example, it is well known that cross-border labor markets introduce constraints concerning pensions, social security, taxes. Mental barriers may also be considered as long as many actors can prefer to stay in their own country, all things being equal to the opportunity and the accessibility. More, we have many reasons to suspect that a potential migrant will prefer to avoid choosing a workplace abroad as compared to an opportunity located in its own country, even if the distance is shorter and the income higher.

The functional indicators with national and European scope are useful to compare a worst-case scenario (impassable borders) with an optimal scenario (fully integrated European territory). What is the size of a border labor market area with and without the border parameter?

### **Measuring potential employment areas: access to active population**

*Objective 3 - Competitiveness of Small and Medium-sized Enterprises (SMEs).*

*Objective 6 - Environmental protection and resource efficiency.*

*Objective 7 - Sustainable transport and removing bottlenecks in key network infrastructures.*

## Annex 1 - FIT – Interim Report – July 13, 2014

*Objective 8 - Employment and supporting labour mobility.*

*Objective 9 - Social inclusion and combating poverty.*

These indicators may be used to measure and visualize the size of potential employment areas. By setting a time threshold of 1 hour, the tool returns the number of active individuals who can access daily to a given NUTS. In this case, the comparison between national and European scope is of particular interest: most of the border NUTS have small employment areas considered in their national boundaries (national scope) but large employment areas considered without national boundaries (European scope). The growing number of cross-border workers can be measured with empirical data (MKW 2009). The conception and assessment of public policies on employment should take into account not only the actual cross-border workers but also the potential cross-border commuting area.

Each of these indicators can be approached through different modal choices attributes that provide an additional dimension to the interpretation of accessibility. In particular, transportation by train brings a special focus on the sustainability of trips made by the population or by the labour force, as the least fuel consuming and polluting form of transport.

Similarly, another transversal approach can be seen in the formulation of the 3 main accessibility indicators by travel time thresholds, ranging from 1 to 4 hour. Previous works have assigned concrete interpretations to such thresholds which can be viewed as “a fixed budget for travel in which a destination has to be reached to be of interest” (S&W, RGG 2007). For instance, from the perspective of the labour force, maximum travel times of about 4 hours one-way are relevant for occasional business trips, whereas a maximal distance traveled of 1 hour one-way is better suited to daily accessibility.

### **References**

Evans A. W. (1971a) “Some properties of the trip distribution methods”, *Transportation Research*, vol.4, pp.19-36.

Evans A. W. (1971b) “The calibration of trip distribution models with exponential or similar cost functions”, *Transportation Research*, vol.5, pp.15-38.

Grasland C., Mathian H., Vincent J.M. (2000) “Multiscalar analysis of map generalisation of discrete social phenomena. Statistical problems and political consequences”, *Statistical Journal of the United Nations*, 17, pp.157-188.

Isaaks E.H., Srivastava R.M. (1989) *An introduction to applied geostatistics*, New York: Oxford University Press.

MKW Wirtschaftsforschung GmbH, Empirica Kft (2009) *Scientific Report on the Mobility of Cross-Border Workers within the EU-27/EEA/EFTA Countries*, Final Report, European Commission, DG Employment and Social Affairs.

Ortúzar J.D, Willumsen L.G. (2011) *Modelling transport*, 4<sup>th</sup> edition, Chichester: Wiley.

S&W Urban and Regional Research, RRG Spatial Planning and Geoinformation (2007) *Update of Selected Potential Accessibility Indicators*, Final Report, ESPON Programme.

### **III. Next steps**

The development of the tool (computation process, back office and visualisation interface) is the next major step to be tackled by project partners. The tool is being thought and designed to function with very classical web configurations, thus avoiding risks of incompatibilities or technical issues. In any case, configuration requirements will be submitted to the ESPON web service provider, as soon as technological choices are established.


The current state of development of the tool (web interface and back office) suggests that the prototype and all the functionalities will be 100 % ready for testing by the deadline sets for the Delivery 2.

In addition to this significant work, some important tasks will to be carry out:


- Testing plan: it will be based on a short written protocol to be carried out remotely with an enlarged number of users from the CU and the MC (i.e. more than five).
- Interoperability (inputs): the tool will already be able to import files from the ESPON Database. But the question of web service and direct linkage to the Database will be raised.
- Interoperability (outputs): the tool will already display maps in the correct ESPON template. The outputs of the tool are maps, graphics and data so it will be possible to suggest solutions to display maps within the RIMAP interface using these data.
- The final report and delivery: they will provide, along with the back office application, guidelines allowing the administrator to keep the tool up-to-date and making it easy to enrich with new datasets. The guidelines will include the precise specification of the appropriate content of the files to be imported in the application (format, type of variable). The frequency and the time needed to perform updates or enrichment of the tool will also be indicated. A part of this report will be dedicated to the future developments of the tool and its integration in the overall ESPON toolbox.

IV. Annex – Current development of the interface:

The screenshot displays the user interface of the ESPON Functional Indicators Tool. At the top, the ESPON logo is centered, with the text "(Func-i)" below it. A navigation bar includes links for "Home", "Maps", "My region", and "Concepts & methods". The main content area is titled "Configure your map with menu" and features a large map of Europe. To the left of the map is a configuration panel with several sections: "Indicators" (radio buttons for name\_GDP and name\_POP), "Potential" (radio buttons for 1, 2, 4, and 8 heures), "Accessibility" (radio buttons for 1, 2, 10, and 20 pour cent), "Mode" (radio button for name\_CAR), and "Time" (radio buttons for 2001, 2006, and 2011). The map itself is color-coded, with a legend at the bottom showing a gradient from light yellow to dark red, with numerical values: 2425.6, 10396, 17752.6, 21098.2, 23742.6, 26889.6, 30535.4, 35522.5, and 35522.5. A large "DRAFT" watermark is overlaid on the map. At the bottom of the interface, there is a row of European Union member state flags.



Go to the ESPON Web Site
Functional indicators computation tool




Find a region

**Barcelona (ES511)** Close X

---

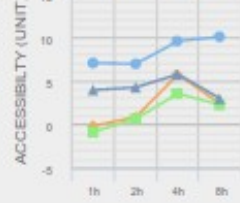
▼ name\_GDP

**ACCESSIBILITY OF NAME\_GDP, YEAR**



Year	Rail	Air	Road	Multi
1%	8	0	0	5
2%	8	0	0	5
10%	10	5	5	5
20%	10	5	5	5

**POTENTIAL OF NAME\_GDP, YEAR**



Year	Rail	Air	Road	Multi
1h	8	0	0	5
2h	8	0	0	5
4h	10	5	5	5
6h	10	5	5	5

---

▶ name\_POP

Find a region


**Arr. Arlon (BE341)** Close X

---

▶ name\_GDP

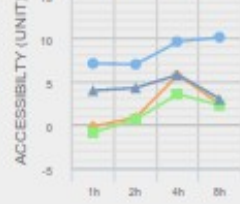
▼ name\_POP

**ACCESSIBILITY OF NAME\_POP, YEAR**



Year	Rail	Air	Road	Multi
1%	8	0	0	5
2%	8	0	0	5
10%	10	5	5	5
20%	10	5	5	5

**POTENTIAL OF NAME\_POP, YEAR**



Year	Rail	Air	Road	Multi
1h	8	0	0	5
2h	8	0	0	5
4h	10	5	5	5
6h	10	5	5	5

15

## Functional Indicator Computation Tool Survey

The Functional Indicator Computation Tool (FIT) is a tool allowing European citizens, policy makers, civil servants and potential investors to assess the accessibility of regions in Europe. Various indicators, maps and graphs are displayed to offer users simple and user-friendly information on accessibility and attractiveness of European regions.

The FIT is based on two aggregated indicators selected for their high potential to improve and ease the European Territorial Cohesion Policy.

- Accessibility indicators measure the distance (or time) needed to reach a potential amount of stock (GDP, total population, active population).
- Potential indicators measure potential stocks (in population, workers, euros...) that are located around a place, at a distance (or time) lower than a given threshold.

Both indicators are showing the same phenomenon from different perspectives. The first one emphasizing time distances while the second highlights stocks.

The FIT allows you to choose among:

- 3 indicators: Total population; Active Population; Gross Domestic Product.
- 3 years of reference: 2001; 2006; 2011
- 4 transport modes\*: road distance, rail distance, air distance; plus you can also select the fastest transport.

The following user test aims to assess how understandable the tool is and to improve the user experience. The first part intends at **presenting the tool and explaining how to get started**. The second part will **confront users to real-like using situations**. The third part is **a survey to collect your opinion** and the improvement we may implement to the tool.

The prototype of the interface of the FIT is available by clicking the following link:

<http://www.ums-riate.fr/test/>

\* Please note that at this stage, the tool is still a prototype under construction and uses very approximate distance matrices. Accurate and final time-distance matrices will be integrated in the final version of the tool.

## Get to know the Functional Indicator Computation Tool

### The “Maps” tab – Accessibility at the European Scale

- What is the amount of GDP reachable around my region?

*By clicking items in the “Potential box” you select the distance (measured in hours) to be covered to reach an amount of GDP.*

For example, the amount of GDP reachable in a neighborhood of 2 hour by road around the Inner London – West Region is of 859 474 Millions of euros in 2006 (Value indicated in the Top 10 summary).

Another possibility would be to limit the amount of GDP reachable within national territories, as if the borders couldn't be crossed (using the switch off borders button). It is then possible for users to work at Member states level and access the amount of GDP reachable within each countries of the ESPON area. This boundaries impact is obvious for Luxembourg values for example.

- How long would it take to reach a particular amount of the total Population?

*By clicking items in the “Accessibility box”, you will select the share of an indicator to be reached.*

For example, it would take 6 to 7 hours to reach 10 % of the active population by air in 2011 in the Bucharest region whereas it would take 2 to 3 hours in The Bern Region.

*NB: in both cases, it is possible to change year of reference and transport modus, to compare between transport modes or see evolutions.*

- The ‘Interpretation key’ box

To assist users in interpreting the displayed maps, key features and a brief explanatory text will complement each map. This short information box is displayed next to the map and summarizes the parameters used to produce the figure and their meaning regarding the European territorial policy. Finally, the user has the possibility to download the data used to draw the map.

### The “My region” tab: Benchmark your region

This tab displays regional graphs of potential and accessibility. It displays the same information as the one on the “maps” tab, detailed regionally.

The first step is to target a region to be analyzed. Fill in the “Find a region” text box. Then all the indicators are displayed in all modes of transport for the selected region.

*You can show or hide modes of transport by clicking them on the legend.*

*It is possible to benchmark two or more regions by adding a name a region in the text box “Add a region”.*

## Scenarios

Those scenarios are made to assess the user-friendliness of the tool. They do not necessarily reflect real case scenario since matrices in the prototype are not final.

### Scenario 1

The European parliament wants to open 3 European 'Parliamentariums', Visitors' Centre across Europe to raise its visibility. The centers have to be as close as possible to a minimum number 6700000 of inhabitants (total population), which means they should be able to reach those centers within 2 hours maximum by road (in 2011). Moreover, the centers must be located in capital cities regions which are far away from London, Brussels and Paris...

- Which regions can the European parliament choose?

Answers:

### Scenario 2

DG Regio plans to assess the potential attraction for the labor force of the most central regions, and needs to know which regions are the most accessible to the working population.

- What regions are the most accessible to 5 and 10% of the European active population by road in 2011?

Answers:

### Scenario 3

DG MOVE wants to invest in rail infrastructure and improve the network by linking ports to their hinterland; the final objective is to increase the reachable amount of GDP from the ports. Two ports are eligible for investment: Rotterdam (Groot-Rijnmond region) and Hamburg (Hamburg region).

- Which one of these two ports have access to the highest amount of GDP within 3 hours by rail (you can compare regions within the "My region" tab)?

Answer:



## Survey

*Please rate these sentences from “I strongly agree” to “I strongly disagree”.*

### **Usefulness**

The tool...

... makes the things I want to accomplish easier to get done.

... meets my needs, it does everything I would expect it to do.

### **Ease of Use**

The tool...

... is easy to use and user friendly.

... is usable without written instructions.

... allows easy downloads and exports (data, maps).

... provides enough information about the displayed indicators.

### **Ease of Learning**

I learned to use the tool quickly.

I easily remember how to use the tool.

I understood its purpose easily.

### **Satisfaction**

I would recommend it to a colleague.

It works the way I want it to work.

It is pleasant to use.

I am satisfied with the map navigation.

The information displayed is well organized.

Annex 2 - FIT – Testing Plan – September 22, 2014

**How can we improve the FIT? Send us your ideas and suggestions.**

For completed surveys or any queries please contact:

[timothee.giraud@ums-riate.fr](mailto:timothee.giraud@ums-riate.fr)

## **FIT - Technical solutions**

Choices regarding technical solutions are based on the ability to respond to computational problems, sustainability, user-friendliness and the quality of display of the tool.

We remind that only open source technologies are used to develop the tool.

We can distinguish three main functional modules in the FIT application which correspond to distinct technological solutions.

The three modules are:

- Geo-statistical processing. This module processes indicators and matrices to create functional indicators, maps and graphics.
- Back Office. This module wraps the geo-statistical processing to let the administrator use it without too much computer literacy and technical installations.
- Front Office. The front office displays the outputs of the geo-statistical processing on a website in a user-friendly way.

### **Geo-statistical processing**

This module is written in the R programming language (<http://www.r-project.org>). The program is structured in two files: a file defining the functions (Functions.R) and a script file for calling these functions (Main.R).

The program performs three main procedures:

- It reads the data from an **input folder**: tables with stock variables, time matrices, NUTS nomenclature and NUTS basemap.
- It computes the functional indicators: potential and accessibility.
- It writes the files containing tables and maps in a **resource folder**. The numeric outputs are exported in text files (csv extension) so that they could be downloaded from the front office.

Extra R packages are needed to perform specific tasks (gdata, foreign, plyr, reshape2, maptools, rjson, png)

*R software allows to deal with a variety of inputs and outputs and to perform geo-statistical operations.*

### **Back Office**

The Back Office is a wrapper of the Geo-statistical processing module.

In technical terms we use a virtual machine in the Oracle VM VirtualBox software. The virtual machine is an emulation of an operating system (guest system) within one other operating system (host system).

Here, the host system is windows and the guest system is Lubuntu.

## Annex 3 - FIT – Technical Solutions – September 22, 2014

In the guest system we have installed all softwares and dependencies needed to run the geo-statistical processing.

*This virtual machine solution has been chosen to ease the installation of a complex software environment and to keep a relatively short run-time of the indicator processing.*

### **Front Office**

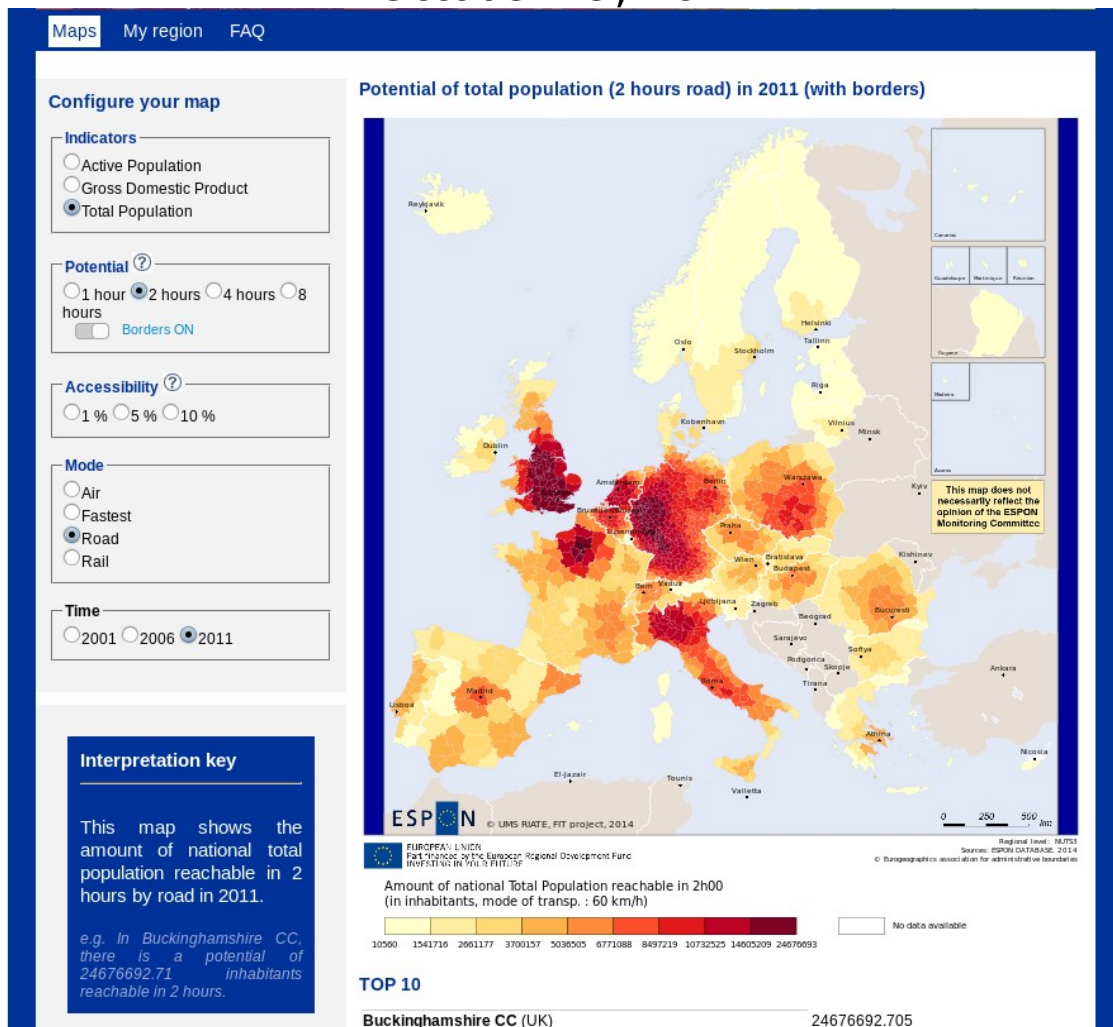
The front office is a web based application. It works on all browsers (Chrome, firefox, internet explorer, safari...) following web standards defined by the W3C. On the server side, the application is built mainly in PHP language (version 5). On the client side, the application is based on HTML5 for document structure, CSS for graphics and layout and JavaScript for scripting (events, animations, and interactivity). Moreover, JQuery library (jquery-1.10.2) is used to simplify the client-side scripting. Finally, the json language is used to facilitate data exchange.

*This very standard solution ensures a fast display of the interface and an easy maintenance of the tool.*

# Functional indicators computation tool

## TESTING OF THE PROTOTYPE VERSION

October 29, 2014



## Annex 4 - FIT – Testing of the Prototype Version – October 29, 2014

This interim report represents results of a research project conducted within the framework of the ESPON 2013 programme, partly financed through the INTERREG III ESPON 2013 programme.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU25, plus Norway, Switzerland, Iceland and Liechtenstein. Each country and the Commission are represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON Programme and projects can be found on [www.espon.eu](http://www.espon.eu)

The web site provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

This basic report exists only in an electronic version.

© The ESPON Monitoring Committee and the partners of the projects mentioned.

Printing, reproduction or quotation is authorized provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg.

**List of contributors to**  
**the FIR**

**UMS RIATE (FR)**

Hadrien Commenges

Amel Feredj

Timothée Giraud

Marianne Guérois

Nicolas Lambert

Isabelle Salmon

## **TABLE OF CONTENT**

**Introduction (p-5)**

**I. Results of the testing (p-6)**

**II. Proposal on the improvements and change to be implemented in the final version (p-9)**

**Conclusion (p-11)**

**Annex (p-12)**



## Annex 4 - FIT – Testing of the Prototype Version – October 29, 2014

### **Introduction**

The test phase is a significant milestone in the process of shaping developing and implementing a tool as the Functional Indicators Computation Tool. The aim of the test phase is to evaluate the ease of use and learnability of the tool, and identify concretely if it suits interests of users and the difficulties they may encounter. In more concrete terms, the test phase allow us to evaluate the user-friendliness and practicability of the tool, to perceive the relevance and usefulness in serving the European Territorial Cohesion Policy, as well as the degree of autonomy of users during the use of the tool.

The test places users in situations as close to reality as possible and evaluate the tool while it is used. The test is not designed to assess all capacities of the tool; users are supposed to follow use cases scenarios to accomplish typical tasks.

The third of October 2014 we send the test<sup>1</sup> to various potential users (ESPO community, European Commission, etc.) and at the end of the testing period (October 22, 2014) we received ten completed tests.

We will firstly explore the results of the testing; then we will present a proposal on the improvements and changes to be implemented in the final version.

---

<sup>1</sup> The survey is in Annex 1.

## **V. Results of the testing**

The survey is divided in three parts:

- Answers to the 3 use case scenario;
- Qualitative answers addressing usefulness, ease of use, ease of learning and satisfaction toward the tool;
- Additional comments and suggestions.

### **a. Answers to the three use case scenario**

All answers to the first scenario are correct (10/10). It shows that the map display and the use of parameters are completed and easy to grasp.

Almost all answers to the second scenario are correct (8/10), which shows that the information is easy to find. Correct answers demonstrate the almost unanimous use of the "TOP 10" functionality below the map as it was requested. Incorrect answers seem to be given after a visual the analysis of the map, so they are less precise. Although results are satisfactory, an enhancement of the "top ten" frame can be performed.

Almost all answers to the third scenario are correct (8/10). Given a certain lack of information provided through the graphs (e.g. information on units of x and y axis), we can consider that 8 correct answers is a good score. This feature ("My region" tab) has to be improved, as well as some parameters of the graphics need to be more explicit.

The overall result of the case-scenarios is that the navigation of the tool is efficient as all users/testers managed to find easily where the answer is and 26 out of 30 answers are correct. We also note that minor clarification and improvement in the interface still need to be implemented.

### **b. Qualitative answers**

Answers to the qualitative questions are summed up in figure 1.

*Usefulness* – Testers assessed that the tool is useful and serves the purpose for which it was built (8 out of 10 testers agree). It is worth noticing that testers also responded "no opinion" to the question on their needs. It might be because of the narrowness the formulation of the question ("everything" is a large expectation to fulfil). However the overall results show that the tool fulfils its central aim.

*Ease of use* – Testers corroborate the user-friendliness of the interface (8 out 10 users found it user friendly and easy to use). However we consider that using the tool without written instructions is not easy and only possible for users familiar with the topic of accessibility. This result underlines the need for user-oriented clear and informative guidelines allowing the use of the tool to users with less expertise in this field. Information about the displayed indicators have to be more detailed. In other words, the test shows

## Annex 4 - FIT – Testing of the Prototype Version – October 29, 2014

that a real user-guide is required. Downloading and exporting maps and data have to be more effective and easy.

*Ease of learning* – Answers show that users were operational quite quickly. The first steps with the tool are smooth and users understand easily what the tool is intended for (8 or more out of 10 users).

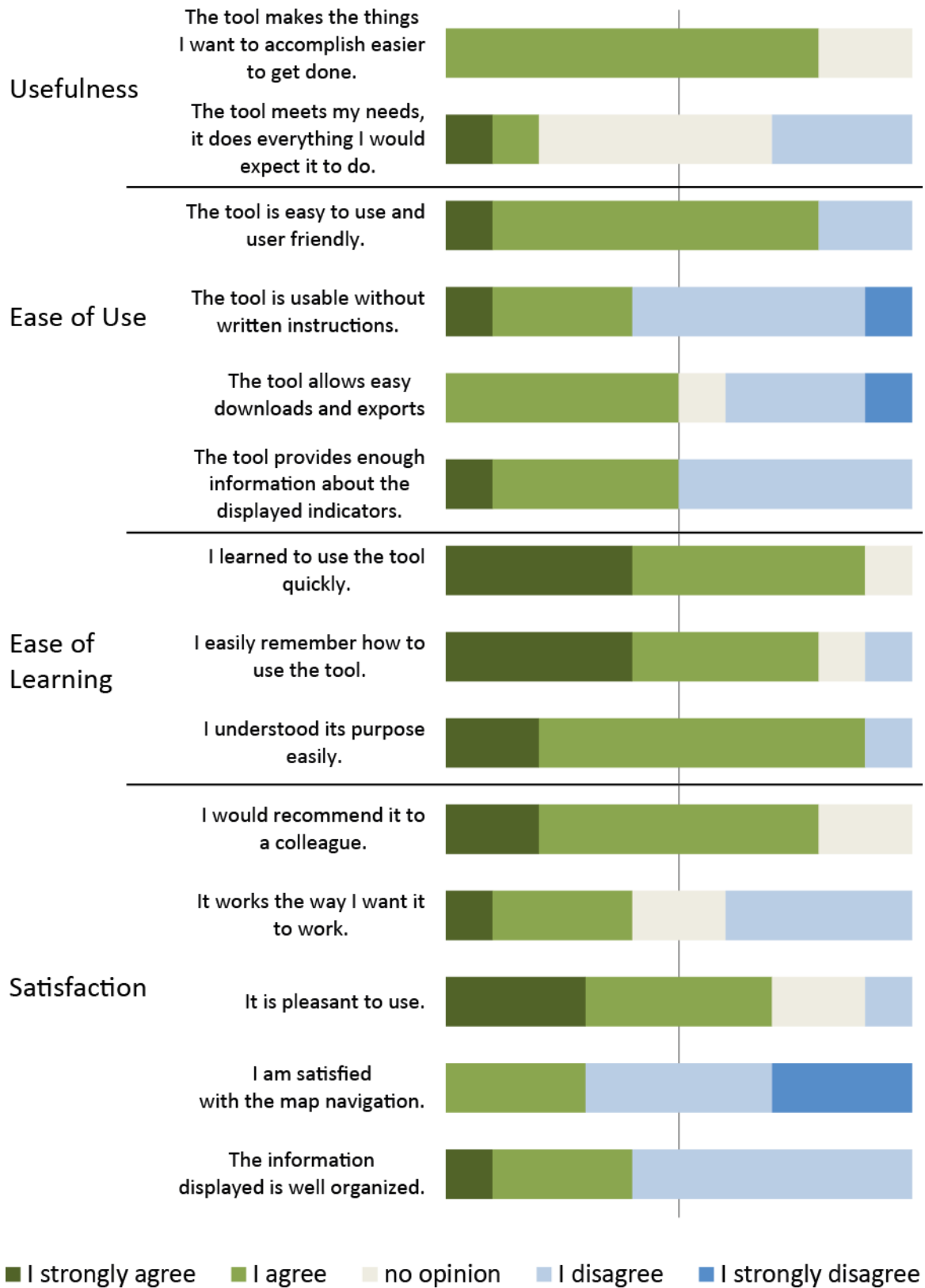
*Satisfaction* – The large majority of the testers found the tool pleasant to use and would recommend it to a colleague. However the map navigation clearly does not satisfy users and will be fixed adapted and improved. As result, the organisation of the displayed information will also be fixed adapted and improved.

Major assets according to the qualitative survey are user friendliness, ease of use and ease of learning. This part of the test also showed some issues to be resolved prior implementing the tool: users need detailed information and precise guidance. It is important to remain very simple to allow users with no background on the topic of accessibility to use the tool. The way Map navigation is implemented seems to trouble some users. We will work on a common, simpler and standard navigation feature.

### **a. Comments and suggestions**

The provided comments imply improvements and changes, it is more convenient to reply to each of these remarks and suggestions in the next point.

**Figure 1 - Answers to the qualitative survey**



## VI. Proposal on the improvements and change to be implemented in the final version

Comments and suggestions made through the test are summarized in the following tables and our replies are in the third column. Many comments are repeated by different users.

**Table 1 – The Maps tab**

	Remarks and suggestions	Solution & Comments
"Configure your map" panel	Order of the transport modes seems arbitrary	Transport modes will be displayed following an increasing order of speed
Switch off border button	This button is not available for the accessibility maps	This is not a bug, intra-national computations are only relevant for potential indicators
	The button should be accompanied by a "?" sign and explained the concept behind the feature explained	A question mark will be added, the concept explained and the button re-named
TOP 10	Figures are presented with too many decimals	Figures will be presented rounded
	Measurement units are not indicated	Measurement units will be added
"Interpretation Key" box	It could be better to call it "Represented Indicator"	The term 'Interpretation key' seems more powerful and refer to a larger scope of explanation
Help question mark (?)	Should display a tooltip rather than leading to the FAQ page	A tooltip will be displayed when hovering the question mark and a click on the it will lead to the "Help" page
	Add one for each entry	A question mark will be added to each relevant parameters
Maps	Difficulties to export the map, explain how to do it	A box will be dedicated to map download
	Legend figures are difficult to read	Size of the legend and legend figures will be increased
	Difficulties to read the legend together with the map	The whole map navigation will be revised to provide a user-friendlier experience
	It would be better to not automatically activate the zoom	
	A classical zoom and pan functionality would be more useful	
	The cross icon on the maps makes you feel you can click on a region	
	Print or export only a part of the map	This is not possible as the output of the computation is a fixed image and can't be interrogated. To find such a feature
Display the names of the regions		

## Annex 4 - FIT – Testing of the Prototype Version – October 29, 2014

	when you go over a region with the mouse	a tool like the RIMAP one is more appropriate. Discussion will be made on how to provide data to this project
Data export	Csv is fine, it could be good to have xls or pdf also	Excel export will be implemented, pdf export is not relevant for large data tables
	Strange symbols appear in the names of the region	This is due to the "exotic" default character encoding used by Excel, Excel exports should solve this problem
	Names of files and fields are not understandable	Field names can't be rename as they would be too long and too complicated, but file names will contain, in a readable form, all the information about the computed indicators

The major change to implement in the Map tab is the map navigation feature. The solution is to use a more common and intuitive mode of navigation.

**Table 2 – The My Region tab**

	Remarks and suggestions	Solution & Comments
Region Selection	The form is very sensible, it is not easy to select a region, add a drop-down menu, a list of NUTS to select from	A drop-down menu will show a list of NUTS units to display (country selection, then Nuts selection)
	Select a region on a the map to see it on a graph	This is not possible as the output of the computation is a fixed image and can't be interrogated. To find such a feature a tool like the RIMAP one is more adapted. Discussion will be made on how to provide data to this project
Charts	Add an "export the graph" function	An export functionality will be added to the graphs
	It is difficult to compare more than 2 regions, add 2 regions or more on the same graph	A new tab ("Benchmark tab") will be added and specially dedicated benchmark regions
	Units of measure are not clear in the graph (x and y)	Units of measurements will be added for the x axis (time in hours) and y axis (indicator units)
	Add zoom in/out to the axis of the graph	Proper axis labelling will make this feature unnecessary
	It is not fully clear which NUTS level is available and displayed	The nuts level of the displayed indicator will be indicated more explicitly

## Annex 4 - FIT – Testing of the Prototype Version – October 29, 2014

The possibility to select a region will be improved through the use of two drop-down menus. The first drop-down menu will allow selecting a country as the second one is intended to select a region within that country.

A new tab, called "Benchmark", will be created. This tab will allow the user to compare indicators for several regions on a same charts.

**Table 3 – General remarks**

Remarks and suggestions	Solution & Comments
Add printing possibilities	The maps and charts will be available for download and it will be possible to insert them in any document and print it
A bug exists when using IE8 browser	Internet Explorer 8 is an old browser (released in 2009), the current version of IE is 11. The large majority of web applications does not develop special feature for IE8
The tool should integrate more TC indicators	This is not relevant in the framework of our project. The back office module is provided to allow the update and/or the processing of new indicators.
Include the "Get to know the FIT" part of the survey in the tool	In the tested version the "Help" page (F.A.Q.) is just a draft. The final version of the Help page will be very complete and will guide users as in the "Get to know the FIT" part of the survey
More background / further information or a link to ESPON projects on accessibility	
The purpose of the tool what it shows and why this is important should be explain somewhere	
The description of the indicators are very technical	
Add more explanations about the meanings of the indicators	

The "F.A.Q." page will be renamed "Help" and will be largely enriched by a detailed documentation and a user guide and a guided tour (as in the survey).

## **Conclusion**

Testing the web interface of the FIT application is an important step in the project lifetime. The evaluation of the user-friendliness and practicability of the tool, as well as the degree of autonomy during the use of the tool is very satisfying.

Answers to scenarios demonstrate that the tool, its purpose and its navigation are well understood by all testers. The qualitative test assesses its user-friendliness, its ease of use and learning. As pointed by comments and suggestions, some minor changes have to be implemented and some new feature added.

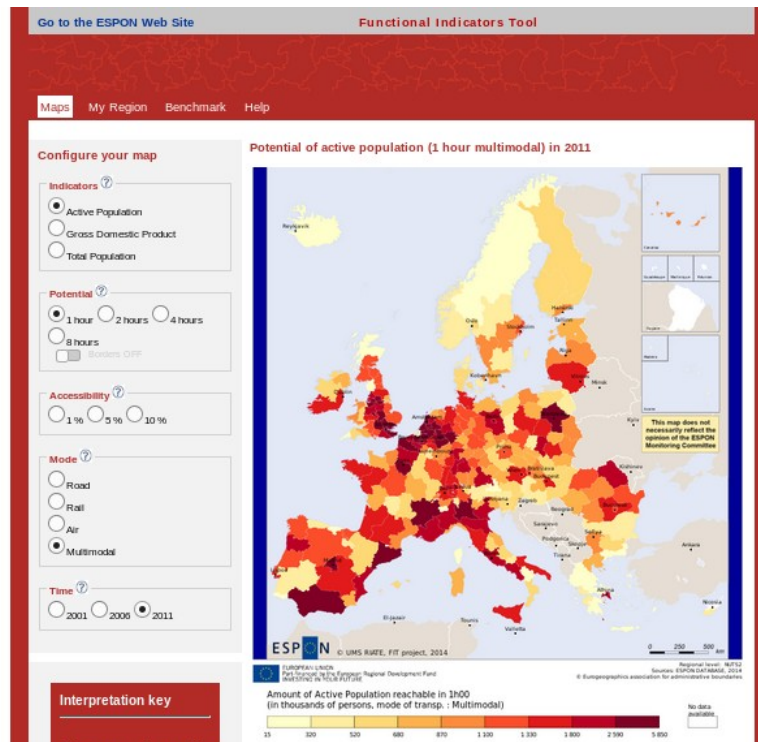
These improvements are entirely in line with the aim of our work to deliver a comprehensive and efficient tool.



## How to Update the Functional Indicators Tool

UMS RIATE

December 04, 2014



### To update the tool, four steps have to be followed:

1. Prepare the data
2. Install the back office module
3. Process the data
4. Upload data, maps and graphs within the interface

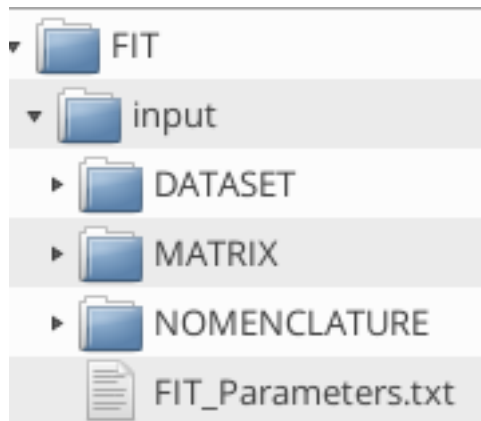
### Computer requirements:

- Operating system: Windows 7 (but it should also work on any superior version)
- Memory (RAM): 4 Go
- Hard disk space: 5 Go
- Administrator rights

## Step 1 - Prepare the data

### Copy the FIT folder on your computer

This folder has a unique sub-folder named input, that folder counts 3 sub-folders named DATASET, MATRIX and NOMENCLATURE and a file named FIT\_Parameters.txt



*The FIT folder*

Modifying or updating this folder is the way to update the tool.

- **NOMENCLATURE folder**

This folder contains one file and you will have to change it only if you want to update or change the nomenclature version.

- **File format**

This file contains the NUTS3 list and their upper-level belonging.

- **File name**

This comma-separated values file contains the nomenclature to be used in the tool.

## Annex 5 - FIT – How to Update the FIT – December 19, 2014

	A	B	C	D	E	F	G	H
1	NUTS3	NAME_NUTS3	NUTS2	NAME_NUTS2	NUTS1	NAME_NUTS1	NUTS0	NAME_NUTS0
2	AT130	<u>Wien</u>	AT13	<u>Wien</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
3	AT111	<u>Mittelburgenland</u>	AT11	<u>Burgenland (AT)</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
4	AT112	<u>Nordburgenland</u>	AT11	<u>Burgenland (AT)</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
5	AT113	<u>Südburgenland</u>	AT11	<u>Burgenland (AT)</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
6	AT121	<u>Mostviertel-Eisenwurzen</u>	AT12	<u>Niederösterreich</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
7	AT122	<u>Niederösterreich-Süd</u>	AT12	<u>Niederösterreich</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
8	AT123	<u>Sankt Pölten</u>	AT12	<u>Niederösterreich</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
9	AT124	<u>Waldviertel</u>	AT12	<u>Niederösterreich</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
10	AT125	<u>Weinviertel</u>	AT12	<u>Niederösterreich</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
11	AT126	<u>Wiener Umland/Nordteil</u>	AT12	<u>Niederösterreich</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
12	AT127	<u>Wiener Umland/Südteil</u>	AT12	<u>Niederösterreich</u>	AT1	OSTÖSTERREICH	AT	ÖSTERREICH
13	AT211	<u>Klagenfurt-Villach</u>	AT21	<u>Kärnten</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
14	AT212	<u>Oberkärnten</u>	AT21	<u>Kärnten</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
15	AT213	<u>Unterkärnten</u>	AT21	<u>Kärnten</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
16	AT221	<u>Graz</u>	AT22	<u>Steiermark</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
17	AT222	<u>Liezen</u>	AT22	<u>Steiermark</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
18	AT223	<u>Östliche Obersteiermark</u>	AT22	<u>Steiermark</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
19	AT224	<u>Oststeiermark</u>	AT22	<u>Steiermark</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
20	AT225	<u>West- und Südsteiermark</u>	AT22	<u>Steiermark</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
21	AT226	<u>Westliche Obersteiermark</u>	AT22	<u>Steiermark</u>	AT2	SÜDÖSTERREICH	AT	ÖSTERREICH
22	AT311	<u>Innviertel</u>	AT31	<u>Oberösterreich</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
23	AT312	<u>Linz-Wels</u>	AT31	<u>Oberösterreich</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
24	AT313	<u>Mühlviertel</u>	AT31	<u>Oberösterreich</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
25	AT314	<u>Steyr-Kirchdorf</u>	AT31	<u>Oberösterreich</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
26	AT315	<u>Traunviertel</u>	AT31	<u>Oberösterreich</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
27	AT321	<u>Lungau</u>	AT32	<u>Salzburg</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
28	AT322	<u>Pinzgau-Pongau</u>	AT32	<u>Salzburg</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
29	AT323	<u>Salzburg und Umgebung</u>	AT32	<u>Salzburg</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
30	AT331	<u>Außerfern</u>	AT33	<u>Tirol</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
31	AT332	<u>Innsbruck</u>	AT33	<u>Tirol</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
32	AT333	<u>Osttirol</u>	AT33	<u>Tirol</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
33	AT334	<u>Tiroler Oberland</u>	AT33	<u>Tirol</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
34	AT335	<u>Tiroler Unterland</u>	AT33	<u>Tirol</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
35	AT341	<u>Bludenz-Bregenzner Wald</u>	AT34	<u>Vorarlberg</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH
36	AT342	<u>Rheintal-Bodenseegebiet</u>	AT34	<u>Vorarlberg</u>	AT3	WESTÖSTERREICH	AT	ÖSTERREICH

*The nomenclature file (V2010.csv)*

- **DATASET Folder**

The DATASET folder contains datasets used in the tool. You can add, remove or update files in this folder.

- **File format**

Each file comes from the ESPON Database Portal (<http://database.espon.eu/db2/>).

These files are formatted following the ESPON Database data and metadata format : 1 spreadsheet with 4 tabs (Dataset, Indicator, Source and Data).

The Data tab must contain only one column of data corresponding to one NUTS level, one nomenclature version and one year of reference.

There must be one value for each NUTS of the corresponding level in the nomenclature file (i.e., 1363 values for the NUTS3 level of the 2010 version of the nomenclature).

There must be one file by year of reference and indicator.

- **File name**

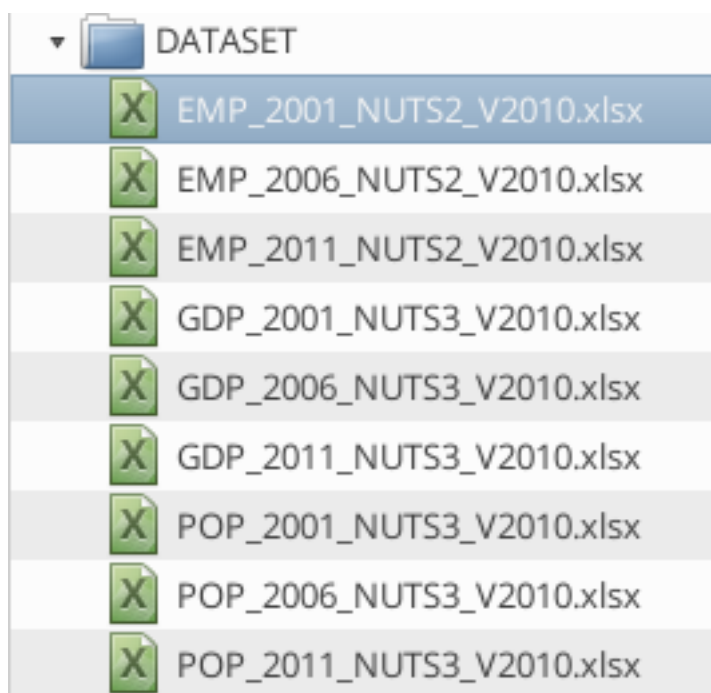
The names of the files are composed following this convention :

"SHORT NAME OF THE INDICATOR"\_"YEAR OF REFERENCE OF THE INDICATOR"\_"NUTS LEVEL"\_"NOMENCLATURE VERSION".xlsx

## Annex 5 - FIT – How to Update the FIT – December 19, 2014

	A	B	C	D	E	F	G
1					act		
2					2001		
3	Unit Code	Object type	Version	Name	2001	source	
4	AT11	NUTS2	2010	Burgenland (AT)	127	1	
5	AT12	NUTS2	2010	Niederösterreich	721	1	
6	AT13	NUTS2	2010	Wien	809	1	
7	AT21	NUTS2	2010	Kärnten	245	1	
8	AT22	NUTS2	2010	Steiermark	554	1	
9	AT31	NUTS2	2010	Oberösterreich	660	1	
10	AT32	NUTS2	2010	Salzburg	254	1	
11	AT33	NUTS2	2010	Tirol	313	1	
12	AT34	NUTS2	2010	Vorarlberg	168	1	

### A dataset file



### The DATASET folder

- **MATRIX folder**

This folder contains the time-distance matrix between the NUTS. You can add, remove or update files in this folder.

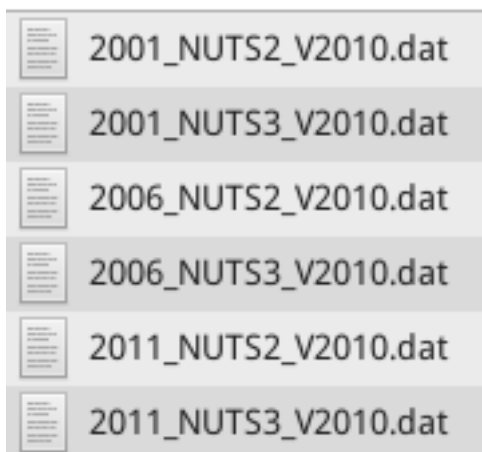
  - **File format**

One file by mode of transportation NUTS level and year of reference. Each file must contains at least 3 fields: "from", "to", "dij" (where dij is a measured in minutes). There can be more than one mode of transportation in the matrices. Each NUTS of the nomenclature must have values in these files.
  - **File name**

The names of the files are composed following this convention : "YEAR REFERENCE OF THE MATRIX" \_ "NUTS LEVEL" \_ "NOMENCLATURE VERSION".dat

```
2011_NUTS2_V2010.dat x
from to road rail air mm
AL00 AD00 2194 1355 703 703
AL01 AD00 2142 1438 743 743
AT11 AD00 1305 1040 656 656
AT12 AD00 1334 967 645 645
AT13 AD00 1350 951 588 588
AT21 AD00 1126 848 607 607
AT22 AD00 1222 975 640 640
AT31 AD00 1232 869 624 624
AT32 AD00 1153 840 625 625
AT33 AD00 1053 743 654 649
AT34 AD00 976 642 637 614
BA00 AD00 1674 1343 771 771
BA01 AD00 1538 1251 772 772
BE10 AD00 903 532 457 454
BE21 AD00 960 563 495 490
```

*A matrix file*



*The MATRIX folder*

- **FIT\_Parameters.txt file**

This file contains some information to be displayed in the front office application. When an update remove or add indicators or matrices this file need to be edited.

- dataset lines refers to the data to be processed in the tool (those in the DATASET folder). One line contains: "dataset", a short name of indicator (the same used in the datasets file names), a long name of indicator (the one that will appear in the application) and the units of the indicator.
- matrix lines refers to the modes of transportation. One line contains: "matrix", a short name of the mode (the same that is used in the matrices files), a long name for the mode and the order of display in the interface
- The next lines must not be modified.

## Annex 5 - FIT – How to Update the FIT – December 19, 2014

```
# Names of inputs datasets (how it will appear in the tool)
dataset : GDP : Gross Domestic Product : millions of euros
dataset : EMP : Active Population : thousands of persons
dataset : POP : Total Population : inhabitants

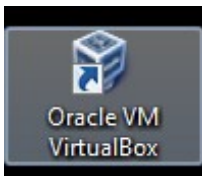
# Names of inputs modes of the matrices (how it will appear in the tool)
matrix : road : Road : 1
matrix : rail : Rail : 2
matrix : air : Air : 3
matrix : mm : Multimodal : 4

# Don't change these lines
param : pParam : 60, 120, 240, 480
param : aParam : 0.01, 0.05, 0.1
```

*The FIT\_Parameters.txt file*

### Step 2 - Install the back office module

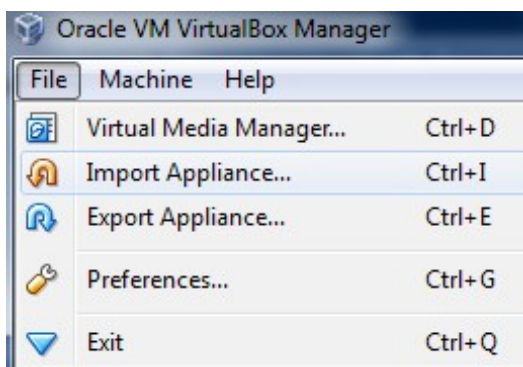
- To install the back office module you have to double-click on the VirtualBox-4.3.12-93733-Win.exe file. Then follow each instruction. (press "next", "yes", "install", "finish"...) )
- When the installation is done, start the application by clicking on this icon on your desktop :



*Start the application*

It will open the Oracle VM VirtualBox software.

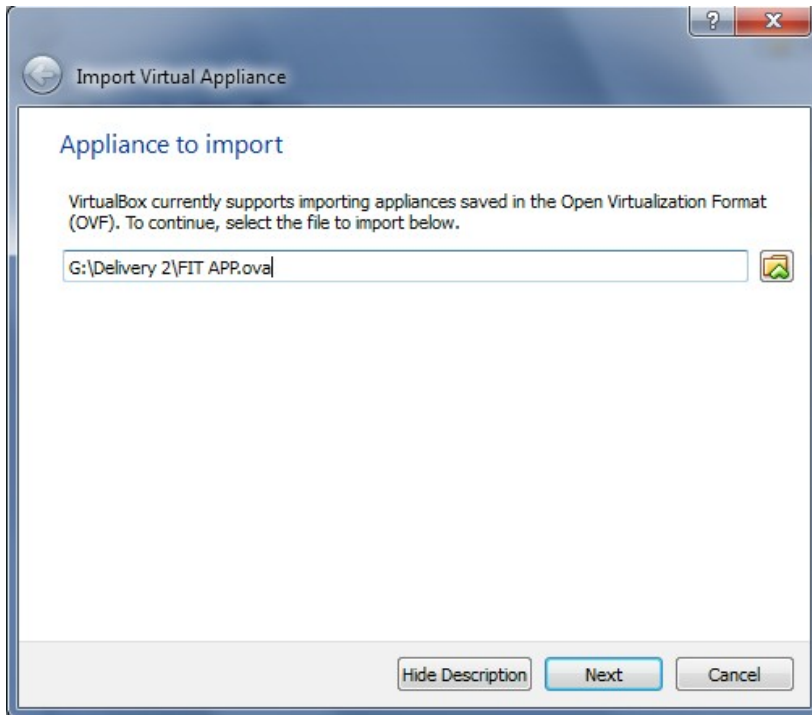
- Select "File" -> "Import appliance".



*Import Appliance*

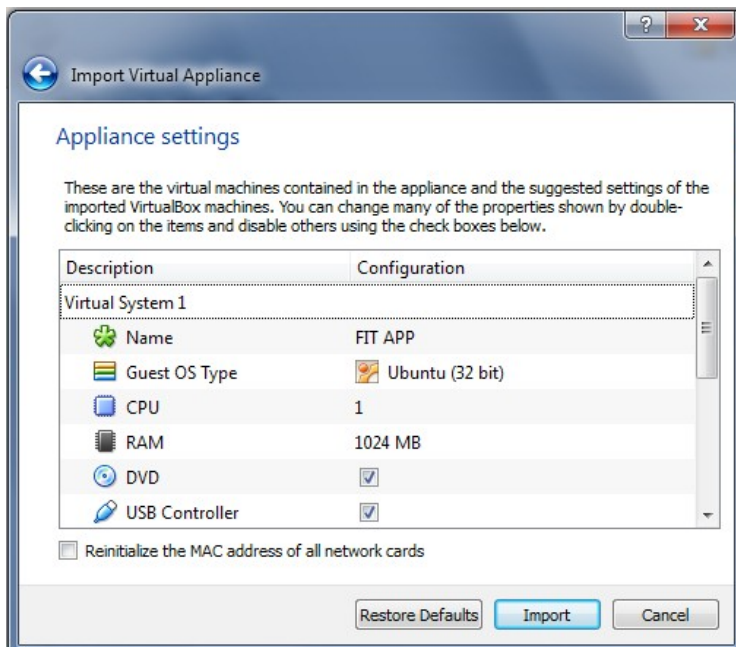
## Annex 5 - FIT – How to Update the FIT – December 19, 2014

- In the file dialog that comes up, navigate to the "FIT APP.ova" file. Then press Next.



*Select the "FIT APP.ova" file*

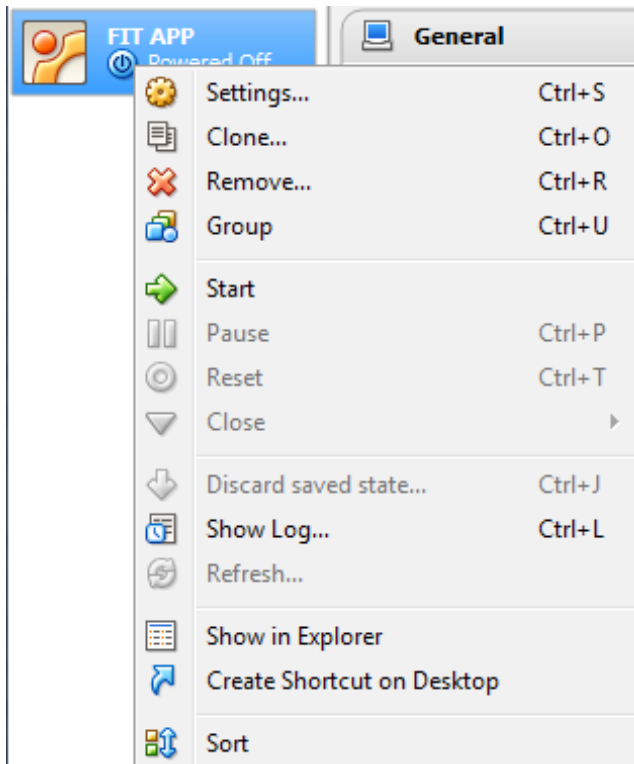
- Press Import



*Import*

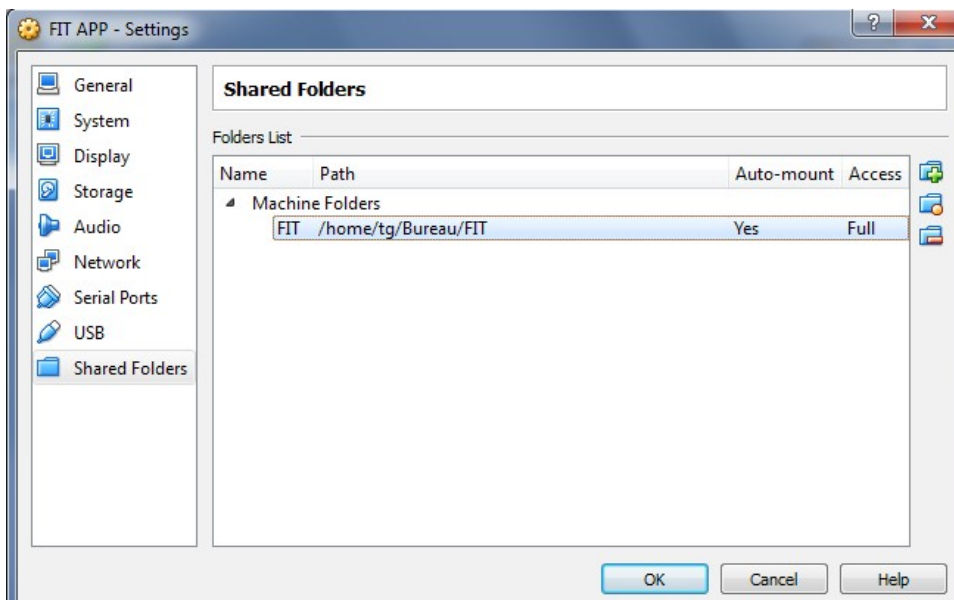
## Annex 5 - FIT – How to Update the FIT – December 19, 2014

- Right-click on the "FIT APP" item in the window and select "Settings"



*Right Click on FIT APP*

- Click on "Shared Folders"

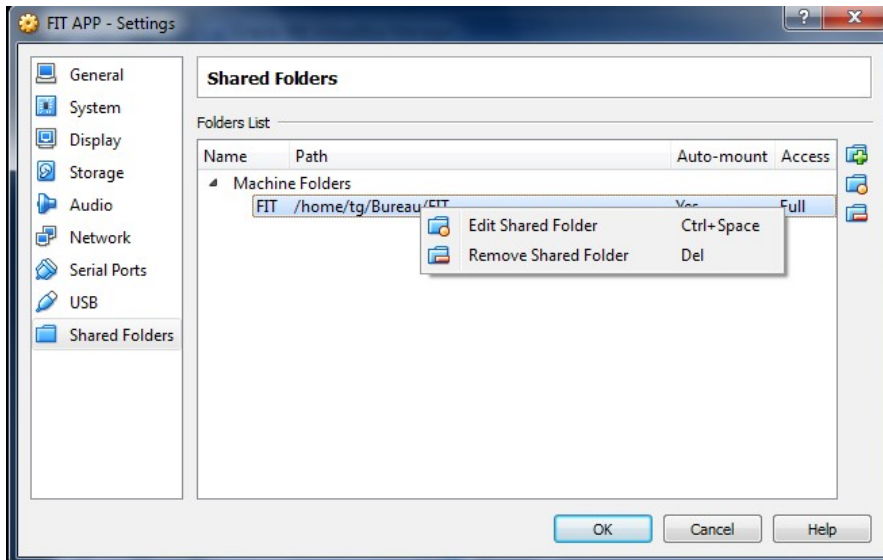


*Click on Shared Folder*



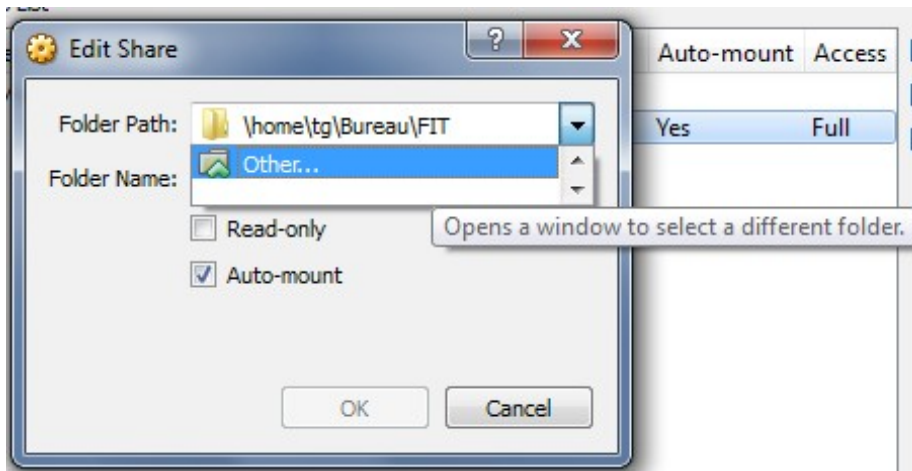
## Annex 5 - FIT – How to Update the FIT – December 19, 2014

- Right-click on the FIT line in the window and select "Edit Shared Folder"



*Edit Shared Folder*

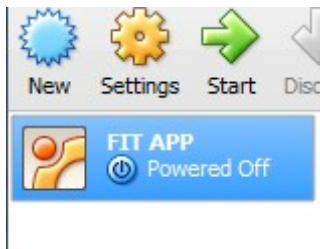
- Update the folder path to the FIT folder created at step one. Press OK and shut the Settings window by clicking OK again.



*Update the folder path*

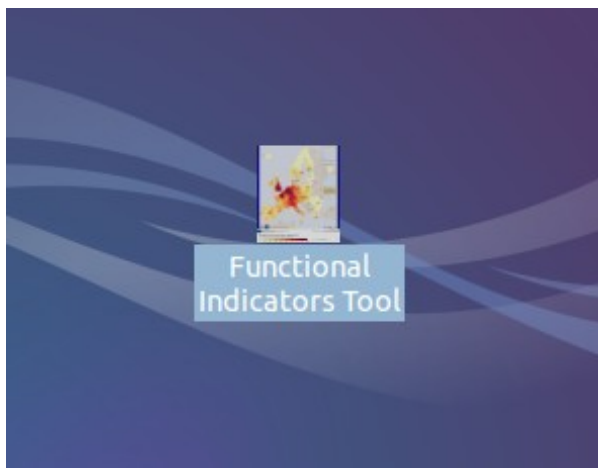
### Step 3 - Process the data

- Double-click on the FIT item in the VirtualBox window.

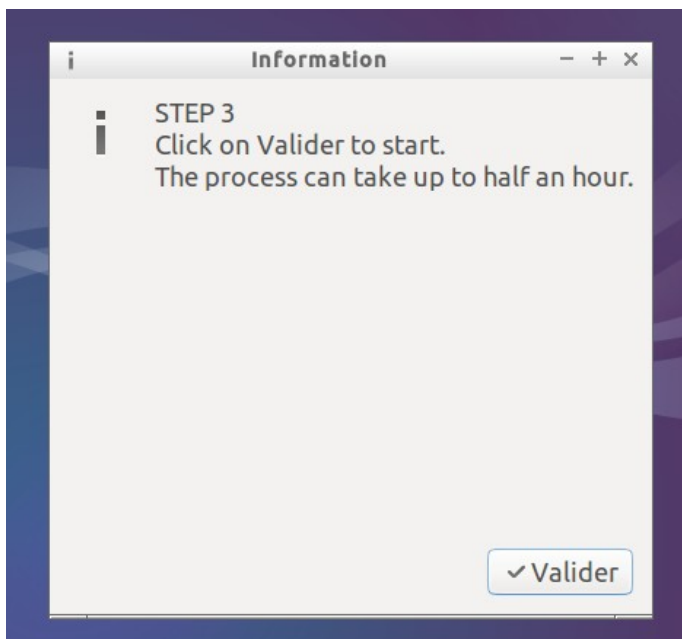


*Start the FIT APP*

- Click on the Functional Indicator Tool Icon and follow the instructions.

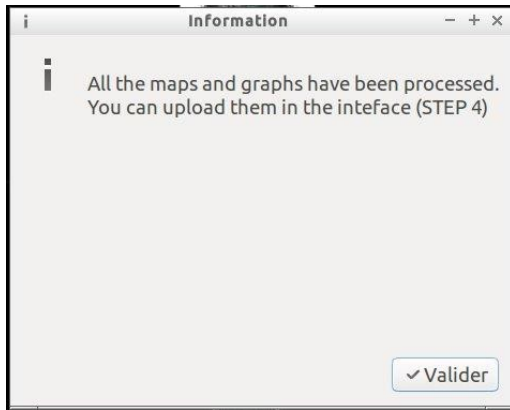


*Start the computation tool*



*Press "Valider"*

## Annex 5 - FIT – How to Update the FIT – December 19, 2014



*Press "Valider"*

- This process can take some time, up to half an hour, it will depend on the computer capacity and the number of indicators to compute.
- A resources folder and a log file have been created in the FIT folder.

### **Step 4 - Upload data, maps and graphs to the interface**

- Upload the folder resources on the server with a ftp connexion according to the hosting provider recommendations.
- Make sure you have access rights on the folder.
- The web site is up-to-date.