Guideline for the ONLINE S3 toolbox tool/application
RIS3 Innovation Maps

ONLINE S3 – 710659 – Guidelines for the pilot experimentation phase

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HISTORY OF CHANGES

Version	Date	Contributing partner	Summary of changes
Version 0.1	2016-10-07	RIM	Structure of the document, elaboration of required information as a template for all tools
Version 1.0	2017-07-21	IIL	Initial Guideline Version

DISCLAIMER

The opinion stated in this report reflects the opinion of the ONLINE S3 consortium and not the opinion of the European Commission.

ACKNOWLEDGEMENT

BACKGROUND AND RATIONAL

Thus far, little effort has been made to analyse data from the private sector's R&D and innovation grant applications, both at national and regional levels. This data provides bottom-up information about new emerging businesses and technology trends as perceived by the private sector. Many R&D and innovation grants require matching funds from the private sector, and hence this information is more credible regarding business interests and trends than official declarations.

In the context of the smart specialisation process and entrepreneurial discovery, Innovation Maps (IMs) have been used to help tease out information about technological trends by the private sector. They are considered as a new way to collect and analyse data from R&D and innovation grant applications to identify emerging areas of business and technological strengths.

Innovation Maps were used as an essential part of the Entrepreneurial Discovery Process (EDP) in Poland, particularly within the pilot project on the EDP and business needs analysis conducted by the World Bank (2015) where they used to identify key priorities for business innovation spending.

Figure 1 provides the rationale behind this ONLINE S3's application.

Analyse R&D and innovation grant application data

Identify emerging Business and Technology Trends

Complements the Entrepreneurial Discovery Process

Figure 1 Rational behind this ONLINE S3 application

DESCRIPTION OF THE APPLICATION

In general terms, Innovation Mapping is a method that enables acquiring a better understanding of the process of innovation, assisting in the development of new tools to measure innovation-related phenomena and to articulate innovation plans (Mahdjoubi, 1997).

The method is one that has not been widely used in EU regions/countries. In the context of the RIS3 development process, Innovation Maps have been used in Poland to help understand technological trends within the private sector using data on grant applications.

The World Bank (2015) methodology for developing an IM based on grant applications data is as follows:
1. **Data collection**. Data on grant applications is required to be collected and submitted to the application. If several Ministries, Agencies or Stakeholders are involved in the funding of innovation and R&D support programmes, then the tool amalgamates this into a single database.
2. **Data cleaning**. Data cleaning includes: Classification of support applications based on existing classifications (e.g. Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets - NABS (2007)), and the Extraction of data from the applications into: applicant type (Industry vs. Academia/Research); application status (Approved vs. Declined); geographic division (e.g. NUTS Regions); and other categories.
3. **Data analysis**. The ultimate objective is to create maps built along a business vs. technology matrix, combining the business area of a grant application, with a technological classification, to identify business and technology trends and new areas of competitive strengths based on revealed preferences of the private sector.
4. **Visualisation**. Heatmaps and geographical-based charts are produced to show the concentration of the number of applications into regions, business areas and technology areas, as well as various other classifications.
5. **Policy intelligence**. When grant application data is collected over several years, the innovation maps' results can be compared to other exercises such as technological foresight results. They can also be benchmarked against smart specialisation priorities and analysed within specific groups to evaluate fitness of prioritised specialisation areas, etc.
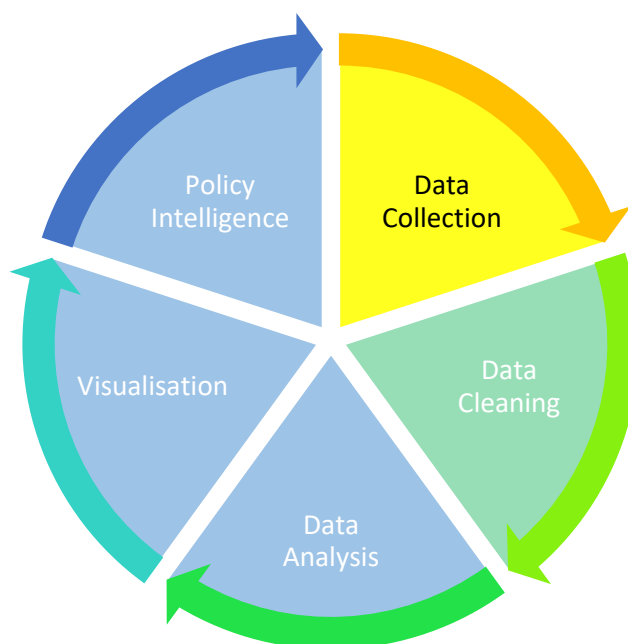

Figure 2 Overview of this ONLINE S3 application

BENEFITS TO KEY ACTORS AND STAKEHOLDERS

IMs can help uncover critical bottom-up information embedded in firms' R&D and innovation applications for public support. Among the identified possible benefits, IMs:

• Act complementary to top-down approaches such as foresight programmes, macro and sectoral data and innovation surveys.

• Help verify, modify and create smart specialisation priority areas based on the private sector's real demand and thus help better prioritise public support for innovation and enhance its efficiency.

• Help monitor business and technology needs trends in real time.

• Provide credible and granular information on innovation activities.

• Help identify regional strengths and concentrations of innovation activities. (World Bank, 2015)
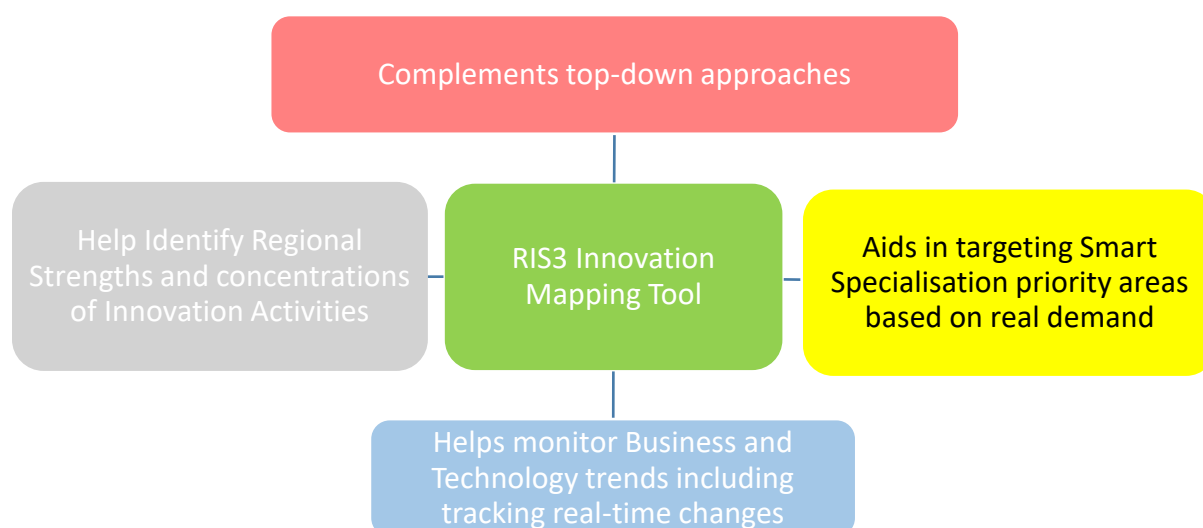

Figure 3 Benefits to stakeholders when using this ONLINE S3 application

KEY ISSUES AND REQUIREMENTS

Required Data

The collection of grant data from grant applications submitted to public innovation support institutions is a prerequisite for producing IMs. For countries that already collect this data, this requires the integration of standardised classifications of business areas and technology areas. This standardised approach to data collection helps to create IMs at regional, national and EU levels based on information from all relevant public support instruments, including specifically flagship matching grant programmes, and allows for comparison.
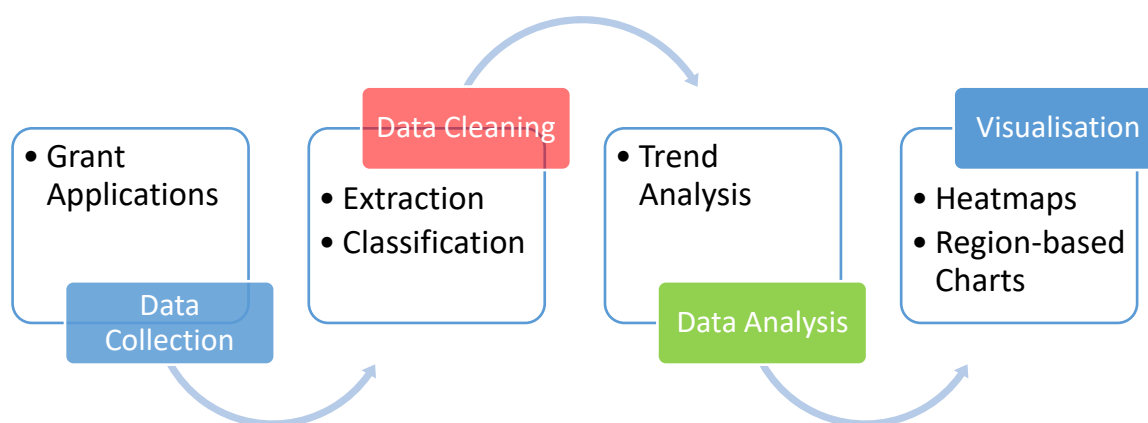
Figure 4 Key issues when using this ONLINE S3 application

How to use this application step-by-step?

App. Navigation

Navigate through the stages of the Innovation Mapping methodology using the step wizard located at the top of the application page.
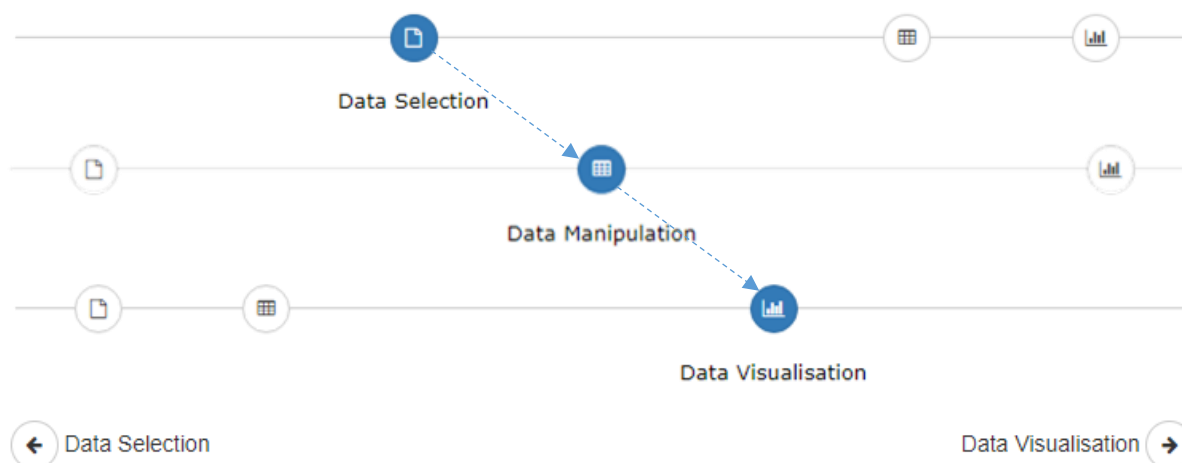

Figure 5 Navigating the ONLINE S3 application

Step 1. a: Data Gathering
Data collection and merging.

A prerequisite to the use of this application is the availability of grant data concerning innovative programmes implemented across numerous regions. Data sources may include regional research councils or funding providers such as Gateway to Research in the UK and Tekes in Finland. Export relevant data from these providers in csv format for upload to the application.

Data import:

1. Selecting a csv file containing project-level grant application data to upload and analyse visually in the form of a heatmap. Alternatively skip this step and manually enter or paste information into the tools editing interface.

2. When uploading data, it is required to specify the relevant columns and to define the method of classification to be used concerning business and technology areas. Please note the use of standard classifications, OECD and NABS, is encouraged to allow for cross-regional and country comparisons in later stages.
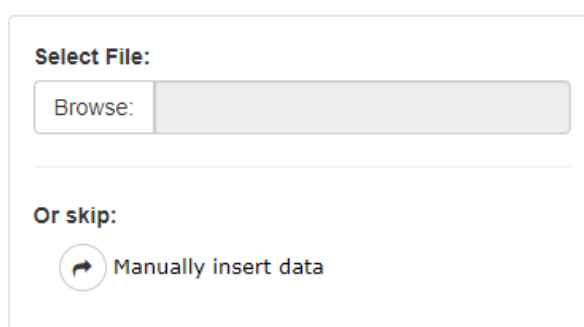

Figure 6 Step 1 for using this ONLINE S3 application: Data Selection and Analysis

Step 1. b: Data Specification
Selection of appropriate fields and the definition of a method of classification, by business area and technology area.

At this stage, it is required to specify the relevant columns containing essential information including: Region, Funding, Business Area and Technology Classification. It is possible to create new columns for manual data entry should this data not be available.

The OECD and NABS standards are built-in to the application and are used as standard however the user may specify a custom classification method. In order to use a custom classification two additional csv files are required to be uploaded which contain:

Column	Contents	Example
"chapter"	Label	1.1.
"topic"	Title	Mathematics
"category" *	Hierarchy	Natural Sciences

<div align="right">* optional</div>

The use of standard classifications is encouraged to allow for cross-regional and cross-country comparisons.

Figure 7 Step 1 (Continued.) for using this ONLINE S3 application: Data import and parsing

Step 2: Data Cleansing and Classification.
Imported data will appear in the spreadsheet where it can be modified and manipulated. If not originally provided it is possible to create new classification columns for the data where the user can classify funded projects by technology- and business area. Classify each row representing a funding area or project using the provided drop down menus.
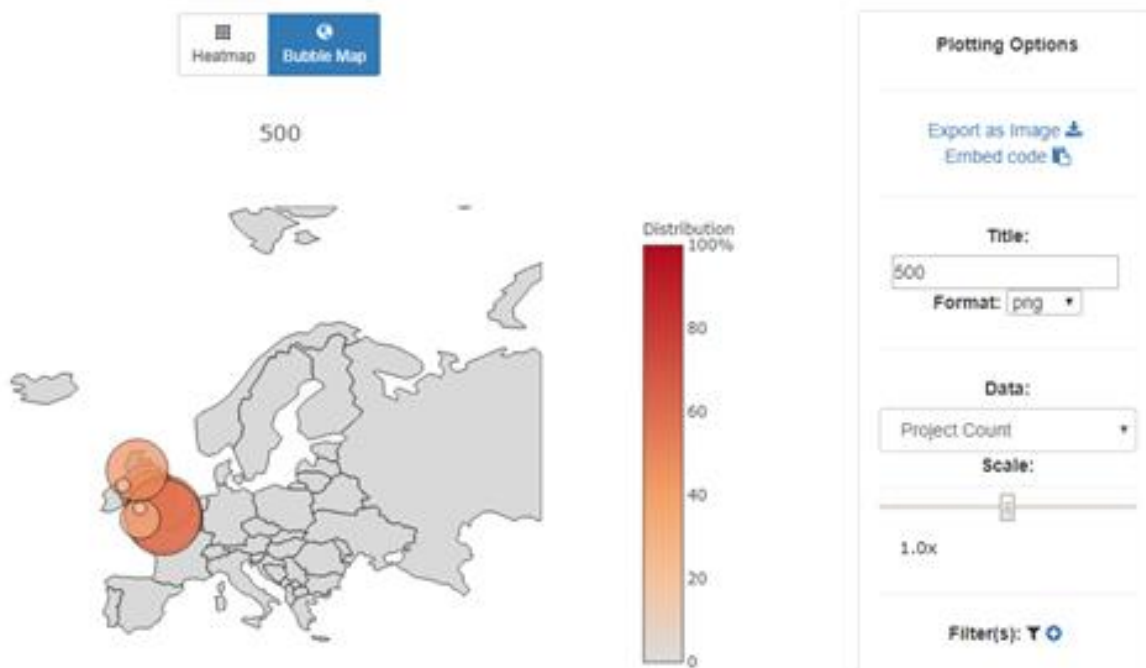
Figure 8 Step 2 for using this ONLINE S3 application: Data cleansing and classification

Step 3: Data Visualisation, Analysis and Policy Intelligence.

Visualise the data in various formats to analyse trends concerning regional smart specialisation priorities.
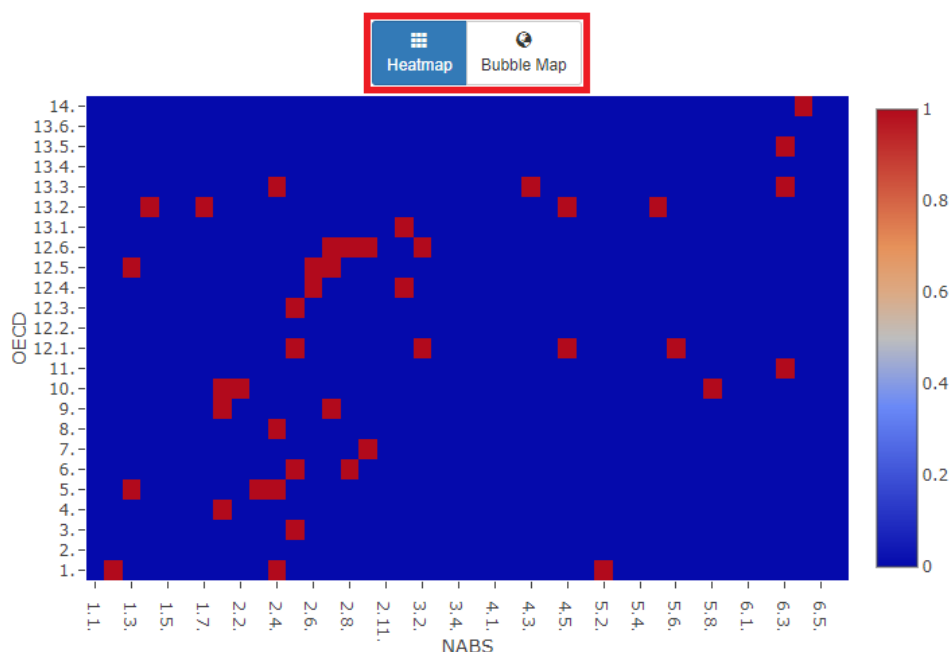
Figure 9 Step 3 for using this ONLINE S3 application: Innovation Map Visualisations – Bubble and Heat-maps

Construct and apply filters to refine the scope of the analysis.

Step-by-step process to create and apply a new filter:
1. Firstly, click the plus symbol: ⊕
2. Select a column to filter by: ⌄
3. Select relevant attributes or Select all: ☑
4. [Remove filter] ⊖

Figure 10 Step 3 (Continued.) for using this ONLINE S3 application: Filter construction and application

Step 4: Plotting Options and Data Export
Adjust and save the underlying data and figures.
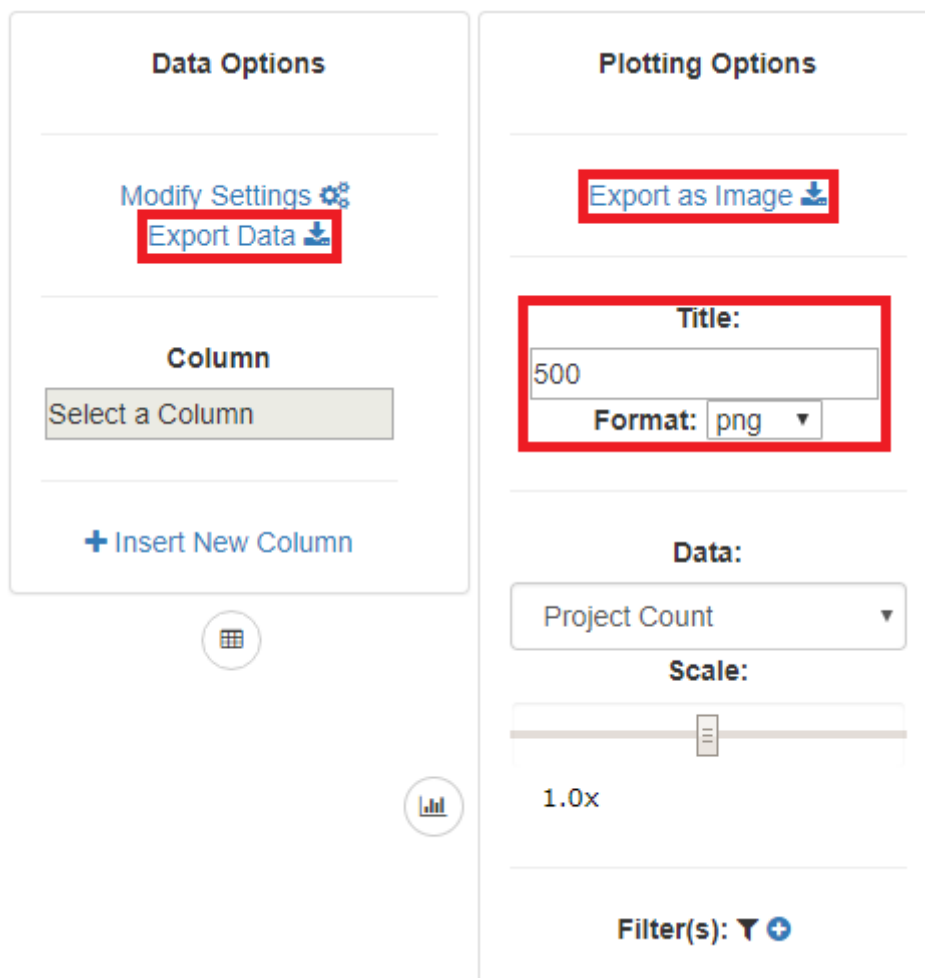
Figure 11: Adjusting settings and Export options

Options

- **Modify Settings**: Adjust column selection and change classification method
- **Column**: Select a column in order to change the header title
- **Insert**: Add a new column
- **Title**: Change the plot title and file name for export
- **Format**: Change the Image type for export - png, jpeg, webp or svg
- **Data**: Chose to plot project count or funding
- **Scale**: Adjust the bubble size for improved comparison
- **Filter**: Construct filter by selecting a column and desired values

Step 5. Policy Intelligence

Analyse the data visualised by the app; for example: Identify regional strengths and concentrations of innovation activities using Heatmap plots with regional filter or Bubble maps with classification filters. Monitor Business and Technology Trends by iteratively filtering by dates provided.

FURTHER INFORMATION

Relevant Data Sources

The main source of data for the implementation of this method is grant application data. Tools for tracking data on projects and initiatives that are publicly funded are not widely used in the EU.

Good practices in this regard include the open data storehouse of Tekes in Finland, which allows to search for projects and beneficiaries that have been funded through Tekes programmes. The Tekes database allows searches by organisation type; by economic sector; project status; Tekes programme and research type. Technology areas are not defined in the database, although some of them are described in the project's abstract. The locality of the grant holders is also provided.

Probably the most developed grant dataset in the EU is the Gateway to Research database of the UK. The dataset provides information about publications, people, organisations and outcomes related to research projects. It includes information about the project such as abstract, duration, the amount awarded, the researchers involved and a list of publications produced. The data is collected from a range of systems used by the funding organisations to collect information from researchers, including the Joint Electronic Submissions system (Je-S) and ResearchFish. Gateway to Research (GtR) publishes information from a variety of source systems. The information is not transferred to GtR on a real-time basis and the information is processed against a set of business rules to determine suitability for publication. The dataset is currently static, or a simple snapshot of other databases and is not being updated regularly. However, the infrastructure is being built to refresh all the data in the website on a regular basis. This will enable consistency for future data access and further analysis. The database does not distinguish technology areas or economic areas. However, abstracts for projects are provided, as well as organisations descriptions. Private sector companies are also distinguished.

Ongoing studies on open data on the use of EU Structural Funds have shown that most data currently published by the EU national and regional authorities are not compatible yet with some of the fundamental requirements of the open data paradigm. Data is rarely complete, accessible, timely, machine-processable and non-proprietary. Open data on public support would allow for tracking of project themes and topics, and assessment of how they match with S3. This kind of data could be highly valuable in tracking progress towards objectives and vision, but also in informing the RIS3 update.

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