Exploring Knowledge production in Europe. The KNOWMAK tool

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Introduction

The goal of the KNOWMAK project is to develop a web-based tool, which provides interactive visualisations and indicators on knowledge production in the European Research Area (ERA).

Indicators are structured around three integrative elements:

- Research topics, by developing ontologies on Societal Grand Challenges (SGC) and Key Enabling Technologies (KET);
- Research actors (key actors in knowledge production);
- Geographical spaces and, more specifically, countries and (metropolitan) regions.

The tool will allow users to perform the following main tasks:

- Exploration: Allows the user to explore indicators in the tool in the form of tables and with different visualisations (maps, bar charts and line diagrams)
- Retrieval: Allows the user to download selected indicators in a suitable format for further statistical analysis or combination with other data
- Explanation: Supports the user in the navigation through the tool with online help features, user handbook, as well as some illustrative analytic examples (data stories)

Architecture

The overall architecture of the KNOWMAK tool is depicted in Figure 1. Primary data sources on knowledge production are structured and enriched in specific datasets (in strong relation to the EU funded RISIS infrastructure, risis2.eu). Harmonisation pertains to the three central integration dimensions, i.e. geographical space, topics, and actors. A core set of data is transferred to the KNOWMAK integrative database which, in turn, feeds indicator construction and the interactive online visualisation tool.
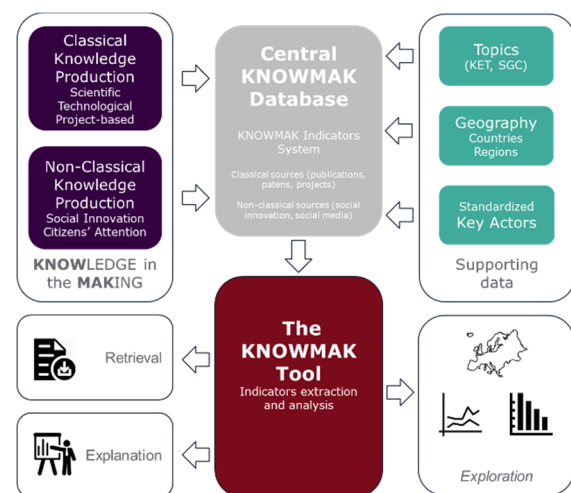

Figure 1. Architecture of the KNOWMAK tool

User involvement

A core part of the KNOWMAK project and web tool development is its co-creation approach. A participatory process from the beginning of the project has ensured that the tool is tailored to the needs of lead user groups. These groups are composed of members of all relevant stakeholder groups, i.e. policy-makers and research funders, managers of research organisations, regional actors and representatives of civil society, and the business sector.

Who we are

The KNOWMAK consortium is composed of eight partners. While all of them are involved in the joint development of the tool, their tasks are specialised, based on the competences and data they own. www.knowmak.eu

Acknowledgments

Investigating knowledge production in Europe: Some illustrative examples

Small regions, big players in knowledge production

One main indicator of KNOWMAK gives an impression on the overall knowledge production volume and intensity, derived from three different types of knowledge production: Patents, publications and FP projects. In terms of intensity (normalised by population), it can be seen that some small to mid-sized regions (e.g. Eindhoven or Heidelberg) produce more knowledge per capita than their mega-city counterparts London, Paris and Berlin.
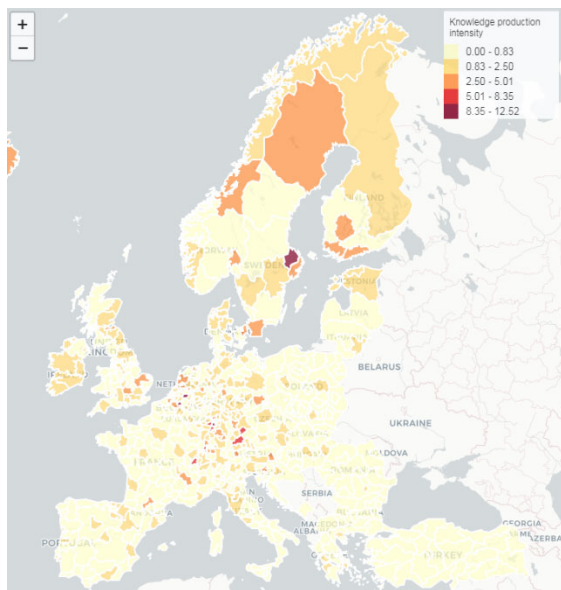

Figure 2. Knowledge production intensity by region

Clusters of knowledge production in genomics

The tool allows to analyse knowledge production at a detailed level of highly relevant topics, identified as crucial for the European socio-economic development. Figure 3 shows the example of Genomics research (one subclass of the KET Industrial Biotechnology) in publications. In 2013, The metropolitan region London turns out as leading hot spot, followed by Paris, Barcelona and East Anglia.
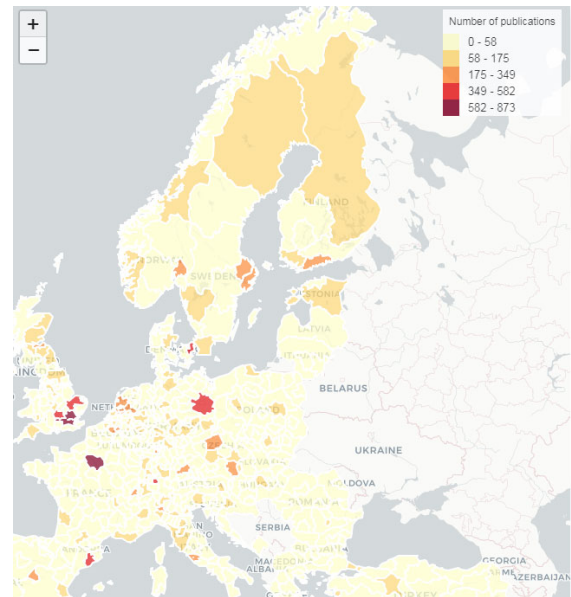

Figure 3. Publications in Genomics by region

Subtopics in nanoscience and technology

For the Nanotechnology KET, the KNOWMAK data allow disaggregating knowledge production by subtopic and type of output (Figure 4). They display systematic differences with nanoscale devices as being the most important subtopic for patents, nanoscale technology for publications and nanoscale materials for projects. This highlights differences in the science vs. technology orientation of domains within a KET, but also possible misalignments between EU funding policies and the European S&T basis.
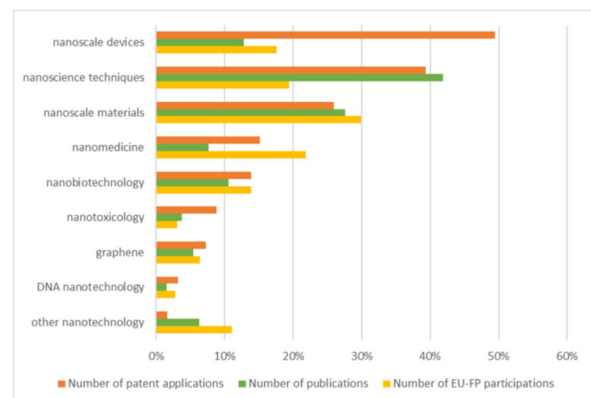

Figure 4. Knowledge production in Nanotechnology by subtopic