

# Interactive Visualisation of Statistical Data with the CentropeSTATISTICS Cross-Border Geoportal

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## 1 ABSTRACT

The Centrope region consists of a number of adjacent counties and states along the borders between Austria, the Czech Republic, Hungary, and the Slovak Republic, comprising regions Jihomoravský, Bratislavský, Trnavský, Győr-Moson-Sopron, Burgenland, Lower Austria, and Vienna. It was founded 2003 by the political declaration of Kittsee and aims to strengthen partnership and economy in a region which were suffering from the Iron Curtain during the second half of the 20th century.

CentropeMAP is a geoportal connecting the region by collecting web map services from the partner countries. The services are brought together in a single map viewer and allow the user to experience a cross-border working area with dozens of data layers dealing with all topics which could be of interest for regional planners and similar professions. Layers are coming from the fields of biota, boundaries, elevation, imagery/base maps, inland waters, planning/cadastre, structure, and transportation. CentropeMAP went online in 2005 and was extended by the cross-border statistics database CentropeSTATISTICS in 2010. During 2015, CentropeMAP and CentropeSTATISTICS were relaunched with new software and remarkably higher speed of map generation.

CentropeSTATISTICS is an extensive statistics database which is directly linked to CentropeMAP and allows its users to create thematic maps and various types of charts on the fly. It is the only available free web tool to visualise cross-border statistical data in its own connected geoportal allowing the user to influence the way of visualisation in multiple ways in the Centrope region. CentropeSTATISTICS can not only create maps, it also serves charts which are interactively created from the data in the cross-border database. The statistics database is continuously expanded in close co-operation with the statistical offices of Hungary, Slovakia, the Czech Republic, Vienna, Lower Austria and Burgenland.

The CentropeMAP newsletter is published twice a year and aims to inform members of state administration and statistical offices about the capabilities of CentropeMAP and CentropeSTATISTICS as well as news from the statistical offices of the partner countries. It also distributes information regarding geodata in the CentropeMAP geoportal.

## 2 INTRODUCTION

The Central European region Centrope is a cross-border region situated along the mutual boundaries of Austria, the Czech Republic, Hungary, and Slovakia. The Centrope region is not naturally grown – a quarter of a century ago it was still divided by the Iron Curtain –, it is a political and economical construction to help all parts of the region to overcome the unfavourable development during the period of the Cold War when these regions were practically cut off at their edges. So it might not be a surprise that the term “Centrope” is still unknown in common everyday life.

However, for planners, politicians and stakeholders the Centrope region is an important tool to initialise cross-border projects and enhance co-operation with colleagues from neighbouring countries. CentropeMAP and CentropeSTATISTICS are a valuable help to gain cross-border information on various topics which need to be evaluated in a cross-border project.

Information on CentropeMAP and the Centrope region is available through the website <http://www.centropemap.org> which is featuring five languages (English and the languages of the Centrope countries: Czech, Hungarian, Slovak, German). However, the CentropeMAP geoportal is available in English only due to its complexity.

## 3 WHY CENTROPEMAP?

### 3.1 CentropeMAP has deeper information than other map services

Everyone knows Google Maps or Open Street Map – both services are available worldwide and offer plenty of map information such as boundaries, transport infrastructure (roads, railway, stops, stations), facilities

(social, shopping, nature, medical care, ...) and points of interest (cultural, sightseeing, landmarks, ...). The goal of CentropeMAP is to take a map like this as a background and add more information which are important for planners and related professions. CentropeMAP helps planners to answer questions like:

- Can I put a shopping centre here or is there any kind of protected area zoning which prohibits such a project?
- I am planning something close to my national boundaries. How is the situation on the other side of the border?
  - What about population density?
  - What age and family structure does the population have?
  - What about commuters and the economic situation?
- What was the situation like some years ago?

### 3.2 CentropeMAP's map data is directly obtained from official servers

Therefore, all data layers in CentropeMAP are always up to date. CentropeMAP works with cascading web map services (WMS): There are single map services for each region or country of the Centrope region which are combined into a single WMS for each topic. These single WMS are hosted on the CentropeMAP server, so if the client sends a request for one layer, the CentropeMAP server splits this request into several requests which are then sent to the partner servers. This is a background process and not directly visible to the user for reasons of simplicity (one layer, one click).

### 3.3 CentropeMAP includes and visualises statistical data

CentropeMAP and CentropeSTATISTICS are two interconnected services which allow the visualisation of statistical data in a topographic map. All statistical tables are directly received from the official statistical offices of the partner countries:<sup>1</sup>

- statistical office of the Czech Republic, <https://www.czso.cz/>
- Hungarian central statistical office, <http://www.ksh.hu/>
- statistical office of the Slovak Republic, <http://www.statistics.sk/>
- Statistik Wien (MA 23), <https://www.wien.gv.at/statistik/>
- Statistik Niederösterreich, <http://www.noel.gv.at/Land-Zukunft/Raumordnung/Statistik.html>
- Statistik Burgenland, <http://www.burgenland.at/land-politik-verwaltung/land/statistik-burgenland/>

### 3.4 CentropeMAP and CentropeSTATISTICS are regularly updated

Many of the tables available through CentropeSTATISTICS have annual data series from 2015 going back to 2003. These tables are updated annually to keep the range of the time series up to date. The web map servers are also regularly checked for additional services to extend the map layer range of CentropeMAP.

### 3.5 CentropeSTATISTICS is the only cross-border database with municipality data

Statistical datasets for the Centrope region can be obtained in multiple ways, for example from the freely accessible databases of the national statistical offices or through the EUROSTAT database maintained by the European Statistical Office. However, most of these datasets are available on district, NUTS 3 or NUTS 2 levels only, which makes them less useful for a cross-border region where details are important at small scale.

Almost all tables in CentropeSTATISTICS are on municipality level (there are more than 3,500 municipalities in the Centrope region) which makes them extremely interesting for people who want to explore cross-border situations or small scale patterns. To visualise these tables, only a few mouse clicks are necessary to convert the numbers into thematic maps which can be directly viewed in CentropeMAP. Also, a wide range of charts is available. All charts can also be created easily with a few mouse clicks.

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<sup>1</sup> all hyperlinks last accessed 19 May 2016

## 4 STRUCTURE OF CENTROPEMAP AND CENTROPESTATISTICS

### 4.1 The Centropemap website

The Centropemap website has some basic information on the Centrope region. On the website <http://www.centropemap.org> you can find out more on Centropemap and CentropemapSTATISTICS content providers, download a detailed CentropemapSTATISTICS manual in English and German, and access the CentropemapSTATISTICS newsletter which is published twice a year.

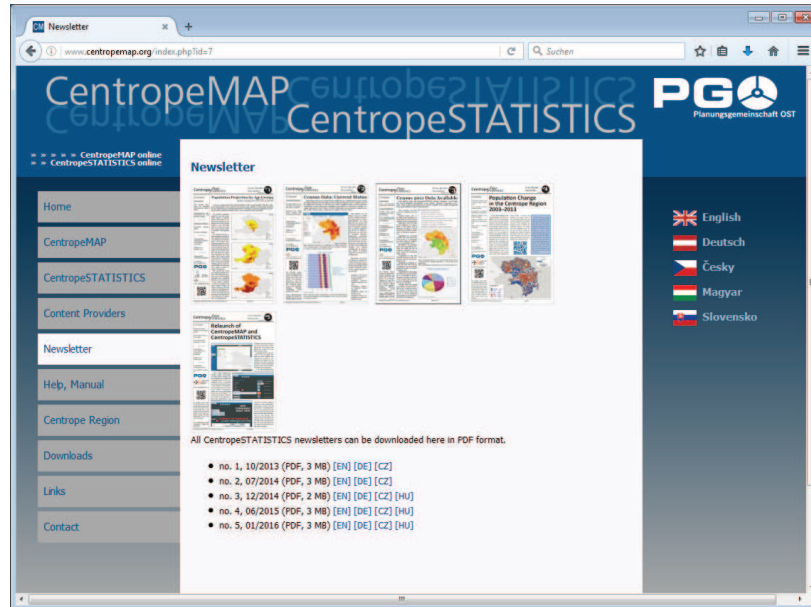


Fig. 1: The Centropemap website.

### 4.2 The Centropemap geoportal

The geoportal features a background map with various boundaries (national, NUTS 3, municipalities) which automatically switches to a more detailed topographic map in deeper zoom levels. The user may switch on additional layers from the *ISO 19115 Geographic Information – Metadata* topic categories biota, boundaries, elevation, inland waters, planning and cadastre, and transportation. Further layer groups are European Urban Atlas (from EEA, the European Environmental Agency), Corine Land Cover (2000–2012), population density raster 2006 (from European Commission/Eurostat/Regio-GIS) and some predefined thematic maps.

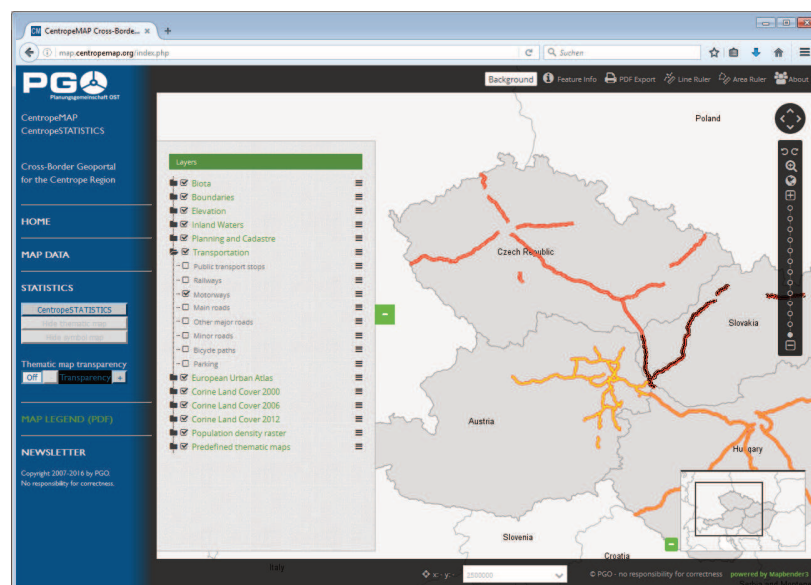


Fig. 2: The Centropemap geoportal. In this image the motorways layer is displayed. Note the different motorway symbols in all four countries.

Most of the thematic layers are composed of content from the partner servers on the fly. Therefore, map images may look like the example in fig. 2 where the same content is symbolised differently for every country because CentropeMAP cannot influence the stylesheets of the external services. This issue will be solved at a later stage of the compulsory implementation of the INSPIRE (Infrastructure for Spatial Information in the European Community) guidelines by all EU member states.

### 4.3 CentropeSTATISTICS

CentropeSTATISTICS is a cross-border statistical database with tables from the topic categories population numbers, population indicators, population projection, citizenship, migration, education, economy/labour market, buildings, and land use.

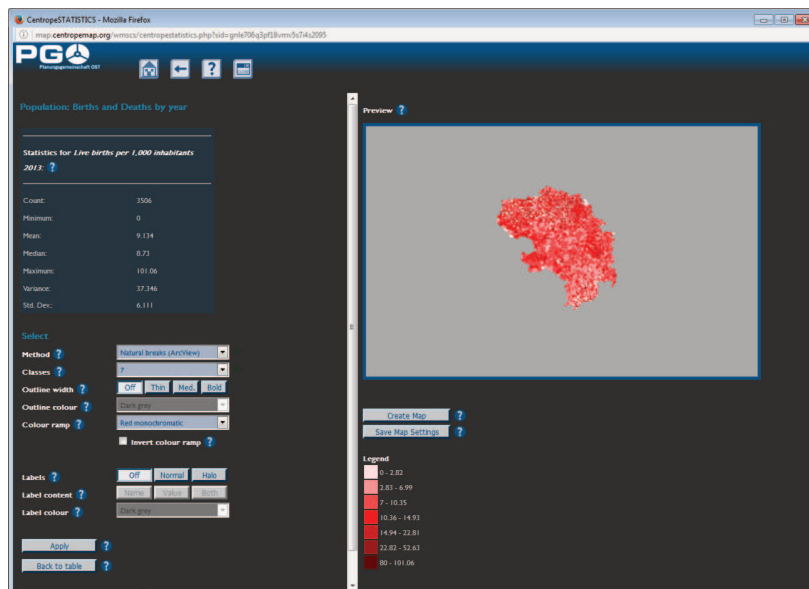


Fig. 3: Surface of CentropeSTATISTICS map creation engine.

These tables can be queried, viewed, exported to Excel, or used for map and chart creation. These features require some basic knowledge in cartography, mapping, and statistics. If someone has ever worked with any GIS (Geographic Information System) software like ArcView, ArcGIS, QGIS or others, they won't encounter any problems during map creation which is like setting up a legend for a GIS layer.

Chart creation is as easy as map creation. Only the selection of a topic and one or more municipalities are necessary to create chart output. All charts are image files which can be simply pasted into any other application. Charts are an important tool to visualise time series from the CentropeSTATISTICS database because for map creation only statistical indicators from single years can be used.

### 4.4 Technical infrastructure

All components of the geoportal CentropeMAP are realised with open source software. The website is powered by the content management system (CMS) Typo3 which allows the easy creation of a multi-language and barrier-free website according to the standards of the Web Accessibility Initiative of the W3C.<sup>2</sup>

The geoportal is powered by the map viewing client Mapbender3 since the 2015 relaunch. In the background the cascading web map services are provided by UMN Mapserver and Geoserver. CentropeSTATISTICS is a PHP/Javascript application written by the CentropeMAP team using some freely available PHP classes like Pear Excel Writer to create MS Excel files for table export or FPDF to create various PDF files. The CentropeMAP server is running the latest version of Ubuntu Linux (server version).

## 5 WEBLINKS

CentropeMAP website: <http://www.centropemap.org>

Shortcut to CentropeMAP geoportal: <http://map.centropemap.org>

<sup>2</sup> <https://www.w3.org/WAI/>, last accessed 19 May 2016.