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## Economic Commission for Europe

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Item 6 of the provisional agenda

#### Spatial statistics

### **Role of a spatial dimension in official statistics**

#### **Note by Statistics Sweden**

##### *Summary*

This note describes two different applications that deal with analysing small area statistics in spatial applications. The first one is the Municipality eXplorer, which builds on the eXplorer platform as developed by the Linköping University in Sweden. This was used to create a specific application for municipal use, or rather for use in visualizing small area statistics. The other application is a spatial aggregation tool that aggregates statistics from data on small areas within any freely defined area, polygon, and presents the results in a report, for example in Excel.

## I. Municipality eXplorer

1. In 2008, the Visualization tool NCVA eXplorer (NCVA – National Center for Visual Analytics), developed by the Linköping University, was presented to Statistics Sweden. We found it to be an interesting tool because of its many facilities for visualizing statistics, primarily maps. Statistics Sweden has worked for many years with data on maps and statistics on small areas. However, the NCVA eXplorer includes other powerful facilities like scatter plot, parallel coordinates, table lens and more. Illustrating relations between variables and values became easy. The Organisation for Economic Co-operation and Development (OECD) eXplorer is probably the most well-known among the different eXplorer applications.

2. Together with NCVA, the Regional Services and Planning Unit at Statistics Sweden started a project on visualizing small area statistics, specifically small municipal areas. Three municipalities - Linköping, Norrköping and Karlstad municipality - were invited to participate. Almost all municipalities in Sweden have a hierarchical small area subdivision of the municipality that is used for the presentation of statistics, sometimes down to the level of blocks.

3. There is one main difficulty in visualizing and mapping data on small areas and that is localization, identifying the WHERE, which is the main reason for using a map in the first place. Localization is not a major problem when mapping statistical data on areas as large as countries or even whole municipalities.

4. On the wish list for further development of the application was therefore the possibility to show statistical data on a map with detailed background information. Another desired development was the possibility to show animated time-varying data, such as that found in the well-known GapMinder application.

5. The idea was that municipalities should have their own application, covering the area of the municipality, and running on the municipality homepage and in local web servers. Furthermore, the municipalities should be able to create and maintain their own eXplorer applications, because the University does not have the resources to help a large number of customers. There are 290 municipalities in Sweden, and the University deals mainly with research. Another drawback is that the University does not have access to the data accessible to the municipality.

6. This implies the development of a function that could be used to create an eXplorer application, an “eXplorer Wizard”, and thus make it possible for everyone to build eXplorer applications.

## II. Result

7. All this was accomplished during the project, and today these functionalities are included in the geospatial family of eXplorer:

- (a) The background map is Google Map;
- (b) Time animation like that used by GapMinder;
- (c) eXplorer wizard, the Open eXplorer wizard.

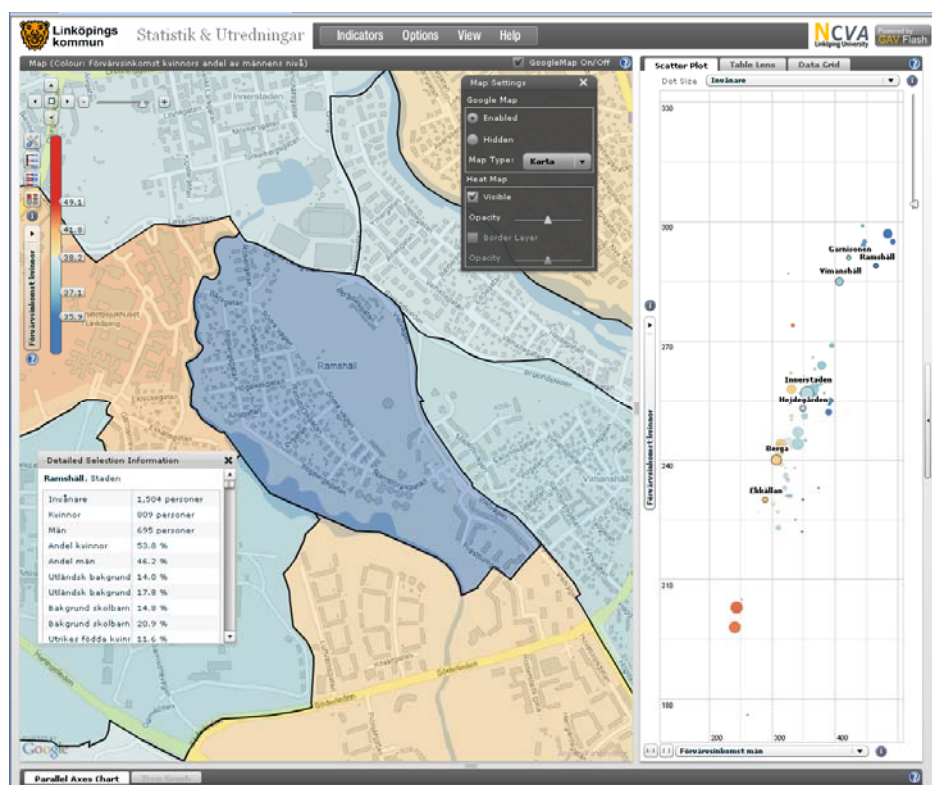
8. Google map and Time animation are now standard in NCVA eXplorer. Open eXplorer is, as the name indicates, open to everyone and free to use.

9. The plan is now to introduce and communicate to the municipalities the possibility of building their own eXplorer applications. Statistics Sweden will offer some support, both in how to handle the application and in the production of statistics. Some municipalities have already started using the application.

10. Various web links showing examples can be found in the footnote <sup>1</sup>

Diagram 1

**Municipality eXplorer with Google Map as background. Opacity can be changed dynamically in the “Map Settings” menu. Map types can be changed into, e.g., Satellite image.**



### III. The “Data from the Map” application

11. The second application to be mentioned in this paper is one that, contrary to eXplorer, does not put data on to the map and visualise it. Instead, this application only uses the map to identify the WHERE, the area of interest, not to display, present or visualize data on a map. Data from the Map is a tool that deals with generating information on an

<sup>1</sup> Examples on what has been done in the Linköping municipality can be seen at: <http://www.linkoping.se/Om-kommunen/Fakta-om-Linkoping/Statistiska-fakta-om-Linkoping/visualisering/> (Use links on the right hand side of the page under: "Relaterade länkar"). Other small area applications can be seen on the Statistics Sweden Homepage, e.g. the *Postnummer eXplorer* (Zip code statistics) at: [http://www.scb.se/Pages/List\\_\\_\\_261736.aspx](http://www.scb.se/Pages/List___261736.aspx) The Open eXplorer Wizard can be reached at: <http://ncva.itn.liu.se/explorer/openexp?l=en>

area that is not predefined, but is freely and temporarily defined by the user. The system then generates information for that particular area in a statistical report. The user draws an area, a polygon, on a detailed street map using a drawing tool. The application identifies information points within the polygon and then aggregates data for the polygon from a separate database holding the information. The aggregated data is transferred to a report, e.g. in Excel, where it is presented in tables and graphs.

12. Today, the application builds on MS MapPoint, which is a commercial Microsoft mapping software that includes the Bing street map that is installed on local personal computers. Visual Basic (VB) programmability is also included. The VB programmability is used in the Data from the Map application to include an AddIn that initiates the creation of the report. Apart from this, only a few of the functions in MapPoint are used. Priced at 300 Euro per license, MapPoint is very affordable.

13. To this is added an information database, with data in this case from Statistics Sweden. The price of the database part depends on the amount of data required.

14. A prototype has also been built for the Internet but has not yet been launched.

15. Despite the many functions in MS MapPoint, Statistics Sweden believes that Data from the Map is as close to a “One click on the button” application as it is possible to get today. Users need only to understand how to find their area of interest and to draw a polygon of that area in the map.

#### **IV. Grid database**

16. Technically, Data from the Map is a very good example of how statistical grids can be used, since the spatial object selected within the area is in fact a grid, measuring 250m x 250m in urban areas and 1km x 1km in rural areas. The size is chosen for confidentiality reasons. Those grids that have their centroid within the polygon are selected and their grid-Id's are transferred to the grid-database. In this version of Data from the Map, the centroid is a Population Centroid located to the part of the grid where most people live. This has shown to considerably increase the accuracy of the result.

17. The data are not stored in MapPoint but in a separate database, e.g. Access. Some customers use MS SQL Server. The data in the database can be whatever is of interest to the user. The shape of the report is adapted to the user's requirements and the report is filled in with data for the selected area. The report can also be customized by the user.

18. Currently, Statistics Sweden has about 50 customers of the Data from the Map application. The largest installation has 40 local licenses of MapPoint and a statistical database with about 30 different variables, 20 of them from Statistics Sweden. Most installations are, however, fairly small with 1-5 licenses and 5-10 variables.

Diagram 2  
Data from the map

