EUROPEAN FORUM FOR GEOSTATISTICS

QUALITY ASSESSMENT: A BENCHMARKING APPROACH

SUMMARY

This paper represents a very first attempt to address the problem of designing a proper quality assessment for the emerging Geostat Dataset. We have proposed a benchmarking approach. This will involve a comparison between a given system at a point in time with a ideal state of a comparable system.

We have previously argued that a product like the spatial dataset produced by the NSI's to be integrated into the so-calledGeostat grid dataset, cannot be considered in isolation. We need to consider the dataset, together with the production processes that produced it in order to make sure that the qualities of the datasets are comparable.

The benchmarking system under development here is based on the general description that was described in the paper "Geostat 1B production process_bigpicture.docx" attached to the Geostat 1B intermediate report in December 2012. This considers a process that extends over a series of 8 sub- processes:

1. Data model
2. Data capture
3. Object- based statistical microdata databases
4. Non- spatial, Spatial and Temporal- analysis
5. Compilation of National, European or Global Geostat dataset(s) for dissemination
6. Dissemination
7. Feedback on real user needs
8. Overall quality assessment

In the Geostat projects the focus is on the development of a series of NSI's spatial datasets that with time will constitute a fully harmonised system. In this process the focus will be on issue 4 in this list, because it is under this section that in many NSI's the spatial microdata reference is produced. A quality assessment will therefore consist of two levels, on broader, and one more focussed on these issues.

The biggest challenge is to produce the outline for an "ideal" dataset and production process. However, when this problem is solved, we propose that both current and ideal products and processes are described with a METADATA approach. On this foundation , a benchmarking process for quality assessment may be produced. We are however, not quite there yet.

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Contents

IN SEARCH OF A SHARED GLOBAL TO LOCAL MODELLING STRATEGY

BENCHMARKING

In a quality assessment we should compare a given dataset with what is "true", or the fact. This is of course very difficult since all descriptions are hypothetical and only more or less "true". We therefore believe that a quality assessment should depend on a method that takes into account the whole production process and the resulting product as compared with an ideal system of statistics and the ideal production process that brings it forth. This is the idea of a benchmarking approach. It depends on our ability to structure our dataset proposals in such a way that they all may be compared with an ideal for the production of statistics in Europe.

The benchmarking idea is directly related to the project idea

1. The "Real" GeoStat dataset
   With the GeoStat dataset we only imply the dataset that is produced through the Geostat project. We do not imply the whole statistical system. At present this dataset has only one variable; the gross population. In the future this dataset may be extended to imply more variables and also differentiate between day- time and night- time populations.
2. The "Ideal" Geostat and its production
   In this paper we are discussing a benchmarking procedure to make a quality assessment for the GeoStat dataset. It is not meant as an effort to make a quality assessment for the whole dataset of an NSI or a group of NSI's. Therefore the "ideal" dataset and production process we describe here only relates to a GeoStat (grid) dataset, and not to the whole statistical system.
3. Benchmarking to compare the "Real" with the Ideal".
   The Benchmarking approach suggested here is intended as a method to compare the real with the ideal. To see how it scores in this comparison. .

This has been the idea of the author's Geostat 1A "Vision" report. This could be further developed and "reduced" to a form that may be used for a benchmarking approach to quality assessment.

A TRUE OBJECT MODEL IS POINT- BASED IN TERMS OF SPATIAL REFERENCE

We believe that in an object- based system all instances should be identifiable with their key attributes based on observations in space and time. This means that the only true foundation for population statistics is the individual citizen, and the only true spatial reference is the smallest unit of geographical reference that the system allows. From this foundation all kinds of relatively "correct" aggregations will be possible.

The system should be point- based in the sense that it is assumed that the basic (single object) entity of human systems are the individual human being (citizen) . Ideally, each individual in such a system is registered with an ID and reference to a fixed position in space (its geo- reference) and time (its time stamp) of the observation.

1. Any logical (no spatial or temporal) distribution of objects (e.g. citizens) .
   How does the aggregation of all grid statistics (P-grids) compare with the aggregation for the same region provided by the national statistical institute for a given region or set of regions?
   a. The true total population of a region or set of regions
   b. The hypothetical, assumed total population
2. The spatial pattern of distribution of objects in space
   What is the quality of the spatial distribution of a population in space
   a. The true distribution of the population in space

    b. The hypothetical, assumed distribution in space
3. The temporal pattern of object attribute changes over <u>time</u>
    a. The true change in the population over given points in time
    b. The hypothetical, assumed change in the population over given points in time

SPATIAL DISTRIBUTIONS

We are here concerned with patterns formed by the distribution of objects in space. Such patterns are best studied by aggregation objects to a system of regular tessellations. The size of the grids used is dependent on the resolution of available data and the scale interval where it is going to be used. In the Geostat project we have focused on the use of km grids that are useful for spatial analysis from 100km windows (a standard national region or very small country) and up to the global level. This grid is a good standard size for use on the scale of Europe with reference connections down to National and up to Global systems.

The Geostat project is dedicated to the idea of mapping the spatial distribution of the EU+ populations according to the 2010-11 census onto 1km grids. However, the quality assessment should not be limited to one gridsize only. We assume the use of a hierarchy of grids that may be aggregated etc. in database environments without the use of GIS. This is achieved by registering objects or collections of objects as units in space and time. For efficient manipulation all references (codes) should be alpha- numerical. In a point- based system with an efficient alphanumeric coding system

STATISTICAL DATA AS A PRODUCT

1. <u>Data model(point- based foundation)</u>
   Data modelling according to the Object approach. It is essential that over time the NSI's of Europe will implement the same basic object modelling structure. It is important to note that for professional modelling purposes. This means that the object features (sometimes provided by the NMA's) and the attributes (produced by NSI's) should refer to this same fundamental model. Each object- type will be referred to with an identification code, a spatial reference to where the object instance was observed and a timestamp for the observation. Ideally both NMA's and NSI's should share the ame data model to ensure the proper integration of geography nd statistics.

STATISTICAL SYSTEMS AS A PRODUCTION PROCESS

2. <u>Data capture</u>
   Data capture in response to the standard (?) data model recommended for Europe and the GGIM work. Censuses are just one of many methods used to capture the information needed for providing the attributes required by the model. All observation of attributes will be stored with the id- code, the spatial reference (coordinates) and the timestamp.
   The critical issue in terms of quality here is the resolution of the smallest aggregation used. We have used the term location here. (Coordinates for Apartment, Street address, Building or real estate unit or if nothing else is available then the geometric centre of census areas)
3. <u>Object- based statistical databases</u> (microdata database system)
   The next major step in the process is to build efficient statistical databases that may be related to the data model as implemented in harmony with the data model.(see step 1). It is sessential that all object attributes are stored as point data. This ensures that most data processing can be accomplished outside GIS systems. These have generally relational database structure where all object tables, are connected with a geography table containing all geographical "part of-" , "belonging to-" and other relations. (e.g. object x belongs to; apartment a, address b, building c, realestate d, censius area e, ..municipality m, region, n...etc.). Both non- spatial and spatial selections should render the same result.
4. <u>Spatial and temporal analysis</u>
   This part of the process is processed with the help of the use of GIS tool. Usually this may-, when

processing the information stored in dedicated statistical databases-, be accomplished without any dependence on other (e.g. NMA-) datasets. Such data are used for orientation only. However, NMA datasets may prove very valuable for processes to compensate for the lack of a high resolution object base-. Analysis here is generally concerned with the production of analysis types that are to be considered as parts of a data infrastructure (e.g. the delineations of urban areas). One of the most fundamental system analysis required to demonstrate the hierarchal structure of aggregations needed. This relates to hierarchies of both regular and irregular tessellations and their relationship..

5. Compilation of (National-, European- or Global-) Geostat datasets for dissemination
   The compilation of datasets for dissemination involves a series of controls in addition to that of quality. One of the more critical controls are those related to confidentiality and other rules.
6. Disemination
   Dissemination of data is of two types. a) Standard data collections that follows a given specification or standard. b) dataset that are produced for a customer according to varying spacifications. Dissemination also depends on it use in two very different user groups; public authority (e.g. data needed for a GGI or GGIM system) use on the one hand and private use as dominated by specifications
7. Use (in response to “real” and “assumed” user requirements)
   This type of spatial analysis is done in response to specific, not general data requirements. We often refer to these as “Use Cases”.that may serve as a general illustration of the use of e.g. spatial statistics.

QUALITY ASESSMENT

8. Overall Quality assessment

QUALITY ASSESSMENT: A BENCHMARKING APPROACH

TO ASESS THE QUALITY OF THE “BOTTOM- UP” WITH A BENCHMARKING APPROACH

The idea of a quality assessment is based on a comparison between a given dataset and the production process that has produced it on the one hand and an ideal statistical system and an ideal production process on the other. Without such a comparison a quality assessment does not make sense. Therefore the start of any quality assessment should start by describing the system we would like to achieve. In the Geostat project this was the task of the vision provided by the Geostat 1A project. I suggest that a complete strategy for quality assessment should cover all national, European and Global levels.

1. National, European and Global GGIM modelling strategy
   - 1.1. Shared modelling strategy
     NSI data model (Benchmarking real with ideal modelling strategy)
     The quality of the data model-, or modelling strategy- designed for uses on all levels of public authority from local to global. The data model used compared with the data model of that of an ideal European data model. These concerns the Vision adopted.
   - 1.2. National Production process
     - 1.2.1. Data capture (Benchmarking real with ideal data capture strategy)
       The quality of the procedure used for capturing data. This should be compared with an ideal method implemented for capturing data
     - 1.2.2. Spatial micro- database (Benchmarking real with ideal database strategy)
       The Quality of the database system selected for storing the data, This should be compared with an ideal database structure.
     - 1.2.3. Spatial analysis (Benchmarking real with ideal post production strategy)
       The quality of the spatial transformations that may be executed on the data should be compared with the transformations of an ideal system

   1.3. Dissemination of national spatial datasets (Benchmarking real with ideal dissemination strategy). The quality of the proposed dataset disseminated as compared with the ideal dissemination of ideal European dataset
2. European post- production process (For EGIM)
   2.1. Shared modelling strategy
   2.2. European post- production (Harmonisation 1: The Geostat project)
   2.3. Dissemination of European spatial datasets
3. Global post production process (for GGIM)
   3.1. Global post- production (Harmonisation 2: A UN GeoStatistical project)
   3.2. Dissemination of Global spatial datasets
4. Use (Benchmarking real with ideal response to real user needs)

If we consider the process above, we may assume that same, or a quite similar process is repeated on each of the three hierarchy levels described in the sections above. This means that we will need only one overall or "big- picture description for the whole NSS, ESS, GSS hierarchy.

A Benchmarking approach to Quality assessment

We propose a simple Benchmarking method based on scores achieved for a series of test questions. Related to the whole system of production-, dissemination- and use-. This process may, according to our overview paper be described in terms of a, eight- step process:

9. Data model
    - Input, Process, Output
10. Data capture
    - Input, Process, Output
11. Object- based statistical microdata databases
    - Input, Process, Output
12. Non- spatial, Spatial and Temporal- analysis
    - Input, Process, Output
13. Compilation of National, European or Global Geostat dataset(s) for dissemination
    - Input, Process, Output
14. Dissemination
    - Input, Process, Output
15. Feedback on real user needs
    - Input, Process, Output
16. Overall quality assessment
    - Input, Process, Output

To assess the quality of a description (model) according to an object model depends on the quality of the correlation between the real object and the information object used to describe it. The first demand is that all object descriptions in systems should be comparable, and the methods used to describe them are harmonised throughout the system.

Benchmarking and projects

NSI's will never be able to capture the "true" quantitative or qualitative description of e.g. the population of human beings in their territory. All efforts will have to be more or less imperfect. The challenge to assess the quality of a national system of grids will have to be judged in comparison with that of a "theoretical" ideal statistical system that may be realized for Europe. The universally accepted method for modelling complex systems is the use of a true "object approach" all the way from model structure over data production and dissemination to satisfying real user needs. It is essential to remember that modern Statistical systems are primary designed and built as a key component in modelling efforts according to the devise "If you cannot describe it, you cannot manage it".

From this we may draw the conclusion that in order to develop a statistical system (or any complex system for that matter) we need three sets descriptions (designs). These three descriptions reflect the three main components in a classical project scheme:

A. Descriptions of the current state of the system to be developed
   This could be formulated as a standard system description based on a METADATA approach with explanations (a metadata+ description)
   a. Current data model
   b. Current data capture method
   c. Current statistical microdata database
   d. Etc.
B. Descriptions of the preferred state of the system to be developed
   This could be formulated as a standard system description based on a METADATA approach as under A above.
   a. Ideal data model
   b. Ideal data capture method
   c. Ideal statistical microdata database
   d. Etc.
C. Descriptions of the actions intended to change the current system in the direction of the ideal.
   These actions could be formulated on the foundation as a standard system comparison based on the current and ideal METADATA descriptions above.
   a. Actions to improve the current data model in the direction of the ideal
   b. Actions to improve the current data capture method in the direction of the ideal
   c. Actions to improve the current statistical microdata database in the direction of the ideal
   d. Etc.

Now, Quality control, or the assessment of the quality of a proposal for a new state B (the product) and the actions (processes) C to make them happen is judged with the benchmarking method. According to this method a proposal for e.g. a national dataset (A1) to be useful as part of an European system of spatial statistics, it will together with the processes used (Ca) have to be "benchmarked" by comparison with an ideal dataset & production process (B) and the production processes (Cb).

1. Data modelling
   (Organised as a NSS, ESS & GSS sub-project)
   A. Current data model
   B. Ideal data model
   C. Actions designed to develop the data model in the direction of the ideal
2. Data capture as a project
   (Organised as a NSS, ESS & GSS sub-project)
   A. Current data capture method
   B. Ideal data capture method
   C. Actions designed to develop the current data capture method in the direction of the ideal
3. Object- based statistical microdata database
   (Organised as a NSS, ESS & GSS sub-project)

   A. Current statistical microdata database system
   B. Ideal statistical microdata database system
   C. Actions designed to develop the Current statistical microdata database system the direction of the ideal
4. Non- spatial, Spatial and Temporal- analysis
   (Organised as a NSS, ESS & GSS sub-project)
   A. Current method for non- spatial spatial and temporal analysis
   B. Ideal method for non- spatial spatial and temporal analysis
   C. Actions designed to develop the Current method for non- spatial spatial and temporal analysis in the direction of the ideal
5. Compilation of NSS, ESS & GSS spatial dataset(s) for dissemination
   (Organised as a NSS, ESS & GSS sub-project)
   A. Current spatial dataset compiled for dissemination
   B. Ideal spatial dataset compiled for dissemination
   C. Actions designed to develop current spatial dataset compiled for dissemination in the direction of the ideal
6. Dissemination
   (Organised as a NSS, ESS & GSS sub-project)
   A. Current dissemination of the spatial dataset
   B. Ideal dissemination of the spatial dataset
   C. Actions designed to develop the current dissemination of the spatial dataset in the direction of the ideal
7. Feedback on real user needs
   (Organised as a NSS, ESS & GSS sub-project)
   A. Current method for assessing real user needs
   B. Ideal method for assessing real user needs
   C. Actions designed to develop the current method for assessing real user needs in the direction of the ideal
8. Overall quality assessment
   (Organised as a NSS, ESS & GSS sub-project)
   A. Current system for overall quality asessment
   B. Ideal system for overall quality asessment
   C. Actions designed to develop the current system for overall quality asessment in the direction of the ideal

THE BOTTOM- UP STRATEGY

This paper or note contains an effort to approach the problem of assessing the quality of NSI contributions to a future grid representation of a-European System regular grids demonstrating the spatial distribution of the EU+ population according to the EU 2010-11 round of (national) censuses. I believe that an assessment like the one called for here, must take into consideration both the product and the production process. I have proposed to describe this as series of three circular (iterative) processes; one national, one European- (global region) and one Global-.

The foundation for both a Global and European "bottom- up" dataset must be the microdata collected and processed by the individual national states. It is however essential that they are all based on the same data model or modelling strategy.

BOTH "PRODUCT" AND ""PRODUCTION PROCESSES" TO BE BENCHMARKED

From a clean "bottom- up" perspective this process is linear going directly from top to bottom. However, some countries have not implemented a proper geographical dimension in their data capture processes, or use methods other that censuses or registers for data capture (e.g. sampling). These countries are forced to use disaggregation methods. The quality of the resulting spatial dataset will certainly depend on two key dimensions, 1) the resolution of the data to be disaggregated and 2) the auxiliary dataset (like the soil sealing dataset) used for disaggregation. The quality of the resulting national dataset, and all higher aggregations will depend on the quality of the <u>methods</u> used here.

Thus we are not primarily concerned with <u>the quality of the datasets produced</u>. We therefore propose that an assessment of national (NSI-) datasets should be compared with our ideal of a future pan- European "bottom- up" dominated GeoStat dataset. This "ideal" dataset is directly related to the Geostat vision for an "ideal" dataset, and an "Ideal" production process as produced for the Geostat 1A (Vision) work packet.

Please consider the following process

START

DATA MODELL (PRODUCT)

1. Data model (Shared modelling
   - 1.1. Quality criteria 1
   - 1.2. Quality criteria 2
   - 1.3. ......

PRIODUCTION PROCESSES

2. Data capture
   - 2.1. Data capture method 1
     - 2.1.1. Quality criteria 1
     - 2.1.2. Quality criteria 2
     - 2.1.3.....
   - 2.2. Data capture method 2
   - 2.3. Etc.
3. Statistical microdata (spatial) databases
   - 3.1. Quality criteria 1
   - 3.2. Quality criteria 2
   - 3.3. ....

4. Non- spatial, spatial analysis and temporal
   In this project we are of course primarily concerned with spatial datasets.
   4.1. Method 1
      4.1.1. Quality criteria 1
      4.1.2. Quality criteria 2
      4.1.3.....
   4.2. Method 2
   4.3. Etc.
5. Dataset(s) designed and compiled for disemmination
   5.1. Quality criteria 1
   5.2. Quality criteria 2
   5.3. ....
6. Disemination (of the datasets above)
   6.1. Quality criteria 1
   6.2. Quality criteria 2
   6.3. ....
7. Feedback of real user needs
   7.1. Quality criteria 1
   7.2. Quality criteria 2
8. ....Quality assessment

   ITERATE

A metadata description of a System of GeoStatistics ?

In this paper we are focussing on the quality of the spatial dimension of National Statistical Systems (NSS) in a European perspective. In this perspective it is essential to take into consideration 1) that the data must be as reliable as possible, and 2) that the data in terms of the shared modelling strategy in terms of variables and resolution (contents) respond to "real user needs. These issues are related to the form (structure) and contents of the dataset and will have to be discussed separately in response to a discussion of the modelling issue that we have started in the Vision" paper of the Geostat 1A project.

We therefore propose that we as soon as possible try to produce a design for a future ESS with a better spatial and temporal reference that may serve as a frame of reference for our benchmarking system. This design does not have to be perfect or reflecting all "stakeholders" requirements, but it should clearly mark the first step in a process that may lead to something that is better and more harmonised than the current.

Although the idea of an Ideal system of grid statistics is outlined in the work produced for the Geostat 1A project, this has not yet been expressively described in enough detail to serve as a reference for proper quality assessment. However, we will assume here that it is possible to base descriptions of both current and ideal states of both datasets and the production process that is our should be used for its production should be based on a METADATA approach

A METADATA APPROACH

Metadata description	**Current state**	**Ideal state**
1. Data model	1. Current data model	1. Ideal data model
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	d. Etc.	d. Etc.
2. Data capture	2. Current data capture	2. Ideal datacapture method
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	d. Etc.	a. Etc.
3. Spatial statistical microdata databases	3. Current spatial statistical microdata database	3. Ideal spatial statistical microdata database
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	d. Etc.	d. Etc.
4. Non- spatial, spatial and temporal- analysis	4. Current non- spatial, spatial & temporal analysis	4. Ideal non-spatial, spatial & temporal analysis
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	**d.** Etc.	d. Etc.
5. Compilation of NSS, ESS or GSS spatial dataset(s)	5. Current NSS, ESS & GSS spatial dataset(s)	5. Ideal NSS, ESS & GSS spatial dataset(s)
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	d. Etc.	d. Etc.
6. Dissemination practice	6. Current dissemination practice	6. Ideal dissemination practice
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	a. Etc.	d. Etc
7. Feedback on real user needs	7. Current feedback on real user needs	7. Ideal feedback on real user needs
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	d. Etc.	d. Etc
8. Quality assessment	8. Current dissemination practice	8. Ideal dissemination practice
a. Criteria 1	a. Current state 1	a. Ideal state 1
b. Criteria 2	b. Current state 2	b. Ideal state 2
c. Criteria 3	c. Current state 3	c. Ideal state 3
d. Etc.	d. Etc.	d. Etc

TOWARDS A BENCHMARKING STRATEGY

DATA MODELL (PRODUCT)

1. Data model (Shared modelling
    - 1.1. Response to a unified modelling strategy (e.g. GGIM, EGIM or NGIM)
        - 1.1.1. Question 1
            - 1.1.1.1. High Score (as compared with the ideal)
            - 1.1.1.2. Medium score (as compared with the ideal)
            - 1.1.1.3. Low score (as compared with the ideal)
        - 1.1.2. Question 2
            - 1.1.2.1. High score
            - 1.1.2.2. Etc.

PRIODUCTION PROCESSES

2. <u>Data capture</u>
    - 2.1. Data capture method 1 (e.g. Registerbased method)
        - 2.1.1. Question 1
            - 2.1.1.1. High Score (as compared with the ideal)
            - 2.1.1.2. Medium score (as compared with the ideal)
            - 2.1.1.3. Low score (as compared with the ideal)
        - 2.1.2. Question 2
            - 2.1.2.1. High score
            - 2.1.2.2. Etc.
    - 2.2. Data capture method 2 (e.g. Census- based method)
    - 2.3. Data capture method 3 (e.g. Sampling- based method)
    - 2.4. Data capture method 4 (e.g. Mixed method 1)
    - 2.5. Etc.
3. <u>Statistical databases</u> (Microdata management system used)
    - 3.1. Spatial microdata management system 1 (e.g. spatial reference)
        - 3.1.1. Question 1 (e.g. concerning the highest resolution of the sptial reference used (apartment, adresss, building, real estate unit, etc.) for the night- time population)
            - 3.1.1.1. High Score (as compared with the ideal)
            - 3.1.1.2. Medium score (as compared with the ideal)
            - 3.1.1.3. Low score (as compared with the ideal)
        - 3.1.2. Question 2 (e.g. concerning spatial reference for day- time population)
            - 3.1.2.1. High score
            - 3.1.2.2. Etc.
    - 3.2. Microdata managemnt system 2 (e.g. spatial DBMS)
    - 3.3. Microdata managemnt system 3 (e.g. mixed DBMS)
    - 3.4. Etc.
4. <u>Spatial analysis</u>
    - 4.1. Spatial analysis method 1: (e.g. clean bottom- up method)
        - 4.1.1. Question 1
            - 4.1.1.1. High Score (as compared with the ideal)
            - 4.1.1.2. Medium score (as compared with the ideal)
            - 4.1.1.3. Low score (as compared with the ideal)
        - 4.1.2. Question 2
            - 4.1.2.1. High score
            - 4.1.2.2. Etc.
    - 4.2. Spatial analysis method 2 (e.g. mixed methods)

- 4.3. Spatial analysis method 3 (e.g. full dependence on top- down methods
- 4.4. Etc.

5. <u>Spatial dataset(s) for disemmination</u>
   - 5.1. Spatial dataset control 1 (e.g. concerning confidentiality rules)
     - 5.1.1. Question 1
       - 5.1.1.1. High Score (as compared with the ideal)
       - 5.1.1.2. Medium score (as compared with the ideal)
       - 5.1.1.3. Low score (as compared with the ideal)
     - 5.1.2. Question 2
       - 5.1.2.1. High score
       - 5.1.2.2. Etc.
   - 5.2.
   - 5.3. Spatial dataset control 2 : (e.g. concerning INSPIRE standards)
   - 5.4. Spatial dataset control 3 (e.g. concerning other national or international regulations)
   - 5.5. Etc.
6. <u>Disemination</u>
   - 6.1. Dissemination aspect 1: (concerning Search & find services)
     - 6.1.1. Question 1
       - 6.1.1.1. High Score (as compared with the ideal)
       - 6.1.1.2. Medium score (as compared with the ideal)
       - 6.1.1.3. Low score (as compared with the ideal)
     - 6.1.2. Question 2
       - 6.1.2.1. High score
       - 6.1.2.2. Etc.
   - 6.2. Dissemination aspect 2: (concerning services to explore dataset)
   - 6.3. Dissemination aspect 3 ((concerning services to download dataset)
   - 6.4. Etc.
7. <u>Feedback of real user needs</u>
   - 7.1. Satisfaction of real user group 1: (e.g. concerning public authority use for design, implementation and evaluation of direct public action)
     - 7.1.1. Question 1
       - 7.1.1.1. High Score (as compared with the ideal)
       - 7.1.1.2. Medium score (as compared with the ideal)
       - 7.1.1.3. Low score (as compared with the ideal)
     - 7.1.2. Question 2
       - 7.1.2.1. High score
       - 7.1.2.2. Etc.
   - 7.2. Satisfaction of real user group 2: (e.g. concerning Public authority use for design, implementation and evaluation of indirect public action)
   - 7.3. Satisfaction of real user group 3: (e.g. concerning private sector use for design, implementation and evaluation of direct or indirect action(s))
   - 7.4. Etc.
8. <u>Quality assessment of the whole</u>
   - 8.1. Quality assessment of the whole process issue by issue
     - 8.1.1. Model
     - 8.1.2. Data capture
     - 8.1.3. Statistical databases (Microdata management system used)
     - 8.1.4. Spatial analysis

8.1.5. Dataset for dissemination
8.1.6. Dissemination
8.1.7. Feedback or real user needs
8.1.8. Quality assessment
8.2. . Quality assessment of the process as an interacting whole

IN SEARCH OF QUALIFIED QUESTIONS FOR BENCHMARKING

Warning! This is a first tentative effort only! This issue requires serious discussion and drafts over a series of iterations. Special attention should be given to section 4 regarding Spatial analysis. This will require a separate more detailed approach based on the detailed process description to be produced by other Geostat 1B partners.

1. DATA MODEL

An object approach to modelling is based on the idea of a fundamental unit that may serve as the building block for the system to be described. The fundamental unit for describing a social- system is a human being. This may be true, although not often practical, for the description of economic systems. (It is based on the assumption that such a quality assessment is only possible by relating to the design for an ideal system in response to assumed "real" user needs. I believe that the foundation for this could be the sytem outlined in the "Vision" report produced in connection with the Geostat 1A project. I believe that the descriptions sendt by Ekkehard, along with the preferences for the dataset discussed by Vilni et. Al. should be part of this "Design" (see Appendix 3)).

I am not sure about the stand of the standardisation of data models adopted for the NSI's Far less about the acceptance and implementation of the same data model for both NMS's and NSI's in Europe. For many experts in this field it was hoped that the INSPIRE project would have put more emphasis on this issue. Instead it has focused on a data model that works relatively well for geographical attributes only.

Q_1.1: Implementation with the European NSI data model

1. High score: Full compliance with the European data model designed for the EU 2010-11 round of censuses.
2. Medium score:
3. Low score:

Comment:

Q_1.2: SMALLEST UNIT FOR GEO (SPATIAL) REFERENCE

For geographical purposes it is essential that the smallest unit of aggregation is used for geo-reference. This is a question of the smallest unit of aggregation that may be georeferenced. It seems clear that the higher resolution the better. References to buildings is better than to territories.

1. High score: Location
   a. Apartment (includes floor)
   b. Street address (entrance door/stairwell etc.)
   c. Building coordinates (geometric centre).
2. Medium score: Real- estate unit (Main building, geometric centre etc.)
3. Low score: Census district or ennnumeration area (geometric centre)

Comment:

We assume that the smallest unit for proper geo reference is the use of the geometric centre for census areas that generally contain approximately 150 households. These will in urban areas correspond to an urban block (approximately a 100m window), or a considerably larger territory in rural areas. The trend here is to use a location in the scale of Street addresses or building coordinates, because these are needed for many basic social services (fire, health, taxi, etc.).

2. Data Capture

It will be very difficult to describe an ideal method for data capture without admitting a host of methods that however tries to model its system with the highest possible resolution. A system that does not attempt to model e.g. the spatial distribution of the natural population of a country to the resolution of building coordinates, cannot be said to attempt a high quality here.

(this quality assessment should be illustrated with reference to “case studies” (production cases))

Q_2.1: Smallest spatial unit used for data capture

For juridical persons this may be place of work (Street address etc.) or the address onto which the business etc. is registered. The Smallest unit for aggregation is in register- based systems is the individual natural person. For census- based systems the smallest unit is probably the census- of enumeration area.

1. Hight score: Location (Apartment, address, Building or real estate unit)
2. Medium score: Real estate unit, Census district, enumeration area or other sub- municipal area.
3. Low score: Municipality

Comment:

Q_2.2: Method used for data capture

This question is related to the method used for data collection. The crude division here is Register- based methods (most accurate), Census- based methods (good but less accurate than register- based systems(?))

1. High score: Register based aggregation of point based statistics
2. Medium score: Census based statistics
3. Low score: Sampling, disaggregation or similar

Comment:

3. Object- based statistical databases

I believe that an ambitious country should try to realize a database system that includes both “day time” and night time” populations. To ensure a proper harmonisation of the Geostat dataset, I think it would be good if each NSI could build a separate “Spatial database” with the same structure in all EU 27+ countries. This dataset could start out small and grow over time.
(this quality assessment should be illustrated with reference to “case studies” (production cases)or examples)

Q_3.1: Method use for spatial distribution

In the Geostat project e have been discussing the spatial distribution of a given population according to three methods. It is probably reasonable to assume that spatial distributions according to bottom-up methods are necessarily of better quality than hybrid methods, and both of these preferable to top-down methods.

1. High score: According to the bottom-up method
2. Medium score: According to the top-down (dis- aggregation or spatial re- distribution) method
3. Low score: According to a hybrid method (this include sampling bethods)

Comment: Only a few NSI's depend on pure point- base systems to serve as a foundation for the spatial dimension of their statistical systems. Although it stands to reason that one should use the geographic reference with the highest resolution available for the statistical system i question, many NSI's still do not capture and store geographical references with micro- data. To compensate for this they have to use "Top-down" or some "Hybrid" method.

Q_3.2: Have grid datasets but stored in non LAEA projection

The Geostat project is concerned with the production of, and improvement of the quality of a system of regular tessellations (square grids) according to the LAEA projection. This means that older datasets that are based on data capture methods other that aggregations
Rina has described the problem of transformation to control the quality of transformations like these)

1. High score: Direct aggregation from decimal coordinates to points to LaEa
2. Medium score: Transformation from a local projection to LaEa (local geoid)
3. Low score: Transformation from a global projection to LaEa (global geoid)

Comment:

Q_3.3: Method used for handling border problem

The foundation for a point based grid system will have difficulties with achieving a correct or comparable results that increases with the size of the grid. For km grid the overlapping problem is considerable. There are different ways to handle this problem. In anticipation of a European standard we might, in a quality assessment,

1. High score: Overlapping
2. Medium score: Cutting the grids with a border
3. Low score: Moving population to neighbouring grids on the right side.

Comment:

4. Non- spatial, Spatial and Temporal- analysis

Spatial analysis relates to basic manipulations that may be executed on the dataset when disseminated over the internet. It is for example assumed that regardless whether the user selects a set of grids covering a series of Nuts 3 regions aggregated to irregular- or regular- tessellations one should get the same total.

(This spatial analysis may also include “top-down” or disaggregation processes that may become necessary in this section to add data with higher resolution to the section C below. (See here the comments sent by Ola (Appendix 2) regarding the Quality assessment proposal from Jean Luc, should be included in this section. This method is important in order to assure the best possible correlation between the “top-down” and the “bottom- up” results achieved.)

Quality criteria should be discussed supported by PRODUCTION CASES.

Q_4.1: The border and point dataset used for aggregation / disaggregation

The quality of the aggregation will depend on the quality of the border- map used. Ideally all aggregations and disaggregations should use the same or at least comparable border datasets. Crudely put this quality is dependent on the resolution of both the point coordinates used and the resolution of the border map.

1. High score: Both high resolution map and high resolution points for smallest spatial aggregation
2. Medium score: Dissimilar resolution between the two.
3. Low score: Neither high resolution for the border map nor the point dataset used for the aggregation

Comment:

Q_4.2: Correlation between aggregations for regular- and irregular- tessellations.

It has been argued that one key control of the quality of a given statistical system is that the total aggregation for regional statistics is given by comparing the results of traditional censuses or register-based aggregations with the results of grid aggregations.
(this quality assessment should be illustrated with reference to “case studies” (production cases))

1. High score
2. Medium score
3. Low score

Comment:

5. Compilation of National, European or Global Geostat dataset(s) for dissemination

6. Dissemination

It makes sense to judge the quality of the dissemination method implemented by the country evaluated according to the basic processes discussed by the INSPIRE system, however special emphasis should be put on efforts to solve the problems that the INSPIRE has neglected.
(this quality assessment should be illustrated with reference to “case studies” (use cases))

Under this topic we should try to assess the quality of the dissemination practices decided for a national system of spatial statistics.

Q_6.1: QUESTION RELATED TO CONFIDENTIALITY RULES

One of the most critical are confidentiality rules. It is important that the EFGS agree on an ideal set of confidentiality rules that we may use for our method for quality assessment. Here we should list a series of three systems of confidentiality solutions and their scoring according to our proposal (vision) for an superior European system of grids.

1. High score
2. Medium score
3. Low score

Comment:

Q_6.2: QUESTION RELATED TO A BUSINESS MODEL

OPEN YET

1. High score
2. Medium score
3. Low score

Comment:

7. FEEDBACK ON REAL USER NEEDS

The Use of data on all levels of public authority from Local to Global

Here the main issue is to judge whether the dataset produced respond to real user needs. For this purpose each national system should try to refer to success stories pointing to the success (or failure) of their datasets to satisfy real user needs.

(this quality assessment should be illustrated with reference to “case studies” (use cases))

Q_7.1 Feedback question 1 to assess real user needs

1. High score
2. Medium score
3. Low score

Comment:

Q_7.2 Feedback question 2 to assess real user needs

1. High score
2. Medium score
3. Low score

Comment:

8. ALL- OVER QUALITY ASSESSMENT

We will of course need an all- over quality assessment of the quality process itself.

Q_8.1 Feedback question 1 to assess real user needs 1. High score 2. Medium score 3. Low score Comment:
Q_8.2 Feedback question 2 to assess real user needs 1. High score 2. Medium score 3. Low score Comment: