Geospatial Information in the Statistical Business Cycle

Prepared by
UN-ESCWA

1 This document is being produced without formal editing
Geospatial Information in the Statistical Business Cycle

Source: UNECE / CES, Common Metadata Framework

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SPECIFY NEEDS  
DESIGN  
BUILD  
COLLECT  
PROCESS  
DISSEMINATE  
ARCHIVE  
EVALUATE
# GENERIC STATISTICAL BUSINESS PROCESS MODEL

## LEVEL 1 + LEVEL 2, VERSION 4.0

### Quality Management / Metadata Management

| 1 | Specify Needs | 2 | Design | 3 | Build | 4 | Collect | 5 | Process | 6 | Analyse | 7 | Disseminate | 8 | Archive | 9 | Evaluate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.1 | Determine needs for information | 2.1 | Design outputs | 3.1 | Build data collection instrument | 4.1 | Select sample | 5.1 | Integrate data | 6.1 | Prepare draft outputs | 7.1 | Update output systems | 8.1 | Define archive rule | 9.1 | Gather evaluation inputs |
| 1.2 | Consult & confirm needs | 2.2 | Design variable descriptions | 3.2 | Build or enhance process components | 4.2 | Set up collection | 5.2 | Classify & code | 6.2 | Validate outputs | 7.2 | Produce dissemination products | 8.2 | Manage archive repository | 9.2 | Conduct evaluation |
| 1.3 | Establish output objectives | 2.3 | Design data collection methodology | 3.3 | Configure workflows | 4.3 | Run collection | 5.3 | Review, Validate & edit | 6.3 | Scrutinize & explain | 7.3 | Manage release of dissemination products | 8.3 | Preserve data and associated metadata | 9.3 | Agree action plan |
| 1.4 | Identify concepts | 2.4 | Design frame & sample methodology | 3.4 | Test production system | 4.4 | Finalize collection | 5.4 | Impute | 6.4 | Apply disclosure control | 7.4 | Promote dissemination products | 8.4 | Dispose of data & associated metadata |
| 1.5 | Check data availability | 2.5 | Design statistical processing methodology | 3.5 | Test statistical business process | 4.5 | Finalize production process | 5.5 | Calculate weights | 6.5 | Finalize output | 7.5 | Manage user support |
| 1.6 | Prepare business case | 2.6 | Design production systems & workflow | 3.6 | Finalize production system | 4.6 | Finalize data files | 5.6 | Calculate aggregates | 6.6 | | |

Source: [www.unece.org/stats](http://www.unece.org/stats)
SPECIFY NEEDS

From Information needs to the business case

- Is the phenomenon measured space dependent?
- Will data be collected from the field?
- Can data be geo-referenced?
- Will the output be presented in the form of maps?
- Is geospatial information available?
DESIGN

• **Formalize**
  • Data model combining geospatial and statistical information

• **Structure**
  • Geo-coding of variables/outputs

• **Organize**
  • Workflow and enumeration areas, maps, GPS,...

Statistical standards:
• SDMX (ISO 17369)
• Dublin Core (ISO 15836)
• Data Documentation Initiative
• Metadata Registries (ISO 1179)
• Corporate Metadata Repository
• Nordic Metamodel – PC-AXIS

Geospatial Standards:
• GIS (ISO 10\9115)
• Spatial Schema (ISO 19107)
• Coordinates (ISO 19111)
• Geo identifiers (ISO 19112)
BUILD

• Applications
  • Automated data entry (coordinates)
  • Quality control (GPS lock)
• Hardware
  • Handhelds, tablets – GPS enabled, maps
• Testing

Statistical standards:
• Common Warehouse Metamodel (ISO 19504)
• Statistical Classification
• Statistical Variables & Characteristics
  • ISO 11179
  • Neuchatel Model, Part II
  • UN Glossary of Terms

Geospatial Standards:
• Spatial Schema (ISO 19107)
• Coordinates (ISO 19111)
• Geo identifiers (ISO 19112)
• Quality principles (ISO 19113)
• Quality evaluation (ISO 19114)
• Encoding (ISO 19118)
COLLECT

• Basic checks
  • Control of the enumerator’s position
  • Respondent-side editing

• Methods
  • Remote sensing
  • Questionnaires, etc.

Statistical standards:
• Statistical Classification
• Statistical Variables & Characteristics
  • ISO 11179
  • Neuchatel Model, Part II
  • UN Glossary of Terms

Geospatial Standards:
• Coordinates (ISO 19111)
• Geo identifiers (ISO 19112)
• Encoding (ISO 19118)
PROCESS

• Integrate Data & Metadata
  • Coding, classifying – statistical and geospatial viewpoint
  • Calculations, aggregations – small areas

• Editing and imputation
  • Avoid systematic errors
  • Hot-deck (geographic proximity)
  • Cold-deck (the same location in previous survey)

Statistical standards:
• SDMX Content Oriented Guidelines
• Statistical Variables & Characteristics
• UNECE./CES: Statistical Data Editing Methods and Techniques I and II

Geospatial Standards:
• Coordinates (ISO 19111)
• Geo identifiers (ISO 19112)
• Encoding (ISO 19118)
• **Analysis**
  • Spatial analysis (e.g. discrimination analysis, etc.)

• **Disclosure Control**
  • Statistical x Geospatial = Increased Risk

• **Quality Control**
  • Statistical, Geospatial
  • To be developed: Quality framework for integrated information (Geospatial with Statistical)

**Statistical standards:**
• IMF: DQAF / SDDS
• ESS: Standard for Quality Reports

**Geospatial Standards:**
• Quality principles (ISO 19113)
• Q. evaluation (ISO 19114)
DISSEMINATE

• Communication
  • Maps, cartograms, etc.

• Management of Releases
  • Management of data x Management of maps

• Management of Queries
  • Identify the caller’s location

Statistical standards:
• OECD: Data and Metadata Reporting and Presentation Handbook
• UNECE: Best Practices in Designing Websites for Dissemination of Statistics
• UNECE: Guidelines for Stat. Metadata on the Internet
• Metadata Registries (ISO 11179)
• SDMX (ISO 17369)

Geospatial Standards:
• Geographic Information – Portrayal (ISO 19117)
• GIS (ISO 19115)
• Data with Metadata
  • Integrated Warehouse, geo-referenced data
• Retention Rules
  • How long are data archived?
• Confidentiality Protection
  • Access permission
  • Released microdata – disclosure control
  • Macrodata – disclosure control for small areas

Statistical standards:
• Common Warehouse Metamodel (ISO 19504)
• UNECE/SDMAX: Statistical Subject-matter Domains

Geospatial Standards:
• Methodology for feature cataloguing (ISO 19110)
Lesson learned
For the new survey instance
SUMMARY
GEOSPATIAL INFORMATION IN THE STATISTICAL BUSINESS PROCESS

• Geographic and cartographic information used in planning
• Geo-referencing of statistical microdata (reporting units)
• Automated data entry
• Remote sensing
• Quality control, workflow control
• Geo-component of data coding, data editing, imputation
• Geo-component of disclosure control
• Spatial data analysis, small areas statistics
• Changes in administrative boundaries
• Dissemination GIS, maps, cartograms
• Queries management – identifying caller’s location
• Geo-referenced data archives
• ...
APPLICABLE GEOSPATIAL STANDARDS

- Geographic Information - Metadata (ISO 19115)
  - Profiles (ISO 19106)
  - Spatial schema (ISO 19107)
  - Temporal schema (ISO 19108)
  - Rules for application schema (ISO 19109)
  - Methodology for feature cataloguing (ISO 19110)
  - Spatial referencing by coordinates (ISO 19111)
  - Spatial referencing by geographic identifiers (ISO 19112)
  - Quality principles (ISO 19113)
  - Quality evaluation procedures (ISO 19114)
  - Portrayal (ISO 19117)
  - Encoding (ISO 19118)
- Codes for the representation of names of countries and their subdivisions (ISO 3166)
APPLICABLE STATISTICAL STANDARDS

- Statistical Classifications
- Statistical Variables and Characteristics
- UNECE/SDMX Statistical Subject-matter Domains (UNECE / SDMX)

- Statistical Data and Metadata eXchange (SDMX) (ISO 17369)
- SDMX: Cross-domain Concepts
- SDMX: Cross-domain Code-lists

- Dublin Core (ISO 15836)
- Data Documentation Initiative (DDI)
- Metadata Registries (ISO 11179)
- Common Warehouse Metamodell (ISO 19504)
- eXtensible Business Reporting Language (XBRL)
STATISTICAL MODELS

- Neuchâtel Model (Classifications, Variables)
- CRISTAL Model
- Generic Statistical Business Process Model (GSBPM)
- Corporate Metadata Repository (CMR)
- IMF: Data Quality Assurance Framework (DQAF)/ Special Data Dissemination Standards (SDDS)
- ESS Standard for Quality Reports
- Nordic Metamodel for PC-Axis
GOOD STATISTICAL PRACTICES

• OECD Data and Metadata Reporting and Presentation Handbook
• UNECE Guidelines for the Modeling Statistical Data and Metadata
• UNECE Guidelines for Statistical Metadata on the Internet
• UNECE Recommendations on Formats Relevant to the Downloading of Data from the Internet
• UNECE Best Practices in Designing Websites for Dissemination of Statistics
• UN-ESCWA: Metadata handbook for Western Asia