

Topographic data production as basis for NSDI - Croatian example

S. Pavičić, M. Rapaić, S. Lemajić

HRVATSKI GEODETSKI INSTITUT

Introduction

- Establishment of NSDI – started in 1990's
- One of basic tasks – creation of TdB
- Production of Topographic data – specific triangle (SGA – CGI - Private Companies)

Preparation activities

- Program of State Survey and Real Estate Cadastre for the period 2001-2005
- STOKIS (Official Topographic and Cartographic Information System of the Republic of Croatia)
 - CROTIS (Croatian Topographic Information System)
- Law on State Survey and Real Estate Cadastre
 - Ordinance on Topographic Survey Methods and State Map Production
 - Guidelines for Orthophoto Production
 - Mapping Catalogue
 - Cartographic Key
 - Guidelines for Aerial Photography
 - Cartographic Generalization with Standardization for State Maps

Program 2001-2005

- Production 603 map sheets of TK25
- Maintaining the cyclic aerial photographing (five years time-frame, 20% per year)
- Finishing the Croatian Base Map 1:5000 (HOK)
- Conversion all HOK in digital format
- Creation of 50% map sheets of Digital Orthophoto 1:5000
- Foundation of digital Registry of Administrative and Spatial Units
- Establishment of multipurpose spatial information system for supporting state and local sector in land management

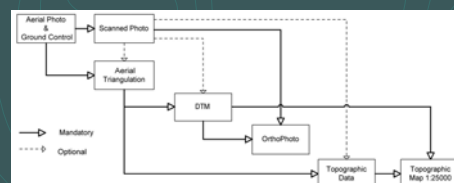
Production of topographic data

- Objective of production – Topographic Database (TdB)
- Topographic Data should fulfill the wide needs of users
- Production in Private Companies



Standardization of topographic data

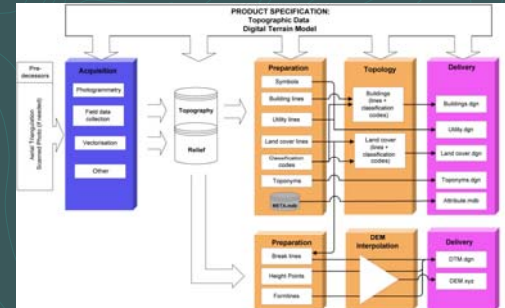
- Croatian-Norwegian Geoinformation project (CRONO-GIP) 2002-2004
 - Aerial Photography and Ground Control, Scanned Photo, Aerial Triangulation, Digital Terrain Model, Orthophoto, Topographic Data and Topographic Map 1:25000



Specification for topographic data

- description and purpose of the Product
- Terminology
- data sources, including obligatory predecessors
- geographic coverage
- coordinate reference systems (horizontal and height)
- description of delivery
- digital format - file format and file arrangement and naming
- technical characteristics of the Product
- technical characteristic of the equipment to be used in production process
- technical description of the production process
- parameters for evaluation of Product's quality
- appendices (Data capture TD Object Selection Criteria, Mapping Catalogue, Classification of Public Roads, Classification of Public Railways, Hydrographical Names)

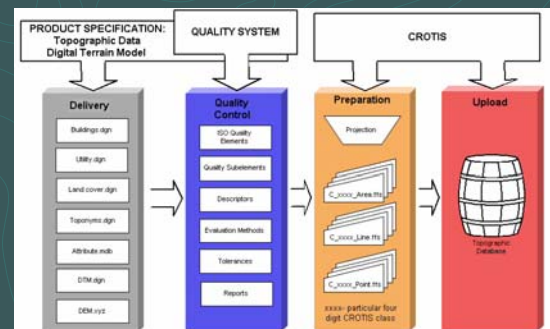
Production of topographic data – acquisition, processing and delivery



Quality Control System

- Delivery
- Quality Plan according to ISO
- Execution of QC
- Quality Evaluation - Reporting

Controlling and database uploading procedure



Quality elements and subelements used for Topographic Data quality control

ISO Quality Element	Quality Subelement	Check ...
Overview	Configuration	- That all items are delivered - Finalities of digital media
	History	Approval of predecessors
Spatial Characteristics	IW and SW description	Producer's information about hardware software, applications, certificates, licenses, etc.
	Model Configuration	Check sensor orientation number of fiducial marks used For analytical plotters, check number of control points program used for model orientation and their distribution in the model Model orientation error Model orientation gross errors > 3 SD
Completeness	Commission	Essential objects
	Omission	Buildings Utility lines Transportation Hydrography Vegetation and land use Topography
Logical Consistency	Domain Consistency	Feature classes, attributes and values
	Format Consistency	- That correct file naming conventions are used - That Misnaming (*) format is used and with parameters according to product specification - That file access >200 is used - That data contains only points, lineworks and text objects
Thematic Accuracy	Geometric fidelity	The data contains only points, lineworks and text objects
	Topological Consistency	The dataset has correct topology
Positional Accuracy	Classification Consistency	Dataset
	Absolut Accuracy	Well defined details Not well defined details Class errors > 1* SD

Process of quality control procedures

- manual full (MF),
- automatic full (AF),
- manual sample (MS),
- automatic sample (AS)

Full Manual Quality Control Procedures

- check all items for Overview quality element:
 - Configuration (all expected documents and files, CD media is usable and the file names)
 - History (predecessors)
 - HW and SW description (instrument calibration Report, vendor name, version number, main purpose of the SW/HW and the technical capabilities for the job are provided)
- Completeness and Logical consistency (some of the items)
 - subelements Commission and Omission
 - Domain consistency and the Format consistency (no undefined attributes and file versions)

Full Automatic Quality Control Procedures

- after manual control of QE Overview
- FME Workbench files
 - minimum size
 - the features are encoded according to the Product Specification
 - the classification text codes according to the Mapping Catalog
 - Geometric representation according to Product Specification
 - check the topological consistency

Sample Manual Quality Control Procedures

- quality control procedure of manual control is done with sampling
- sample size determination based on 95% confidence interval

For sample based control of errors and missing objects					For sample based control of standard deviation						
Number of objects		Pa (%) =			Number of objects		Sample size	F-distribution			
From	To	1.0	2.0	3.0	5.0	From			To		
1	8	all	1	1	1	1	1	26	50	all	1
9	50	8	1	1	1	1	1.54	26	50	5	1.54
51	90	13	1	2	2	3	1.45	51	90	7	1.45
91	150	20	2	2	3	4	1.37	91	150	10	1.37
151	280	32	2	3	3	4	1.30	151	280	15	1.30
281	400	50	3	3	4	6	1.26	281	400	20	1.26
401	500	60	3	4	5	7	1.23	401	500	25	1.23

Pa - tolerance from the Product Specification

Reporting

- Microsoft Excel tables as a templates

Id	Description	E	MS				n/a	2.0	n/a	n/a
Id=1	Toponyms - significant hydrogr	E	MS				n/a	2.0	n/a	n/a
Id=2	Toponyms - settlements	E	MS	111	8	0	0.0	2.0	1	Accept
Id=3	Toponyms - other	E	MS				n/a	2.0	n/a	n/a
Id=4	Building areas - residential	E	MS	4461	200	5	2.5	1.0	6	Accept
Id=5	Building areas - not residential	E	MS	505	80	5	6.3	3.0	6	Accept
Id=6	Building - point objects	E	MS				n/a	2.0	n/a	n/a
Id=7	Building - other objects	E	MS				n/a	2.0	n/a	n/a
Id=8	Utility line and point features	E	MS				n/a	2.0	n/a	n/a
Id=9	Landuse - general	E	MS	2500	125	5	4.0	2.0	6	Accept
Id=10	Landuse - special purpose	E	MS				n/a	2.0	n/a	n/a
Id=11	Transportation-classified roads	E	MS				n/a	1.0	n/a	n/a

Data preparation for TdB

- FME files (ffs)
- Unique coordinate system
- Data structure according to CROTIS (Specification for TD)
- Data upload in SGA

Conclusion

- Republic of Croatia started processes with the goal to create NSDI
- All processes are guided by the SGA
- Production of spatial data have started
- Quality Control System according to ISO norms is in process of development and implementation
- all Products are standardized with State warranty
- Croatia have the obligation to perform integration into the European spatial system (geodetic datum and cartographic projection)

THANK YOU FOR ATTENTION!

- Croatian Geodetic Institute
- ZAGREB – CROATIA
- www.hgi.htnet.hr