

Quality control of TK25 in Croatia

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ABSTRACT

Production of TK25 started in 2006 for Istria region which is covering with 20 map sheets. Contract was signed with private company and at that time there detailed specifications did not exist. Production was made from aerial images in scale 1:20000 and according to the technical specification written for bid. In 2007 first maps were produced and a lot of questions come up, new cartographic key, standardization between different companies and quality level of final map. Croatian-Norwegian geoinformation project (CRONO GIP) started in 2002 and till 2004 solved almost all question from data capture, generalisation, printing and quality control principles. In 2008 Croatia has almost 400 official maps in scale 1:25000.

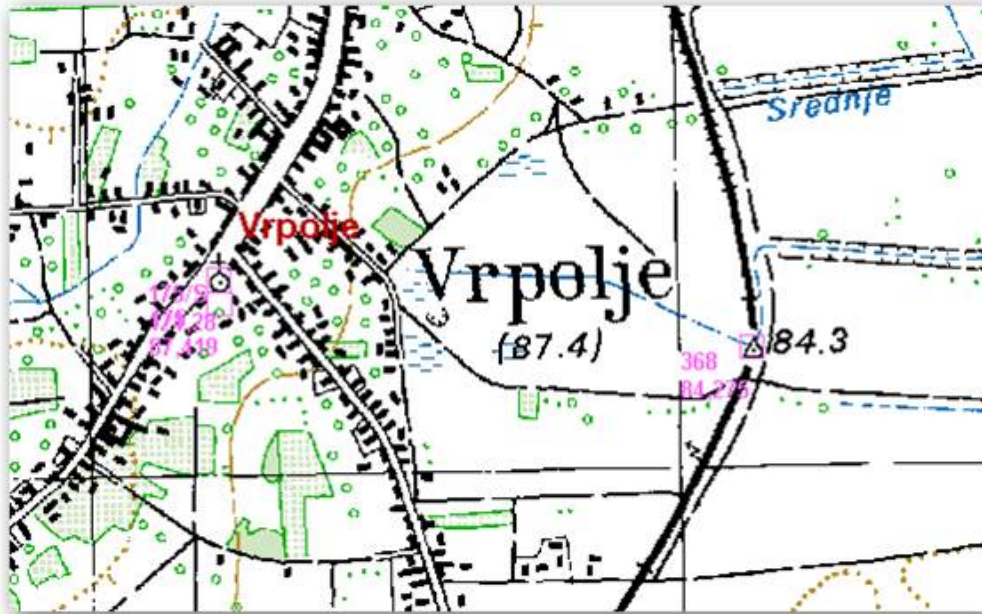
INTRODUCTION

Since 1996 State Geodetic Administration covered almost all area of Republic of Croatia with Geodata. Department for Topographic Survey and State Maps of State Geodetic Administration (SGA) is leading topographic survey and production of state maps. Also they are building topographic and cartographic databases as well as official state maps. Production of geodata and maps is covered by contracts with private sector, but officially status product are becoming after quality control process in Croatian Geodetic Institute (CGI).

In 1999 Croatian Parliament accepted the Law on State Survey and Real Estate Cadastre which defined founding of public institutions for state survey and real estate cadastre works - Croatian Geodetic Institute (CGI). One of the main tasks of CGI was quality control of SGA's data. In continuation to the mentioned Law in 2001 the Book of ordinance for topographic survey manner and state maps production was adapted. Through those regulations official status of SGA's data, actively topographic data and state maps was defined.

PRODUCTION OF TK25

Product Specification for TK25 production is dealing with all necessary elements needed for efficient production: using predecessors, cartographic generalization, map editing, field update and final process of printing. Specification is also covering general information's like usage of TK25, potential users, data source provided by SGA (Picture 1) and TK25 predecessors (Topographic Data and Digital Terrain Model- Picture 2), language used on maps. Superior requirements described in Specification are geographic covering of all maps, definition of official coordinate reference system in positional and vertical and indexing and naming of TK25. Except rules for map production man part of specification are also appendices: Delivery List, Production Report, Map Sheet Nomenclature and Names, Cartographic Generalisation, Cartographic Key, Settlements Names, Guidelines for Toponyms and Report Tables.



Picture 1: SGA's Data source



Picture 2: TK25- predecessor

The Producer of TK25 shall deliver all items described in Specification: Delivery List, Production report, final cartographic vector data, color separated postscript files (and film for each color), printed maps and final digital raster file (including georeferencing file). Producer is delivering maps on Quality control direct to the Croatian Geodetic Institute.

QUALITY CONTROL OF TK25

At the beginning of controlling of TK25 quality control system was based on "experience" and full control method. This took a time and progress of making officially status (proclamation) was very slow. In 2002 started Croatian Norwegian geoinformation project (CRONO GIP) for drafting of Product Specifications in SGA, establishing of Quality control system in CGI and establishment of topographic database in SGA. In respect with quality control CRONO GIP accelerated process of proclamation.

The result of CRONO GIP in 2004 was QC documentation with general documents (basic principles, guidelines for sampling), procedures for control of quality elements and practical check lists. The approved confidence level for QC is 95%. Also, the result of CRONO GIP was a set of Specifications: Aerial Photography and Ground Control Points, Scanned Photos, Aerial Triangulation, Digital Terrain Model, Orthophoto, Topographic Data and Topographic map in scale 1:25000 (TK25). Building of specifications and quality control documentation was in line with International standards.

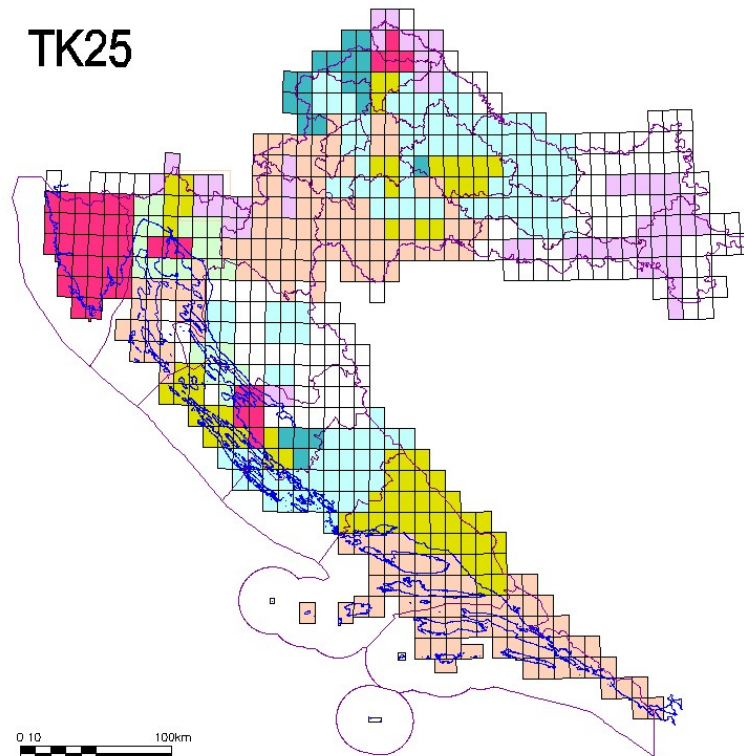
Each of the Products mentioned above serves as the predecessor for the following production phase so that each company can be in state to undertake and proceed the job from any other company. Two "main" products are needed for production of Topographic map in scale 1:25000: Topographic Data (TD) and Digital Terrain Model (DTM) and for their production, the Aerial Triangulation is the predecessor. It is planned that each production step in form of the Product will have to be quality controlled and approved before further usage (Rapaić, 2004.).

The whole territory of RH is covered with 594 map sheets in scale 1:25000 according to the official map sheet nomenclature published by SGA. Current status of quality control is shown on Picture 3. Different colors mean different company which produced the map. The process of QC consists of some few phases, in first phase QC in office and checking in the field, second phase consists of QC of bug fixes and evaluation for last phase i.e. production of films and test prints. In last (third) phase subject of QC is testing of quality of films, test prints and final data (vector data, raster and post script).

The Production of TK25 is done according to the Topographic data (TD) vector and TD is the main source for production i.e. TD is a predecessor for TK25.

According to QC documentation several quality methods could be used: full manual, full automatic or sample manual. Practically list of objects controlled in CGI is: map frame and coordinate grid, map description, trigonometric points (according to the official database and compatibility with relief), relief review, check of settlements, objects and utility (according to the TD, generalization), hydrography (objects, type of waters, compatibility with relief, generalization), traffic (categorization, objects, generalization), land cover and land types, check of toponyms (according to the sources), edge matching,

field checking (check with reality, accuracy) and general alignment of topographic symbols with cartographic key (Specification) including standardization of different producers.



Picture 3: Current status of quality control

Sampling methods in TK25 quality control is using by dividing map in kilometer squares and approximately area of each sheet (136 km²). Each square kilometer is treated as one object (for 136 objects sample is approximately 20). Procedures for determination of sample size are described in quality documentation (Guidelines for Sampling, CGI, 2004).

Quality control findings for sample should be extrapolated for full map and obligation of producer is to correct findings in sample and check and correct the content outside of sample. All corrections should be documented in producers report.

After map is technically corrected CGI proposes the finalization of production i.e. preparation for printing (color separation), production of postscript files and films and finally printing the map.

Producer is also delivering final raster georeferenced files (tif, tfw), postscript files, films, printed maps and technical documentations with internal quality control findings (map dimension and coordinate network control).

Using densitometer CGI is checking films (for cyan, magenta, yellow and black color) and using software is checking postscript files and comparing them with Product specification. Final map print is checking visually comparing with beforehand printed and approved maps.

Report with findings for raster files, postscript files, films and printed map is document with proposal for proclamation of topographic map. Finally, Director of SGA has obligation to publish map official.

CONCLUSION

Production of TK25 (400/594 are official) is still in progress, first experiences enabled to improve implemented documents and technology procedures. Very important part in the cycle of improvement lies on the Croatian Geodetic Institute that controls most of the geodetic Products and their role is to evaluate the Products and its Specification in the same time. It has to be pointed out that the Quality Control System according to ISO norms is in constant process of development and improvement. The challenge in future is approval of new geodetic datum and new map sheet nomenclature (already officially) and believable change of cartographic key and finally update of map content. Importance of TK25 quality control is huge also because of building of National Spatial Data Infrastructure (NSDI) where only approved and official data should be stored.

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