Republic of Kosovo
Kosovo Cadastral Agency (KCA)

Human Resource Development Project on Geo-Spatial Information of Kosovo

Final Report

Summary

March 2015

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

PASCO CORPORATION
KOKUSAI KOGYO CO., LTD.

EI
JR
15-123

Currency exchange rate

Currency unit: Euro (EUR)

1 euro = 129.83 yen (designated by JICA as of April 2015)

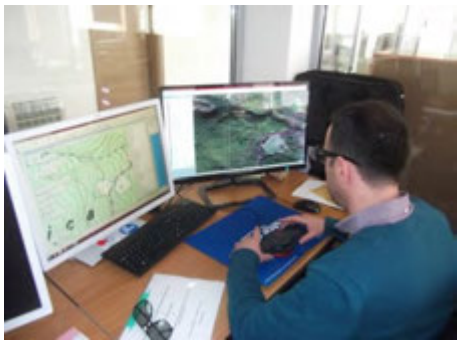
Photos

Counterpart (KCA)

Various Discussions with KCA

First Seminar

Second Seminar



Digital Plotting

Digital Compilation

Field Completion

Digital Compilation after Field Completion

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Abbreviations

BKG	Bundesamt für Kartographie und Geodäsie (German Federal Agency for Cartography and Geodesy)
DeGAP	Department for Electronic Governance and Administrative Processes
DMC	Digital Mapping Camera
DTP	Desktop Publishing
EPA	Environmental Protection Agency
ETRS80	European Terrestrial Reference System 1980
EU	European Union
GCP	Ground Control Point
GIS	Geographical Information System
GML	Geography Markup Language
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GRS80	Geodetic Reference System 1980
IGN	Institut Géographique National (National Geographic Institute, France)
ISP	Institute of Spatial Planning
JPGIS	Japan Profile for Geographic Information Standards
KAS	Kosovo Agency of Statistics
KCA	Kosovo Cadastral Agency
KCLIS	Kosovo Cadastre Land Information System
KOPOS	Kosovo Positing System
MEI	Ministry of European Integration
MEP	Ministry of Environment Protection
MESP	Ministry of Environment and Spatial Planning
MI	Ministry of Infrastructure
MPA	Ministry of Public Administration
NSDI	National Spatial Data Infrastructure
NSII	National Spatial Information Infrastructure
USGS	Unite States Geological Survey

1. Outline of the Project

1.1. Background and Objectives of the Project

The Republic of Kosovo (hereinafter referred to as Kosovo), which was once an autonomous province of the Republic of Serbia, declared independence in 2008. It has an area of 10,887 km2 and a population of approx. 1.82 million (World Bank statistics 2013).

The Government of Kosovo is addressing various issues including the establishment of a legal system and economic growth and is planning to formulate a master plan to develop the Spatial Plan of Kosovo for urban and regional development and conservation of the natural environment. Therefore, the government is in need of highly-reliable (1/25,000) national base maps for the formulation of such plan. However, the only national base maps (1/25,000) that the government had at the commencement of this project were printed maps created in the 1970s. In addition, the counterpart organization, KCA, has neither experience in creating topographic maps nor sufficient engineers, equipment or budget for collecting accurate topographic information.

The Government of Kosovo is also planning to introduce "E-Government" as part of the reform of public administration. Its introduction will enable online provision of public and administrative services and various types of information. Its introduction will also require the creation of digital topographic maps and GIS data and the establishment of NSDI and a Geo-Portal.

The purposes of this project are to develop 1/25,000 digital topographic maps and fundamental GIS data, which have a wide range of applicability, study ways to promote their utilization and enhance awareness of the maps and data, and to transfer the relevant technologies to KCA. The outputs of this project shall be the first step towards the solution of various problems faced by the Government of Kosovo.

The Project will be implemented for a period of approx. 20 months, from October 2013 to May 2015.

1.2. Project Purpose

The following purposes were adopted for the achievement of its objectives of the objectives mentioned above.

Project purpose:

- **Development of geo-spatial data***
- **Development of human resources (of KCA) to be engaged in geo-spatial data-related work**
- **Promotion of the utilization of geo-spatial data**

Outputs:

- **1/25,000 digital topographic map**
- **1/25,000-level GIS data**
- **Development of specifications necessary for the creation, revision and provision of geo-spatial data**
- **Development of human resources relating to geo-spatial data**

* Hereinafter, the combination of the digital topographic map and the GIS data will be referred to as "geo-spatial data".

1.3. Project Target Area

Figure 1-1 shows the original target area of the Project agreed during the Detailed Design Survey. KCA and the Project Team agreed that the area indicated in Figure 1-2 should be the target area in the discussion on specifications. The revised target area includes approx. 9,863 km^2 of the territory of Kosovo (of its total land area of 10,887 km^2).

The details of the discussion that led to the decision on the new target area are described in "[4] Discussion on Specifications" in Chapter 2.2 Details of Project Implementation.

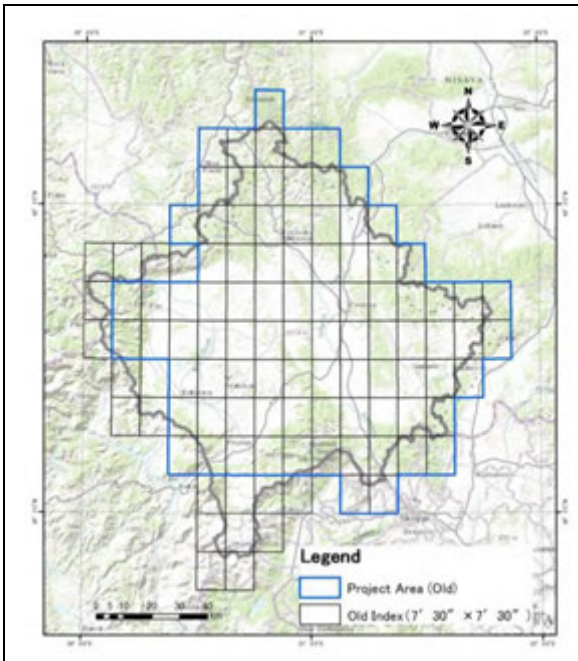


Figure 1-1 Target Area of the Project (Original)

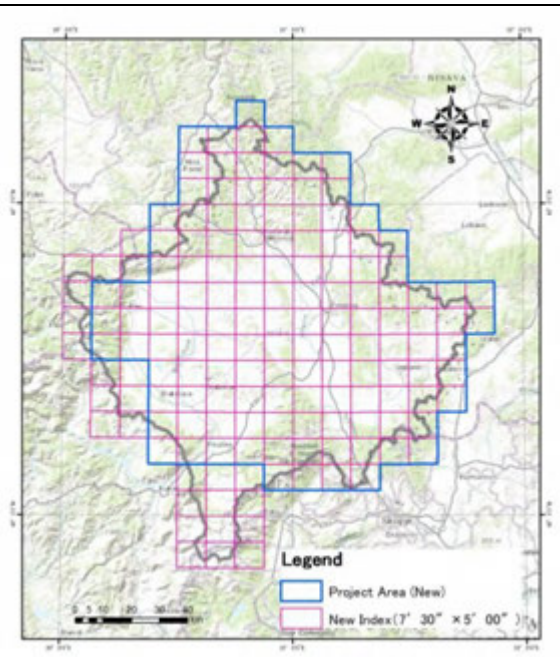
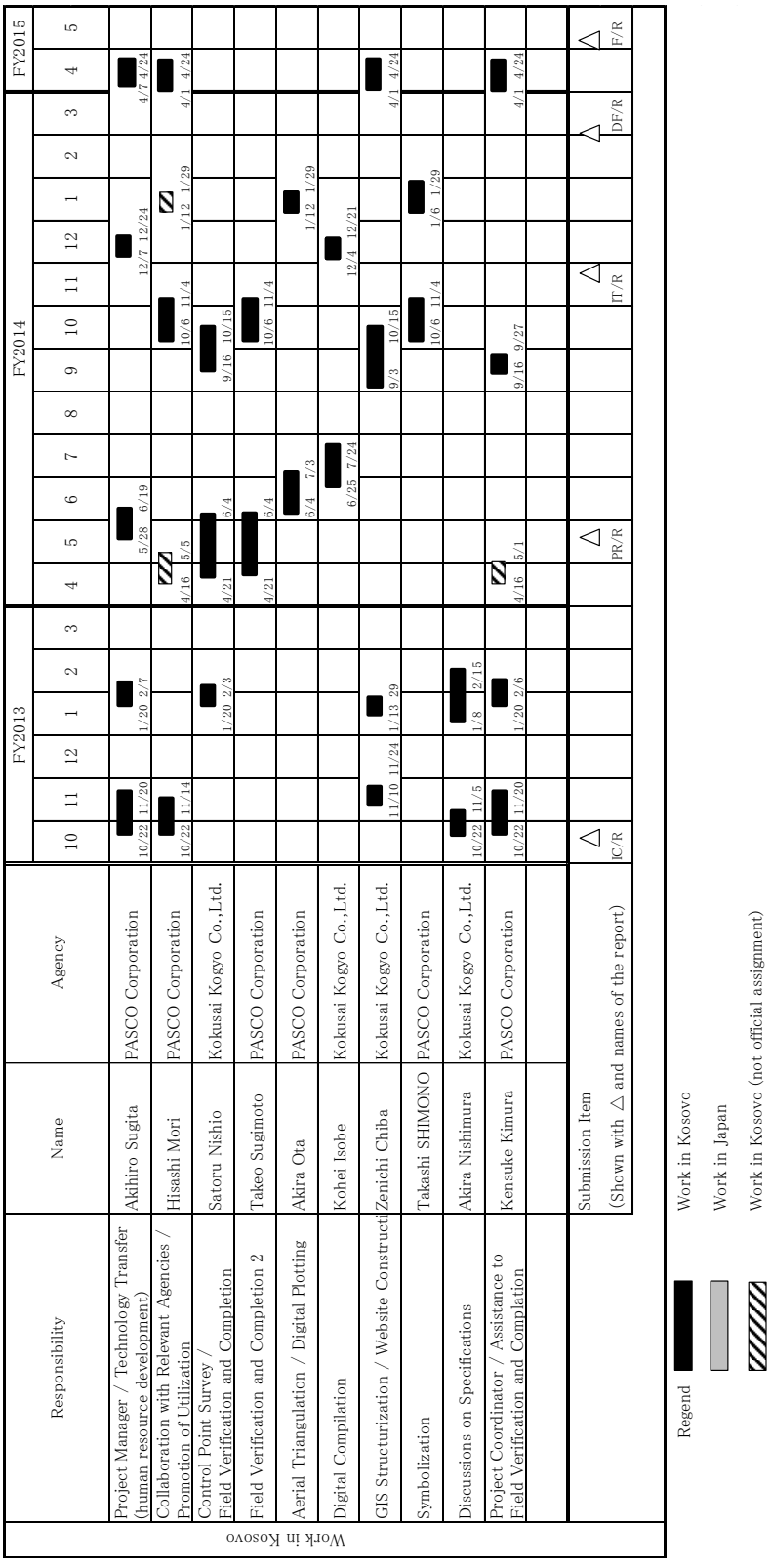


Figure 1-2 Target Area of the Project (After revision)

1.4. Assignment Result of Project Team Members

The assignment result of the Project Team members is as follows.

Table 1-1 Assignment Result of Project Team Members



1.5. Outputs of the Project

1.5.1. Development of Geo-spatial Data

Table 1-2 Data List

Item	Area/Quantity	Remarks
1/25,000 topographic map data	9,863 km^2	90 % of the total land area of Kosovo
1/25,000 fundamental GIS data	9,863 km^2	
1/25,000 topographic maps in PDF	130 map sheets	
Results of the field verification	1 set	Results of the verification of the information on topography, features, etc. and administrative boundaries and names

1.5.2. Technology Transfer

The figure below shows a general workflow for the creation of geo-spatial data. In the Project, latest materials and equipment were used for the series of operations except for aerial photography to transfer state-of-the-art technology.

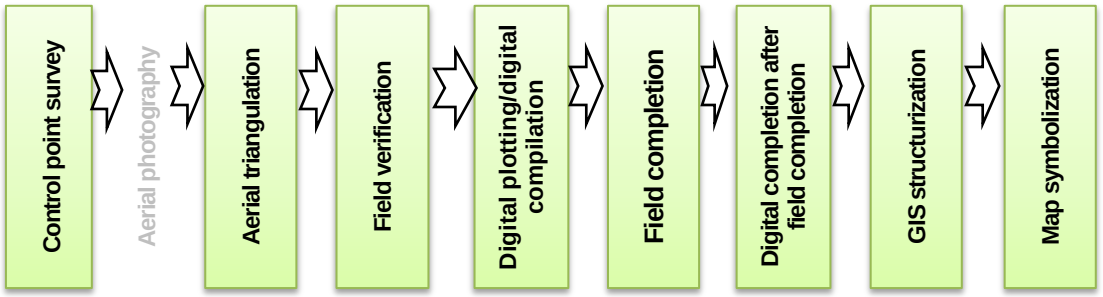


Figure 1-3 General Workflow for Creation of Geo-spatial Data

Because geo-spatial data are being created from the outputs of the aerial photography and aerial triangulation available at KCA, new aerial photography or control point survey has not been performed (although the technology transfer on the control point survey was implemented) in the Project.

Table 1-3 List of Implemented Technology Transfer Subjects

	Content	Goal
Fieldwork	Control point survey	Understanding of basic concept
		GNSS survey planning and management
		Leveling planning and management
		Confirmation, understanding and evaluation of measurement and calculation results
		Finalization of survey results
		Understanding of quality control and creation of quality control sheet
		Creation of manuals
	Field verification	Understanding of the work in the pre-interpretation and the methods for the analysis of existing reference materials and photo-interpretation
		Understanding of the practical method of field verification
		Understanding of how to organize the verification result
		Understanding of the quality and accuracy control
		Operation of handheld GPS devices
		Creation of manuals
	Field completion	Method of identifying unclear/mismatching locations at the site
		Compilation of the verified data
		Understanding of quality control and creation of quality control sheet
		Creation of manuals
Office work	Aerial triangulation	Basic operation of digital photogrammetry system (project file creation, data import)
		Basic processing of aerial photography images
		Basic operation of software (tie point observation, GCP observation, adjustment calculation)
		Confirmation, understanding and evaluation of adjustment calculation results
		Advanced operation of software
		Understanding of parameters and adjustment calculation results
		Understanding of quality control and creation of quality control sheet
		Creation of manuals
	Digital plotting	Basic operation of digital photogrammetry system (understanding the plotting operations)
		Basic operation of software
		Advanced operation of software (detailed settings, etc.)
		Understanding of map symbols
		Understanding of capturing method in accordance with the contraction scale
		Understanding of plane feature plotting/understanding of contour line plotting
		Understanding of quality control and creation of quality control sheet
		Creation of manuals

	Content	Goal
Office work	Digital compilation	Basic operation of software (MicroStation and Bentley Map)
		Entry of the data of annotations and administrative boundaries
		Adjustment of locations of features
		Data cleaning
		Creation of polygon data
		Edge matching with existing topographic map data
		Understanding of quality control and creation of quality control sheet
		Creation of field completion forms
		Creation of manuals
	Digital compilation after field completion	Verification of the confirmation results of field completion
		Understanding of the modification work based on map symbols and practical training
		Understanding of the inspection method of modified data and practical training
		Understanding of quality control and creation of quality control sheet
		Conversion to the data file to be provided for the subsequent process
		Creation of manuals
	Data structurization Creation of Fundamental GIS data	Understanding of the GIS (understanding of standard data structures)
		Basic operation of GIS software
		Advanced operation of GIS software
		Proposals on the utilization of GIS data
		Understanding of quality control and creation of quality control sheet
		Creation of manuals
	Application of symbols to topographic map data and map adjustment	Understanding of map adjustment
		Understanding of symbolization method in accordance with contraction scale
		Basic operation of symbolization software
		Advanced operation of symbolization software (detailed settings, etc.)
		Understanding of quality control and creation of quality control sheet
		Creation of manuals

1.5.3. Promotion of Data Utilization

The programs mentioned in the table below were held for the promotion of data utilization.

Table 1-4 List of Programs Held for Promotion of Data Utilization

Method	Target	Purposes
Questionnaire surveys	Participants of the first seminar and relevant agencies	Understanding of the current state of data utilization Identification of potential users
Holding of seminars	Relevant agencies, users of the topographic map data and the fundamental GIS data, foreign donor organizations and members of the press	Presentation of the project contents and output Presentation of recommendations for, and cases of, the data utilization
Training for users by the working group	Engineers and experts of the relevant agencies	Provision of training and support on the methods and technologies for the data utilization
Web-based delivery	Users in Kosovo and around the world	Contribution to the promotion of E-Government by disclosing the data prepared in this Project, as well as orthophotos and the data of existing maps which had already been publicly available (both in the raster data format)

1.6. Effects of the Project Implementation (What It Has Brought to the Counterparts)

1.6.1. Accomplishment of the Development of Nationwide Geo-spatial Data

The 1/25,000 topographic maps created in the 1970's in the era of the former Yugoslavia had been used as the national base maps, the basic data for national development, in Kosovo. Therefore, updating of geo-spatial data and development of digital data had been expected in order to meet various data needs including data use in GIS. The implementation of this Project has led to the establishment of the foundation of the national development with the creation of the latest geo-spatial data of approx. 90 % of the total land area of Kosovo.

1.6.2. Technical Capacity to Create and Update Geo-spatial Data without External Assistance

Staff members of KCA have learned a series of basic technologies and methods required for the creation

of geo-spatial data in the technology transfer. As a consequence, KCA is considered to be ready to create geo-spatial data of the approx. 10 % of the total land area of Kosovo outside the project area which KCA will have to create unassisted and thereafter update the data for change in the future. The Project Team confirmed that KCA had submitted a request for the budget for the data creation and updating mentioned above for the next fiscal year to its competent authority, MESP, in the discussion on the Draft Final Report.

1.6.3. Web-based Delivery

KCA has already established a system to provide cadastral data, small-scale topographic maps and orthophotos through the Internet by launching its Geo-Portal. However, it has many limitations including those on types of available data, methods of data utilization and range of the free data provision. The geo-spatial data created in this Project are digital data and hence versatile. If these data are made freely available on the existing Geo-Portal, utilization of geo-spatial data which has been until now mostly limited to staff members in technical positions in governmental organizations will be dramatically extended. The delivery of topographic map data in the raster format is planned for the time being after the completion of the Project.

1.6.4. Trigger to Expand Data Utilization Extensively in Development and Conservation of the National Land

The Geo-spatial Data Utilization Working Group was launched for the effective utilization of the output data and promotion of data utilization after the commencement of the Project. Implementation of training for geo-spatial data users was one of the activities undertaken by the group. It is hoped that the implementation of this training increases the demand for the data and serves as a trigger to promote information exchange among the relevant agencies and data utilization in a wide range of areas.

1.6.5. Training in Japan

During the approx. two-week Training in Japan, the three participants visited relevant agencies, including the Geospatial Information Authority of Japan, an agency administering surveying and mapping in Japan and consultancy firms. They also visited the Japan Aerospace Exploration Agency (JAXA), with the possibility of using satellite imagery for developing geo-spatial data taken into consideration. They learned the difference in the roles of their respective duties in the administration of map- and mapping-related affairs in Kosovo and Japan, new technologies and the legal system for creation and utilization of geo-spatial data in Japan. They expressed a strong will to utilize what they had learned in the Training in Japan for the development of standards for surveying and mapping, a system for operating geo-spatial databases and laws related to geo-spatial data in their country after their return.

1 . 6 . 6. Potential Cases for Data Utilization

It is considered that the 1/25,000 geo-spatial data created in this Project can be effectively utilized in the formulation of master plans covering the entire territory of the country and ecosystem-based guidelines for natural environmental conservation. Potential use of the National Spatial Data Infrastructure (NSDI), which can be developed in future, is expected in the following examples.

(1) Spatial Plan of Kosovo

A. Basic Concept for Urban Development

Master plans for urban development and landscape conservation/improvement at the regional level are required for the formulation of guidelines for appropriate demarcation of urban areas (of residential, commercial and industrial areas, areas for public facilities, etc.), selection of areas available for development, disaster risk reduction and environmental conservation on the basis of the projections of the population, commercial sales and industrial production. The 1/25,000 geo-spatial data can be effectively utilized for the formulation of these master plans.

B. Basic Concept for Agricultural Development

Assessment of land resources at the national level is indispensable for conservation and new development of agricultural land. The 1/25,000 geo-spatial data created in this Project are suitable for general classification of topography required for the assessment. Information at the level appropriate (neither too detailed nor too general) for the analysis from the viewpoint of river-system management can be derived from the data. Therefore, the output of this Project can be utilized as basic information justifying the basic concept included in the Spatial Plan.

C. Concept for the Trunk Road Network

For the areas where functional skeletal roads have not been sufficiently developed, it is recommended to formulate master plans for layout of a trunk road network in which the existing roads are classified into trunk and semi-trunk road networks and the projected road traffic volume is appropriately allocated to these networks. The 1/25,000 geo-spatial data can be utilized as a source of information for the study on the current road conditions and roadside land usage and the projection of traffic volume required for the formulation of the master plans.

D. Basic Concept for Natural Environmental Conservation and Disaster Risk Management

(1) Formulation of the Basic Policy on Disaster Risk Management

It is possible to forecast and evaluate the occurrence of landslides and expansion of soil erosion and use the result of the forecast and evaluation for the conservation and the maintenance and improvement of

productivity of land by assessing the possibility of occurrence of disasters by overlaying various data including those on meteorological conditions, topography, land use, vegetation cover and river systems on the geo-spatial data. It is also possible to formulate a basic plan for disaster risk management with the formulation of regional master plans for flood control measures and the simulation of the expansion and scale of areas affected by river flooding based on the data on land use and habitable areas in river basins and accurate data on public facilities.

(2) Formulation of Guidelines for the Conservation of the Natural Environment and Cultural Assets

The 1/25,000 topographic map data can be utilized as useful information for the formulation of a master plan for environmental conservation, etc. which includes conservation of forests and bio-diversity for the conservation of ecosystem and designation and review of environmental conservation areas at the national level and assessment of hot spots for protection and utilization of cultural assets.

2. Details of Project Implementation

2 . 1. Project Workflow

The overall workflow of this Project is shown in the figure below.

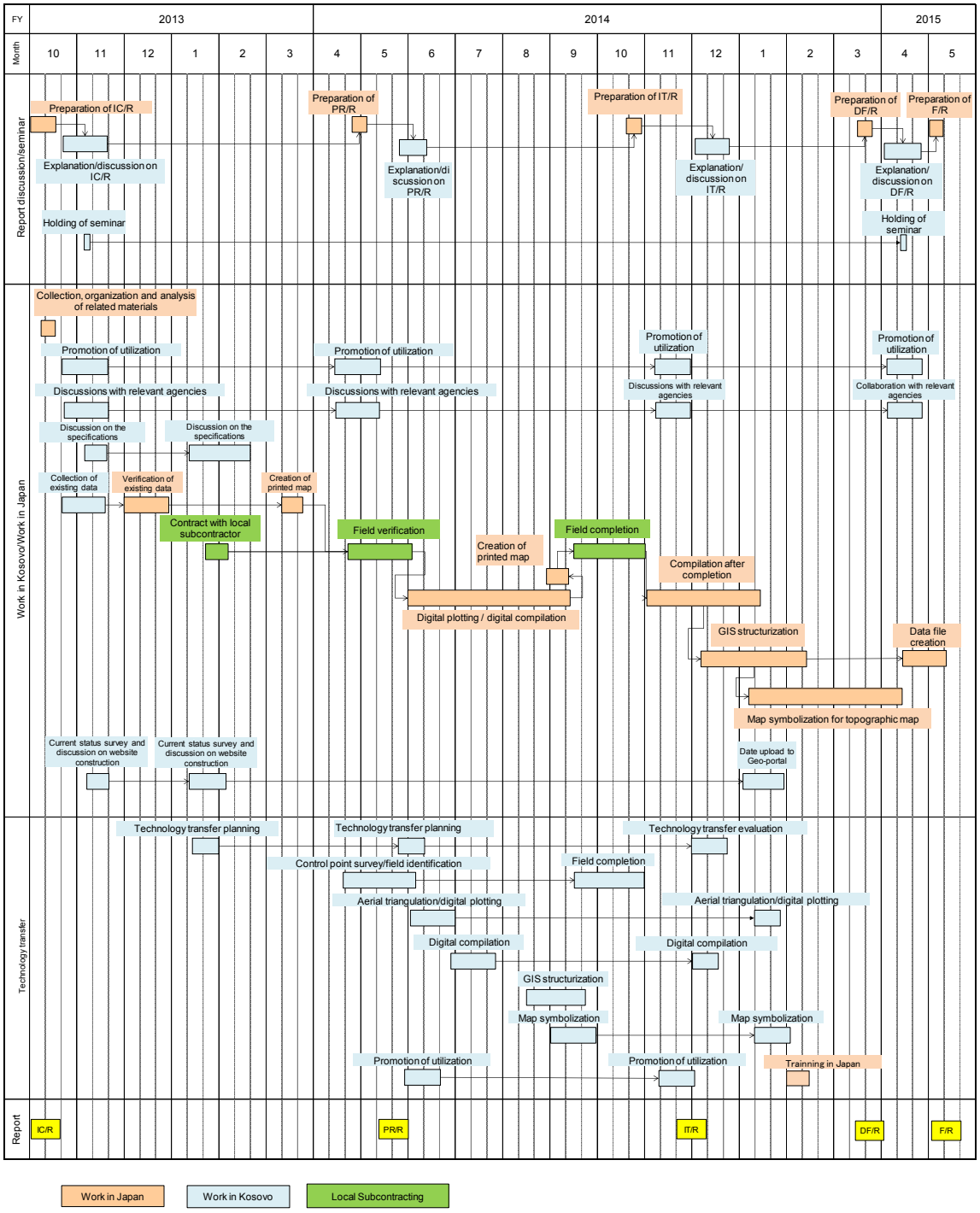


Figure 2-1 Project Workflow

2 . 2. Details of Project Implementation

[1] Collection, Organization and Analysis of Relevant Materials/Information (Work in Japan)

Reference materials and information relevant to the Project available in Japan were obtained and analyzed. The result of the analysis was used for the development of clearly-defined basic policies for the Project implementation and in a study on survey plan and methods, methods of technology transfer, subjects and details of the survey, subjects and details of the technology transfer and implementation structure and schedule.

[2] Preparation of Inception Report (Work in Japan)

The result of [1] mentioned above was used in the preparation of the Inception Report. The report describes the following:

- Objectives of the Project
- Project purposes
- Basic policies for Project implementation
- Details and methods of Project implementation
- Technology transfer
- Materials and equipment necessary for the technology transfer
- Outputs
- Project implementation structure
- Personnel plan of the Project Team

[3] Explanation and Discussion on the Inception Report (Work in Kosovo)

The Inception Report was explained to KCA to discuss the policies, details and cooperation structure with respect to the implementation of the Project. The contents of discussion in the meeting were compiled in the minutes of the meeting, which were approved by both parties.

Figure 2-2 Explanation and Discussion on the Inception Report

[4] Discussion on Specifications (Work in Kosovo)

A decision on the survey criteria to be applied to 1/25,000 digital topographic maps to be created, map sheet size and division of the digital topographic maps and map symbol regulations of 1/25,000 digital topographic maps was made in the discussion with KCA.

- Geodetic datum: EUREF (ETRS89)
- Reference ellipsoid: GRS-80
  Semi-major axis a = 6378137.00 m
  Flattening f = 1/298.257222101
- Projection method: Transverse Mercator (TM)
- Plane coordinate system: Central meridian 21°E
  Latitude of Origin 0°N (Equator)
  Zone width 3° (in the longitudinal direction)
  Scale factor at Origin 0.9999
  False easting at Origin Y = 7,500,000.00 m
  False northing at Origin X = 0.00 m
- Height standard: Height standard based on the mean sea level of the Adriatic Sea

- Map sheet size: 7‟ 30” (longitude) x 5‟ 00” (latitude) (approx. 10 km x 9.2 km)
- Map sheet division: Division compliant with the international rules based on the above-mentioned map sheet size
- Map sheet numbers: Allocation of map sheet numbers in compliance with the international rules
- Map sheet names: An identification name of each map sheet shall be a name of a principal location in an area on the map sheet concern selected by KCA

(1) Discussion on Map Symbol Regulations of 1/25,000 Digital Topographic Maps

1) Created Map Symbol Regulations of Digital Topographic Maps

Feature class:	9
Data class:	34
Total number of topography/features:	158 (including 28 annotations)

2) Discussion on Marginal Information on Digital Topographic Maps

In the discussion on the marginal information on printout digital topographic maps, the following matters were discussed and determined:

- Items to be printed in the marginal information
- Locations of printing and designs of items to be printed

a. Items to be printed in the marginal information

Items to be printed in the marginal information were discussed and determined with the existing 1/25,000 analog topographic maps of Kosovo and printout topographic maps at the same scale of the neighboring countries used as reference materials.

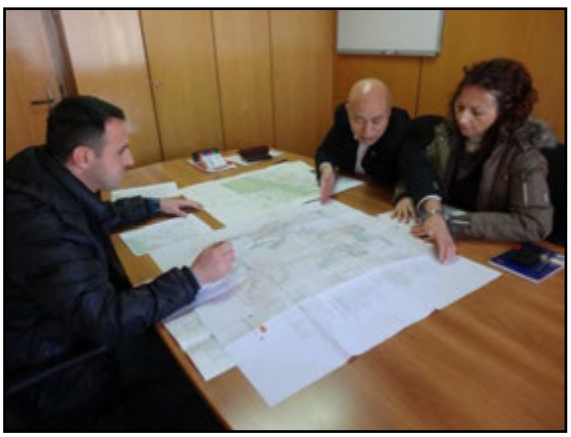



Figure 2-3 Scenes from Discussion on Specifications

b. Locations of printing and designs of items to be printed

Locations of printing and design of items to be printed were discussed and determined with the designs of printout topographic maps of the neighboring countries used as main reference materials.

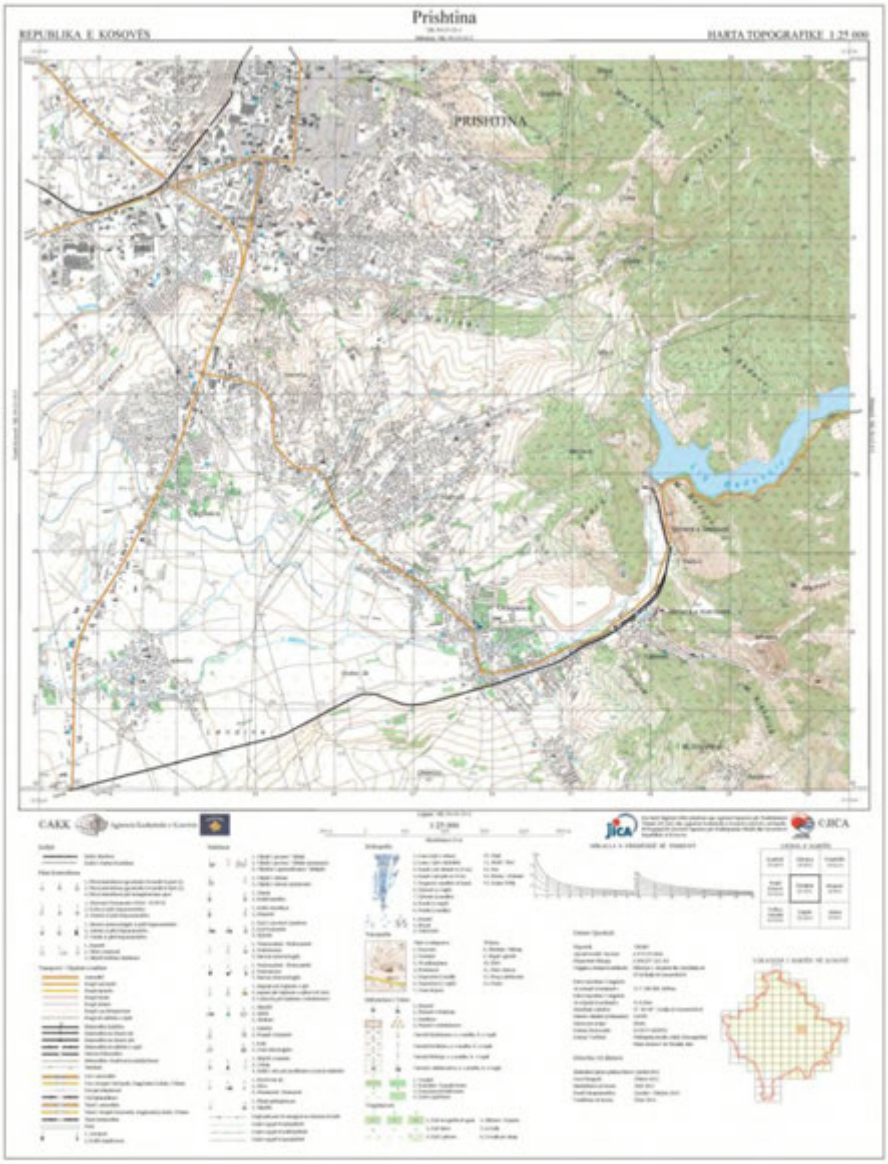


Figure 2-4 Marginal Information (Final version)

[5] Collection and Organization of Existing Materials (Work in Kosovo)

Various data in possession of KCA were obtained. The main data sets among the obtained are mentioned below. The total size of the obtained data was approx. 9 TB (terabytes).

- Data of the aerial photographs taken in 2004 and orthophoto data and results of aerial triangulation
- Data of the aerial photographs taken in 2009 and orthophoto data and results of aerial triangulation
- Data of the aerial photographs taken in 2012 and 2013 and orthophoto data and results of aerial triangulation
- Scan data of various types of existing maps (at the scales of 1/25,000, 1/50,000, 1/100,000, etc.)
- Others

[6] Survey on Current Environment for Website Construction (Work in Japan/Kosovo)

(1) Outline of Geo-Portal

Geo-Portal was constructed in May 2013 with assistance from the Norwegian national survey institution, the Norwegian Mapping Authority (Statens Karverk). A private Croatian company developed software for this website.

Its main functions include browsing, printing, measurement, input, search, downloading and uploading of geo-spatial data and user management (including user"s authorization). In other words, software for most of the functions required for a portal has been developed. As the GML format is used for downloading and uploading of vector geo-spatial data and the GeoTiFF format is used for downloading and uploading of shape files and raster data of geo-spatial data, both vector and raster data can be added to the website. Therefore, there is no need for customization of the website for registration of topographic maps. However, since symbology of map symbols, line types, etc. has not been fully developed, creation of symbology is required for efficient browsing of vector data. Styled Layer Descriptor (SLD) of Open GIS® is followed for the types of symbology of polygons, lines and points. The main contents and functions of SLD are as follows:

Point:	Selection among □, ○, Δ, ☆, ×, etc. Setting of colors, outlines, degrees of transparency, sizes, angles, etc. Label setting, filtering (attributes, scale)
Line:	Colors, line types (solid/broken/dotted lines), line widths, degrees of transparency Label setting, filtering (attributes, scale)
Polygon:	Setting of colors, outlines (solid/broken/dotted lines), degrees of transparency, etc. Label setting, filtering (attributes, scale)

Since SLD does not support annotations, they are to be expressed as labels of point data.

The data created in the "Project on Support to the Civil Registration Agency and Unified Address System" implemented in KCA with assistance from the EU have been stored on the website and data such as those created in the "Cadastral Map" project of Finland are to be stored on the website.

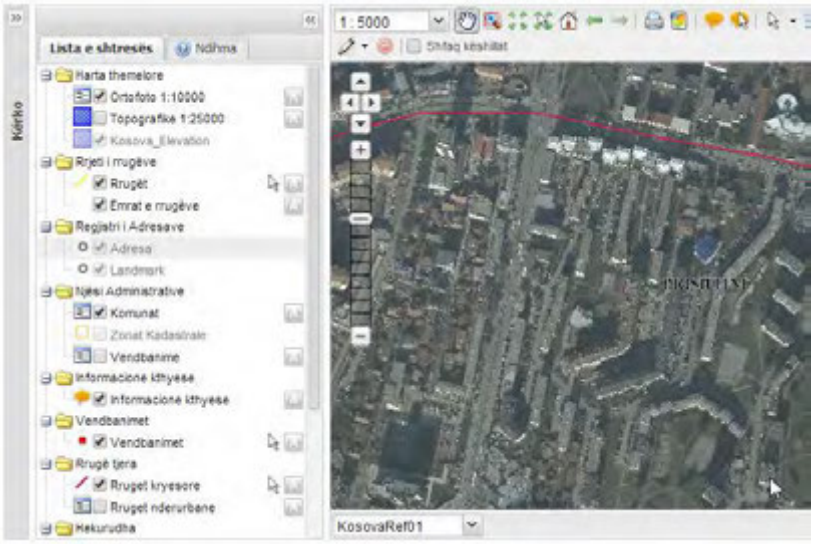


Figure 2-5 Geo-Portal of KCA

(2) Operational Status of Geo-Portal

No significant problem seems to have occurred with regard to the operation of the website in its first year of operation, with exception of minor operational problems. The major geo-spatial information contents registered at the website include:

1) Orthophotos,
2) Raster data of topographic maps (created in the Yugoslavia era),
3) Elevation maps,
4) Cadastral zones,
5) Administrative boundaries and names of local governments and villages,
6) Addresses
7) Road network, and
8) Others

(3) Operating Condition of the Hardware

Geo-Portal is being operated on the equipment which had been owned by KCA before the construction of the portal. This single-case rack-mount server is being used not only for the operation of Geo-Portal but also in other projects and as a print server and a data server (of

orthophotos and original aerial photo data created in the past). Its major component elements as of January 2014 were eight blades, which had a total storage capacity of approx. 36 TB.

Blade (CPU, memory, etc.)

Hard disks

Vacant space

Figure 2-6 Condition of Hardware

(4) Relationship with NSII

The NSII Law has not been enacted. It is still at the stage of a bill. It appears that, if this bill is enacted, Geo-Portal of KCA will be the platform of NSII. Article 9 of the bill stipulates that KCA shall take responsibility of construction, development and maintenance of the NSII Geo-Portal. It will be possible to browse all data once the construction of NSII has been completed. However, it is assumed that fees will be charged for downloading some data and downloading of such data as cadastral maps will be restricted.

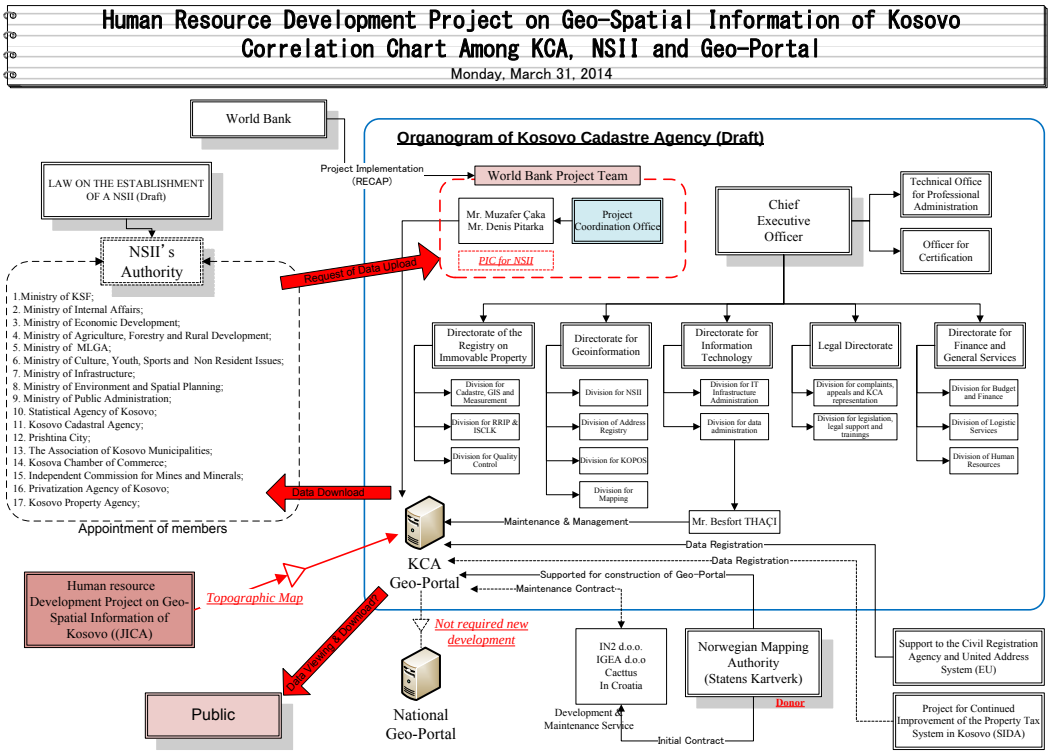


Figure 2-7 Diagram of Interactions between KCA and NSII

(5) Transmission of Topographic Map Data

As of September 2014, KCA had installed or was planning to install the additional equipment of its Geo-Portal. Therefore, there is no longer the need for procurement of equipment for the installation of additional hard disks by JICA which was discussed in March 2014. Under such circumstances, KCA and the Project Team agreed on the policies mentioned below for the provision of the topographic map data.

- Digital topographic map data shall be transmitted from the Geo-Portal of KCA.
- KCA shall prepare disk space for digital topographic map data in its Geo-Portal.
- Digital topographic map data shall be transmitted as raster data. However, KCA shall enter vector data if the need for the entry of such data arises.
- After the completion of the Project, KCA shall enter (upload) the digital topographic map data to the KCA Geo-Portal.

Figure 2-8 Interview with KCA Staff Members

[7] Verification and Preparation of Images, etc. (Work in Kosovo/Work in Japan)

The aerial photographic data and results of the aerial triangulation obtained from KCA were used for the verification of their accuracy for their use in the creation of geo-spatial data in this Project.

The aerial photographic data derived from the photographs taken in 2004, 2009, 2012 and 2013 were obtained. However, the verification was not conducted on the photographs taken in 2004, because they were not to be used for the data creation of the target area. The accuracy verification revealed that there was no problem in using the data concerned in this Project.

Figure 2-9 shows the locations of the image data obtained from KCA by year of photography. Images taken in 2013, 2012 and 2009 are indicated in red, green and blue, respectively.

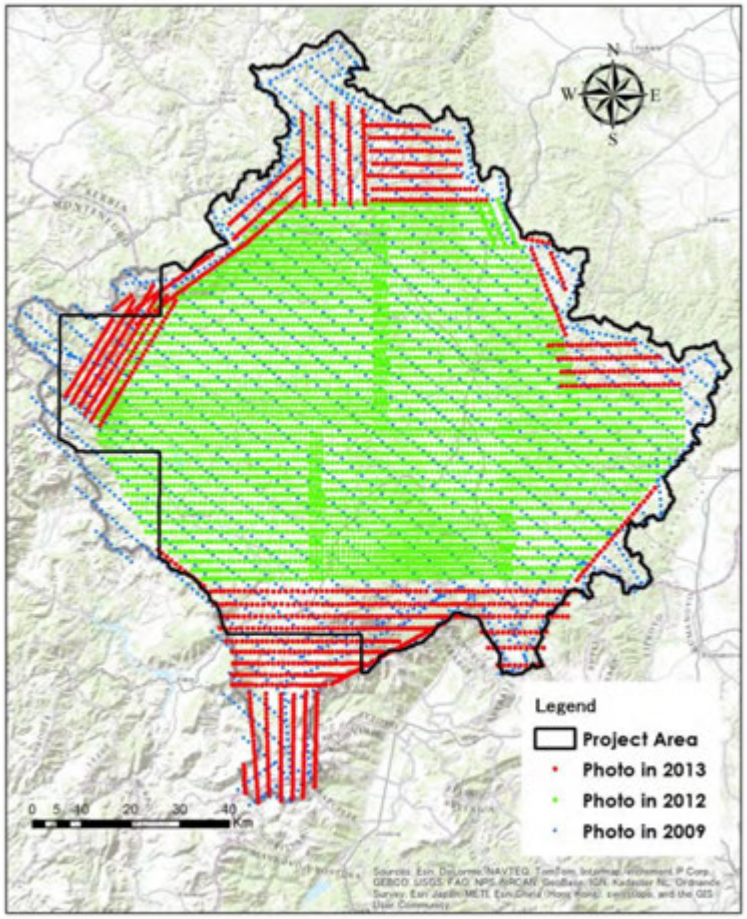


Figure 2-9 Locations of the Images by Year of Photography

[8] Subcontracting of Field Verification and Field Completion (Work in Kosovo)

The field verification and field completion were implemented by a local subcontractor as described in the original plan. Before the tender for the selection of the local subcontractor, a discussion was held with KCA on the work to be subcontracted and the three private companies mentioned below which were considered capable of completing the work concerned in the stipulated study area within the stipulated work period were shortlisted for the tender.

Invitation to Tender delivered to: Consulting EA
GM Architecture
CADCOM sh.p.k.

A general competitive bid with the three designated companies mentioned above was implemented for the selection of the local subcontractor (of the field verification and field completion). CADCOM sh.p.k. was

selected as the subcontractor in the bid in which the number of full-time engineers, quantity of equipment owned, business experience and price were used as the selection criteria and was awarded the contract.

[9] Participation in ODA Seminar (Work in Kosovo)

JICA Balkan Office hosted ODA Seminar at Swiss Diamond Hotel in Pristina on February 5, 2014. The Chief Executive Officer, Dr. Meha, and Mr. Avni of KCA participated in the seminar as presenters. They explained the current state of KCA and the details of the implementation of this Project to other participants from relevant agencies as an effort to inform them of the Project.

Figure 2-10 Chief Executive Officer, Dr. Meha, (right) and Mr. Avni (left) Making Presentations

[10] Preparation of Progress Report (Work in Japan)

With respect to the work details and technology transfer carried out after the preparation of the Inception Report, a Progress Report describing the progress, the future plan and others was created.

[11] Field Verification (Work in Kosovo)

In the field verification, the subcontractor who had been awarded the contract for the field verification/completion in [8] above conducted field surveys, collected reference materials and acquired the information required for capturing topography and features defined as those to be expressed on digital topographic maps in the map symbol regulations in the digital plotting from

the survey results and collected materials. The technology transfer on the field verification to the engineers of KCA was implemented in the form of OJT while the field verification was being implemented.

In order to control the quality of the field verification, the project members inspected its outputs, while the subcontractor was implementing it. In accordance with the Survey International Specifications of JICA, 2 % of the work completed was to be selected for the inspection and the error ratio of 5 % of the number of the verification subjects was to be used as the pass mark of the inspection. Although 2 % of the total number of map sheets of 130 was 2.6, which should be rounded up to 3, the field verification in four map sheet areas were inspected with the time of the work and characteristics of individual map sheet areas taken into consideration. In the inspection, the project members conducted independent field verification of the selected map sheet areas where the subcontractor had already conducted it and the results of the two verifications were compared.

Figure 2-11 Discussion with the Subcontractor (left) and Scene from Inspection of Field Verification (right)

The original plan was that the subcontractor was to take the lead in the collection of reference materials and data to be displayed on topographic maps, however, the data (*e.g.* those of administrative boundaries) are considered almost as national secrets and that, thus, it was impossible to acquire the data in the subcontractor-led operation. Therefore, most of the data were collected by the staff members of KCA and the project members.

Table 2-1 List of Collected Documents and Data

Collected documents/data	Source	Date of collection	Document or digital data	Notes
State boundary	KCA	October 2014	Digital data	Received the data updated in October
National park	KCA	April 2014	Digital data	
1st and 2nd order geodetic control point, GNSS – KOPOS	KCA	April 2014	Digital data	
Road category	Transportation Road Department	April 2014	Digital data	
High tension power line	Kosovo Energy Corporation	April 2014	Document	A diagram of the network of high tension power lines at the voltage of 110kV or above
Name of municipalities	Kosovo Statistic Agency	April 2014	Digital data	
Trigonometric point (church, mosque, meteorological station, antenna, chimney)	KCA	July 2014	Digital data	
State boundary pillar	KCA	August 2014	Digital data	

[12] Explanation and Discussion on Progress Report (Work in Kosovo)

The Progress Report prepared was explained to KCA to discuss the content. The content of the discussion was summarized as a record of discussion on which an agreement was obtained from both parties.

[13] Digital Plotting (Work in Japan)

In accordance with the content determined by the discussions on the map symbol rules and by referring to the field verification results, the shapes and the positions of features were captured as graphic information to create a digital plotting data file of level 25,000 (about 9,869km^2). With respect to the feature type and category, classification was carried out in accordance with the items captured by plotting and the capturing standard.

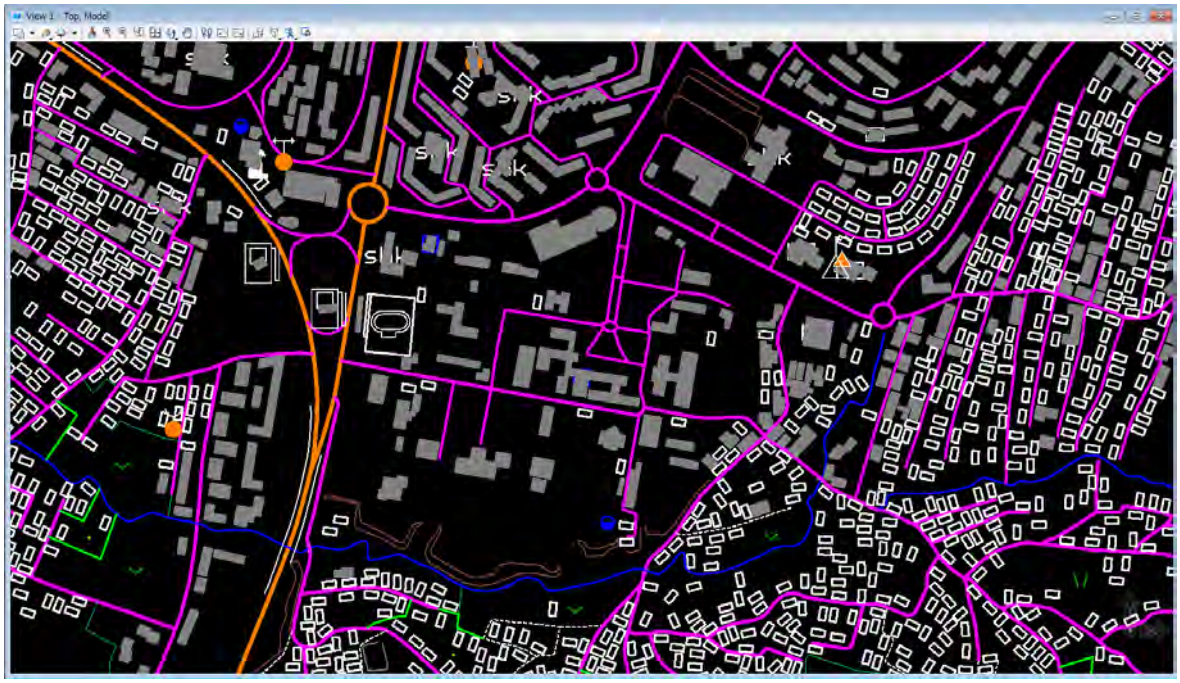


Figure 2-12 Digital Plotting Image (in Pristina City)

[14] Digital Compilation (Work in Japan)

Topographic map data were created by performing data cleaning, such as combining line data, converting data to polygons and deletion of unnecessary data, on the digital plotting data file and adding administrative boundary data, annotation data, etc. In creating the topographic map data, features in adjacent map sheets were checked.

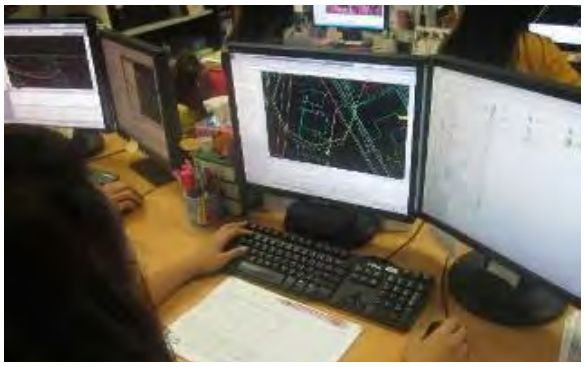


Figure 2-13 Digital Compilation Work

[15] Field Completion (Work in Kosovo)

Field completion was implemented by outsourcing to a local subcontractor, as was the case for field verification.

The subcontractor conducted the field completion at the 1,386 locations where doubt in the accuracy of the data had been detected in the digital plotting. The engineers of the subcontractors surveyed all topography and features requiring re-verification at the sites, including those whose shapes had not been clearly defined, those which had not been able to be located, those whose codes might have been recorded wrongly, those whose annotations might have been misspelled and those with edge mismatching, using the

digital cameras with GPS and handheld GPS devices effectively.

Figure 2-14 Discussion with Subcontractor on Field Completion (left) and Scene from Field Completion (right)

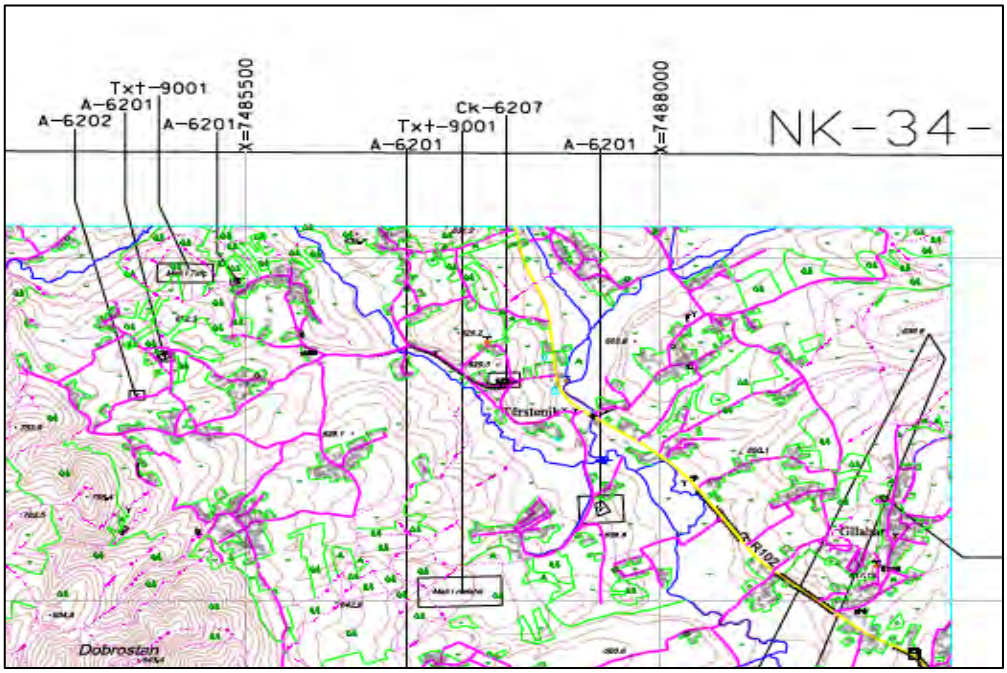


Figure 2-15 Field Completion Form

In order to control the quality of field completion work, the subcontractor's work was inspected by the project members while it was being implemented. In accordance with the Survey International Specifications of JICA, 2 % of the work completed was to be selected for the inspection and the error ratio of 5 % of the number of the verification subjects was to be used as the pass mark of the inspection. Although 2 % of the total number of map sheets of 130 was 2.6, which should be rounded up to 3, the field completion in four map sheet areas were actually inspected with the characteristics of the mapping area

taken into consideration.

In the inspection, the project members conducted independent field completion of the selected map sheet areas where the subcontractor had already conducted it and the results of the two completion works were compared.

[16] Preparation of Interim Report (Work in Japan)

With respect to the work details and technology transfer carried out after the preparation of the Progress Report, an Interim Report describing the progress, the future plan and others was prepared.

[17] Explanation and Discussion on the Interim Report (Work in Kosovo)

The Interim Report prepared was explained to KCA to discuss the content. The content of the discussion was summarized as a record of discussion on which an agreement was obtained from both parties.

The explanation and discussion meeting was held on December 15, 2014 at the conference room in KCA. Five staff members of KCA and three Project Team members participated in the meeting.

Figure 2-16 Explanation and Discussion on the Interim Report

[18] Digital Compilation after Field Completion (Work in Japan)

Data correction and modification were carried out on the items confirmed in the field completion. Also, administrative boundary data collected at the site and annotation data were entered.

[19] Data Structurization (Work in Japan)

The topographic map data completed by digital compilation after field completion were structuralized in accordance with the map symbol rules to make the data usable on the GIS. The GIS data created in the structurization are in the ArcGIS Geodatabase format for their use in the subsequent map symbolization. The GIS data were created for each map sheet area.

[20] Map Symbolization for Topographic Map (Work in Japan)

Based on the map symbols determined in the discussions on the specifications, map symbolization was carried out on the data after the completion of data structurization for the creation of topographic map.

Conventionally, different software were often used for structurization and symbolization and for this reason, the work of creating a new topographic map after modification was complicated. Since the symbolization function of GIS software (ESRI ArcGIS) has improved lately, GIS software was used for symbolization.

[21] Preparation of Draft Final Report (Work in Japan)

A Draft Final Report was prepared by summarizing the results of creating the geo-spatial data, technology transfer and promotion of utilization as well as recommendations to KCA.

JICA (Infrastructure and Peacebuilding Department and Middle East and Europe Department), Geospatial Information Authority of Japan and the Project Team conducted a meeting on March 23, 2015 and confirmed the outputs of the Project and others using this Report.

[22] Explanation and Discussion on Draft Final Report (Work in Kosovo)

The Draft Final Report prepared in the step above was explained to KCA to discuss the content. The content of the discussion was summarized as a record of discussion on which an agreement was obtained from both parties.

The explanation and discussion meeting was held on April 16, 2015, in the conference room in KCA. Four staff members of KCA and five Project Team members participated in the meeting.

Figure 2-17 Explanation and Discussion on the Draft Final Report

[23] Preparation of Final Report (Work in Japan)

In consideration of the comments by KCA, the Draft Final Report will be revised to make the Final Report.

In addition, manuals created through the technology transfer should be finalized and a report on quality control should also be created. The manuals and quality report should be compiled separately in consideration of the usability.

[24] Creation of Data Files (Work in Japan)

In accordance with the specifications agreed with KCA after discussions, the geo-spatial data that have been created should be stored on recording media.

3. Technology Transfer

3 . 1. Technology Transfer Item

[1] Technology Transfer Planning (Work in Kosovo)

KCA selected the five staff members mentioned in the table below as the participants of the technology transfer in this Project.

Table 3-1 Participants of Technology Transfer Selected by KCA

Name	Post	Age	Experience in surveying and mapping
Mr. Avni Rrustemi	GIS & Mapping Expert	34 years old	Approx. 3 years
Mr. Mentor Kosumi	Measurement Expert	31 years old	Approx. 7 years
Mr. Amir Reçica	GIS Expert	31 years old	Approx. 7 years
Mr. Esat Xani	GIS Expert	31 years old	Approx. 9 years
Mr. Qazim Sinani	GIS Expert	35 years old	Approx. 6 years

The geo-spatial data created covers about 90 % of the national land of Kosovo and the remaining data, which covers about 10 %, will be created by KCA on its own after the completion of the Project. For this reason, technology transfer was implemented in relation to the series of operations to enable KCA to develop geo-spatial data independently.

The following manuals shall be created in order to maintain sustainability of the project and establish a sustainable structure for smooth development of geo-spatial data and continuous use of the transferred technologies by KCA after the completion of this Project.

Table 3-2 Types and Purposes of Manuals

Type	Purpose	Description
Work manual	To enable the KCA personnel to execute the work by using this manual	Specific technical details of the work executed in each process step for the creation of geo-spatial data, including software operation manuals, etc.
Training manual	To enable KCA to carry out technology transfer within its organization	Objectives, positioning and technology required of each process step and method for evaluating the result of technology transfer for the whole process for the creation of geo-spatial data

The manuals were created not only in English but also in Albanian and Serbian, official languages of Kosovo.

[2] Control Point Survey

Technology transfer was implemented as follows with respect to control point survey (the work of setting control points necessary for the succeeding work of aerial triangulation and capturing the positional information of the points by measurement).

Table 3-3 Contents of Technology Transfer on Control Point Survey

Content	Goal
Control point survey	Understanding of basic concept
	GNSS survey planning and management
	Leveling planning and management
	Confirmation, understanding and evaluation of measurement and calculation results
	Finalization of survey results
	Understanding of quality control and creation of quality control sheet
	Creation of manuals

Figure 3-1 Equipment of KCA (GNSS receiver and controller)

a. Participants of technology transfer

- Mr. Avni Rrustemi
- Mr. Mentor Kosumi
- Mr. Amir Reçica
- Mr. Esat Xani

b. Method of technology transfer

The technology transfer was carried out mainly in the form of lectures. In consideration of not only transfer of the technologies to the participants but also dissemination of the technologies to KCA staff who did not participate in the technology transfer, a work manual which could be used also as a training manual was created for and used in the technology transfer.

c. Evaluation of the result of technology transfer

A comprehensive evaluation method in which qualitative evaluation was added to quantitative evaluation was used for the evaluation of the result of the technology transfer. It has been concluded that the participants have acquired the transferred technologies with their knowledge and technical capacity in the surveying that they had before this technology transfer, the perfect attendance record and their positive learning attitude, as mentioned in the following:

- The perfect attendance record and earnest attitude towards the lectures of all the participants deserves praise.
- As the control point survey by the subcontractor was already in progress, the participants of the technology transfer were able to learn its basic components in a short period of time.
- As they have basic knowledge of photogrammetry, their capacity in the control point survey is considered to have reached the level at which they can implement it independently after the completion of this Project.

Table 3-4 Result of Technology Transfer on Control Point Survey

Name of the participant	Attendance percentage	Attitude during the technology transfer	
		Activeness	Attentiveness
A	100 %	Δ*	○
B	100 %	Δ*	○
C	100 %	Δ*	○
D	100 %	Δ*	○

Evaluation criteria

Activeness: ○ Sufficient preparation and asking questions Δ No particular questions

× Coming late to the class/leaving the class early

Attentiveness: ○ Always taking notes Δ Whispering

× Leaving the room temporarily during the class, etc.

* Because the participants had the basic knowledge, they did not ask many questions.

[3] Field Verification

Technology transfer was implemented as follows with respect to field verification (identification of the features that cannot be identified by photography interpretation at the site) using aerial photographs or orthophotos.

Table 3-5 Contents of Technology Transfer on Field Verification

Content	Goal
Field verification	Understanding of the work in the pre-interpretation and the methods for the analysis of existing reference materials and photo-interpretation

	Understanding of the practical method of field verification
	Understanding of how to organize the verification result
	Understanding of the quality and accuracy control
	Operation of handheld GPS devices
	Creation of manuals

a. Participants of technology transfer

- Mr. Avni Rrustemi
- Mr. Mentor Kosumi
- Mr. Amir Reçica
- Mr. Esat Xani

b. Method of technology transfer

After the lecture on field verification work as a preliminary training, the technologies concerned were transferred at the site of the field verification in the form of OJT (on-the-job training). The technology transfer was conducted with dissemination of the technologies to the engineers of KCA who did not participate in the technology transfer taken into consideration, with the inclusion of the work process management including collaboration with the subcontractor and inspection of the field verification by the subcontractor in the technology transfer.

Figure 3-2 Technology Transfer on Field Verification

c. Evaluation of the result of technology transfer

The level of mastery of the field verification of the participants was evaluated with the attendance record and the attitude towards the lecture during the technology transfer as well as with a quantitative indicator. They managed to complete all the work assigned to them within the allocated time in the OJT. The inspection by the project members in charge of field verification has found no problems in the result of their OJT. These facts indicate that the participants have acquired the technologies used in the field verification.

- The project members were able to confirm that the participants had acquired the skills essential for the field verification including the skills to make plans required for travelling in and surveying a target area in a systematic way, to identify locations on the ground with aerial photographs and to verify features of interest in accordance with the capturing standards in the OJT.
- The participants were able to recognize kinds of problems which were likely to occur in the field verification through the OJT on the inspection and were able to prepare measures to rectify the problems.

Table 3-6 Result of Technology Transfer on Field Verification

Name of the participant	Attendance percentage	Attitude during the technology transfer	
		Activeness	Attentiveness
A	100 %	○	○
B	100 %	○	○
C	100 %	○	○
D	100 %	○	○

Evaluation criteria

Activeness: ○ Sufficient preparation and asking questions Δ No particular questions
× Coming late to the class/leaving the class early

Attentiveness: ○ Always taking notes Δ Whispering
× Leaving the room temporarily during the class, etc.

[4] Field Completion

Technology transfer was implemented as follows with respect to field completion (re-identification of unclear locations (missing data, errors) found in digital plotting and compilation) using map sheets after digital compilation.

Table 3-7 Contents of Technology Transfer on Field Completion

Content	Goal
Field completion	Method of identifying unclear/mismatching locations at the site
	Compilation of the verified data
	Understanding of quality control and creation of quality control sheet
	Creation of manuals

a. Participants of technology transfer

- Mr. Avni Rrustemi
- Mr. Mentor Kosumi
- Mr. Amir Reçica
- Mr. Esat Xani
- Mr. Qazim Sinani

b. Method of technology transfer

The technology transfer was conducted mostly in the form of lectures. In consideration of not only transfer of the technologies to the participants but also dissemination of the technologies to engineers of KCA who did not participate in the technology transfer, a work manual which could be used also as a training manual was created for and used in the technology transfer.

Furthermore, the technology was transferred in the form of OJT (on-the-job-training) at the site. Collaboration with the subcontractor in the field verification and the work process management including inspection of the field verification conducted by the subcontractor were also included in the technology transfer.

Figure 3-3 Technology Transfer on Field Completion

c. Evaluation of the result of technology transfer

The level of the mastery of the field completion of the participants was evaluated with the attendance records and attitude towards the lectures on Day 1 and a quantitative indicator. They managed to complete all the work assigned to them within the allocated time in the OJT. The inspection by the project members in charge of field completion has found no problems in the result of their OJT. These facts indicate that the participants have acquired the technologies used in the field completion.

- Since the field completion is the work similar to the field verification, the project members in charge of field completion were able to reconfirm the level of mastery of the actual work in the field verification of the participants in the OJT of the field completion.
- The project members confirmed that the participants understood what unclear data and errors were and had skills to correct them at the site.

Table 3-8 Result of Technology Transfer on Field Completion

Name of the participant	Attendance percentage	Attitude during the technology transfer	
		Activeness	Attentiveness
A	100 %	○	○
B	100 %	○	○
C	100 %	○	○
D	100 %	○	○

Evaluation criteria

Activeness: ○ Sufficient preparation and asking questions △ No particular questions

× Coming late to the class/leaving the class early

Attentiveness: ○ Always taking notes △ Whispering

× Leaving the room temporarily during the class, etc.

[5] Aerial Triangulation

Technology transfer was implemented as follows with respect to aerial triangulation (adjustment calculation necessary for constructing stereo models in the succeeding 3D digital plotting work) using existing aerial photography data and control point data.

a. Participants of technology transfer

Table 3-9 Participants of Technology Transfer on Aerial Triangulation

Name	Post	Experience, skills, etc. in aerial triangulation		Remarks
		Theory	Software operation	
Avni Rrustemi	GIS and Cartography Expert	Yes	No	
Avni Ahmeti	Head of GIS Department	Yes	Yes	Experience in operating software for photogrammetry, such as ERDAS and SOCET SET
Amir Reçica	GIS Expert	No	No	
Esat Xani	GIS Expert	Yes	No	A little experience in using ERDAS software
Mentor Kosumi	GIS Expert	No	No	

b. Contents of technology transfer

(1) Basic operation of the digital photogrammetry system (creation of a project file and import of various types of data)

(2) Basic processing of aerial photograph images

(3) Basic operation of the software (tie point observation, GCP observation and adjustment calculation)

(4) Confirmation, understanding and evaluation of the result of the adjustment calculation

(5) Advanced operation of the software

(6) Understanding of the relationship between the parameter setting and the result of the adjustment calculation

(7) Understanding of the quality control and creation of the quality control sheet

(8) Reproduction of existing aerial triangulation results

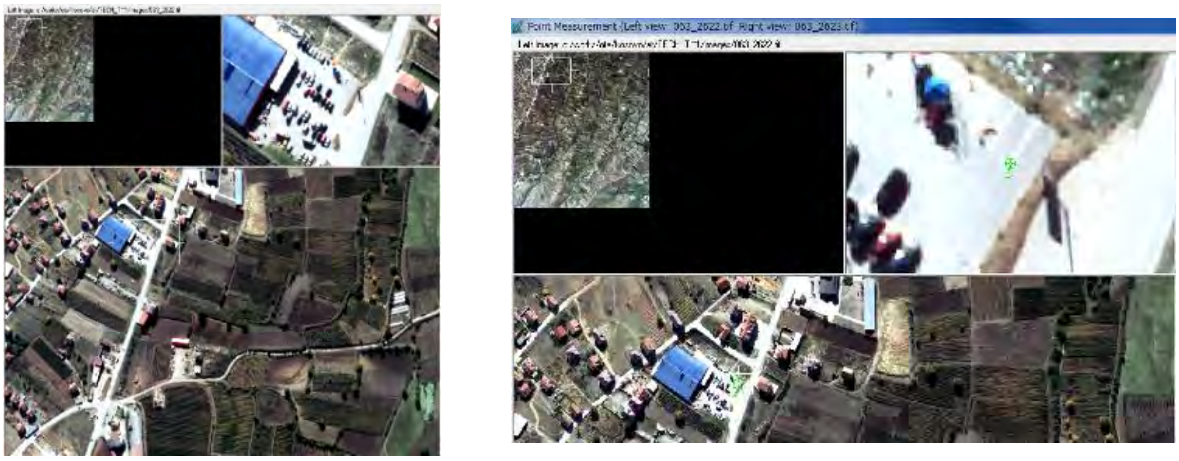


Figure 3-4 Control Point Observation Screen

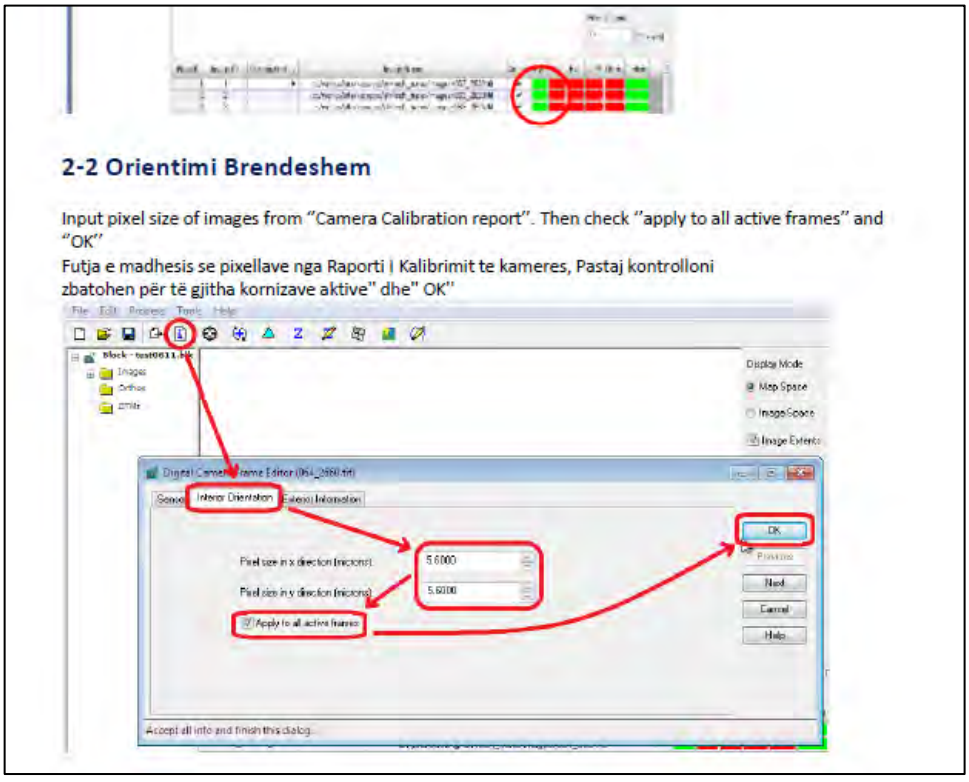


Figure 3-5 Part of Manual for Aerial Triangulation

c. Evaluation of the result of technology transfer

Table 3-10 Result of Technology Transfer on Aerial Triangulation

Content	Goal	Evaluation indicator	Evaluation result
Aerial triangulation	Basic operation of the digital photogrammetry system (creation of a project file and import of various types of data)	The participants are able to perform the basic operation unassisted on a condition different from that used in the training.	The participants have acquired technical capacity to reproduce existing aerial triangulation outputs.
	Basic processing of aerial photography images	The participants are able to set a condition which makes the observation easy unassisted.	The participants were able to set such parameters as color tones at will.
	Basic operation of the software (tie point observation, GCP observation and adjustment calculation)	The participants are able to perform manual observation smoothly.	The participants have become able to smoothly identify locations of target points in photo-interpretation and observe these points.
	Confirmation, understanding and evaluation of the result of the adjustment calculation	The participants are able to identify locations of errors and correct them.	The participants have become able to identify locations of errors from the calculation report and correct them. They will have to be able to do the above-mentioned with a large quantities of tie points and GCPs.
	Advanced operation of the software	The participants are able to process data of a designated range with the automatic processing. The participants are able to reproduce the existing aerial triangulation result.	The participants were able to observe tie points with the automatic processing. They have acquired the technical capacity to reproduce existing aerial triangulation outputs.
	Understanding of the relationship between the parameter setting and the result of the adjustment calculation	The participants are able to set parameters for the automatic observation appropriately for different conditions.	The participants were able to understand the parameter setting for the automatic processing.
	Understanding of the quality control and creation of the quality control sheet	The participants are able to create the quality control sheet unassisted.	The participants were able to create the quality control sheet unassisted.
	Creation of manuals	The participants are able to create manuals.	The participants were able to create manuals.

[6] Digital Plotting

Technology transfer was implemented as follows with respect to 3D digital plotting (capturing features as graphic information by measuring the stereo models constructed by using the aerial triangulation results) using aerial photography images and aerial triangulation results.

a. Participants of technology transfer

Table 3-11 Participants of Technology Transfer on Digital Plotting

Name	Post	Experience, skills, etc. in digital plotting		Remarks
		Theory	Software operation	
Avni Rrustemi	GIS and Cartography Expert	No	Yes	AutoCAD, ArcGIS
Avni Ahmeti	Head of GIS Department	No	Yes	AutoCAD, Quantum GIS
Amir Reçica	GIS Expert	No	Yes	AutoCAD, Geomedia
Esat Xani	GIS Expert	No	Yes	AutoCAD, Geomedia
Mentor Kosumi	GIS Expert	No	No	Geomedia

b. Contents of technology transfer

(1) Basic operation of the digital photogrammetry system (Understanding of the plotting operation)

(2) Basic operation of the software

(3) Advanced operation of the software (detailed setting, etc.)

(4) Understanding of map symbols

(5) Understanding of the scale-specific data capturing method

(6) Understanding of the plotting of planimetric features and contours

(7) Training of the digital plotting of the area to be mapped independently by KCA

(8) Training of the digital compilation and map symbolization of the area to be mapped independently by KCA

(9) Understanding of quality control and creation of quality control sheet

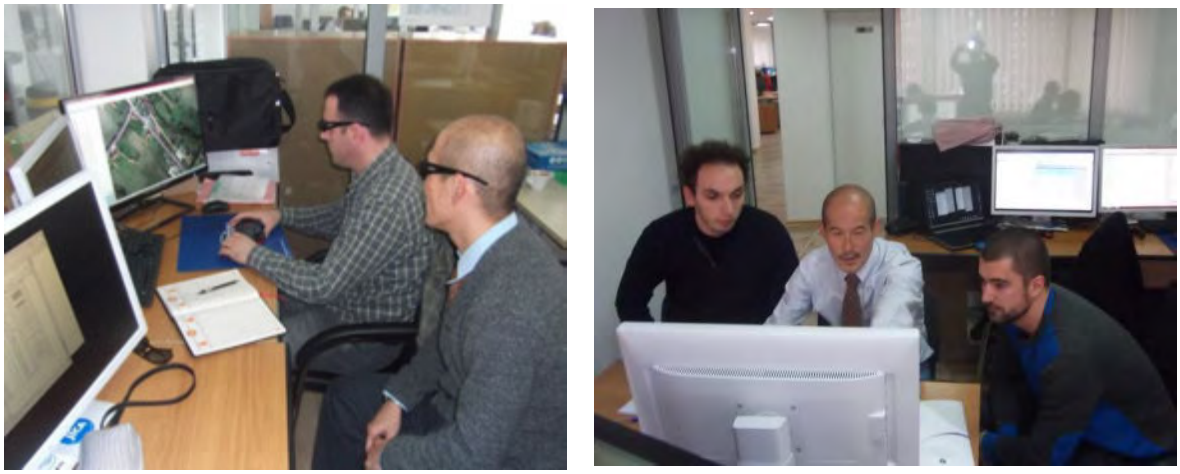


Figure 3-6 Scenes from Technology Transfer on Digital Plotting

c. Evaluation of the technology transfer

Table 3-12 Result of Technology Transfer on Digital Plotting

Content	Goal	Evaluation indicator	Evaluation result
Digital plotting	Basic operation of the digital photogrammetry system (understanding of the plotting operation)	The participants are able to perform the initial setting of PRO600 unassisted on a condition different from that used in the training.	The participants were able to perform the setting of PRO600 in accordance with the capturing standards, which were revised during the project period, unassisted.
	Basic operation of the software	The participants are able to create designated symbols smoothly with MicroStation.	The participants were able to create symbols, which were changed during the project period, independently.
	Advanced operation of the software (detailed setting, etc.)	The participants are able to create designated symbols smoothly with PRO600.	The participants were able to create symbols, which were modified during the project period, on PRO600 unassisted.
	Understanding of map symbols	The participants are able to select a correct code for each feature smoothly.	The participants are able to select appropriate codes without a problem.
	Understanding of the scale-specific data capturing method	The data captured in the mapping area satisfy the capturing standards for map symbols.	The participants are able to capture data other than contours appropriately.
	Understanding of the plotting of planimetric features	The data integrity in the designated area is at least at 90 %.	The output created by the participants satisfied the criterion of the integrity of more than 90 %. (98.5 %)
	Understanding of the plotting of contours	The data integrity in the designated area is at least at 90 %.	The output created by the participants satisfied the criterion of the integrity of more than 90 %. (95.6 %)
	Understanding of quality control and creation of quality control sheet	The participants are able to create the quality control sheet unassisted.	The participants were able to create the quality control sheet.
	Creation of manuals	The participants are able to create manuals.	The participants were able to create manuals.

[7] Digital Compilation

Technology transfer was implemented as follows with respect to digital compilation (creating topographic map data by aligning digital plotting data and data cleaning based on the field compilation results and capturing standard) to create topographic map data from the digital plotting data.

a. Participants of technology transfer

- Mr. Avni Rrustemi

- Mr. Mentor Kosumi
- Mr. Amir Reçica
- Mr. Esat Xani
- Mr. Qazim Sinani

b. Contents of technology transfer

(1) Basic operation of the software (MicroStation and Bentley Map)

(2) Entry of annotations and administrative boundaries

(3) Adjustment of locations of features

(4) Data cleaning

(5) Creation of polygon data

(6) Edge matching with the existing topographic maps

(7) Understanding of quality control and creation of quality control sheet

(8) Creation of field completion forms

Figure 3-7 Technology Transfer on Digital Compilation

c. Evaluation of the technology transfer

The project member asked the participants to fill in a questionnaire and take an examination for the evaluation of their level of understanding of the transferred technologies.

The participants of the technology transfer mostly selected "I have understood" as their answers to the questions on the technologies from the options, "I have understood," "I have understood a little" "I cannot say whether I have understood or not" and "I have not understood." Most of them selected "Sufficient" as the answer to the question on the duration of the training. The result of this questionnaire survey has confirmed that the participants consider that they have understood the contents of the technology transfer.

The percentage of correct answers of the participants in the examination for the evaluation of the level of

understanding (which had ten questions) was 72 % on average. This observation indicates that they have understood the contents of the technology transfer, in general. There was one question to which all of them had answered incorrectly. As misconception about the intention of the question seemed to have been the cause for the incorrect answer, the project member provided additional explanation on the question during the technology transfer on the digital compilation after field completion.

The outputs of the practice and the responses in the questionnaire and the examination indicate that the participants of the technology transfer have understood the contents of the work in the digital compilation sufficiently.

[8] Digital Compilation after Field Completion

Technology transfer was implemented as follows with respect to digital compilation after field completion (correction and modification of digital compilation data based on the result of field verification of unclear locations (missing data, errors) found in digital compilation) to correct and modify digital compilation data.

a. Participants of technology transfer

The people mentioned below participated in the technology transfer on the digital compilation after field completion.

- Mr. Avni Rrustemi
- Mr. Mentor Kosumi
- Mr. Amir Reçica
- Mr. Qazim Sinani

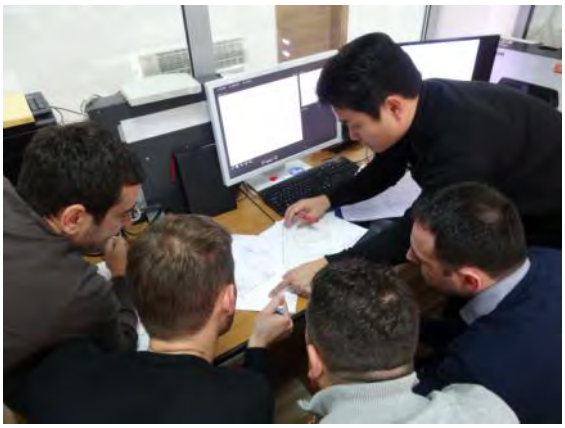


Figure 3-8 Technology Transfer on Digital Compilation after Field Completion

b. Contents of technology transfer

(1) Verification and interpretation of the survey results obtained in the field completion

(2) Lecture and practical training on the modification work based on the map symbols
(3) Lectures and practical training on the inspection method of modified data
(4) Understanding of quality control and creation of quality control sheet
(5) Conversion to the data file to be provided for the subsequent process

c. Evaluation of the technology transfer

The participants of the technology transfer were able to create data of the area used in the technology transfer to be used in the subsequent processes by performing the digital compilation after field completion, quality control and data conversion independently. Inspection of their output revealed that they had understood the methods used in those processes.

The project member asked the participants to fill in a questionnaire and take a written examination in order to evaluate the level of their understanding of the transferred technologies. The participants were asked to evaluate their own levels of understanding by answering the questions in the questionnaire given below.

- Have you understood the details of the work in the digital compilation after field completion?
- Have you understood the workflow of the digital compilation after field completion?
- Have you understood the symbols used on the output of the field completion?
- Have you understood how to modify data?
- Have you understood the quality control method?
- Have you understood the methods of the visual inspection?
- Have you understood the symbols used in the visual inspection?
- Have you understood how to create the quality control sheet?
- Have you understood how to convert data?
- Was the training period sufficient?

The participants were asked to respond to these questions with “Yes.”, “Yes, to a certain extent.”, “I cannot say yes or no.” or “No.”

Two of the four respondents responded “Yes.” to all the questions concerning their understanding and “Yes.” to the question on the training period.

One of the remaining two responded “Yes, to a certain extent.” to three questions and the other did the same to one. (Both of them responded “Yes.” to the other questions.) One of the two responded “No, it was a little insufficient.” to the question on the training period.

The training period for the digital compilation after field completion was shorter than that for the digital compilation. This fact is considered to have been a cause of those slightly unsatisfactory responses.

The average mark of the participants for the ten questions in the written examination was approx. 50 %. The project member concluded that their understanding of the transferred technologies was insufficient on

the basis of this examination result. Thus, the member returned the marked examination papers to them and asked them to study the manuals and other relevant materials for the questions to which they had given incorrect answers. Some of the participants could not attend part of the training because they had other training to attend. The low mark may be attributed to this fact.

On the basis of the results of the questionnaire inquiry and the examination, the project member requests the participants to repeat the voluntary practice of the learned technologies to improve their understanding of the technologies.

On the other hand, although the number of the participants was small, they helped and complemented one another in the practical training to manage to achieve the goal of creating the topographic map of the area used in the technology transfer. This fact led the project member to conclude that they would be able to create the geo-spatial data of the remaining 10 % of the total land area of the country in cooperation.

[9] GIS Structurization

Technology transfer was implemented as follows with respect to map symbolization and the structurization of digital compilation data for the use of the data in the GIS (structurization of the topographic map data created in digital compilation to create data that is usable in the GIS).

a. Target of technology transfer

The four people mentioned below participated in the technology transfer on the GIS data structurization. They had a little experience in using GIS.

- Mr. Avni Rrustemi
- Mr. Mentor Kosumi
- Mr. Amir Reçica
- Mr. Qazim Sinani

b. Contents of technology transfer

The project member created a manual covering the contents of the technology transfer and used it in the technology transfer.

1) Target level: To be able to convert CAD data into GIS database with GIS software
2) Target of skill acquisition: Understanding of the outline of GIS, basic operation of ArcGIS, understanding of the basics of GIS database, conversion of topographic map data (CAD) into GIS database, etc.
3) Implementation method: Lecture on the outline of theories and practices associated with the

theories

4) Final exercise: Conversion of digital compilation CAD data (of one map sheet area) into GIS database

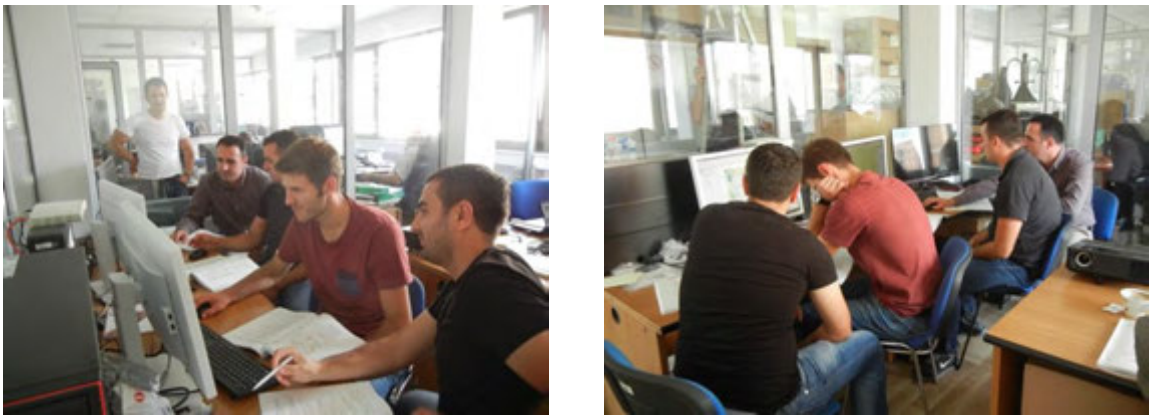


Figure 3-9 Technology Transfer on GIS Structurization

After the completion of the technology transfer, the final exercise was given to the participants. In the final exercise, the participants practiced conversion of sample data created in the digital compilation (of one map sheet area, a design file of MicroStation) into a GIS database in accordance with the provided GIS database structure. They also created polygons and compiled attribute data using the same data in the final exercise. The figure below shows the CAD data used and GIS data created in the practice.

Output data of the digital compilation (CAD)	GIS-structured data

Figure 3-10 Input and Output of Final Exercise of GIS Structurization

c. Evaluation of the technology transfer

Table 3-13 Result of Technology Transfer on GIS Structurization

Item	Indicator	Evaluation method	Mark
Motivation	Percentage of attendance	Quantitative	○
Attitude	Learning attitude during the technology transfer	Qualitative	○
Acquisition of technical knowledge	Result of the final exercise	Quantitative	Δ
Mastery of actual work	Figures in the quality control sheets	Qualitative	Δ
	Time required for the entire work	Qualitative	Δ

- Result of the final exercise

As two PCs were used by four participants in the technology transfer, participants were divided in two teams and took the final exercise as teams. The participants completed the exercise with guidance provided by the project member when the participants had to perform work they had not understood completely. Therefore, the same scores were given to both teams. The table below shows the allotment of marks to the subjects in the exercise and the marks given to the teams of the participants.

Table 3-14 Result of Exercise of GIS Structurization

Point allotment / Team	Data conversion	Polygon creation/ Attribute addition	Topology check	Attribute compilation	Adjustment/ Listing	Total
	30 points	25 points	15 points	20 points	10 points	
A	21	16	5	13	8	63
B	21	16	5	13	8	63

[10] Map Symbolization

The technologies used for the symbolization of the topographic map data for the printing and distribution of topographic maps were transferred to the participants as follows. Map symbolization is the process of creating data which can be printed with a plotter through map adjustment, which is the work of creating maps with respectable appearance with pre-determined expressions by applying the map symbols determined in the Discussion on Specifications to the data structured from the digital compilation data in accordance with the provisions of the map symbol regulations.

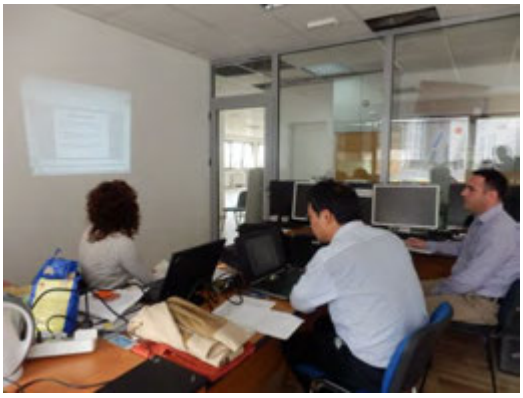
a. Participants of technology transfer

- Mr. Avni Rrustemi

b. Contents of technology transfer

1) Explanation on the outline of map symbolization and adjustment with ArcGIS in a lecture

2) Instruction on the methods for the creation and registration of map symbols
3) Conversion to "Representation"
4) How to carry out map adjustment
5) Method of setting neatlines on arbitrary lines of longitude and latitude
6) Quality control



Technology transfer (lecture)

Technology transfer (practice)

Figure 3-11 Technology Transfer on Map Symbolization

c. Evaluation of the technology transfer

Map symbolization (map adjustment) is work requiring high levels of understanding and technical capacity. Therefore, the participant shall have to continue self-training until he becomes able to provide topographic maps with excellent representation.

A "generally good" result was obtained in the technology transfer that was conducted with the goal of completing the creation of map data of the area used in the technology transfer. However, it was unfortunate that only one person could participate in the training because the others had other engagements.

An examination was given to the participant and another staff member of KCA for the overall evaluation of the technology transfer. The result of the examination indicates that they have acquired a high level of understanding of the symbolization work and have understood 80 % of the technology transfer. This fact is considered to indicate that the participant has acquired the technical capacity to perform map symbolization unassisted.

3 . 2. Materials and Equipment Procured for the Technology Transfer

Table 3-15 and Figure 3-12 show the materials and equipment procured for the technology transfer and their configuration diagram, respectively.

Table 3-15 Materials and Equipment for Technology Transfer

Usage	Name of material or equipment	Quantity
Photogrammetry system		
Desktop PC	Fujitsu Celsius R930	2
Software for digital photogrammetry	IMAGINE Photogrammetry	2
Aerial triangulation software	ORIMA	1
Software for digital plotting	PRO600	2
CAD software for digital plotting	Bentley MicroStation	2
CAD software for digital compilation	Bentley Map	2
Software for DEM data creation/compilation	IMAGINE AutoDTM IMAGINE Terrain Editor	2
Stereo image observation device (3D monitor)	Philips 278G4DHSD	2
Mouse for photogrammetry	TopoMouse	2
Image processing software	Adobe Photoshop	1
Uninterruptible power supply (UPS)	APC SC1500I 230V RM	2
For GIS structurization and map symbolization		
Desktop PC	Fujitsu Celsius R930	2
Software for GIS	ESRI ArcGIS for Desktop Advanced	1
Software for map symbolization	ESRI ArcGIS for Desktop Standard	1
Uninterruptible power supply (UPS)	APC SC1500I 230V RM	2
Miscellaneous		
Handheld GPS	Garmin GPSMAP62SC	2
A set of consumables for plotter Ink cartridge, print head, rolled paper	Genuine parts of HP	1

Photogrammetry system

Hardware configuration
- PC
(Fujitsu Celsius R930)
- 3D monitor (including glasses)
(Philips 278G4DHSD)
- Mouse for photogrammetry
(Leica TopoMouse)
- UPS
(APC SC1500I 230V RM)

Software configuration
For photogrammetry
- Digital photogrammetry software
(IMAGINE Photogrammetry)
- Software for aerial triangulation
(ORIMA)
- Software for DEM data creation/compilation
(IMAGINE AutoDTM, IMAGINE Terrain Editor)
- Software for digital plotting
(PRO600)
- CAD software for digital plotting and compilation
(MicroStation, Bentley Map)
- Software for creating documents
(Microsoft Office)
- Software for assisting document creation
(Adobe Acrobat)
- Anti-virus software
(F-Secure)

Hardware configuration
- PC
(Fujitsu Celsius R930)
- 3D monitor (including glasses)
(Philips 278G4DHSD)
- Mouse for photogrammetry
(Leica TopoMouse)
- UPS
(APC SC1500I 230V RM)

Software configuration
For photogrammetry
- Digital photogrammetry software
(IMAGINE Photogrammetry)
- Software for DEM data creation/compilation
(IMAGINE AutoDTM, IMAGINE Terrain Editor)
- Software for digital plotting
(PRO600)
- CAD software for digital plotting and compilation
(MicroStation, Bentley Map)
- Software for creating documents
(Microsoft Office)
- Software for assisting document creation
(Adobe Acrobat)
- Anti-virus software
(F-Secure)
- Image processing software
(Adobe Photoshop)

GIS/ symbolization

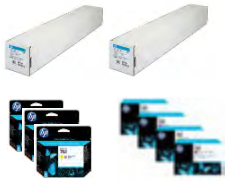
Hardware configuration
- PC
(Fujitsu Celsius R930)
- UPS
(APC SC1500I 230V RM)

Software configuration
- Software for GIS
(ESRI ArcGIS for Desktop Advanced)
- Software for creating documents
(Microsoft Office)
- Software for assisting document creation
(Adobe Acrobat)
- Anti-virus software
(F-Secure)

Hardware configuration
- PC
(Fujitsu Celsius R930)
- UPS
(APC SC1500I 230V RM)

Software configuration
- Software for symbolization
(ESRI ArcGIS for Desktop Standard)
- Software for assisting document creation
(Adobe Acrobat)
- Anti-virus software
(F-Secure)

- Handheld GPS
(Garmin GPSMAP62SC)



- Plotter paper
- Plotter ink cartridge
- Plotter print head

Figure 3-12 Materials and Equipment Configuration Diagram

3 . 3. Training in Japan of the Counterparts

KCA submitted a request to JICA for training in Japan of its staff members. The proposed purpose of the training was to observe and learn how geo-spatial data were created, utilized and managed in Japan. JICA studied the request and decided to implement this training. As a consequence, the training in Japan aiming at "strengthening the organization and the administration of map and mapping-related affairs" was conducted in February 2015.

The output of this training is expected to be shared with staff members of KCA who did not participate in the training and utilized for the strengthening of the organizational capacity (human resources), the capacity to administer map and mapping-related affairs, the technical and management capacity and the promotion of the development, dissemination and utilization of geo-spatial data.

(a) Number of participants: 3

Table 3-16 Participants of Training in Japan

Name	Position
Dr. Murat Meha	Chief Executive Officer
Mr. Esat Xani	GIS Expert
Mr. Avni Rrustemi	GIS and Cartography Expert

Courtesy call to GSI

GNSS-based Control Station (at GSI)

Figure 3-13 Scenes from Training in Japan

(b) Utilization of the outputs of the training

- Establishment and improvement of a legal system for the administration of map- and mapping-related affairs (*e.g.* quality control and a data sales system) in Kosovo
- Information transmission for expansion of the geo-spatial data utilization to organizations using the data and the private sector

- Reform and strengthening of the organizational structure of KCA
- A study on standards on calibration of surveying instruments which Kosovo does not have
- A study on the establishment of a qualification system for those involved in map creation and surveying (similar to the system for qualifying surveyors and assistant surveyors of Japan)
- Creation of various topographic and thematic maps using satellite imagery
- Creation of 3D geographic information
- Others

3 . 4. Conclusion

The project members felt that the participants of the technology transfer participated in the training with the will to continue to develop geo-spatial data of the 10 % of the total land area outside of the project area independently. Although it is understandable that they had to attend other duties while participating in the technology transfer, it is unfortunate that the attendance rate to the technology transfer was lower than expected.

The duration of the technology transfer was by no means long enough. However, the level of achievement of the technology transfer was evaluated at „4" in the comprehensive analysis of the result of the evaluation of the technology transfer of each process mentioned below with the criteria mentioned in the following table. This evaluation result seems to indicate that the KCA staff members who participated in the technology transfer have acquired the capacity to create geo-spatial data of the remaining 10 % of the total land area unassisted, even though it may take a long time for them to do so.

Table 3-17 Evaluation Criteria for Technology Transfer as a Whole

Level of achievement	Evaluation criterion	Relative capacity level compared with that of the project members set at 100
5	Equivalent or superior to the level of the project members	100 % – 91 %
4	Able to complete the work, even though it will take a long time	90 % – 76 %
3	Able to complete the work with assistance from experts	75 % – 51 %
2	Unable to implement the work without guidance and instruction of experts	50 % – 26 %
1	Unable to implement the work at all	25 % – 1 %

Meanwhile, it is possible to assume KCA as an organization administrating map- and mapping-related affairs responsible for operating and managing the geo-spatial data. In this case, KCA may outsource the data creation. As its staff members have learned what work has to be carried out and how the quality of data should be controlled at each process in the data creation in the technology transfer, they are considered to be sufficiently capable of controlling outsourced work.

The increase in the number of requests for sophisticated data services to KCA will be a natural

consequence of the development of the new geo-spatial data in Kosovo. In order to meet these requests, KCA shall have to perform the following:

- ✧ The geo-spatial data of the remaining 10 % of the territory shall be developed without fail either by itself or through outsourcing.
- ✧ As not all the functions of the materials and equipment used in the technology transfer were explained or used in the technology transfer, efficiency of the work shall be improved with the use of those unused functions.
- ✧ Human resources for the geo-spatial data creation shall be developed within KCA by accumulating knowledge and experience on the geo-spatial data creation in accordance with the manuals created in the technology transfer.
- ✧ The capacity to acquire highly reliable geographic information shall be enhanced by improving the capacity in interpretation of aerial photographs.
- ✧ Use of satellite imagery shall be discussed when creating or updating geo-spatial data when necessary.

4. Data Utilization

4.1. Current State and Issues of the Use of Map Data

4.1.1. Current State of and Demand Projection for the Use of Topographic Maps

[1] Understanding of the Current State with a Questionnaire Survey

A questionnaire survey of the participants of the First Seminar was conducted to elucidate the current trends in the geo-spatial data utilization.

1) Details of the Questions and Respondents

The participants were requested to give their responses to the questions set up individually for the four themes mentioned below. Only six non-KCA staff member participants responded to the questionnaire while the project members were in Kosovo. The number of the respondents was small presumably because of the insufficient understanding by the participants of the aim of this Project on the data utilization, in addition to the short period of time given to them to respond to the questionnaire.

- Use of map data in daily work
  - Types of map data used
  - Purposes of the use
  - Method to obtain map data
- Requirement for future usage
- Environment of the office in terms of Hardware and Software
  - Availability of PCs
  - Network environment at work places
- For wider use of geo-spatial data
  - Details of the expectation of new geo-spatial information data
  - Expected future data use with assumed use in GIS, etc.

The total number of the collected responses is 11. The table below shows the numbers of respondents by institution.

Table 4-1 List of Questionnaire Responses

	Agency	Number of collected responses
1.	Ministry of Environment Protection (MEP)	1
2.	Ministry of Public Administration (MPA)	2
3.	Ministry of Environment and Spatial Planning (MESP)	1
4.	Agency of Statistic	1
5.	Local governments	1
6.	KCA	5
Total		11

[2] Profiles of the Respondents and Data Use in Their Organizations

The respondent engineers and experts from the five institutions using geo-spatial information work for planning departments of their respective institutions and have approx. ten years of working experience. At this time, there have been only several cases of the data use at those institutions. It seems that map data have not been used frequently in MPA, with printout maps used only as reference materials. Meanwhile, it seems that medium scale maps such as 1/25,000 maps have been used frequently in MEP and MESP and those ministries have a high expectation of the creation of new geo-spatial information by KCA. As all the institutions have adequate network environments including LAN, they seemed to intend to use the data frequently for creation of thematic maps if KCA manages to deliver the data.

4.1.2. Current State and Issues of the Use of Geo-spatial Data

[1] Current State and Expectation of the Use of Geo-spatial Data

The answers from user institutions, such as the ministries contributing to planning and designing the land, revealed the fact that they have been likely to utilize paper-wise topographic maps instead of digital topographic data. Although they have not used digital map data, it looks that they need to utilize geo-spatial data inevitably in common cases.

Most of cases seem to making use of those information for creation of thematic maps and presentation of geographic features in analytical consideration. The answers showed the strong will that they are going to utilize the geo-spatial data more positively if the data shall be disseminated in digital format, and will try to learn the technology such as GIS.

[2] Problems in the Promotion of the Data Utilization

Staff members of governmental organizations, who are heavy users of maps, have used medium-scale topographic maps in one way or another. However, they have mostly used printed maps and, if they have ever used electronic data, the data used have been mostly raster data. These users are discontent with the limitation on the data usage such as fees charged on the usage. They expect the increase in the types of data available from Geo-Portal and the development of an environment allowing free data downloading as the motivations to increase the use of digital data. KCA is certainly required to develop an environment and review systems to meet these requests and demands.

4 . 2. Utilization Seminar

4 . 2 . 1. Holding of the First Seminar

The first seminar was held at Hotel Sirius in Pristina on November 8, 2013 with the objectives of explaining the significance of this Project, the outputs, the cases of promoting the use of the data and the cases of data utilization and promoting the utilization of the data.

A total of 48 people from relevant agencies, including Mr. Shpëtim Rudi, the Deputy Minister of the Ministry of Environment and Spatial Planning (MESP) to which KCA belonged, participated in the seminar. The participants were from the following agencies:

- Ministry of Environment and Spatial Planning
- Ministry of Public Administration
- Ministry of European Integration
- Ministry of Environment and Spatial Planning - Kosovo Environmental Protection Agency
- Ministry of Culture, Youth and Sport - Department of Cultural Heritage
- Ministry of Economic Development - Kosovo Geological Service
- Independent Commission for Mines and Minerals
- Municipality of Pristina
- Municipality of Mitrovica
- Municipality of Prizren
- Cadastral Office, Pristina
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Radio Television of Kosovo - Radio

Presentations on the details of this Project mentioned below were made at the seminar by members of the Project Team and staff of KCA.

- Explanation of the study methods, work composition and work schedule (by the Project Team)
- Expected areas of data utilization and application and case studies (by the Project Team)
- History and current status of topographic maps in Kosovo (by KCA)


Figure 4-1 Scenes from the First Seminar

4 . 2 . 2. Holding of the Second Seminar and its Outputs

The Second Seminar was held at the Swiss Diamond Hotel in Pristina on April 15, 2015. One hundred and one people participated in the seminar.

Detailed presentations on 1) the processes and outputs of the geo-spatial data creation, 2) the policies for, problems in and actual cases of promotion of data utilization and 3) the measures and basic policies to be adopted by KCA for the promotion of data utilization were made in the seminar which was composed of three parts as mentioned below. (See Appendix-7 for the seminar program.)

In Part 1, the Project members gave a presentation focused on the outputs of the geo-spatial data and other data created in this project and their significance. The presentation also included an explanation of the survey methods.

In Part 2, two representatives of the Geo-spatial Data Utilization Working Group, one government official and one researcher in the urban administration, as data users, presented cases of the utilization of geo-spatial data in practical work in their presentations on the methods and findings of studies on cases of geo-spatial data utilization by utilization organizations.

In Part 3, the Project Team and the Chief Executive Officer of KCA gave a presentation entitled "Potential of and Proposal for the Promotion of Geo-spatial Data Utilization." They mentioned the roles expected of geo-spatial data and the methods and prospect of their utilization during the implementation of the strategic plans for the development of Kosovo (including the Spatial Plan of Kosovo and E-Government) in their presentation. The Chief Executive Officer of KCA also stated the importance of the creation of geo-spatial data of the remaining 10 % of the territory and announced KCA's intention to create such data.

The organizations mentioned below participated in the seminar.

- Ministry of Environment and Spatial Planning – Institute of Spatial Planning
- Ministry of Public Administration
- Ministry of Agriculture, Forestry and Rural Development
- Ministry of Culture, Youth and Sport
- Ministry of Culture, Youth and Sport – Kosovo Institute for Protection of Monuments
- Ministry of Infrastructure
- Ministry for the Kosovo Security Forces
- Kosovo Agency of Statistics
- Independent Commission for Mines and Minerals
- Kosovo Security Force
- Hydro-Economic Enterprise
- Hydrometeorology Institute of Kosovo
- KOSTT – Kosovo Electricity Transmission, System and Market Operator J.S.C.
- Municipal Cadastral Office, Drenas
- Municipal Cadastral Office, Ferizaj
- Municipal Cadastral Office, Fushë
- Municipal Cadastral Office, Gjakova
- Municipal Cadastral Office, Gjilan
- Municipal Cadastral Office, Istog
- Municipal Cadastral Office, Lipjan
- Municipal Cadastral Office, Podujevo
- Municipal Cadastral Office, Prishtina
- Municipal Cadastral Office, Prizren
- Municipal Cadastral Office, Rahovec
- Municipal Cadastral Office, Skenderaj
- UNDP
- University of Pristina – Faculty of Geography
- University of Pristina – Faculty of Philology
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- KCA
- JICA
- RTK (Public TV broadcast)

Figure 4-2 Image of the Second Seminar

4 . 3. Assistance to Users in Relevant Agencies for the Promotion of the Data Utilization

4 . 3 . 1. Capacity Building of Users in Relevant Agencies

[1] Planning and Calling for Participation in the Data Utilization Promotion Training

A meeting for the promotion of geo-spatial data utilization, "The Geo-spatial Data Utilization Working Group," was planned. Working-level data users in charge of planning and survey from government-affiliated organizations including relevant ministries and agencies (hereinafter referred to as "relevant agencies"), where the utilization of geo-spatial data was recommended, were the intended participants of the meeting, as the purpose of the meeting was to promote the geo-spatial data utilization in those agencies by urging their users to utilize the data as much as possible in the performance of their duties.

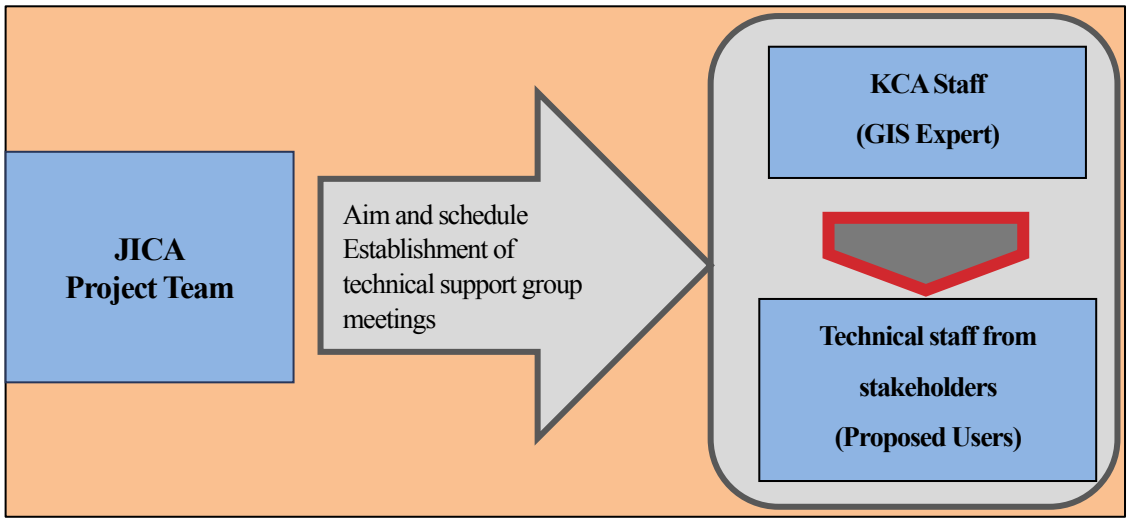


Figure 4-3 Composition of Working Group and Functional Relationship between its Components

Unlike the technology transfer implemented within KCA, the Working Group Training was intended to promote utilization of the geo-spatial data in actual work in relevant agencies after the release of the geo-spatial data created through the Project. Therefore, it was for staff members of relevant agencies whose need for the knowledge and technologies for the data utilization is directly connected to their duties.

Table 4-2 Institutions/Organizations which Have Expressed Intention to Participate in Working Group Training and Names of Participants from Them

Institutions	Participants
Kosovo Environmental Protection Agency	Bajram Kafexholli
Planning Institute	Riza Murseli
Kosovo Agency of Statistics	Idriz Shala
Department of Road Infrastructure, Ministry of Infrastructure	Naim Kelmendi
Department of Heritage, Ministry of Culture, Youth and Sport	Drenushë Behluli-Mehmeti Milot Berisha
Department of Tourism, Ministry of Trade and Industry	Halil Bajrami
Ministry of Environment and Spatial Planning	Riza Murseli Hasim Kryeziu
Cadastral Office, Prizren	Dukagjin Berisha
Cadastral Office, Mitrovica	Fatime Beqiri Cyma Mehmetaj-Morina
Cadastral Office, Pristina	Vjosa Statovci
Independent Commission for Mines and Minerals (Agency)	Sami Duraku

[2] Capacity Building Program for the Geo-Spatial Data Utilization in the Training

Quantum GIS, open-source GIS software, was used in the training as a tool for the utilization of geo-spatial data. The Project Team members took the lead in the implementation of the hands-on-training on the contents, basic operation and introductory application techniques of the software.

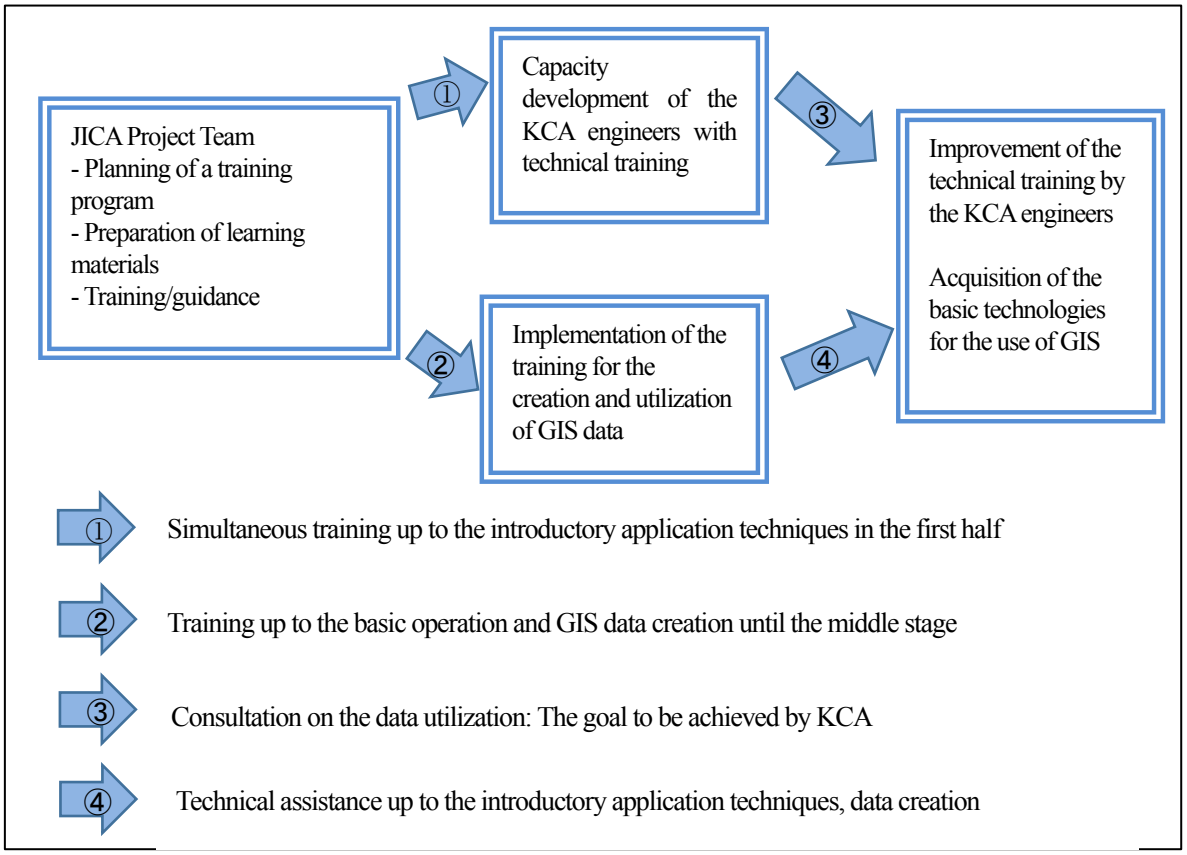


Figure 4-4 Concept of Capacity Building Program for Enhancing Data Utilization Supporting Ability of KCA GIS Staff

[3] Implementation of the Working Group Training and its Outputs

This working group training program was implemented in five sessions. The participants were provided with instructions and advice in accordance with their capacities and aims. They used the basic data of their own in the training.

Table 4-3 List of Participants in Working Group Training

Relevant Agency	Post	Name of the Participant
Ministry of Environment and Spatial Planning	Responsible for GIS	Mr. Riza Murseli
Kosovo Agency of Statistics	Responsible for GIS	Mr. Idriz Shala
Ministry of Culture, Youth and Sports	Archeologist	Mr. Milot Berisha
	Officer for Architectural Heritage	Ms. Drenushë Behluli-Mehmeti

Municipal Cadastral Office – Pristina	Senior Officer for Geodesy	Ms. Vjosa Statovci
Independent Commission for Mines & Minerals	Head of GIS Department	Mr. Sami Duraku
Ministry of Trade and Industry	Officer for Tourism Policies	Mr. Bedri Milaku
Ministry of Trade and Industry	Officer for Regional Tourism Policies for Tourism Policies	Mr. Xhmmajl Pllana

Figure 4-5 Consultation with Participants on Data Utilization for Themes Selected by Them

The project member in charge of promotion of data utilization prepared manuals for the provision of instructions on operation methods of the GIS software and the basic technologies such as creation of GIS data to the participants while they were actually operating the software for their individual themes.

The participants were able to learn methods for data utilization and those used in GIS and get closer to their individual goals by following this manual.

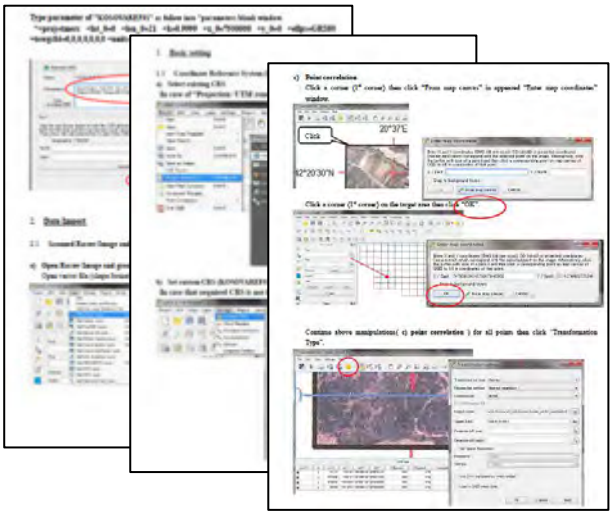


Figure 4-6 Part of Manual

Two or three of the participants are expected to give presentations on the outputs of this training at the Second Seminar.

4.4. Measures to Promote Data Utilization

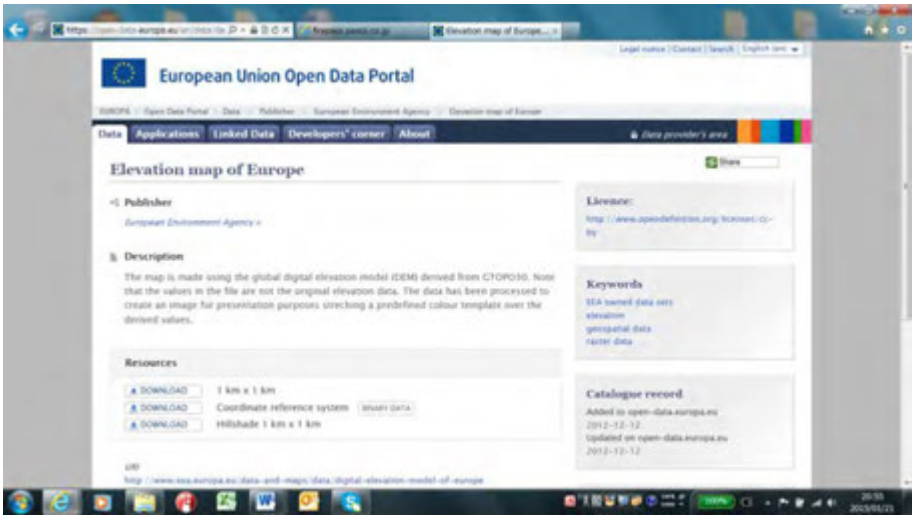
4.4.1. Promotion of Data Utilization with Conversion of Geographic Information to Open Data

[1] Trends in the Open Data Policies of Major Developed Countries

As a strategy to promote e-governance, the governments of developed countries are accelerating the conversion of their data to open data, with the importance of ensuring transparency and accountability, promotion of the data utilization in the private sector and expansion of economic activities taken into consideration. The major trends in this area are described in the following.

- ✧ At the end of 2011, the EU formulated the "Open Data Strategy for Europe." The EU decided to launch "Data Portal[*1]," maintain fair conditions in the EU area and support research and development of data processing technologies in accordance with the strategy.
- ✧ In May 2012, the Obama Administration of the U.S.A. announced acceleration of the open data movement in "Building a 21st Century Digital Government."
- ✧ In Japan, with the submission of the Open Government Data Strategy by the IT Strategic Headquarters in June 2012, the open data movement has gained momentum. It was decided that the infrastructure development for and the promotion of the geo-spatial utilization, which were already in progress, should keep pace with this government-wide acceleration of the promotion of the Open Government Data Strategy. The government announced the principles mentioned below to be applied to the information that it possesses.

1. The Government shall actively release public data.
2. Public data shall be released in machine-readable formats which make secondary use of the data easy.
3. The use of public information shall be encouraged whether for both commercial and non-commercial purposes.



***[1]: European Union Open Data Portal**

The EU Open Data Portal is your single point of access to a growing range of data produced by the institutions and other bodies of the European Union. Data are free to use, reuse, link and redistribute for commercial or non-commercial purposes.

The importance of the services of KCA is increasing in Kosovo as the government seeks to establish e-government. KCA and MPA, the organization promoting e-government, shall define their respective duties and shall be actively involved in the task of disclosing geo-spatial data.

[2] Composition of the Promotion of the Open Data Movement for the Geo-spatial Data

European countries have realized the high potential of various types of information owned by the public sector organizations, mainly those handling geo-spatial data, for commercial use and adopted a strategy of promoting unconditional or reasonably conditional secondary use of the data in a wide range of areas. The Government of Japan intends to announce its concept on the use of copyrighted materials which allows secondary use of data copyrighted and disclosed by the government in a wide range of areas.

The promotion of geo-spatial data utilization is expected to contribute to the development of the national economy in Kosovo. The data utilization shall have to be promoted in a wide range of areas both in the public and private sectors and the public data shall have to be utilized in businesses and for new services. Therefore, it is advisable to review the functions of the existing Geo-Portal which is providing geo-spatial data, conduct a study for the conversion of the data to open data and develop a system which allows secondary use (reuse and reproduction) of the data in a wide range of areas. (See Figure 4-7)

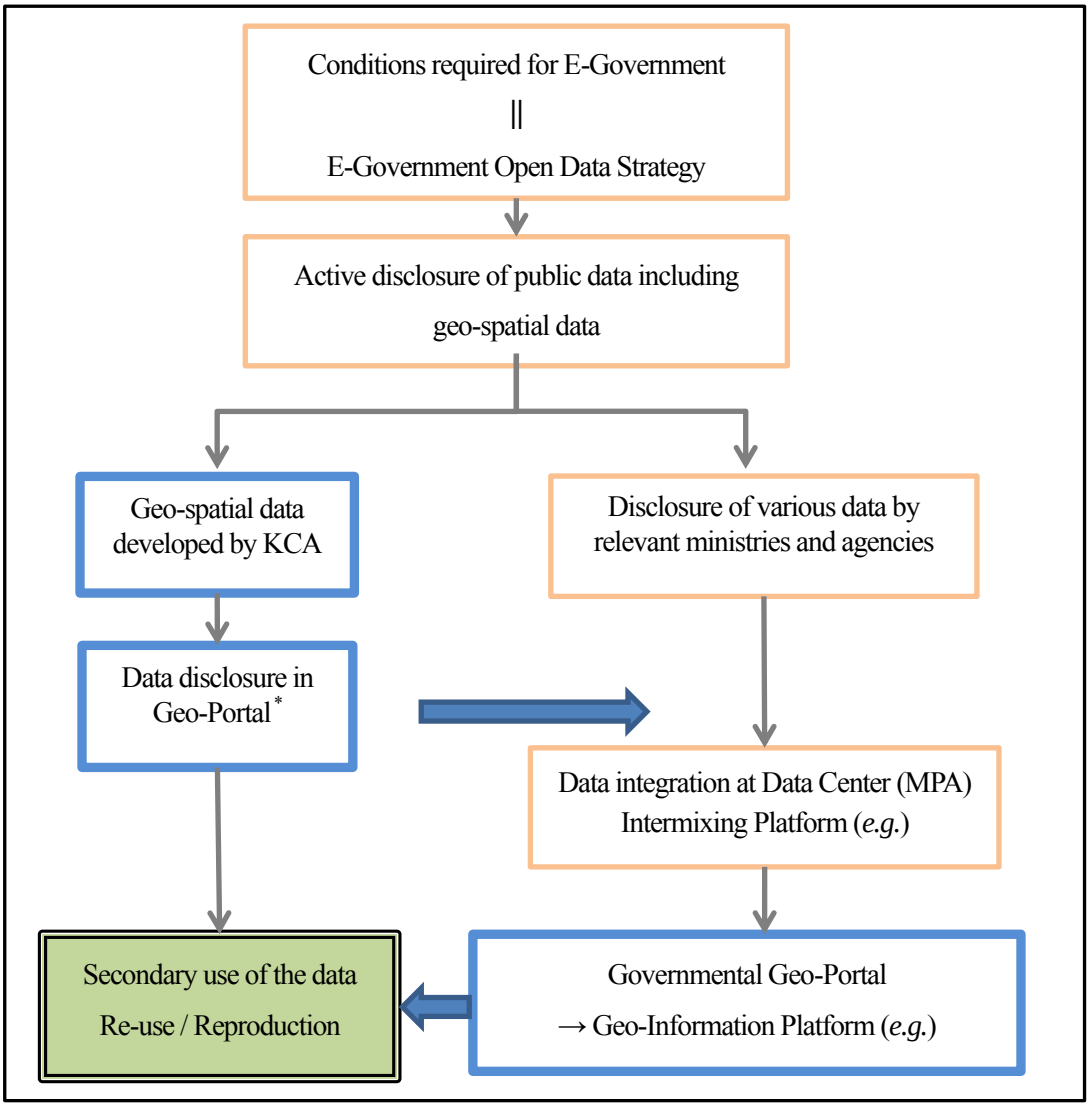


Figure 4-7 Contribution of Disclosure of Geo-spatial Data to Secondary Data Use and Construction of E-Government

KCA has already established Geo-Portal as a system which enables provision of cadastral data, small-scale maps and orthophotos through the Internet. To promote utilization of Geo-Portal for a wide variety of users, a review and improvement of the contents of Geo-Portal, the types of data available in Geo-Portal, methods used in Geo-Portal, fees and range of free services is required.

4.4.2. Measures to Promote Secondary Use of Geo-spatial Data

[1] Development of Guidelines for Data Disclosure for the Promotion of Secondary Use

Guidelines for the secondary use of geo-spatial data have to be developed to clearly define the concept of the secondary use of geographic information at data user organizations and to provide guidelines for provision and distribution of geo-spatial data with issues concerning copyrights appropriately addressed. It

is advisable to include matters mentioned below in the guidelines.

≪Basic provisions in the terms of use for the promotion of the secondary use≫

- KCA, as a data source, shall have to define in advance the range to which authorization for the secondary use of its geo-spatial data, including handling of the copyright, applies in the cases where users use the provided geo-spatial data to create information with added value greater than that of the original data and distribute it.
- It shall be provided whether the permission for the data use shall be provided under a license agreement or other means. The conditions for the permission of reproduction of, partial modification of and creation of derivative data (derivative works) from the provided data shall be clearly defined.
- The conditions for the distribution of outputs of secondary use shall also be clearly defined. The license agreements in Japan and Germany (BKG) allow free secondary use of provided geo-spatial data with the clear indication of the source of the original data.
- The permission shall not prohibit integration and superposition of geo-spatial data of KCA and data created by other organizations.

[2] Method for the Provision of Geo-spatial Data

It is advisable to disclose geo-spatial data as open data for the promotion of their secondary use. To disclose them as open data requires a study on the regulations on handling of map data currently in use and interpretation of intellectual property rights* and the creation of a new system and terms of use for geo-spatial data provision on the basis of the result of the study.

*: The Law No. 04/L-065 on Copyright and Related Right provides the details and range of application of copyrights and related rights in Kosovo. The legal office of KCA explained that it was difficult to copyright the products of KCA on the basis of its interpretation of the law.

"MESP Administrative Instruction No. 25/2013" which provides regulations and fees for the use of products of KCA has the following provisions on obligations of data users:

- Users shall not give products of KCA to third parties without permission of KCA.
- Users shall not reproduce products of KCA without permission of KCA except where the reproduction is deemed necessary on the basis of a security concern.
- Users shall prevent unauthorized access to products of KCA of third parties.
- Users shall not allow their co-workers and employers to use the provided data for personal

use.

◆ When KCA has given permission to reproduce its product to a data-user organization, the organization shall have to specify that the duplicate is a product of KCA with the logo mark of KCA on it.

[Reference] Table 4-4 shows the systems for the disclosure and provision of geo-spatial data in major countries.

Table 4-4 Provision and Use of Geo-spatial Data in Major Countries in Europe / North America and Japan

	Data acquisition through the Internet	Regulation on data use	Intellectual property right
USGS (USA)*	Downloadable	Copyright-free (Data can be used freely)	Data created by the government can be used as copyright-free data
Ordinance Survey (UK)*	Downloadable	License agreement	The Copyright Law
IGN (France)*	Downloadable	License agreement	Intellectual Property Code
BKG (Germany)*	Downloadable	• License agreement • Guidelines	The Copyright Act
Japan	Downloadable (base map data)	Free use with user registration	Data copyrighted by the government can be used as copyright-free data, in principle
	Purchasable in CD-ROM	To be used in accordance with the terms of use	

* Source: "Survey on Guidelines for the Provision of Geo-spatial information in major countries, 2007," GSI (in Japanese, partially revised)

Both a system using the Internet via new functionally improved Geo-Portal and a system of direct provision in electronic media can be used for the provision of geo-spatial data of KCA to their users. Whichever system is selected, it is important to conclude license agreement with KCA and data users and provide general articles for the data use mentioned below including clear definition of the obligations and rights of both parties to the agreement.

✧ Articles to be included in the license agreement

- Definition of the licenser and the licensee (beneficiary) (who provides the license to what kind of party)
- Subject: to clearly define the purpose(s) of the licensing

- To clearly define the rights of both the data provider (KCA) and data users
- To define obligations of licensed users generated under the agreement

Data distribution through a license agreement system is beneficial to KCA because it ensures the licenser (KCA) user fee revenue from the data provision under the license and enables KCA to recover the data development cost.

Under the system currently in use, all the geo-spatial data (cadastral maps) and orthophoto data created by KCA are properties of the nation and the fees for data and service provision are set in accordance with "Administrative Instruction MESP No. 25/2013 on Fees for Products and Services of Kosovo Cadastral Agency." It is assumed necessary to conduct a new study based on the current fee system on the quality control and frequency of updating of data, purpose of data use and the rights to redistribute and reproduce them to set the license fee.

Table 4-5 shows the total amounts of the sales of the data created by KCA in each of the last three years (2012 – 2014) on a revenue basis. Most of the data were sold to governmental organizations in this period. The sales revenue has been paid to the Ministry of Finance.

Table 4-5 Record of Paid Distribution of Products of KCA (in Euros)

Year	Cadastral maps	Orthophotos
2012	53,411.44	–
2013	24,654.00	–
2014	146,129.50	125,000

Source: Interview at the Marketing Dept., KCA

4.4.3. Implementation of Comprehensive Measures to Expand Data Utilization in Inter-organizational Cooperation among Relevant Ministries and Agencies

Strengthening of the cooperation between KCA and relevant governmental organizations is indispensable for the promotion of the utilization of geo-spatial data in a wide range of areas. There are those who appeal for the need for the implementation of comprehensive measures in cooperation between KCA and these organizations for the expansion of the data utilization in new areas in these organizations. Under such circumstances, a study on and implementation of practical measures are urgently required. Some of such measures are described in the following.

[1] Establishment of a Platform for Geo-spatial Data Utilization

A platform which is designed to allow all user organizations and general users interactive access to it through the data center established in MPA and allow them to update, add and share data and to use

applications with ease shall be established. The aim of establishing this platform is to maximize the utilization of the geo-spatial data provided by KCA. It is expected to become impossible to meet various data needs only with the existing Geo-Portal of KCA* in future. Therefore, this platform shall be established as a site for comprehensive utilization of geo-spatial data which allows utilization of multiple pieces of information in an organized fashion (provisionally called Geo Information Platform).

* The only digital data available on Geo-Portal at the moment are cadastral data. The base map data can only be downloaded from Geo-Portal as raster data. The current Geo-Portal users are classified into general users and professional users working in the public sector and different restrictions on the use of Geo-Portal functions apply to the two groups. These facts are considered as potential hindrances to the utilization of geo-spatial data.

[2] Reinforcement of Cooperation between KCA and MPA for the Realization of E-Governance Function – Through the Geo-Information Platform –

In MPA, DeGAP was restructured into the Agency for Information Society (AIS) in January 2014 as stipulated in a new law.

AIS considers that the "Geo-Information Platform" proposed by the JICA (Project Team) is an important component for the realization of E-governance because it can play an important role in the actual operation of E-Governance. A new data center, "State Data Electric Center," was established in MPA with assistance from the World Bank. MPA has a plan to construct a system in which all the data owned and created by all the national institutions are stored in this data center and users can share and utilize all the digitized data stored in the center for their needs.

However, as the server with which KCA provides data is not located in MPA at present, MPA considers it necessary to relocate the data server of KCA to the new data center established in MPA. MPA is also considering a plan to develop a platform for the utilization of geo-spatial information by a wide variety of users by developing a map module.

It is recommendable to establish an organic mutual relationship between MPA and KCA shown in Figure 4-8 in order to accommodate those plans of MPA.

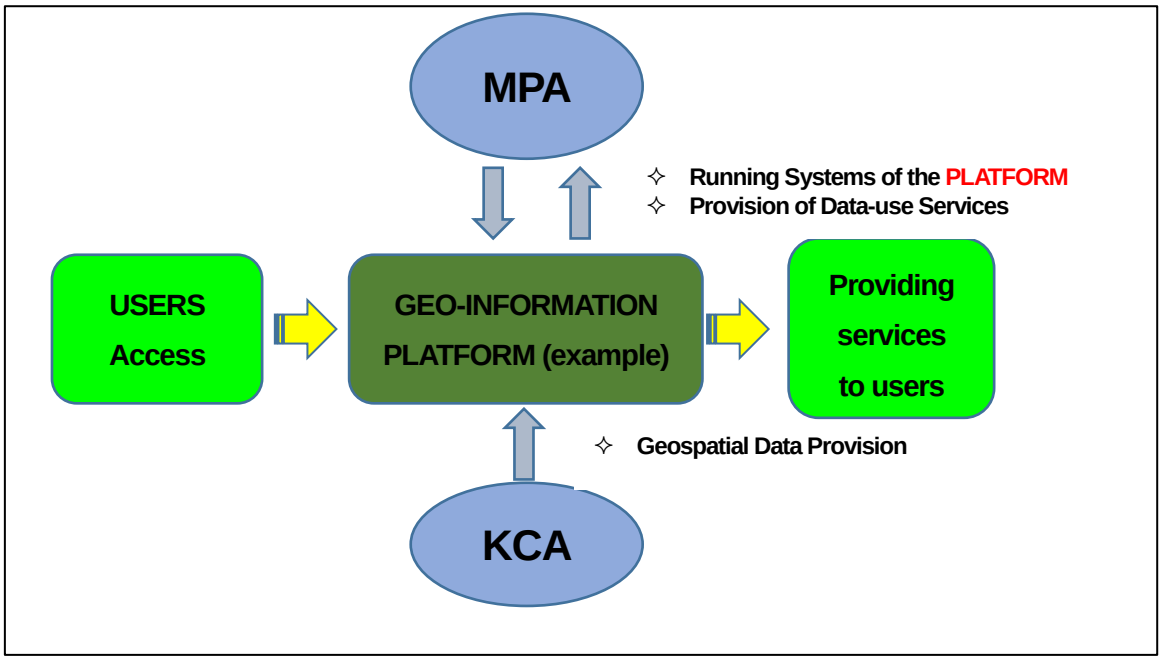


Figure 4-8 Schematic Diagram of Conversion of Geo-spatial Data of KCA to Open Data for Promotion of E-Government

[3] Implementation of Organized Promotion Activities by the Ministries and Institutions involved in NSII

1) Establishment of the Open Data Utilization Council

The Inter-ministerial Coordination Council (tentative name) shall be established (with the members of the "Working Group" established within the NSII Council as its core members). The members of the council shall have regular discussion and consultation on studies on released data, selection of functions, rules for and methods of data utilization, legal matters including copyright issues and needs surveys on the above-mentioned platform.

2) Establishment of an Organization to Promote the Use of Geo-spatial Data

In order to promote expansion of the data utilization in various scenes after the completion of this Project, geographic data users (including government ministries and agencies responsible for planning and administration, independent agencies, universities and research institutions, mining companies and foreign corporations associated with them, private surveyors and NGOs) shall, with the establishment "the Organization to Promote the Use of Geo-spatial Data (provisional)" in mind, have regular discussions with data providing organizations on details of the activities of the organizations, improvement of their services and creation of a system for the data utilization and take lead in creation of consensus among the personnel and organizations concerned.

3) Implementation of the Training for Data Users

Seminars and training courses to improve and promote the use of and create awareness to the technologies for the data utilization shall be held on a regular basis to expand the user base and promote international exchange. It is ideal that the GIS-related departments in KCA which planned and provided the training program in the Geo-spatial Data Utilization Working Group shall take lead in the implementation of this training/workshop.

4.5. Conclusion

The measures to be formulated, systems to be developed and activities to be taken to promote the utilization of and improve the awareness to the new geo-spatial data mentioned above are summarized as follows.

[Expansion of the User Base]

At present, the utilization of geo-spatial data is limited mostly in the planning and administrative departments of relevant governmental organizations including ministries and agencies. Therefore, efforts shall be made to expand the user base of the geo-spatial data administered by KCA. In practice, systems shall be developed, regulations shall be eased and the types of data available for downloading shall be increased in order to encourage private companies, foreign aid organizations, general users and researchers to use the geo-spatial data of KCA.

[Promotion of the Open Data Movement]

Domestic guidelines for the promotion of the conversion of geo-spatial data into open data, which has been carried out in many countries including Japan, shall be developed.

[Review of the Internal Regulations on Data Utilization and Preparation of New Regulations]

At present, certain types of KCA's products cannot be downloaded. There are restrictions which prevent secondary use of data, such as prohibition of unauthorized reproduction of data. Therefore, KCA is required to modernize the user policies with review of the internal regulations and easing of restrictions in line with the international standards.

[Gathering of the Stakeholders]

Enactment of the NSII Law is expected in very near future. After the enactment, technical exchange among the stakeholders interested in geo-spatial information including KCA and discussion on proposals submitted by them are expected to be held in the regular meetings of "the Inter-organizational Working Group on Data Utilization" provided in the NSII Law and in meetings of the sub-working groups. It is

advisable to have gatherings of the stakeholders for the technical exchange and the discussion as frequently as possible.

[Establishment of a Support System on the Use of Data Utilization Technologies]

It is also considered necessary for KCA to take lead in supporting active data utilization by users in the general public by implementing technical training courses on a regular basis on such subjects as methods for the utilization of geo-spatial data and advanced utilization of the data in GIS. As the output data of the Project are to be made publicly available on Geo-Portal, KCA should consider offering workshops and other training opportunities on effective use of the data, particularly for NGOs and private researchers.