OIE Cooperation Project

Capacity development for implementing a Geographic Information System (GIS) applied to surveillance, control and zoning of avian influenza and other emerging avian diseases in China

Parent Reference Laboratory	Collaborating Centre for Epidemiology, Training and Control of Emerging Avian Diseases at Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) **Legnaro (PD) - Italy**
Candidate Laboratory	Chinese Academy of Inspection and Quarantine (CAIQ) **Beijing - China**

Interim report

29th April 2015

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Introduction

The OIE Cooperation Project between the OIE Collaborating Centre for Epidemiology and Training on Emerging Avian Diseases at Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) and the Chinese Academy for Inspection and Quarantine (CAIQ), entitled "Capacity development for implementing a Geographic Information System (GIS) applied to surveillance, control and zoning of avian influenza and other emerging avian diseases in China" officially started on 27th October 2014.

The main objective of the project is to allow CAIQ to acquire expertise to introduce and design GIS applications for surveillance, disease control, and zoning. To achieve these objectives training activities on GIS management techniques, spatial statistical analyses and spatial models integrated with GIS applications have to be implemented.

GIS can be beneficial to veterinary organisations by providing a means to map their own data and use them not only for internal analysis but also to inform other organisations about their activities. In order to organise a successful GIS platform, it is necessary to integrate well-designed GIS framework into the organisational veterinary data management system workflow. IZSVe and CAIQ believe that a system integrating GIS data, with epidemiology and surveillance data, can hide complexity from users, minimise mistakes and enhance the transparency through inter-application operability, communication and cooperation.

Inception phase and preparatory activities

The project inception (activities put into practice before the 27th of November 2014) was dedicated: (i) To create and define, by means of remote connection tools, the project environment that will be used to exchange documents and information, (ii) to plan the first mission, (iii) to start the collection of relevant updated information on Zoning (Activity 1.1).

Project environment implementation

Two elements were tentatively defined for document exchange:

1. A Dropbox folder (Dropbox.com), named "OIE Cooperation project IZSVe – CAIQ", was created. All the scientists involved in the project were invited to join this folder. The aim of the folder is to exchange the final version of public documents.
2. A FTP folder hosted by IZSVe. The IP address of the folder is: ftp://90.147.123.12/OIE_Coop_IZSVe_CAIQ. The access to this folder can be only by means of user name and password provided by IZSVe to the project scientists. The aim of this folder is to contain reserved documents and draft versions.

First Interim Report of the OIE cooperation project IZSVe-CAIQ

A web site was also published. The DNS of the web site is:

http://gis.IZSVenezie.it/tests/OIE/IZSVe-CAIQ/index.php

Figure 1: home page of the cooperation project

At present, the web site consists of only an html page. It will be expanded with documents and information that OIE, IZSVe and CAIQ will agree to publish.

Activity 1.1 Collation and search of relevant updated information

A bibliographical review was carried out by a search of relevant keywords in well-known literature repositories, including PubMed, Web of Knowledge, and the OIE websites. The results were further skimmed by adding definite filters to obtain a core of published papers both to better contextualise the concept of Zoning in veterinary activities and to clarify the glossary already present in the OIE Terrestrial Animal Health Code (OIE Code).

A detailed description of the result of activity 1.1 can be founded in annex 1 (Annex 1 – Biblio search)

Activity 1.2 Baseline assessment of CAIQ GIS organisation and capacity

From 22nd to 27th November 2014 the first mission of IZSVe experts to China was carried out to perform a baseline assessment of CAIQ as far as regard GIS issues are concerned(Activity 1.2). A detailed description of the activities implemented during the mission can be found in annex 2 (Annex 2 – BTOR meeting November 2014).

The selection of a workable dataset on surveillance, identification and traceability by CAIQ is still in progress.

Activity 1.3

The introductory workshop will be jointly organised by IZSVe and CAIQ in May 2015.

Activity 1.4

In progress: assessment of the availability and legal usability of spatial data.

Enclosed documents

Annex 1 (Bibliographical search)

Annex 2 (BTOR meeting November 2014)

Annex 3 (Financial Report)

Annex 1: Preliminary results – Bibliographical search and selection of relevant documents

Introduction

According to the World Organisation for Animal Health (OIE), Zoning/Regionalisation is a procedure implemented by a Member Country, under the provisions of the relevant chapters of the OIE Terrestrial Animal Health Code (OIE Terrestrial Code), to define subpopulations of animals based on their health status, within its territory for the purpose of disease control and/or international trade. This is achieved by defining a geographical area with its boundaries, and by developing and applying biosecurity and surveillance plans. The procedure is supposed to be different depending on the relevant disease(s) and the particular situation of the zone and country (Bruschke and Vallat, 2008).

This concept was introduced by OIE following the difficulties experienced by many Member Countries to eradicate diseases from the whole country and/or to maintain the disease-free status. This happened because the country was considered as a single area with one global health status (Bruschke and Vallat, 2008). Zoning is a concept that allows a greater dynamism in evaluating the animal health status of a country, allowing considering the possibility of the co-existence of different health statuses in the same country.

In order to understand this concept it is necessary to acknowledge the policy framework, which includes the OIE and the Sanitary and Phytosanitary agreement (SPS) (WTO, 2014). The SPS agreement was one of several agreements created when the World Trade Organization (WTO) was formed on 1st January 1995 (WTO, 2014). The SPS agreement has the objective to guide all decisions adopting a science-based approach regarding agricultural products as to avoid needless trade barriers. The use of international standards is also strongly suggested and OIE was selected to provide guidelines in this regard (Thiermann, 2011; Zepeda et al., 2005). The SPS agreement makes reference to Zoning in article 6 "Adaptation of regional conditions, including pest- or disease-free areas", point 1 (Zoning and regionalisation), and the most important idea to retain is that Members of the WTO should recognize the concept of areas with distinct health status. In other words, they should recognize the concept of Zoning (WTO, 2014).

Due to the importance of standardising procedures, and to the large use of the concept of Zoning, either formally expressed or not, in a wide array of circumstances, including disease control and eradication, a clear definition of the main components of Zoning and their field of application is paramount. Hereby the procedure used for a detailed bibliographical search on Zoning is reported and discussed, together with the methods applied to select the relevant documents and papers. The articles and studies found will be used to define univocally the main components and concepts of Zoning, in order to create a common basis on which IZSVe and CAIQ could discuss and work limiting the possibility of different interpretations.

Procedure to produce a comprehensive review of the concept of Zoning

The collection of bibliographical references included the OIE Code and relevant scientific publications found in Web of Science™ and in OIE-related publications.

The method of collection and selection of relevant articles differed between Web of Science™ and OIE-related publications. In regards to Web of Science™, the search terms used were "zoning", "regionalisation", "protection zone", "containment zone", "surveillance zone", "restriction zone" and "buffer zone". Each search term was then complemented by filtering only the articles associated to Veterinary Sciences. Additionally the

search terms "zoning" and "regionalisation" were refined by adding the term "OIE" in order to discard the great quantity of irrelevant publication presented by the search. The OIE-related publications were searched manually through the repository of articles in the OIE website.

All articles found were selected after an evaluation of their relevance first by the title then by the abstract and finally by reading the full article. Articles were included in the review either if they mentioned Zoning in an unequivocal way or if they reported an application of the concept to real-life situations.

The OIE Terrestrial Code 2013 and the articles were then used to understand the concept and identify the components that are part of it and how do they relate to each other. That information was then used to feed the conceptual model.

Results of the Bibliographical selection

Results of the Web of Science™ search are reported in Table 1. Out of all the publications retrieved 17 were classified as theoretical or general approaches to the concept, and 14 were considered as practical examples of Zoning (Table 2).

Search term	Filter 1 - Veterinary Sciences	Filter 2 - OIE	No. of articles
"Zoning"	yes	Yes	8
"Regionalisation"	yes	Yes	2
"Protection zone"	yes	No	20
"Containment zone"	yes	No	1
"Surveillance zone"	yes	No	8
"Restriction zone"	yes	No	5
"Buffer zone"	yes	No	28

Table 1 Search terms used in Web of Science™, the filters applied and the number of articles retrieved

	OIE-related publications	Web of Science™
General approach to Zoning	9	8
Practical example	5	9

Table 2. Papers considered to be relevant and the search engine of origin

Future steps

The preliminary results of the bibliographical search allowed to select a number of papers considered relevant for the project. These documents and studies will be thoroughly read to collect information on the components of Zoning, and to refine the Glossary already present in the OIE Terrestrial Code.

The procedures to search and select the document will also be applied by the CAIQ to identify and select relevant publication or documents on Zoning implementation and exploitation in China and neighbouring countries.

A reference manager platform will be used to circulate the collected documents between CAIQ and IZSVe.

Acknowledgements

The present document was based on part of the Master Thesis on Zoning presented by João Tiago Coelho Vieira at the University of Oporto (Portugal). The thesis was written in the context of an Internship spent at the Parent Institute during the preliminary phases of the IZSVe - CAIQ Cooperation Project drafting.

Annex 2: Back-to-office report – meeting November 2014

Executive summary

From 22nd to 27th November 2014 the first mission of PI experts to China was carried out with the main objective of performing a baseline assessment of CAIQ on GIS issues (Activity 1.2). CAIQ partners were able to organize a successful meeting by inviting not only the prominent coordinators of CAIQ but also a group of scientists that will be involved in the project.

All the topics listed in the mission agenda (see annex "Mission Agenda - November 2014") were discussed and relevant agreements were reached. In particular, scientists discussed about the Zoning principle described on the chapter 4.3 of the OIE Terrestrial Animal Health Code and the role that a GIS framework can have in supporting the epidemiology and surveillance activities of CI.

The meeting ended with general satisfaction and the feeling that both IZSVe and CAIQ acquired more knowledge on GIS aspects and about surveillance on avian influenza and other emerging avian diseases.

Mission agenda

The objectives of the mission were:

1. To provide an updated presentation of IZSVe and CAIQ organisations and activities

2. To give an overview of the project objectives, work plan and to find an agreement on a common road map

3. To share the results achieved for activity 1.1 and experiences about zoning

4. To perform a baseline assessment of CAIQ GIS organisation and capacity

5. To stimulate the CAIQ to identify/select a workable dataset for the implementation of a GIS dedicated to zoning

6. To plan the Introductory workshop

Baseline assessment of CAIQ GIS organization and capacity (Activity 1.2)

In accordance with commonly applied Information Technology (IT) and GIS assessment frameworks, the IZSVe experts interviewed the personnel and reviewed processes and technologies used by CAIQ to manage geographical information and spatial analysis. The team focused the assessment on GIS and IT organizational structures, GIS and IT procedures/applications and IT infrastructure.

For the detailed description of the assessment exercise, see document: Baseline assessment report.docx.

Mission outcomes

During the 3-day mission, the two teams reinforced their personal relationships.

The open discussions held during the workshops allowed the participants to exchange their knowledge on the OIE Zoning concept and the role of GIS applications and spatial analysis for surveillance and import/export activities.

It emerged that further discussions will be necessary to improve the common knowledge about Zooning, the different aspects that compose the Zoning concept (e.g.: geographical, biosecurity, traceability, etc.) and the implication of its implementation in a large country as China.

Another element that emerged during the workshop was the usage of geographical tools used by CAIQ to support the GIS operations. The considerable usage of Google applications made by the CAIQ partners must be carefully evaluated with respect to Google's policy. Clearly, the CAIQ partners should consider developing GIS tools that are independent from private providers or restrictive policies.

Finally, it was detected that neither specific software nor applications for spatial analysis nor specific spatial analysis competences are present. Great effort and the selection of adequate human resources by CAIQ are necessary to fulfil these crucial aspects of Zooning and GIS applications.

The identification of a workable dataset containing data on surveillance, identification and traceability of live animals will be discussed at a later stage and will require an exchange of information between CAIQ and other relevant institutions (i.e. Ministry of Agriculture).

Recommendation provided by IZSVe

- Any project expenditure needs to be agreed upon well in advance between IZSVe and CAIQ to reduce the risk of payment delays, and to allow a cost verification in accordance with OIE cost eligibility rules.

- CAIQ GIS and IT experts of both IZSVe and CAIQ must be involved since the beginning of the project together with veterinary experts.

- Focus the efforts on capacity building for Zoning concept definition and implementation.

- CAIQ shall identify at least one specific and accurately selected scientist in order to carry out spatial statistical analysis. The criteria for the personnel selection should be discussed with the IZSVe experts.

- In order to plan GIS activities, a GIS multi-year strategic and long-range plan document for GIS laboratory must be laid down.

Self-correction measures identified by CI

- Draft Standard Operative Procedures for GIS applied to traceability of animal products

- Promote the use of Open Source GIS software in order to facilitate the collaboration with other Asian countries with limited financial resources

- More involvement and training activities for final GIS users

- Involvement of a Ministry of Agriculture representative only at a later stage (final workshop)

Follow up actions

Introductory workshop (Activity 1.3)

The Introductory workshop has been tentatively planned from 11 to 15 May 2015. Deadlines to submit a list of participants, identification of the training location and draft of the workshop budget have already been set.

Preparatory activities

Further steps to be undertaken by IZSVe and CAIQ:

- IZSVe shall create a public working group in Mendeley Reference Manager and invite relevant CAIQ staff to join the platform

- CAIQ shall submit to IZSVe the final proposal of the participants list to the introductory WS

- CAIQ shall submit to IZSVe the CVs of the trainees who will attend the first training in Italy

- By 31st January the venue and location of the introductory WS to be held in May 2015 will be identified.

- IZSVe will send to CAIQ additional zoning references (activity 1.1)

Annexes

Mission Agenda - November 2014

Baseline assessment report.docx.

Mission Agenda - November 2014

Meeting venue

Beijing Guizhou Hotel No.18, West Yinghua Bridge Chaoyang District, Beijing 100029, P. R. China

Flight schedule IZSVe experts

Departure: Venice airport – 22/11/2014

Arrival: Beijing airport – 23/11/2014

Departure: Beijing airport – 27/11/2014

Arrival: Venice airport – 28/11/2014

Day 1 Monday 24th November 2014: Welcome meeting

Topics:

- Participants' self-introduction presentations

- Presentation of CAIQ organisation and activities

- Presentation of IZSVe organisation and activities

- Presentation of the Cooperation Project goals and work plan

- Timing and organisation of the project activities and criteria for CAIQ personnel selection

- Tour of CAIQ headquarters

Participants:

Italy	China
Nicola Ferrè, IZSVe Head of GIS office	Zhao Zengliang, AQSIQ Deputy Director Genera
Paolo Mulatti, IZSVe Epidemiology unit	Dou Shulong, AQSIQ Deputy Director
Matteo Morini, IZSVe International Cooperation office	Fang Zhiqiang, CAIQ Vice President
	Han Xueqing, CAIQ Expert on AI and Professor
	Wu Shao Qiang, CAIQ Deputy Division
	Qiu Song Yin, CAIQ
	Liu Xiaofei, CAIQ
	Jiang Hongqi, Chongqing CIQ Deputy Director
	Shan Yuping, Guangdong CIQ
	Zhang Biao, Zhuhai CIQ
	Liu Yan, Interpreter

Mr Zhao Zengliang opened the meeting and outlined previous and current cooperation activities between IZSVe (Italy) and CAIQ (China). He underlined the importance of Macao and Hong Kong as trading partners for China and the importance of poultry product traceability.

Mr Fang Zhiqiang presented the structure and tasks of CAIQ. The presentation was mainly focused on CAIQ, which has been identified as the referring institute with the necessary know-how and expertise to successfully accomplish the objects of this project.

Mr Nicola Ferrè stressed the strategic importance of GIS both for animal health and for food safety issues. He also pointed out the GIS development at IZSVe during the last years.

Mr Matteo Morini presented a general overview of the structure and organisation of IZSVe.

Mr Dou Shulong described his personal experience on GIS applications acquired during the previous collaborations with IZSVe. He highlighted the importance to use GIS to improve China trading perspectives by means of the implementation of the project.

After the preliminary presentations of the project objectives, Mr Ferrè provides an overview of the project work plan and expected results.

In the afternoon the IZSVe experts with Mr Qiu Song Yin visited the CAIQ premises and GIS office (some pictures are available in the Dropbox folder used to exchange the project documents and materials).

Day 2 Tuesday 25th November 2014

Topics:

- Sharing knowledge/ experience about Zoning (theory and application)

- Presentation of the preliminary results of the scientific referencing work about Zoning

- Discussion on possible contributions of CAIQ and IZSVe staffs to the scientific referencing collection and analysis about Zoning

Participants:

Italy	China
Nicola Ferrè, Head of GIS office	Qiu Song Yin, CAIQ
Paolo Mulatti, Epidemiology unit	Jiang Hongqi, Chongqing CIQ Deputy Director
Matteo Morini, International Cooperation office	Shan Yuping, Guangdong CIQ
	Qian Wei, Jiang Su CIQ
	Zhang Biao, Zhuhai CIQ
	Liu Xiaofei, CAIQ
	Liu Yan, Interpreter

Mr Zhang Biao provided an overview of the import and export activities of poultry products from China mainland to Macao and Hong Kong. He also outlined CAIQ expectations through the development of a GIS to support the surveillance of trade activities.

Mr Nicola Ferrè delivered a detailed presentation of the project work plan and milestones.

Mr Jiang Hongqi presented the GIS activities already implemented by CAIQ.

During the meeting, a practical example of GIS applications to surveillance on the import of animal products was shown by CAIQ experts. The availability of background maps and the use of Google maps as possible software for GIS were also discussed.

Finally, Dr Paolo Mulatti presented the preliminary result of activity 1.1 (Collation and search of relevant updated information) and suggested CAIQ staff to follow up with relevant Chinese references.

Day 3 Wednesday 26th November 2014

Topics:

- Jointly definition of the main Baseline assessment report contents

- Planning the "Introductory workshop" (draft agenda, list of participants, logistic information, timing)

- Wrap-up and final remarks

Participants:

Italy	China
Nicola Ferrè Head of GIS office	Qiu Song Yin, CAIQ
Paolo Mulatti, Epidemiology unit	Chen Ke, CAIQ
Matteo Morini, International Cooperation office	Liu Xiaofei, CAIQ
	Jiang Hongqi, Chongqing CIQ Deputy Director
	Liu Yan, Interpreter

Day 3 was mainly devoted to the assessment interviews of the relevant CAIQ staff. In particular, IZSVe experts interviewed:

Mr Qiu Song Yin, CAIQ

Mr Jiang Hongqi, Chongqing CIQ Deputy Director

Chen Ke, CAIQ

Ms Liu Xiaofei, CAIQ

The workshop was closed with the commitment of both parties to work on the development of the project in a proactive way to achieve the goals set.

OIE Cooperation Project

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Parent Reference Laboratory	Collaborating Centre for Epidemiology, Training and Control of Emerging Avian Diseases at Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) **Legnaro (PD) - Italy**
Candidate Laboratory	Chinese Academy of Inspection and Quarantine (CAIQ). **Beijing - China**

Baseline assessment report

29ᵗʰ April 2015

Document Information

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The views expressed in this document are those of the author(s) and do not necessarily reflect the views of the World Organisation for Animal Health (OIE).

Executive report

Within the framework of the OIE cooperation project between IZSVe (Italy) and CAIQ (China), it was planned to execute the baseline assessment of CAIQ GIS organisation and capacity. In particular, it was required to evaluate the existing GIS organizational structure, the GIS software and application in use, available equipment, the information technological infrastructure and the trainees' expectations.

This document, which is one of the resulting deliverables, has been written to identify the current state of the GIS organization in place at CAIQ and to make a gap analysis whose results will help to tailor the capacity building actions requested by the cooperation project.

Introduction

The World Organisation for Animal Health (hereinafter referred to as the OIE) together with Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) and Chinese Academy of Inspection and Quarantine (CAIQ) has activated the Cooperation Project entitled "Capacity development for implementing a Geographic Information System (GIS) applied to surveillance, control and zoning of avian influenza and other emerging avian diseases in China" (hereinafter referred to as Project). In order to describe and assess the key points and components of the GIS and Information Technology (IT) organizational structure and IT infrastructure at CAIQ, from 22nd to 27th November 2014, an IZSVe team of experts carried out a mission during which the CAIQ scientists that will be involved in the Project were interviewed (with reference to their experience and activities on GIS), and the CAIQ GIS offices were visited.

Objectives

The specific assessment objectives were:

- evaluation of available (GIS) equipment;

- network and IT set-up;

- compatibility of equipment with the project software requirements;

- assessment of existing GIS expertise, trainees' familiarity with GIS and trainees' expectations;

- gap analysis whose results will help to tailor the capacity building action.

Scope

In accordance with commonly applied GIS and IT assessment framework, the team interviewed the personnel, and reviewed processes and technologies used by CAIQ. IZSVe team focused the assessment on the critical resources to be implemented in order to achieve the project objectives: (i) GIS office organizational structure, (ii) available spatial data, (iii) GIS software/applications, (iv) IT infrastructure, and (v) expertise on spatial statistical analysis.

The IT assessment was performed during a 3-day workshop.

Approach

IZSVe team performed the assessment in accordance with the objectives using a simplified version of COBIT® "Control Practices: Guidance to Achieve Control Objectives for Successful IT Governance" (2nd Edition) integrated with the typical GIS elements. With the designed framework, it was possible to define the needs to be considered when assessing GIS and IT processes and implementing improvements.

To conduct the assessment, the team interviewed the CAIQ scientists that will be involved in the Project and were appointed as reference persons for GIS management, spatial analysis, and IT infrastructure. In addition, IZSVe team visited the GIS office and obtained information on spatial data available, operating system, network and application in use.

Technology overview

GIS and related activities have three different locations:

1. CAIQ Department of risk analysis in Guangdong (Mr Cheng Ke)

2. Administration department of Chongqing Airport, entry-exit inspection and quarantine bureau (Mr Jiang Hongqi)

3. Technical support department, AQSIQ, CAIQ (Mr Qiu Song-yin)

1. The Department of risk analysis in Guangdong is organized to publish client-server applications; in particular, the department is equipped with two servers: one working as DB server and the other as application server.

   The department has developed in-house six applications, mainly dedicated to collect data on imported goods (both plants and animals). The main IT characteristics of these applications are:

   – # users: more than 2000

   – # records/per year: more than 1.000.000

   – amount of memory used per year: 2 GB

   – language: .Net

   – DBMS: Microsoft SQL Server

   – service agreement level: best effort

   – software enhancements: in charge of an outsource company

   The department is testing a webGIS application (operated at intranet level) based on Oracle in combination with ESRI ArcSDE. The webGIS uses ESRI ArcGIS Server as map engine. Silverlight is the language used for the client side.

2. Chongqing department is organized with an in-house server that manages four different applications related to inspection. The applications have been designed to manage information related to outbreaks, risk analysis, and inspection activity reports/statistics (these last are embedded in the applications). The main IT characteristics of these applications are:

   – # users: more than 500

   – # records/per year: more than 5.000.000

- language: .Net

- service agreement level: not defined

- DBMS: Microsoft SQL Server or Oracle

- software enhancements: in charge of an outsource company

The department does not have specific webGIS applications. Two frameworks with some spatial components dedicated to quarantine of imported animals and inspection of travelers' baggage are present. The department uses Google Earth to locate the collected information (based on Google gazetteer service). The ESRI ArcGIS ArcView 10.0 is used to GIS mapping.

3. The CAIQ department is 100% dedicated to GIS activities. The department works only with desktop applications (10- 20 applications in total). The main IT characteristics of these applications are:

- # users: 1

- # records/per year: more than 3.000

- amount of maps authored per year: more than 500

- language: visual basic

- service agreement level: not defined

- DBMS: Microsoft SQL Server

- GIS software: ESRI ArcGIS ArcView 10.2, QGIS, MAPGIS.

Personnel overview

The personnel interviewed reported that they are self-educated (they declared they had followed short training programs such as ESRI introductory/advanced course and internet available courses) on GIS and related technologies.

- Spatial analysis experiences: neither expertise nor formal education on spatial analysis was declared.

- GIS experiences: two scientists interviewed declared some years of GIS experience (3 and 5 years respectively) exclusively with desktop GIS software. One scientist declared that he has started some self-educated tasks related to the implementation of webGIS tools based on ArcGIS Server map server.

- IT infrastructure experience: experience on design, implementation and maintenance of distributed IT applications was declared.

The scientist interviewed showed a positive attitude towards the Project and for any possible training dedicated to specific hardware, software and procedural standards that can be developed during the Project activities.

Data set

The applications presented by the interviewed staff were essentially dedicated to the management of feature attributes. Information about farms is managed by the Ministry of Agriculture, with which there is not any data exchange framework in place.

The management of spatial data collection is performed through Google Earth. The obtained data are exported in KML format and then converted in SHP for the usage in ArcGIS.

Background maps and statistical information were bought by CAIQ in 2012 and contain information on:

– Country level administrative division

– Name of administrative division

– Natural geographic name

– Prefecture level administrative region

– Provincial administrative region

– Railroad

Summary of results

As a major result of this assessment, the team noted that there exists a moderate GIS misalignment among the three departments analyzed. Only one department is organized with a GIS office with a full time "GIS technician"[1], the others use the GIS as "GIS user (light)[2]". There is a substantial absence of any integrated GIS framework. It was noted that under the analyzed business model, there is a lack of information exchange between applications and staff. Nevertheless, the Department of risk analysis in Guangdong can be considered mature enough to play a key role in the designing, developing and implementing a pilot project for an internet webGIS application useful for the CAIQ GIS related activities. Neither the adoption of a written multi-year strategic and long-range plan nor any operational plan for GIS and spatial analysis activities were reported. No formal written project plan or any written documentation for the applications in place was presented. In addition, with reference to the spatial data, the usage of Google Earth client as a way to collect

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[1]GIS technician: technician which typical duties are: (i) capture GIS data in different formats using GPS, electronic data recorders, digitisers, and other means; (ii) download, convert and upload GIS data available from internal and external sources to make them usable; (iii) perform GIS data quality control, including reviewing data for completeness and accuracy; identifying and correcting errors or omissions in the data; (iv) catalogue and inventory GIS data, including metadata creation; (v) input, update and maintain GIS databases, including backups and also maintaining linkages to other databases; (vi) perform GIS spatial analyses; (vii) create map layouts and views, and generate maps and reports; (viii) develop new applications and train others in the use of these applications.
Reference: Huxhold, W. (ed), 2000. Model Job Descriptions for GIS Professionals, Urban and Regional Information Systems Association, Park Ridge, IL, 60068, USA.

[2]GIS user (light): a "light" GIS user would use GIS software only now and then. These individuals can come from a wide variety of backgrounds or positions within the public sector, ranging from planning, to engineering, to public works. These individuals may be able to navigate themselves around the GIS but most often have a fairly limited knowledge of the system. The light GIS user acquires one's skill through either limited training or hands on practice.
Reference: Huxhold, W. (ed), 2000. Model Job Descriptions for GIS Professionals, Urban and Regional Information Systems Association, Park Ridge, IL, 60068, USA.

spatial information should be replaced with applications to integrate spatial information with the related attribute features in order to improve the usability and quality of GIS data.

Recommendations

The following points are the key recommendations that should be taken into account during the implementation of the Project.

— Staff: the selection of specific staff to acquire dedicated training on spatial analysis should be considered as a must.

— Organization of GIS activities: the advantages to centralize the design and planning of GIS applications in order to re-use developed tools or components should be considered. Moreover, spatial data and related attribute features should be organized in a centralized data warehouse in order to re-use the collected data and the available background maps to produce report, statistics, and to support surveillance or emergency activities.

— Formalizing IT documentation: the assessment highlighted several weak points regarding the lack of formalized GIS and IT documentation. Documentation is the main element to design a sustainable GIS framework. To implement corrective actions, CAIQ should consider the following recommendations:

a. Provide a written multi-year strategic and long-range plan for GIS and spatial analysis activities.

b. Provide a written operational plan for GIS and spatial analysis activities.

c. Substantiate minimum security baselines for network devices, servers and databases with documents

d. Substantiate with documents the data set schemas.