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

GIS applications to support entry-exit inspection and quarantine activities

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Background

On 27th October 2014 the Istituto Zooprofilattico Sperimentale delle Venezie - (IZSVe) and the Chinese Academy for Inspection and Quarantine (CAIQ) have started an OIE 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".

The main objective of the project is to allow CAIQ to acquire expertise to design and implement GIS applications applied to surveillance, control and zoning of avian influenza and other emerging avian diseases in China and to support the animal products entry-exit inspection and quarantine activities. To achieve this objective, a specific tailored capacity building program on GIS management techniques, data capture techniques and explorative spatial analysis has been defined.

The ability of GIS technologies to capture spatial information, carry out exploratory spatial data analyses and produce cartograms can be used to define the spatial component of a Zoning procedure and to support the entry, exit and transit quarantine risk analysis. In particular, for the entry-exit inspection and quarantine sector activities, the GIS can be used to analyse the quarantine stations and exporting farms spatial distribution, assess the presence of specific facilities (e.g.: farms, slaughterhouse, etc.) that can impact on the quarantine station or exporting farm performance, valuate the environment composition that surrounds the quarantine station of exporting farm, etc.

Possible GIS applications for entry-exit inspection and quarantine activities were analysed and discussed during the "CAIQ and IZSVe OIE cooperation project introductory workshop". The workshop held on 14th - 15th May 2015, was organised by CAIQ in the framework of the above mentioned OIE Cooperation Project and was hosted by CIQ Guangdong.

At the workshop, oral presentation and special discussion session emphasized: (1) the opportunities provided by the GIS technologies to support entry-exit inspection and quarantine activities; (2) methods for capturing and publishing spatial data (here, "publishing" includes Web-based release); (3) field data capture software and techniques, including the use of Open Source software; (4) analytical GIS techniques and (5) project management techniques.

These proceedings present the major outcomes of the issues discussed during the 2-day workshop. For more information and links to the presentations, please refer to the list of presentations on the cooperation project web site[1].

[1] http://gis.izsvenezie.it/cooperation/oie/izsve-caiq/index.php

Introduction

Geographic information systems (GIS) can provide tools and technological solutions to support the activities related to the entry-exit inspection activities of animals and animal products. For example, GIS can be used to evaluate the geographical distribution of quarantine stations with respect to a given type of well defined facility (e.g. farms, hospitals, etc.). Similarly, the exploratory spatial analysis performed with GIS can be used to evaluate the physical, geographical, or location factors that may affect the biosecurity performance of a candidate exporting farm.

The present document reports on the workshop held 14th -15th May 2015, to bring together experts and stakeholders to address current issues in GIScience and entry-exit inspection and quarantine activities. The goals of this workshop were to build awareness on possible GIS application on entry-exit inspection and quarantine sector, to identify roadblocks for future progress in this field and provide recommendations to overcome these roadblocks.

Fifteen participants were invited from different sectors, including epidemiology, geography, information technology, project management, and inspection and quarantine communities. Fifty percent of them were from the P.R. China government, representing the entry-exit inspection and quarantine system.

During the first day, GIS and Information Technology experts presented their views of the state of the art on GIS, recent GIS applications and future trends. The IZSVe epidemiology department staff delivered background presentations on spatial analysis methods in veterinary field. Participants then identified challenges in each of the focus areas related to the entry-exit inspection and quarantine activities (Entry quarantine and pre-export quarantine). On the second day of the workshop, an open discussion on possible GIS tools that could be used to support the entry-exit inspection and quarantine activities. Hereinafter, there were the presentation abstracts made by the invited experts.

Summary

Acronyms

GIS Geographical Information System
IZSVe Istituto Zooprofilattico Sperimentale delle Venezie
CAIQ Chinese Academy of Inspection and Quarantine
AQSIQ General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
Q&I Quarantine and Inspection
CIQ Chinese Entry-Exit Inspection and Quarantine Bureau

Workshop organisers

Chinese Academy of Inspection and Quarantine & Guangdong Entry-Exit Inspection and Quarantine Bureau

Istituto Zooprofilattico Sperimentale delle Venezie

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The success of this workshop depended upon the commitment and enthusiasm of the attendees. Special thanks go to Ms Li Yijuan and Mr Dou Shulong from AQSIQ, Mr Fang Zhiqiang from CAIQ, Mr Chen Yonghong, Mr Liao Jinwan and Mr Jiang Jianjun from Guangdong CIQ and Ms Liu Xiaofei from CAIQ for the logistic support provided.

GIS Management Strategies for entry-exit inspection and quarantine sector

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GIS technology has increased in popularity, use and interest in recent years thanks also to new applications like car navigators and globe map systems (i.e.: Google Earth, Bing Maps etc.). Nowadays, urban and regional planners, civil engineers, geographers, sociologists, environmental scientists, and alike, daily use GIS tools, and applications for analysing various types of geospatial data and dealing with complex situations. This great expansion of GIS applications is due to the cost reduction of spatial information and technologies (e.g. GPS, satellite data, etc.) and the communicating power maps: a map can be considered a flexible and universal method of communication in and between disciplines and to the public as a whole.

GIS can deliver benefits to any organisation that manages information with a geographical component. These may be operational activities, such as deliveries of products or services (i.e.: transportation decision support system, bus information and transit system), or analytical operation, such as to understand health issues and to depict relationships and significant hotspots within a community (i.e.: disease vector mosquito data management system, management system of epidemic situation).

GIS science and technologies deliver these benefits in two ways. First, GIS has the ability to analyse issues by taking into account the spatial relationship: disparate data sets, which appear to have no commonality, but all of which are geographically referenced, can be brought together using GIS tools (i.e.: map algebra, overlay operations) and to generate new insights, to identify spatial patterns and to improve decision making. Secondly, by using maps to show data, GIS, can transform the cooperation between different parts of an organisation, because it facilitates the communication of information, improves the transparency of data and procedures and thus maximises the efficiency and effectiveness of operations.

The above described GIS benefits can also be exploited by the entry-exit animal inspection and quarantine sector. In particular, for this sector, the effectiveness of GISs can fall into five basic categories:

1. Cost savings resulting from greater efficiency. These are associated either with carrying out or improve the mission (i.e.: quarantine station and exporting farm facilities identification, risk analysis based also on spatial components) by producing new type of report, analysis and information in general;
2. Better decision making. GIS is able to integrate heterogeneous information into thematic maps. This ability to acquire different sources of data and to derive a synthesised information is one of the most important aspect of GIS technology;
3. Improved communication. GIS-based maps and visualizations greatly assist in understanding situations and storytelling. Thematic maps and cartograms can improve communication between different teams and departments, but above all, with importer countries;
4. Promote the reuse of data. Many organizations that collect and manage data are not able to see that the data can be reused to produce new information. The idea to reuse the “transactional data” (data that supports the daily operations of an organization, i.e. describes business events) as “analytical data” (data that supports decision-making, reporting, query, and analysis, i.e. describes business performance) can improve the ERP (Enterprise Resource Planning) capabilities of an organisation. GIS provides a strong framework for managing these types of solutions with full analytical support and reporting tools;
5. Managing geographically. Geography is emerging as a new way to organize and manage information. Administrators and executives use GIS information products to analyse data and communicate. These products provide a visual framework for conceptualizing, understanding, and prescribing action. This goes far beyond simply spatially enabling business tables in a DBMS (Data Base Management

System): GIS is transforming the way organizations manage their assets, serve their customers/citizens, make decisions and communicate.

To achieve the above described benefits substantial background and skills are required not only in "pure GIS discipline"[2] but also in Information Technology (IT)[3], spatial data analysis[4]and project management[5]. In particular, for a successful GIS project, the following elements must be carefully evaluated and tailored on the organisation needs:

1. the scale[6] of GIS involvement with the workings of an organisation;
2. the extent of GIS operations. This factor includes the number of (i) users, (ii) applications, (iii) GIS databases and (iv) their distribution throughout the organization;
3. the degree of integration of GIS into applications/process (GIS functionality may be tightly integrated or serve as an add-on);
4. the frequency of GIS use and its (estimated) life cycle;
5. the complexity of GIS tools;
6. the cost of the implementation and maintenance.

Other major factors that affect GIS implementation include various implementation drivers (ie.: personnel availability, time of realisation), cost effectiveness, data, system availability and characteristics (ie.: technological constraints, open source vs. commercial software).

For those organisations that are wanting on one (or more) of the above listed GIS planning aspects, their GIS projects can endure of serious problems that produce incorrect geographical representation or analysis (i.e.: problem with spatial references, combination of spatial data with different accuracies, datasets poorly described and disorganised). In particular, for those organizations that want to implement GIS to support some of their business activities, and (i) do not have GIS tools and application integrated in their framework, (ii) the system requirements are unclear at the start of the GIS project, and (iii) the resources to devote to their GIS are limited, they cannot afford to develop GIS by simply acquiring a GIS software and quickly train one of their staff member on GIS because they expose themselves to errors and inaccuracies.

In our opinion, the best option for an organisation that possesses few skills in GIS discipline and has decided to develop a GIS platform would be begin with a GIS plan that focuses on starting small, not pre-planning everything from the start, and evolving the GISs slowly through engagement with the organization needs and achieve early successes. The basic idea is to develop a "small GIS framework" to solve a specific organisation's problem (i.e.: a GIS framework to support the quarantine facilities site selection) and, in the same time, to provide a clear message throughout the organisation of what a GIS can deliver. We consider that clear messaging is absolutely critical to the success of any GIS project, no matter how big or small, young or old the organisation is. Constraints and barriers relate to a lack of leadership embracement and a general lack of

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[2] Pure GIS skills regard: geodesy, cartography, spatial data processing and field data collection.

[3] IT tasks include: Database design, Database administration, Application design, Application development, Web site design, Web site administration and System integration.

[4] Spatial data analysis regards all the transformations, manipulations and methods that can be applied to geographic data to add value to them, to support decisions and to reveal patterns and anomalies that are not immediately obvious.

[5] Management, in this context, focusing on spatial data and GIS projects. Therefore the required skills are: Project management, Planning, Managing resources.

[6] The smallest scale might be referred to as the Project-Level GIS. In this situation, a single employee (or a small number of employees) utilises GIS to accomplish a single task, or project. The technology and data are not used throughout the organisation, and very few people require the skills to use the software. The largest-scale involvement of GIS in an organisation is often referred to as Enterprise GIS. In this situation, GIS functionality and data are widely used within the organisation and many people are capable/required of using the technology. In large organisations, staff may be dedicated solely to creating, maintaining and distributing geographic data. Data flow, maintenance and quality must be well defined and strictly monitored.

understanding about GIS functionality and its applicability to existing projects and other day-to-day activities, are considered the major constraints for an effective use of GIS by an organisation.

A typical “small GIS framework” that is able to show off what GIS technology is able to achieve and deliver is a webGIS application. WebGIS are a special case of Web applications that provides to GIS users easy access to geographic information data, spatial information, GIS modelling and processing tools. It provides an open and distributed architecture for disseminating geospatial data and web processing tools on the internet. This makes easier for organizations to distribute maps and tools without time and cost restrictions for the end user. For an entry-exit inspection and quarantine organisation, a small GIS framework can be the development of a “webGIS to edit and visualize quarantine sites” dedicated to capture and validate the localisation of the quarantine station and exporting farm and perform the preliminary spatial analysis of the physical, geographical, or location factors that may affect the biosecurity performance of candidate quarantine station or exporting farms.
Implementing a webGIS as the one above depicted, can be considered a good starting point for an entry-exit inspection and quarantine organisation to implement GISs expertise because:

- WebGIS is able to facilitate the communication of information in intuitive and engaging ways. Literally anybody can understand information when it is presented graphically as a map: display in a web-client where a quarantine facility is located, with respect to the surrounding environment, a specific set of point of interests and the other quarantine sites is the classic ‘a picture speaks a thousand words’.
- WebGIS can improve how different parts of an organisation work together by providing a common operating picture (managed at centralised level). Seeing relevant information of quarantine site presented on a map and sharing information via such a web-client interface can transform the understanding and cooperation between different parts of the organisation, thus maximising efficiency and effectiveness of operations.

GIS Software and applications for an Import/Export Organization

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Geography can be considered the key to manage and solve problems related to the territory, following the concept that almost all phenomena have a spatial component. Nowadays, the geographical aspects are managed and analysed with the support of GIS technologies. We can distinguish two types of GIS applications: desktop GIS and WebGIS.

Desktop GIS applications are used to work with data on personal computer. They are based on a desktop software (e.g. ArcGIS, Quantum GIS) and a database (of file data) that contains the spatial and non-spatial with information stored in the computer disk. Usually, this kind of solution is the starting step of working with GIS. Many organisations or single researchers start with this type of solution because it is affordable and easy to implement.

The increasing popularity of the internet has led to the development of web applications. The WebGIS applications can be considered as an evolution of the above described Desktop GIS. The main difference between the two solutions is that while one user uses the Desktop GIS only, the WebGIS has the precise purpose of communicating and sharing information with many users through the internet. In particular, a WebGIS integrates the original functions of desktop GIS (i.e. zoom, pan, search, element information), with characteristics that are typical of web applications, such as interface customization for specific users and navigation between data (both from internal or external source), centralise data collection, harmonised operative frameworks, etc.

With respect to traditional web applications, WebGIS requires special focus on spatial data management. It involves the usage of complex functionalities for visualization and content management and it depends upon the availability of a set of spatial information called base or reference maps.

WebGIS applications are usually implemented for pursuing specific functionalities (e.g.: capture a specific set of data, visualise a theme according to a given layout). Typical example in the field of animal health are WebGIS dedicated to publish thematic maps on outbreaks distribution, or WebGISs to capture the spatial location of a disease event.

A typical infrastructure to support a WebGIS application consist of three different components:

- Web Server with the WebGIS application deployed;
- Application Server with Spatial Server installed;
- Database server with Spatial Relational Database Management System (SRDBMS) installed.

The WebGIS application development process follows the same principles of “standard” web applications development process. The WebGIS application is based on two main components:

- Server side. This side is responsible for serving the web pages;
- Client side. This side interacts with pages generated by the Server without new server requests, using the web browser engine.

The Server side is in charge of enabling the web page generation. The server side can be composed by different elements to support the server operability (i.e. database server). The information displayed in a digital map can derive from various sources, in a transparent way for the final user. Spatial data can be displayed on the map through Standard Spatial Web Services that publish data stored in different places or in different formats. Common services are Web Features Services (WFS) and Web Map Services (WMS), which are published using web technology by the Spatial Server. A typical Spatial server is Gesoserver, that publishes standard Web Services. However, in order to store, link and maintain relationships between data used in GIS and in WebGIS applications, it is necessary to use a specific software called Spatial Relational Database Management System (SRDBMS). This software allows the Database Administrator (DBA) to manage data (both spatial and not spatial) in the Spatial Database (GeoDatabase). A typical SRDBMS is PostGresSQL with the spatial extension PostGIS.

The client side can be developed by using Javascripts (JS) code. In this case, commons functionalities and component are ensured by JS Library (i.e. JQuery), while the asynchronous communication with server side is allowed by Asynchronous JavaScript and XML (AJAX) technologies. In order to manage spatial data derived by Spatial Services, it is necessary to use a Spatial JS framework (i.e. OpenLayers).

According to the reported architecture and the WebGIS application, it is possible to offer a web environment to the final user where visualise and manage data, and interact with them.

In conclusion, WebGIS cannot be considered a full-fledged replacement for a desktop GIS, nevertheless the continuous improvements of these technologies offer the possibility, for a larger set of people, to account for the spatial/geographical dimensions, as driver when taking important decisions in a wide array of topics.

GIS analysis for an Import/Export Organization

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GIS and spatial analysis techniques in general are defined as a series of analytical methods to determine the spatial distribution of a variable of interest, the relationship existing between the spatial pattern of different variables and how the variables are associated within an area. In a simpler way, spatial analysis allows to investigate phenomena that are distributed in space (and time) and have a physical dimension (i.e. a measurable intensity, be it the simple presence of absence of a generic event). In the last decades, the use of spatial analysis in epidemiology and in other health related topics has grown in an exponential way. Mathematical and (geo) statistical models have been developed and/or adapted to analyse the geographical distributions of events of Public Health interest, usually outbreaks of infectious diseases, pollution sources and other similar occurrences.

In Veterinary Public Health (VPH), GIS and spatial analyses have been largely adopted to manage infectious diseases outbreaks, by defining the spatial relationship between separate cases and allowing to generate outbreaks distribution maps. One of the other important aims of spatially explicit analysis in VPH is the study of risk factors for given diseases or for other health-related issues (e.g. poisoning in domestic animals, effect of pollution of animals), allowing the generation of hypotheses on the presence of factors that may spatially drive the occurrence of the events of interests (e.g. whether there may be a defined source of infection, and/or whether environmental characteristics could constrain the direction and extension of the spread of the events).

Nevertheless GIS/spatial analyses find uses not only in the managements and study of outbreaks, in fact analytical methods may be of great help in planning activities during 'peace-time', where cases have still to occur. The definition of which risk factors can drive the introduction and spread of a given disease, and the study of their geographical distribution, are paramount to create what is called 'risk map' that shows at which risk level a given point in space is exposed with respect to a defined disease/health issue. This allows to identify areas exposed to different levels of risk, therefore permitting to classify farms or other structures of interest with the aims of optimising control and surveillance measures. The study of risk factors distribution and the classification of structures are paramount also in a broader context, such as the import/export sector, as they can help in providing guarantee that animals and/or animal products come from farms that satisfy specific requirements and that are located in areas were risk factors for given health issues are limited or absent.

In conclusion, the importance of spatial analysis in VPH has increased in the last decades and its use has also expanded from epidemiological studies of risk factors to the management of territory in order to reduce the risk of disease spreading in case of introduction and optimise surveillance activities. Spatial analytical techniques find also their use in a broader context, including import/export of products. However, all of this come with the need of creating expertise, with the need of dedicated personnel who can merge the geographical processes with statistical and mathematical procedures, and with the understanding of the biological/veterinarian background to correctly interpret the results.

The role of project planning for implementing GIS applications

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There is no fundamental difference between the planning and management of GIS projects and other information technology projects. In fact, like any other project implementation when we want to implement a GIS project we take into account the same terms and conditions used in project management:

- Time: a project activities can either take shorter or longer amount of time to complete;
- Resources: itis necessary to have an estimation of the resourced required when undertaking a project (for both the project manager and the organization);
- Scope: the outcome of the project undertaken must be clearly defined and shared between the project developers and management;
- Quality: degree to which a set of inherent characteristics fulfils requirements;
- Risk: effect of uncertainty on objectives. Risk is often expressed in terms of a combination of the consequences of an event and the associated likelihood of occurrence;
- Benefits: the measurable improvement resulting from an outcome perceived as an advantage by one or more stakeholders.

It is out of the scope of this abstract to provide information on GIS project planning. Basic information about project approach for implementation of GIS are available from a variety of sources including textbooks, articles and courses. What we want here is to focus on using a specific method of project approach for the implementation of GIS solutions that, in our opinion, showed great benefits in GIS planning: the PRINCE2 - PRoject IN Controlled Environment method (http://prince2.wiki/PRINCE2) and in particular it's simplified version called P3.express. P3.express is a free, extremely simplified project management framework based on PRINCE2.

From a practical perspective, at the start-up point in the PRINCE2/ P3.express project management method, you are simply getting together enough information to check if the project is worth planning in detail and to provide key information for planning. In particular the elements that should be considered are:

1. Put key roles in place. The minimum is Project Executive and Project Manager, but also the appointment of the available resource should be included in this preliminary step;
2. Produce the Project Brief (sketch of the project idea). In general, the idea is accompanied with the sketch of the map output and the core information managed;
3. Plan the Initiation Stage, allowing for risk analysis;
4. Editing of the Business Case document.

The outcome of this stage is the Business Case document. A Business Case document is an overview that explains the needed goals, scheduling, staff and resources to all those concerned with the effort. The purpose of this document is to establish mechanisms to judge whether the project is desirable, viable and achievable. In this document, the resource component is a crucial aspect to explore and describe because for a GIS project not only "pure GIS resources" are necessary but also expertise on Information Technology, spatial data analysis and capture, and geodatabase management are required. The Business Case document, is the document used to evaluate whether or not the project can continue through the next steps (Go/No-Go decision). If the Business Case document is approved, the next step is the full project planning and the Project kick-off phase.

In the full project definition, the following aspects should be considered:

1. Accountability. The purpose of this theme is to define the project's structure of accountability and responsibilities.

2. Quality. The adoption of mechanisms to control the product quality is one of the crucial theme in any project planning. In particular, in a GIS context, the quality issues are a crucial aspect to produce reliable results. The reference for this theme is the standard ISO 19113 – Geographic Information Quality Principles (http://www.iso.org/iso/catalogue_detail.htm?csnumber=26018). The purpose of describing the quality of geographic data is to facilitate the selection of the geographic dataset best suited to application needs or requirements. Information on the quality of geographic data allows a data producer or vendor to validate how well a dataset meets the criteria set forth in its product specification and assists a data user in determining a product's ability to satisfy the requirements for their particular application. Since the high adding value of the quality element, we strongly suggest to develop a specific task for spatial data management, capture and for the scale management in the planning process.
3. Risk. The purpose of this theme is to identify, assess and control uncertainty and, as a result, improve the ability of the project to succeed. In GIS, one of the most identified problem is the data capture. For instance if a farm facility has to be captured with an accuracy of 1 meter, it requires many more resources (including quality control) than the case where an accuracy of 5 meters is sufficient. It could even be the case that the method of capturing high quality data is different than low quality, which may, again, double the costs.
4. Put simple controls and reporting procedures in place. Mechanisms to measure the progress of the project activities will be used to manage deviations. We suggest to use the Schedule Model and Progress Register methods.
5. Focused communication. Communication is for Prince2 a relevant task. We strongly suggest to send short messages to everyone involved in the project, and briefs them on what is going to be done in the planned activities, and the risks that may affect them, as well as the plans to respond to those risks. The purpose is to ensure everyone is aligned with the overall goal of the project, and there will not be conflicts among teams and suppliers.

Once the project, the Cycle Planning section and the project Flow management start, the Project Manger constantly monitors the project completion growing, the team accountability, the potential risks and the potential pitfalls.

The final step of the Project Management process regards the closing phase. This phase includes: (i) receiving approval and handing over the product, (ii) closing audit, and (iii) the definition of the essential elements for the project outcomes maintenance.

To recap, GIS project planning governed with PRINCE2 or P3.express methods can make the work easier for the Project Manager. In fact, using these methods for GIS project planning helps to navigate through all the essentials elements for running a successful project.

Q&I System for Animals Exported from China Mainland to Hong Kong and Macau

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In China, the supervision and administration of the quarantine stations and exporting farms is in charge of the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ). AQSIQ is responsible for the control of animals and their products that enter or leave China. This includes checks on imported animals, quarantine and certification of animals to be exported. The entry-exit activities are organised in a hierarchical structure: on the top there is the AQSIQ at the second level there are 35 entry-exit Inspection and Quarantine Bureaus and at the third level there are 589 branches of entry-exit Inspection and Quarantine Bureaus at the ports. The number of employees of AQSIQ is more than 30,000.

From the functional point of view, the AQSIQ organisation considers 10 different branches:

1. Farm registration includes Farm environment, Farm facilities, Animal health situation, Bio-security measures and Qualified employees;
2. Quality management includes Quarantine leading group, Feeding management, Disease reporting, Quarantine and disinfection, Use of feed and drugs;
3. Official inspection includes Clinical inspection, Bio-security measures, Facility and sampling;
4. Official surveillance plan includes H5/H7 avian influenza, foot and mouth disease, infections bursal disease, classical swine fever and other important diseases, Banned and limited veterinary drugs, Heavy metals, Environment pollutants (Dioxins);
5. Pre-export declaration: the owner should declare the export plan to CIQ 3-10 days before export, the plan needs to specify the original farm, which pen, how many and when to load;
6. Pre-export isolation includes Isolated in one pen, sampling before export and clinical inspection;
7. Certificate issuing means that the contents and formats of the certificates are based on bilateral agreements;
8. Loading and Transportation supervision include transportation Disinfection, Seal, Needle stamps and Tags;
9. Port inspection includes final check and clinical inspection;
10. Emergency Management is mainly about the emergency response plan for entry and exit of major animal diseases.

For AQSIQ, the Hong Kong and Macau regions are of great interest, since within this area there is a well established trade of live animal with a value of 580 million USD per year. To supply the Hong Kong and Macau marked, 299 farms located in more than 29 provinces, sell 7,000,000 poultries, 1,700,000 pigs, 20,000 cattle and 6,000 goats. The evaluation of the physical and geographical factors that may affect the biosecurity performance of exporting farm, is of extreme importance for AQSIQ because a disease problem in one these farms can compromise the trade between China Mainland and the Hong Kong and Macau region.

AQSIQ consider that the support of GIS in the entry, exit, transit quarantine risk analysis can improve the effectiveness and efficiency of the diseases and hygiene risk surveillance programs, enhance the quarantine and safety traceability of export animals and improve animal health status of China and promote the export animals trade.

Requirements Analysis of Export Livestock Information Management System

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The present abstract, starting from the historical aspect that characterised the export of live animals from China Mainland to the Hong Kong and Macau region, will present the new perspectives and innovative solution for the implementation of an Export Animals Information Management System.

Since the 60's, China Mainland exports live animals to the Hong Kong and Macau region. At the beginning, the animals were transported by trains which were called "Three Express". In early 80's, the main transportation solution became trucks. Nowadays, the export trade market of live animals with the Hong Kong and Macau region involves more than 8 millions of animals (mainly poultry).

As far as regarding the importing of live animal in China Mainland, in 2014, more than 2 millions of animals transited through the Shenzhen port.

The import numbers, together with the export numbers provide a clear picture of the importance to have an efficient system to track the animal movements in and from the China Mainland.

According to the quarantine laws in China, the supervision and the control of live animals and their products that leave China can be functionally split in two branches: "Farms Inspection and Quarantine" and "Pre-export Inspection and Quarantine".

The Farms Inspection and Quarantine activities include: exporting farm registration and surveillance, animal feed control, control during the animal loading and so on. The Pre-export Inspection and Quarantine regards the activities related to the transit of live animals in the transit station (e.g.: clinical inspection, animal sampling).

Although the history of live animals export supervision is very long and AQSIQ has gained wide expertise in managing the animal flow from farm to transit station, the Information Technology (IT) capacity has become obsolete to sustain the high number of transits. The department of supervising of animals export considers the time mature enough to renovate the IT and start a process to study and implement a new IT system that will be able to sustain the entry-exit activities and to improve the reliability and transparency of animals export supervision.

The envisaged system should be able to collect all the information about exporting farms, animals movements, disease situation in the animal origin area, transit station data management, and so on. This system should have a specific module to manage geographical information by means of a webGIS.

Note: Ji Fan is an official quarantine officer from Shenzhen CIQ who is in charge of the export animals. Shenzhen city is next to HK， the unique livestock transit station over China is under Shenzhen CIQ's supervision. Ji presented "The Plan of Project of Export Animals Information Management System".