Available online at gisws.media.osaka-cu.ac.jp/gisideas16/

GIS-IDEAS 2016

International Conference on GeoInformatics for Spatial-Infrastructure Development in Earth & Allied Sciences (GIS-IDEAS)

STUDY, BUILD THE MODEL FOR DELIVERY PRODUCTS OF SURVEY AND MAPPING IN INTERNET

Msc. Nguyen Van Tuan[1]*, Msc. Nong Thi Oanh[2], Msc. Nguyen Thi Hai Yen[2]

[1]Vietnam Department of Survey and Mapping, MONRE.
[2]Faculty of Information Technology, HUMG.

Abstract

In Vietnam, the Survey and Mapping Database System with field data, topographic maps, photomaps, geographic names and geographic database has been completed. It is still inconvenient for customers to do the business with the center because mapping and surveying data is locally managed using internal software. Whenever there is a demand, the customer has to go to the Center of Survey and Mapping Data (Vietnam Department of Survey and Mapping, MONRE) to send a request to the provider. This paper provides an overview of how spatial data is currently provided by DONRE and proposes a system delivering mapping products via internet using ASP.NET. The system enables users reach for data faster and more convenient through the internet.

Keywords: Type your keywords here, separated by semicolons ;

1. Introduction

Center of survey and mapping data under Vietnam Department of Survey and Mapping is an authorised agency for storing, managing, and providing survey and mapping data. Previously, data storing was managed in data warehouse and stored in CDs, DVDs. When there is a data order from customers, the information will be queried by software on a personal computer. The results of the inquiry will be recorded onto a note to search from CDs or DVDs then the data will be copied and delivered to the customer. This way of data management and delivery has been done by computer software. The drawback is that it still operates internally and processes manually the transactions with the customer, disregards the advantages of internet to advertise and spread the information to the customers. So it is necessary to build an effective framework that provides users with more convenient and better mapping services and data products.

The study on developing a model for providing survey and mapping data on the internet will give a feasible solution and implement a GIS application of providing mapping service and survey data through the internet. This system will provide users with mapping services and surveying data in a fast and efficient way.

2. Status of mapping data provision

2.1 Types of products being offered

Currently, the Center of survey and mapping data is providing the following data:

Geodetic data: Ground control network including the results and point notes of the coordinates network of class I, II; Elevation control network data including the results and point notes of elevation network of class I, II and III. Gravity data includes base points, datum point and gravity points.

Maps:

- Topographic maps: spatial model and attribute information have been built into a geodatabase.
- Cadastral base maps: spatial model and attribute information has been built into a geodatabase.

* Corresponding author. Tel.: +0-000-000-0000 ; fax: +0-000-000-0000 .
E-mail address: author@institute.xxx .

- Administrative maps: spatial model and attribute information has been built into a geodatabase.
  Paper maps are stored on the map racks; digital maps are stored in CDs, DVDs and SAN systems in the Center.
  Photos and imageries:
- Film, air-photos: films and air-photos have been digitalized and standardized; spatial model and attribute information have been built into a geodatabase.
- Remote Sensing data: includes spatial model and attribute information have been built into a geodatabase.
- Remote sensing maps: Include air-borne photo maps and cadastral photo maps.

Gazetteer data includes place names of Vietnam administration; World maps, population, mountains, hydrographic names places and socio-economic place names.

Geographical database: geographical database at various scales of 1 / 10,000; 1 / 5,000 and 1 / 2,000

2.2 Method of providing data

Previously, data has been provided manually, the topography data is held in the archives stored in the storage such as CDs, DVDs. When customers order the data, the detail information will be searched on the software installed on personal computers. Search results will be recorded in the note to find on CDs or DVDs and delivered to the customers. Although the maps or data is managed and operated on devices, but the supply of these products is still conducted using internal operating software. This made the transaction with the customers inconvenient and disregarded the advantage of information network to advertise and spread the information for the customers in a wide scale and automated manner. The fact that the customer have to go on site, contact us directly to inquire about the situation of their regional data resulted in the limitation of spreading the information to the majority of customers.

The system of internal management and operation has some basic limitations:

- The current system can perform only the catalogue of price of data
- Not allow searching for online catalogue;
- Customers need to come directly to the center to search and purchase data, spending a lot of time and travel costs, especially for clients residing in remote areas.

3. Solution for developing model of providing mapping services and data on the internet

3.1 System Requirements

The system for providing mapping service and data needs to meet the following basic requirements:

- Develop after an advanced model, ensuring the safety, security and the provision of information lookup online services continuously;
- Database must be compliant to geographic information standards to ensure the openness and regular updates;
- Allows customers to search for information quickly by attributes and by spatial model;
- Allows customers to make a payment to exploit mapping data by internet banking services.

3.2 Application development model

The architecture model of the application is multi-layer architecture:

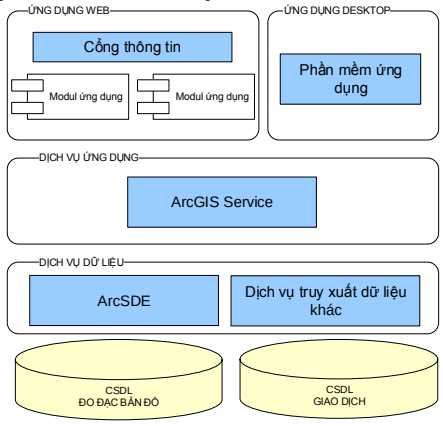

Figure 1. System architecture

- Database layer: Responsible for managing data stored in the system. The database is divided into the following components:
  - Cartographical database is responsible for organizing, storing various types of map data;
  - Transaction database is responsible for organizing, storing of information about customers, orders, and

customer transactions.

- A GIS database designed and set up on the SQL Server 2012 data management system;

- Database service layer: database service layer is used as a platform to access data for the top layer.
- Application service layer: Provides application services to perform operations according to system functions.
- Application Layer: This layer installed software applications directly handle the functions of the system and interact with users. This layer consists of two main components are based on the software platform and web application software is based on desktop application platform.

As for system overview, the system is developed into a service-oriented architecture SOA (Service Oriented Architecture) including multiple layers. The lower layers run to the functions to provide services for the upper layers. The advantages of SOA architecture in this system:

- This is an advanced system widely used in modern computer systems, can be built quickly and efficiently exploited;
- Flexibility in the use and modification to meet users' needs;
- Scalability;

Application software solutions: using the library of ArcEngine and ESRI ArcGIS Server.
Web Server is IIS and programming language is ASP.Net.

3.3 Online Payment Solutions

The system allows for integration with the most popular electronic payment gateway in Vietnam today-vnpay.vn. Then the system supports credit/debit card transaction on the website. Payment results take effect immediately in order sheet when an order is placed.

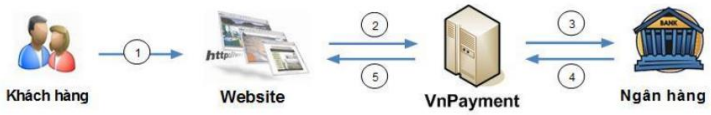

Figure 2: Process connection with electronic payment gateway

Based on the results of purchases by customers, e-commerce partner (seller, owner of e-commerce websites) will process the order based on the results of the transaction:

- Successful transaction: EC partner proceeds the delivery to the customers to fulfil the requirements of the order.
- Successful transactions in VNPAYMENT - Sold Out: EC Partners will sign into VNPAYMENT and refund for customers.
- Transaction failed: Based on the error codes returned by VNPAYMENT, e-commerce websites will display an error message to the customers

3.4 The main functions of the software

Software providing mapping services and map products is deployed at http://www.bandovn.vn. The main functions of the software include:

- Search: Search for geodesic and cartographic data by attribute or spatial patterns
- Order surveying and mapping data: Customers can directly send orders to buy the data on the system instead of going to the Information Center data Geodesy and Cartography. The required information about the customer will be reviewed and answered during the day.
- Online payment: This function allows customers to pay for the fee of providing data immediately via internet using a banking account without having to travel to service provider.
- Product download and upload: this group of function allows customers to receive data directly by downloading the product to personal computers (username and password is neccessary to download)

4. Results and discussion

The system's software products have been tested during research project implementation with different customers. The following software is in detail:

- E-commerce Website of surveying and mapping: allows clients to browse, search for surveying products and maps, order products, deal with the Vietnam Department of Survey and Mapping through the ordering system integrated in the software, allows the officials of the Department to manage customer lists, manage orders and product transactions.
- Software support for operational personnel of Vietnam Department of Survey and Mapping before providing surveying and map products to customers: providing data conversion tools, integrate new data into the system.

During the testing process, the system run stable, then it can be deployed in exploiting and providing surveying and map products of map database on the internet to provide map data in an effective way.

Here are some screen shots of system interface:

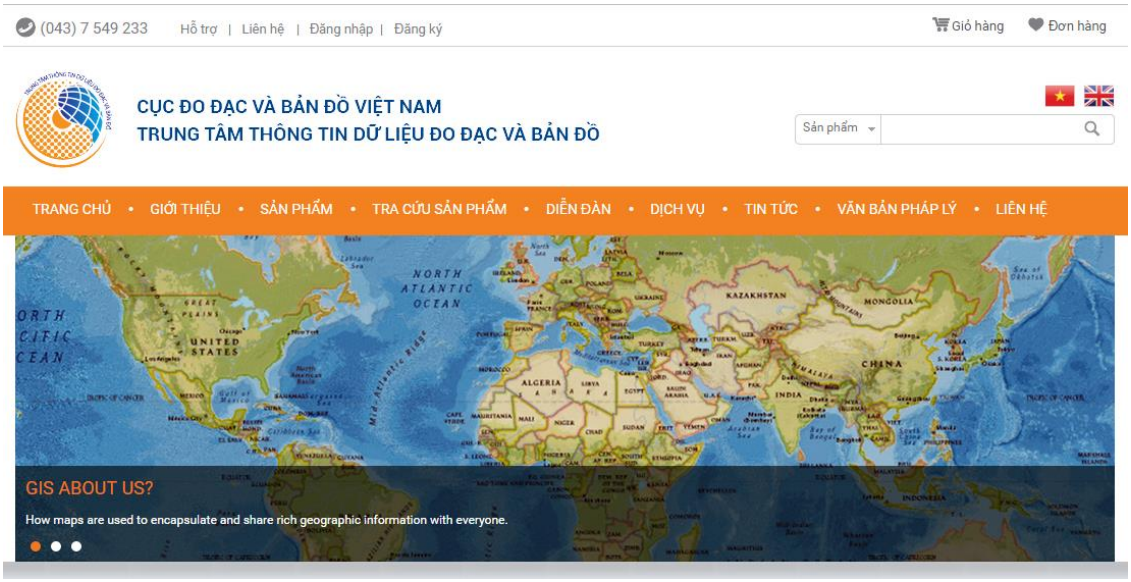

Figure 3: Home page

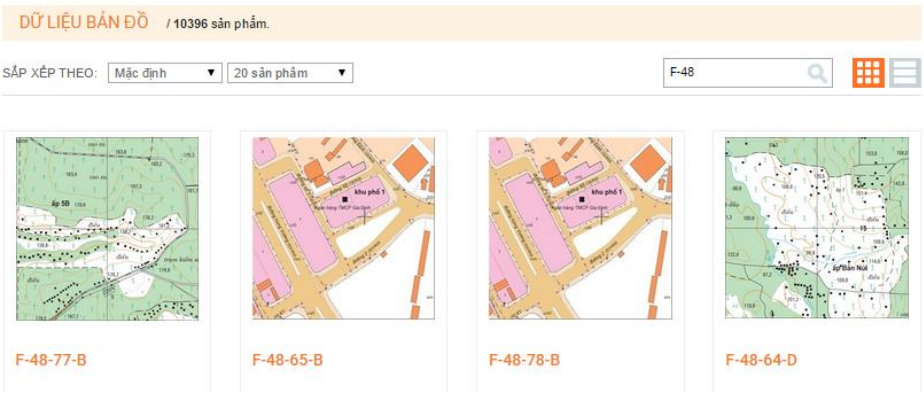

Figure 4: Query by attributes

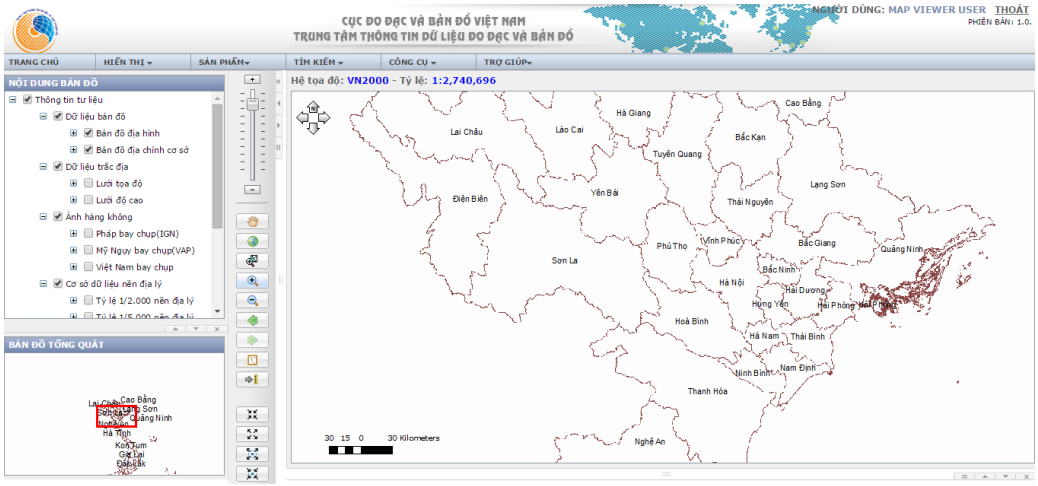

Figure 5: Query by spatial

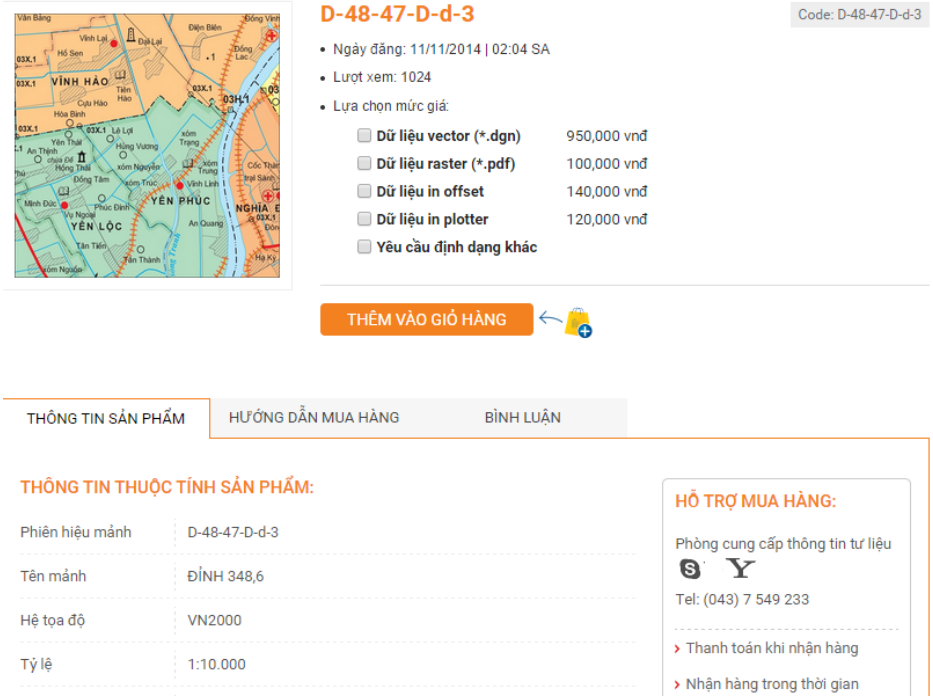

Figure **6**: Detailed information of map data

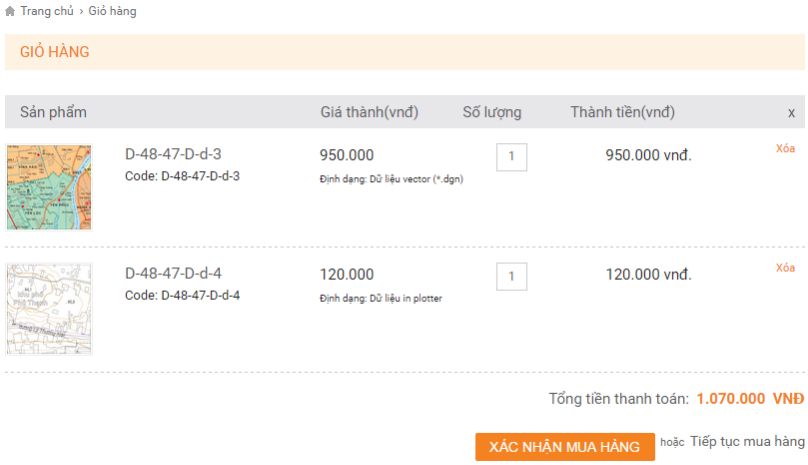

Figure 7: Manage orders

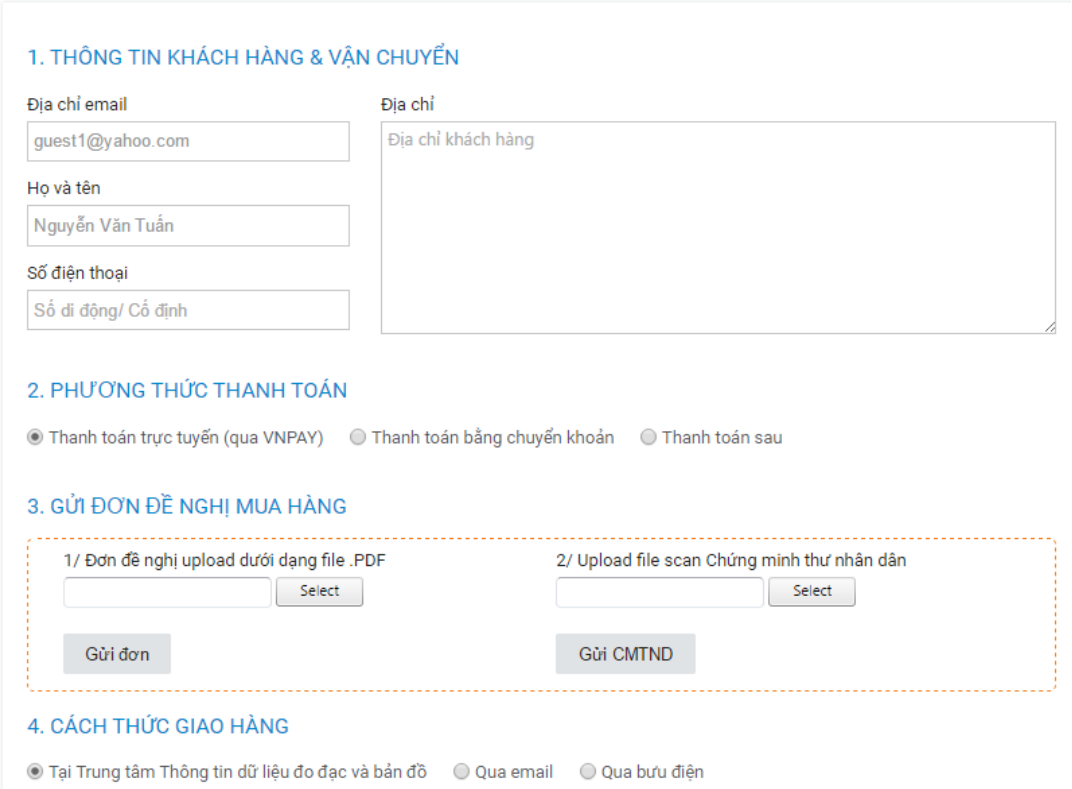

Figure **8**: **Order form**

Figure **8**: **Manage transactions**

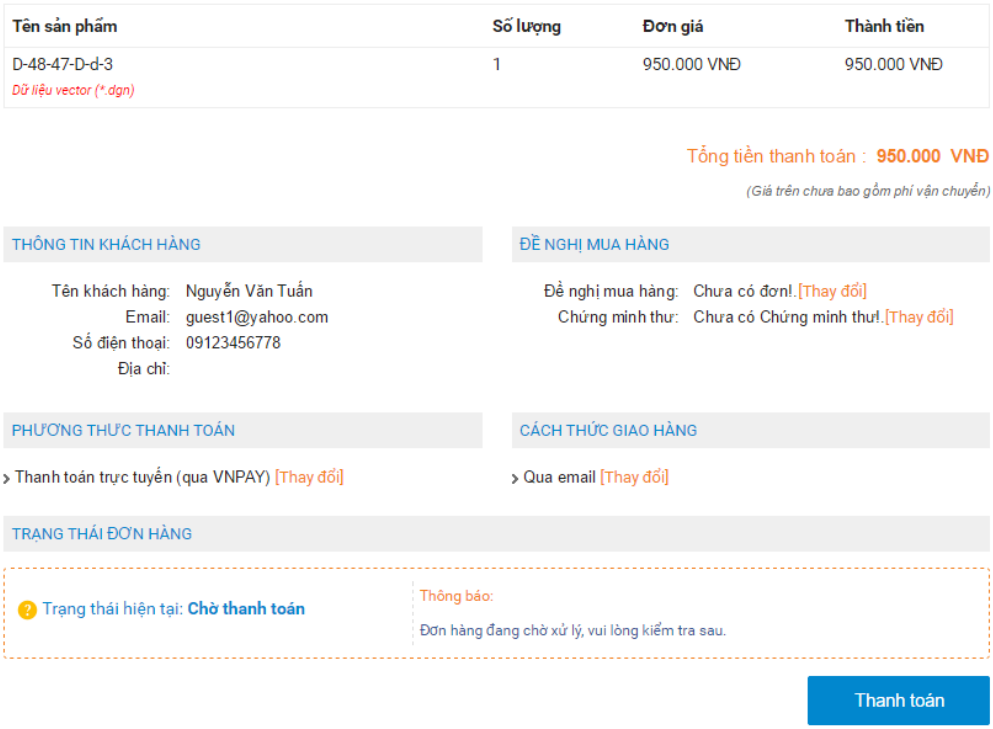

Figure **9:** Pay fee for providing data by internet banking

5. Conclusion

GIS technology is one of advanced technologies serving for designing and developing applications relating to spatial data. Problem of management and provision of survey and mapping products has been developed to meet the public service level 4. In this paper, we have presented a solution for providing survey and mapping products in Internet platform. The developed system with high performance and availabilities allows users to look for spatial information and model quickly. The system database is designed to conform standards, which is open and extensible. Users can make secure transactions to pay via internet banking. The positive results achieved through the performance system testing the feasibility of the proposed system in current context of technology in our country.

References

[1] The project "Building a Monitoring System for Natural Resources and Environment in Vietnam - ENRMS" (2004), Ministry of Natural Resources and Environment. The document of the group EADS - NDC in the design, specification of project ENRMS, 2006.
[2] The technical documentation of the project "Building a national database on natural resources and the environment", Department of Information Technology.
[3] The technical documentation of the project "Building management system database based national geographic database and cartography", Department of Survey and Mapping of Vietnam.
[4] Decree No. 64/2007 / ND-CP of the Government dated 10-04-2007 on the application of information technology in the operation of state agencies.
[5] Jeffrey A.Hoffer - Mary B.Prescott - Fred R. McFaddaen (2010), "Modern Database Management (10th Edition)", The Benjamin / Cummings Publish Company, Inc.
[6] Michael ZEILER (2010), "Modeling Our World: The ESRI Guide to Geodatabase Concepts", Environmental Systems Research Institute, Inc.
[7] ESRI Press (2004), "ArcGIS Engine Developer's Guide"

Appendix A. An example appendix

Authors including an appendix section should do so after References section. Multiple appendices should all have headings in the style used above. They will automatically be ordered A, B, C etc.

A.1. Example of a sub-heading within an appendix

There is also the option to include a subheading within the Appendix if you wish.