

# **GIS for a Policy Decision Support & Adopting Web Services in National Tourism Portal**

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## **Abstract**

South Korea's Tourism Knowledge System has four major tourism related databases; tourism resources, statistics, laws, and development. It is its third year project of operation and development. These four major databases are related to each other and linked by GIS serving information to tourism information seekers not only for people in general but also policy decision maker. This paper introduces how the system provides comprehensive information to information seeker. New and important added functionality of the 3<sup>rd</sup> year's project is regional portal pages that would provide regional tourism information situation at a glance based on administrative districts. Also, the paper shows the service framework of collaborative web services between central and local government.

## **I. Introduction**

### **1. National Tourism Information Strategy Plan of Korea**

Many tourist information systems serve information for tourists. However, policy decision support systems in tourism field are a few. Therefore, the Korea ministry of culture and tourism (MCT) established the National Tourism Information Strategy Plan (ISP) for building Tourism Knowledge systems (TKS) in which GIS has significant role.

The system includes four major databases such as tourism resources (tourist attractions), statistics, laws, and investments. In addition to these four major databases, GIS layers in this system have topographical map, transportation map, land use map and natural environment map.

According to the National Tourism Information Strategy Plan, annual tasks have been accomplished and major task of the 3<sup>rd</sup> year project which has finished in March 2005. are regional tourism portal pages. This paper introduces the 3<sup>rd</sup> project in chapter II titled '**II. Tourism Knowledge System & GIS for Decision Support**' and the 4<sup>th</sup> year project which will

start around September 2005 in chapter III titled 'III. Adopting Web Services for Tourism Knowledge System'.

## 2. Tourism Knowledge System and 4 major tourism related databases

### 2.1. The Conceptual Role of TKS

Korean Tourism Knowledge System (TKS, <http://www.tour.go.kr>) has 4 major tourism related databases including Tourism Resources, Tourism Statistics, Tourism Laws, Tourism Investments and GIS database. These four databases are associated with each other based on GIS database for serving comprehensive information for information seeker. GIS plays an important role of linking four major databases (tourism resources, statistics, laws and investments database) in the TKS. Therefore, the TKS lets visitors browse comprehensive information combined four databases based on GIS.

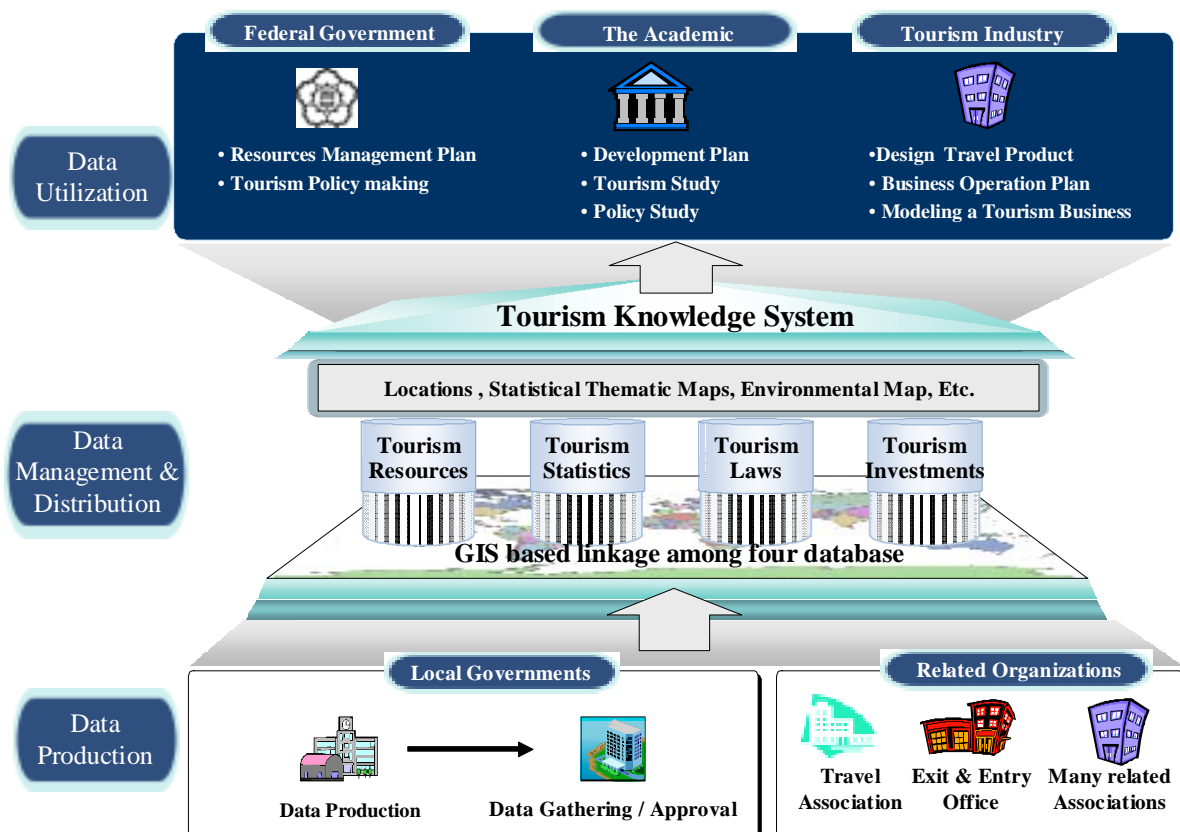


Figure1. The conceptual role of TKS

The ultimate objective of the role for GIS is to make four databases be linked. The concept of

“being linked” is for example while users watching tourism resources database, if they want to search another database such as statistics or investment databases they can access through “map” (GIS) Therefore, visitors who access the system can get overall information through GIS.

## **2.2. Tourism related four major databases**

Tourism resources database has about 46,000 points (spatial data) scattered all over the country and its attributes that are based on the nationwide investigation in 1999 and supplemented yearly. The tourism resources are divided into 3 highest classifications such as “culture”, “nature”, “place & facilities“, second highest 19 classifications and the lowest 248 classifications.

In addition, tourism statistics database contains almost of all statistics concerned tourism that are very useful and meaningful for tourism research. Major classifications are “exit & entry statistics”, “attraction visitor statistics” and “tourism industry statistics.”

Tourism laws database gives “current laws”, “historical record of laws,” “local government’s regulations,” “precedent,” “explanatory note of current laws,” “FAQ to MCT.” All laws were reclassified from the tourism point of view after gathering data.

Tourism investment databases are mainly for the investors, researchers, or local-government officials who want to know what sort of tourism developments are going on or will be promoted in the future. This database is consists of 3 major part such as “investment guidance” that has information for attracting investment, reports on development plan, development condition and “investment support” that has the present status of tourist resort, investment example, administrative support, financial support, ”reports for investment”.

## **II. Tourism Knowledge System & Decision Support**

### **1. The Characteristics of Decision Making in Tourism**

#### **1.1. Demand for Various Information**

A lot of information in various fields is necessary for decision making in tourism field. As our society advances, many parties concerned occur. In addition, in order to meet their desire, generally complicated decision-making using much information is accomplished.

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At the present, databases are linked based on local IDs and object IDs. Ultimately, intermediations for being linked with each other will be map(coordinate).

This chapter introduces tasks which had been conducted from the 1<sup>st</sup> ~ 3<sup>rd</sup> year projects (from year 2002 ~ to present)

The related fields with a tourism decision-making are tourist statistics, tourism industry statistics, tourism law, tourism administration, tourism policy, tourism research materials, national land use plan, environment, transportation, investment and so on. Considering an aspect of supplying them with that information, we need to build a database of those and make a plan for connecting system with related database.

## **2) The Difficulties of Acquiring and Using Data**

The core policy of information-oriented society is to furnishing information seeker with not just a single field information but total information of concerned fields including sharing information between related organizations.

In the same concept, tourism database should be designed to serve comprehensive information through linkage or sharing between related databases.

For example, usually local government's tourist information system serves only about their administrative district. Therefore, if a trip route spread over more than two districts, information seeker has to search all tourism internet homepages separately.

For the officers in charge of tourism business at the local government, even if they try to design travel products or set up tourism policies, they have a difficulty to get information, because of a diverse type of data format and a different kinds of systems.

## **3) The Matter of Linkage and Sharing Tourism Information**

With positive drive of information-oriented project, they built so many databases and information service using these all over our society. However, because each project is conducted only with their own objectives by different organizations, there are so many troubles of linkage or sharing even in the related fields. It is the same problem in the tourism field in Korea. Therefore, the information about a certain tourist attractions can be different according to managers of the database.

These problems are caused by lack of information standardization method and organizations in charge of supporting information interchange between interested bodies.

## **2. Using GIS for Supporting Decision-Making in Tourism**

For the effective management of tourism resources (tourist attractions such as resort, mountain, river, valley etc.), in the process of planning, execution and evaluation the right information reflecting characteristics and status about tourism resources is very important for policy makers, local administrators, specialists and the interested parties. However, surveying, monitoring, information management are conducted by each organization or project, so it is not easy to use

survey result systematically. In addition, rational decision based on scientific data such as terrain, land use and attributes is hard to make.

GIS has a spatial and attribute data. There is a linkage between spatial and attribute in a database of GIS. It means that searching, editing, analyzing the data is very efficiency. In addition, GIS data has a topology in spatial features, so feature layer overlay, analyze, search, select by theme are possible. These kinds of characteristics make us use GIS as a tool of decision support such as location analysis, land use plan, tourism development plan.

This article illustrates “Korean Tourism Knowledge System” as the example of supporting decision making with GIS.

### 2.1. Linkage between GIS and four databases

The four major tourism databases can be operated independently, however as you see below these databases are linked with each other for serving comprehensive information to information seeker. Tourism resources and Investment are connected with GIS database directly, tourism statistics and laws are connected with GIS database through resources and investment database except for some of statistics which could be distributed into regions.

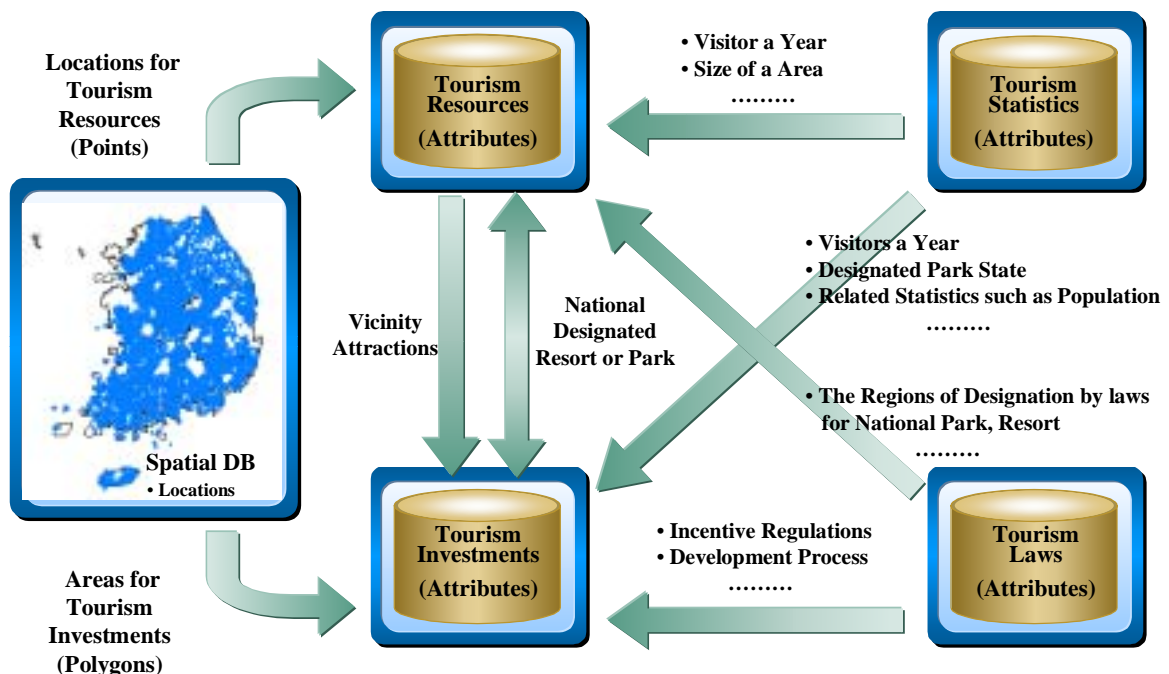


Figure2. Linkage Diagram between GIS and Four Databases

## **2.2. Major Support Tool for Decision-Making**

### **1) Layers Overlay Analysis**

Mapping where things are lets us find places that have the features you are looking for and to see where to take action. GIS can have various layers such as topographical layer, geological layer, soil layer, environmental layer, land registration layer etc. Based on these thematic maps (or layers), GIS lets us be able to overlay layers and figure out hidden meaning that we can not recognize before overlaying layers.

### **2) The Tourism Resources and GIS**

Tourism resources databases is mainly for managing tourism resources by federal government and serving the source to local governments in order to building tourist information system. The detail items that the tourism resources database contains are name, investigation date, investigator, reviewer, history, transportation, location, size, shape and additional note etc.

Principally, the tourism resources databases are supposed to be updated by local government's officer who is in charge of tourism affair. After initial input, each data has to be approved by upper rank officers such as federal government officers and center administrator. The highest rank administrator (center administrator who is responsible for running the system) is supposed to make a linkage between attributes and spatial data of each updated tourism resource.

The locations of tourism resources can be displayed point or polygon. We can see distribution patterns of tourism resources thorough this point or polygon layers. In addition, if we overlay the point layer on topographical layer, we are able to see accessibility, contiguity, and supplementary relationship among tourism resources.

Besides, GIS for the tourism resources has a radius search function that makes travel planners at travel agencies be able to plan travel products. If users do a radius search with selecting certain tourism resources categories, the system offers the name of tourism resources corresponding to the category. For instance, the below picture shows that only museums corresponding to the user defined category and radius of 1 km in the downtown area of Seoul. It will help travel planner to make downtown museum tour. Likewise, it can be applied to search restaurants and loadings in and around sightseeing resort area. It will be a practical help to planner, if the system includes shortest path analysis among selected points in the future.



Figure3. Radius Search



Figure4. Real-time Tourism Resources Distribution Map

In addition, real-time tourism resources distribution map can help government officers be able to draw up tourism resources management plan.

### 3) The Tourism Statistics and GIS

Major contents of tourism statistics are visit statistics for tourist facilities. GIS for the tourism statistics allows users to browse visit statistics by area. Real-time statistical thematic maps based on world map show an inbound tourist statistics by visit purpose, the length of stay, an age bracket, nations, entrance port etc. Likewise, outbound tourist statistics can be created using GIS

Additional data in the statistics are designated resort, tourism industry, and world tourism statistics etc. Among these data, spatially related data such as an international conventions record by area, domestic tourist visit by area use maps for generating the thematic maps.

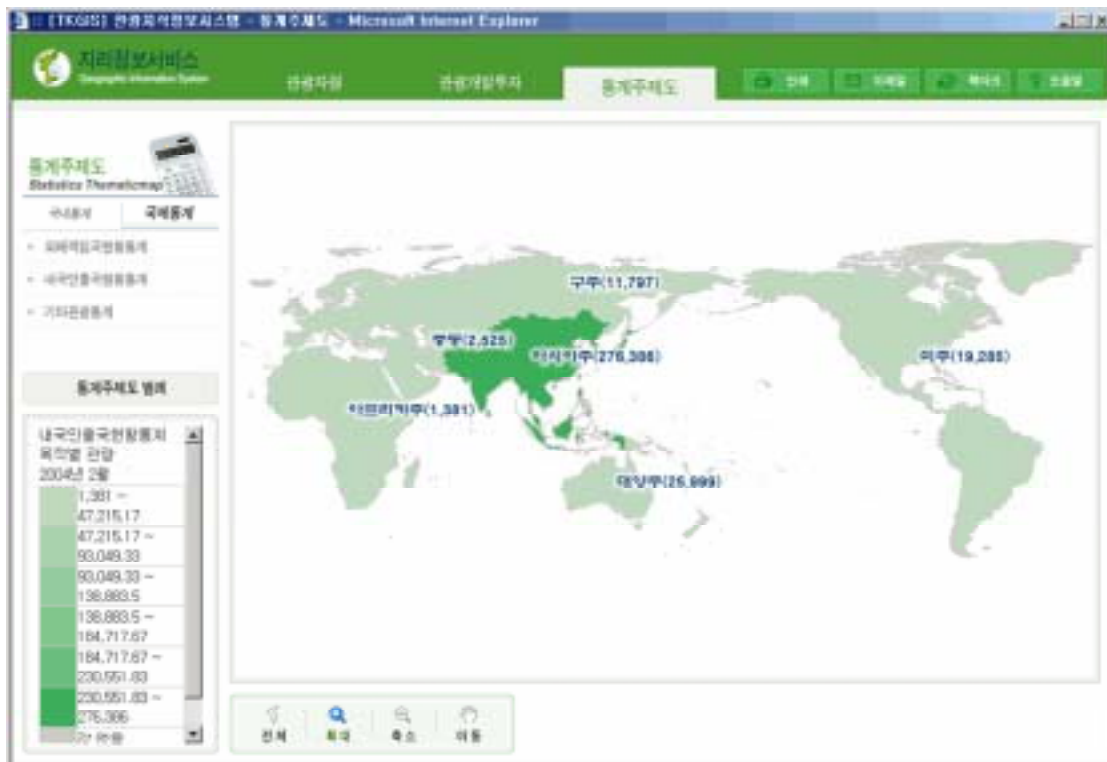


Figure5. Inbound Tourist Statistics Based on World Map

### 4) The Tourism Investments and GIS

Three major contents of tourism investment database have spatial data as a polygon and its attributes.





**Figure6. Overlaying Various Layers around Investment Area and Its Vicinity**

Generally, investors are interested in surrounding environments both in artificial and in natural for investment and development. Therefore, present land use map, natural environment map, contour map and conservative area map are very useful for figuring out conditions for development by overlaying these maps.

### **5) The Tourism Laws and GIS**

The tourism laws prescribe promotion and regulations matters on development or company operation, Linkage between the laws and GIS is very restricted. However, local government's regulations can be browsed by regions, based on administrative boundary map. In addition, if the system contains urban planning map (or zoning map) that regulates development guidance in the future, the systems enable user to confirm what kind of facilities can be installed or not.

## **3. Regional Tourism Portal Services**

### **3.1. Concept**

Regional tourism portal services furnish two-categorized information which consist of tourism related brief such as population, conditions of location, the number of designated resorts and its

names, tourism market trend, trend analysis and information which can be distributed into administrative district out of 4 major tourism databases.

Also, the services provide the list of official government's site and tourism sites as well. At the present, these service items are supposed to update by central administrator of TKS. But in the future, this service might be developed toward advertising local events or festivals, too.

### 3.2. Service Details

Regional tourism portal page is divided into three parts including: 1)map area 2)tourism brief information area 3)four major databases area. If user clicks certain district on the map area, the other two areas would show the regional information.

The picture below illustrates how this service organize information which are classified by the respect of tourism into the view point of region.



Figure7. Regional Tourism Portal Service

### **III. Adopting Web Services for Tourism Resources database in TKS**

#### **1. Backgrounds**

Local governments in Korea are preceding with establishment the foundation of tourist information system to build good reputation for tourism and attract foreign tourists, in order to activate the tourist industry in Korea. The local tourist information systems are considerably different from the others as there is no standardized format. According to the National Tourism Information Strategy Plan (2002), if local governments want to use the Tourism Resources database in TKS for building their tourist information system after updating original database on up-to-date.

Basically, Tourism Knowledge System connects information creator and consumer. We are in the middle of collecting and reconstructing all different computerized and non-computerized information through the yearly constructed business in order to collect and provide tourism resources efficiently.

#### **2. Collaborative Web Services Framework for Tourism Resources**

##### **2.1. Conceptual Framework**

Building standard web services are requested for assisting local government's tourist information system to attract tourist and creating various value added based on tourism resources in TKS which are the largest tourism resources database in Korea. The picture below illustrates how central and local governments are cooperated based on web services.

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This chapter introduces tasks which will be conducted in 4<sup>th</sup> year project.(from this fall)

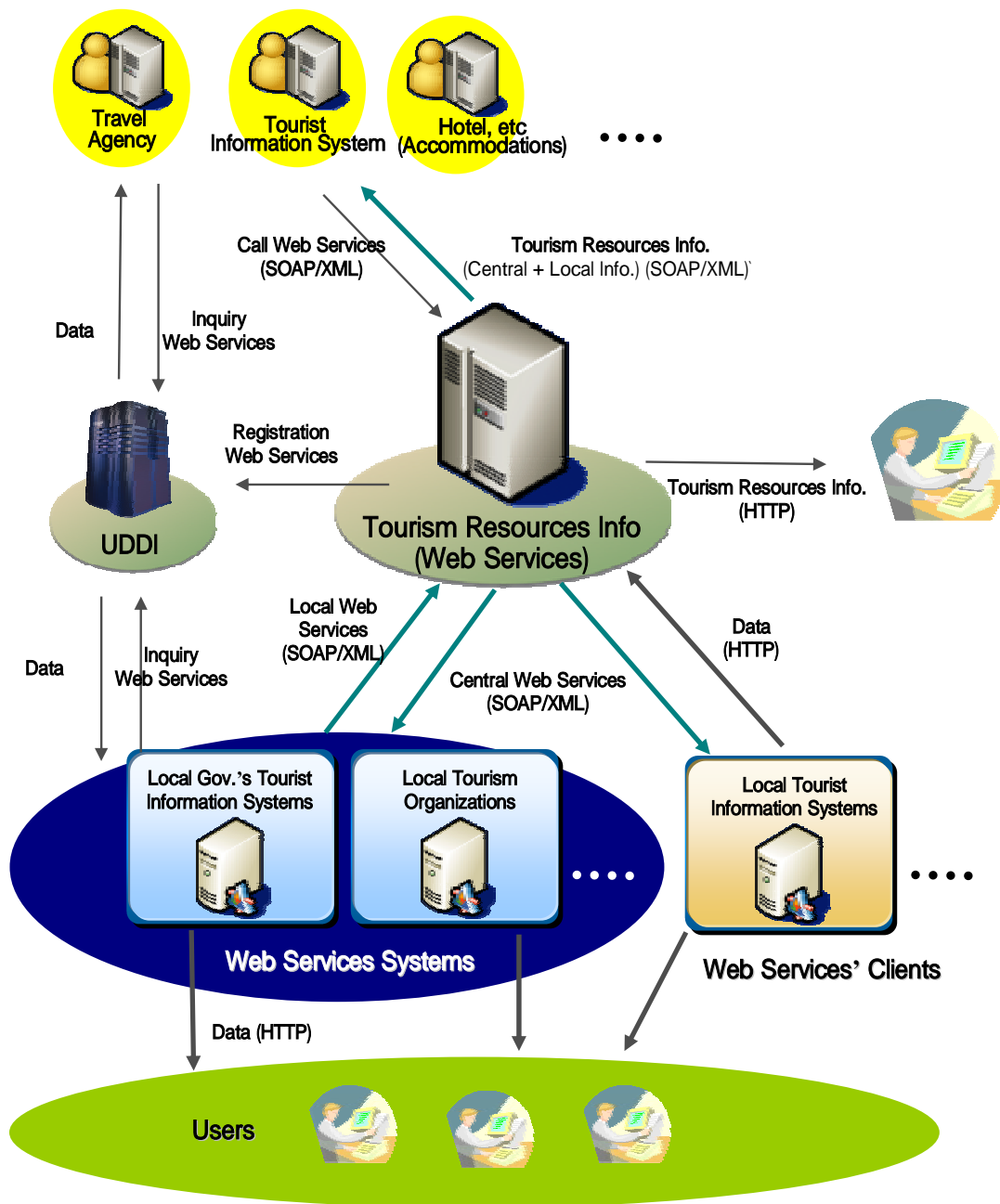


Figure8. Collaborative Web Services Framework for Tourism Resources

## 2.2. Service Details and Requirements

### 1) The Collaborative model for using Web Services mutually between national and local system

Local tourist information systems provide tourism resources' information inside their administrative district, and local tourist information system can call central Web Services

powered by TKS which serve tourism resources' information for the rest of area especially vicinity of interest. In the same manner, central TKS can call local Web Services powered by local tourist information system which serve unique local tourist information for serving comprehensive and combined information which is called two or more separate Web Services.

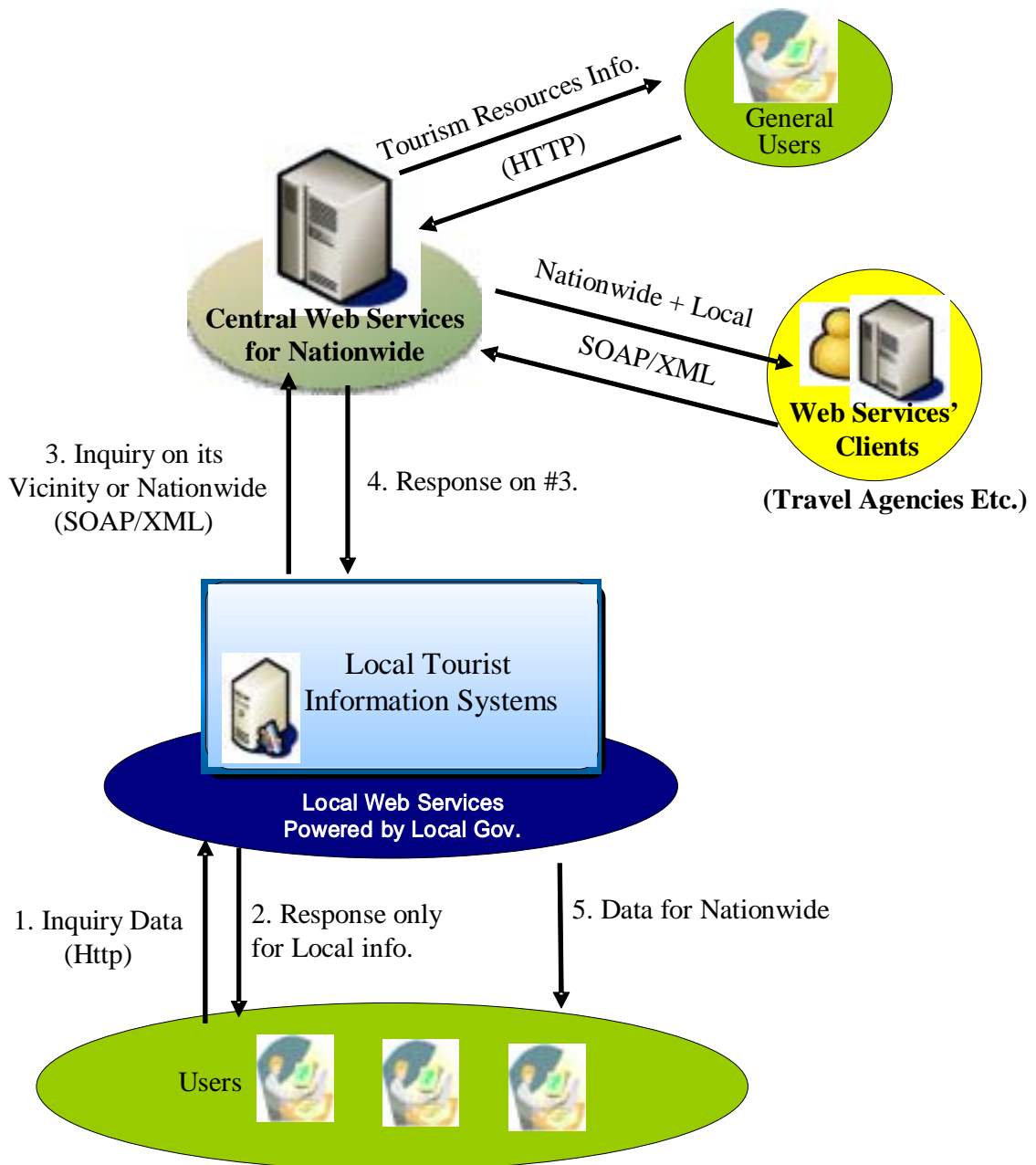
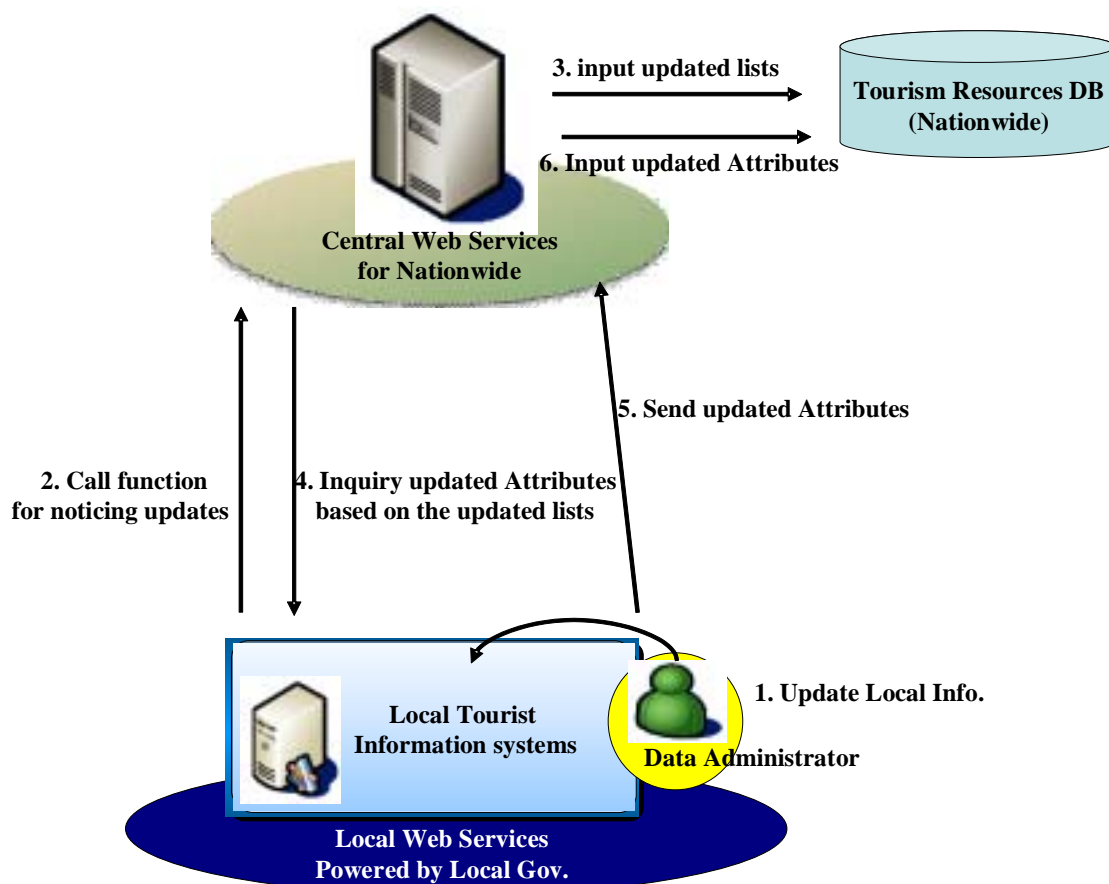


Figure9. The Collaborative model for using Web Services mutually between national and local system

**2) The collaborative model based on Web Services to update the tourism resources' information in the national (TKS) and local tourist information system mutually**

In order to maintain up-to-date the best quality tourism resources' information relatively, the central and national database should be updated automatically when the local tourist information have been updated by manager. To be able to do this in almost real time mutually, the collaborative Web Services should be developed.



**Figure10. The collaborative model based on Web Services to update the tourism resources' information in the national (TKS) and local tourist information system mutually**

**3) The Web Services based assistance model mutually for private travel agencies**

Although the tourism resources' information is difficult to build for private travel agencies and lodging companies, the information is important and highly used to advertise private travel agencies' on-line services for traveling and selling the rooms of accommodations. Because of this, the private travel agencies' Web based service should be activated. In order to prevent the

construction of similar database and system, the national Web Service should be used, and the standardized model for private travel agencies should be built to activate the system in the future.

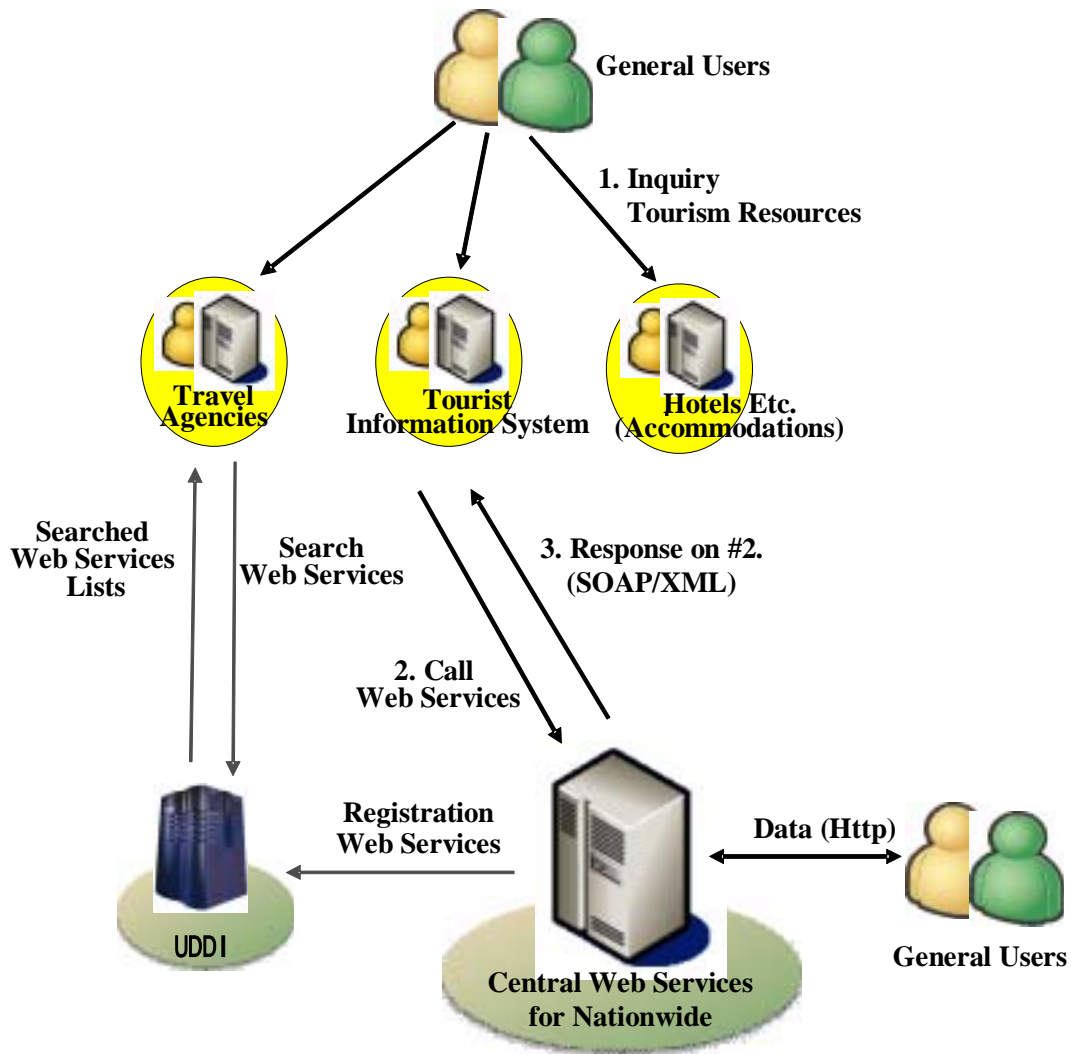


Figure11. The Web Services based assistance model mutually for private travel agencies

### 3. Expecting Effects

#### 3.1. Enabling Sharing Tourism Standard Web Services.

The quality of tourism resources (information) which are served by central and local tourist information system can be improved. Also, sharing tourism standard Web Services makes them not to building similar database or systems.

Usually, local government has served the information only inside its administrative district so far,

but if local tourist information system can use central standard Web Services, it is possible that furnishing information around its vicinity. Normally, it is expected that serving certain information about an attraction and its vicinity totally for effective use or attracting tourists more and more.

### **3.2. Effective Distribution and Sharing Structure for Tourism Resources**

By adopting Web Services for tourism resources, these are possible that keeping up-to-date information which would improve user satisfaction and almost real time distribution structure which is expected to enhance performance of tourism information manager.

### **3.3. Saving National Budget through Avoiding Building Similar Information System**

Usually, local tourist information systems have been building by their own plan without the consideration of union or connection with neighboring provinces or cities and standard formats or items. As a result of separated information systems and rebuilding similar databases, there have been reasons which would squander the nation's resources. Adopting the standard tourism resources Web Services framework are highly expected to reduce cost and time for building local tourist information system.