Introduction of Digital Asia Network

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Abstract

Digital Asia is an initiative to provide people and communities with easy access to geo-spatial information over the Internet through open sharing of GIS and Remote Sensing Data among all the countries of Asia. Digital Asia will form the Digital Asia Network (DAN) to bring together all participating people and agencies, and to provide a place where they can obtain useful information for developing their applications and demonstration systems. As a three-year activity, DAN would support participants' efforts to link these Web-based GIS systems to demonstrate the usefulness of data availability and data sharing for society.

The main objectives of Digital Asia are (1) to develop a mechanism for data sharing, so that partners can participate easily, (2) to provide guidelines for developing applications and demonstration systems, (3) to help any agencies, through sharing of technical knowledge and training, who would like to open their data, (4) to stimulate development of demonstration systems which will be the basis of a future operational system, and (5) to share experience and "lessons learned" through development of demonstration systems

To promote this Digital Asia Network concept, NASDA agreed to support a DAN preparation meeting in cooperation with the DAN secretariat at the Asian Institute of Technology (AIT), and the preparation of a three-year implementation plan for DAN.

Keywords: DAN, NASDA, ACRORS, OGC, WMS

Overview of Digital Asia Network

Concept of Digital Asia

In Asia, Earth observation satellite data is emerging as an indispensable tool for policy and decision making including land management, disaster mitigation and other areas of application. However, there are major problems relating to inter-use of data and information among agencies and/or among countries due to a lack of technology and lack of coordinating mechanisms. In recent years, the widespread availability of the Internet and of GIS technology has greatly facilitated the world-wide sharing of spatial data and information. Notably, the Open GIS Consortium (OGC) has been established in the USA and has made progress in standardizing the interface between server and client for Web-based GIS.

This Web-based GIS technology is called Web Map Technology (WMT) and is widely used in the GIS community. OGC continues to implement testbed systems to verify interoperability issues and to confirm compatibility.

Under these circumstances, ACRORS and NASDA were encouraged to promote a framework to share GIS and Earth observation satellite data by using the Internet and Web-based GIS systems. This concept is called "Digital Asia" and is essentially the same concept as the "Digital Earth" proposed by the former US vice-President, Al Gore. In addition, this concept is part of a follow up program being undertaken in Japan by NASDA for the WSSD (World Summit for Sustainable Development). Figure 1 shows the concept of Digital Asia.
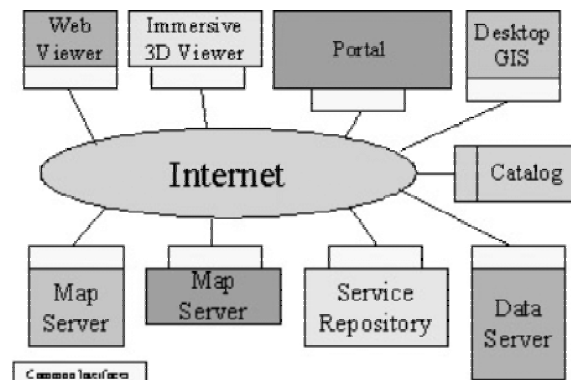

Figure. 1 The conceptual figure of Digital Asia

Digital Asia Network (DAN)

In order to formulate this Digital Asia concept it is very important to develop an appropriate infrastructure. The Digital Asia Network (DAN) is being proposed to formulate such a structure. DAN consists of three groups including (1) a steering committee, (2) a technical support team and (3) a secretariat - as follows;

1) The Steering Committee will: Propose and coordinate the Digital Asia concept and future direction; formulate sponsoring agencies, participating agencies and IT and GIS experts from universities and

commercial companies. The Steering committee will be formulated in the middle of 2003;

2) The Technical Support Team will: Support the implementation of demonstration systems by participating agencies through provision of technical training courses and consulting services; collect and maintain freeware GIS and IT tools; and possibly provide their own developed software as shared tools;

3) The Secretariat will: Support overall management of DAN and its activities including training courses and DAN homepage operation which will provide Digital Asia information and freeware tools; coordinate with the Steering Committee and participating agencies to host a DAN workshop or special session at various international remote sensing and GIS conferences; be located at ACRORS/AIT and supported by NASDA and other sponsors. ACROS already operates a DAN home page (http://www.ACRoRS.ait.ac.th/digital_asia) and mailing list to share information.

Since DAN is a self-funding, best-effort forum, each participant has the responsibility to develop and operate their own data sharing system.

Three Year Plan for Digital Asia Network

Three Year Plan

NASDA and ACRORS have drafted the following three year plan to promote the Digital Asia Network - starting from 2002. This plan was agreed to at the first DAN session at the Asian Conference on Remote Sensing (ACRS) in Nepal in November 2002.

1) Digital Asia Workshops/Sessions. Host Digital Asia workshops and/or special sessions to promote the Digital Asia concept and call for participation in DAN at international remote sensing and GIS conferences (such as ACRS, GMSARN and APAN) through support from NASDA/RESTEC and other sponsors.

2) DAN Home Page. Develop and maintain a home page for DAN to promote the Digital Asia concept and call for participation in DAN. Maintain a mailing list for all DAN participants, the Steering Committee, the Technical Support Team and users.

3) Prototype Demonstration Systems. Each participant is expected to implement a prototype demonstration system for data sharing using OGC WMT and IT. These demonstration systems will be evaluated by users, the Steering Committee and DAN participants to compile issues and lessons learned for future development of operational systems.

Demonstration System (Prototype System)

There are some expected Web-based GIS demonstration systems for DAN developed with open source software on Linux platform as below:.

(1) NASDA/MAFF Web Feature Server/Web Map Server (WFS/WMS). JERS-1 L-band SAR South East

Asia Mosaic Thailand forest fire risk map by AVHRR. Thailand forest fire hot spot by AVHRR and DMSP/OLS

(2) Chiba University WMS. Asian land use map by AVHRR

(3) Chulalongkorn University WMS. Ton Le Sap environmental information database shared by stake holders.

The key components of those Web-based GIS systems are open source of Web Map Server on Linux machine because Asian countries have small budget and it is important to develop the systems with minimum cost. Figure 2 shows the snapshot of NASDA WMS system.
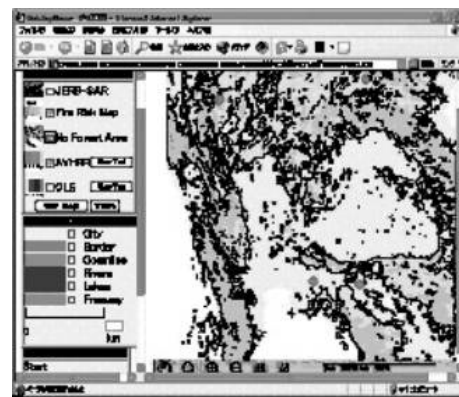

Figure.2 Snapshot of NASDA'S WMS

DAN Promotion

Since last August, NASDA and ACRORS have actively promoted DAN in cooperation with RESTEC – particularly via special sessions in international remote sensing conferences. DAN special sessions were arranged at ACRS 2002 in Nepal last November and at Asia Pacific Advanced Network (APAN) in Fukuoka, Japan this January. An overview of the Digital Asia concept and Open GIS technology was presented, as well as some demonstration systems developed by NASDA and RESTEC for South East Asia Forest Fire monitoring, in cooperation with Japan's MAFF (Ministry of Agriculture, Forest and Fisheries). Both special sessions were very successful and received with interest. Some important comments from participants were provided as feedback:

(1) We should study the possibility of collaboration with GRID technology;

(2) We need to focus on specific application fields – such as forest management or water management.

In addition to DAN special sessions, NASDA has contracted ACRORS to hold Open GIS training courses to support capacity building in Asia, and as a valuable means of technology transfer. There has been strong interest from Asian countries, and NASDA and ACRORS plan to continue to host Open GIS training courses, and also plan to provide training courses in

Asian countries in collaboration with local organizations.

ACRORS and NASDA also plan to create a 'cookbook' to allow interested agencies to install their own Web Map Server. The technical support team is expected to support this installation effort by Asian countries on a voluntary basis.

Use Case – Testbed Deployment

NASDA, MAFF, Chiba University, Keio University and other agencies already archive various data sets derived from Earth observation satellite such as NOAA, JERS-1, ADEOS-II, EOS-TERRA, etc.. By using these useful data sets, NASDA has agreed to deploy a testbed system based on OGC standards in cooperation with MAFF and other partners. NASDA, in cooperation with MAFF, has already finished development of a Web Map Server for South East Asia Forest Fires (using NOAA/AVHRR and DMSP/OLS data). NASDA will add JERS-1 SAR mosaic data from South East Asia to this project. Starting from next April, NASDA plans to accelerate this effort for forest management and/or other appropriate applications in cooperation with MAFF and other partners (Chiba University, Keio University and ACRORS are potential partners.)

NASDA hopes to expand this testbed activity in co-operation with Asian partners in 2003 and beyond.

Conclusion

Since the Digital Asia concept and DAN framework is well accepted by the Asian community, NASDA is encouraged to promote DAN in cooperation with ACRORS and RESTEC. Future efforts will include consideration of the lack of Internet bandwidth in some countries and the impact on the way in which data must be shared with users on low speed networks (such as those on 56 Kbps modems).

A step-by-step approach is advocated in order to build confidence and provide demonstrations of the practical benefits of the DAN.

NASDA and ACRORS will continue to implement the proposed three year plan and study the above issues. By 2004, we expect to have learned valuable lessons from our initial efforts and hope to be able to provide data and information from the Advanced Land Observing Satellite (ALOS) mission to users through the DAN framework.