FROM PRODUCER TO USER

Joint ISPRS workshop in Boulder

October 7-9 1997

Development of services utilising the Internet is very rapid and symposia, workshops and meetings in this area are usually aimed to the development community. In this workshop the intention was to bring together developers with users and providers of on-line services for Earth Observation and other spatial data types. The overall objective with the workshop was to inform and discuss technological development using the Web and Internet based systems, and requirements for and impact of utilising these technologies.

The workshop was organised by working group I/2 - Pre-processing, Archival and Dissemination of Data and II/3 - Spatial Data Handling Techniques. Approximately 50 participants attended the workshop and around 25 presentations were given during three days. The workshop took place in beautiful surroundings, at the Marriott hotel in Boulder, Colorado. The social activities were very much appreciated and included a dinner at a local micro brewery and a hike at Chatauqua Mountain Park.

The workshop included four major topics:

- Spatial Data Search and Retrieval
- Reception, processing and On-line Distribution
- Distribution of Satellite Data via Internet
- Data Base Management and Exchange of Meta Data in Heterogeneous Environments

In addition to this presentations were given by Space Imaging, Earth Watch and IBM.

The aim was to have presentations covering the whole range from producers of satellite data via distributors to end users. The overall impression of the workshop was very good and the presentations were of very high quality.

Spatial Data Search and Retrieval

The presentations within this area focused on data services for search via the Internet. Some of the projects are mentioned here.

Arnulf Kjeldsen from the Joint Research Centre presented the Centre for Earth Observationï¿½s (CEO) on-line information system "Enabling Services" (ES). The aim of this system is to increase the exchange and accessibility of meta-data and information on Earth Observation. A potential user can explore all provider services registered within the ES in an efficient way.

Professor Sudha Ram from the University of Arizona presented a semantic-based approach for managing remote sensing data in a heterogeneous distributed environment. To retrieve and manage the huge volume of distributed data a

mechanism that combines a semantic model of the data with the use of intelligent software is proposed.

NASDAï¿½s on-line user services were presented by Shin-ichi Sobue from the Earth Observation Center. ADEOS operation terminated after only seven months of operation. However, data from these months are desired by many scientists and NASDA had to develop an ADEOS user service to make earth observation data and related information services available to users via the Internet.

Pekka Sarkola from the National Land Survey in Finland presented MapSite, an Internet service for browsing topographic maps of Finland, which is provided by the National Land Survey. The user may browse seamless maps in various scales, scroll a map or search a view by place name, address or co-ordinates. The citizenï¿½s MapSite Service is free of charge for users in Finland, but requires registration. The Professionalï¿½s MapSite will be available for an annual fee.

Presentations from Space Imaging, Earthwatch and IBM

After the first session there were presentations from Space Imaging, Earthwatch and IBM. SpaceImaging presented the Ikonos 1 and 2 satellites which will have a spatial resolution of one to four meters. Earth Watch presented the two very high resolution satellites Early Bird and Quick Bird which are to be launched soon. Early Bird will have a spatial resolution of three meters for the panchromatic sensor, while the multispectral sensor will give a resolution of 15 metres. Quick bird will have sub metre resolution, 0.82 metres for panchromatic and 3.28 metres multispectral. IBM presented a Java tool for data search, also applications dealing with smoke and fire detection were presented.

Reception, processing and on-line distribution

In this second session Jeffery Eidenshink and John Faundeen from U.S. Geological Survey presented "the Global Land 1-km AVHRR data set". Continuous pole to pole segments of data are made from individual scenes which are stitched together. The data are converted to standard format and in the process a metadata record is created. A digital quick look image is generated, and a public query system is populated with the individual scene information. Raw data are processed into vegetation index compositions.

K. Reiniger from DLR (German Centre for Aeronautics and Space) presented "Reception and Dissemination of Data Acquired by Mobile Receiving Stations". These mobile ground-stations are believed to fill a demand for near real time acquisition and processing for e.g. disaster monitoring and projects with short life time. DLR has used mobile stations at different places since the end of 1996. The quality of the acquired data is as expected, but the storage capacity has to be increased. The reception of data by the user with equipment comparable to a weather stations is expected to be the real challenge in the future.

Distribution of Satellite Data via Internet

"A WWW-based distributed satellite data processing system" was presented by Wolfgang Walcer from Vexcel Corporation. Providing WWW access to remote

sensing data requires to hold on-line not only raw sensor data but also a variety of derived products. Pre-processing all these data introduces high costs for processing and archiving a static set of standard products. On-demand processing of data products is more flexible and requires less storage space but also makes it difficult to cope with high server loads. The presented system combines these two approaches. The processing software is based on Java and CORBA. The ultimate goal of the project is to provide a collaborative environment where users may ingest their own methods and data to share them with others.

Steven Carty from IBM presented "Internet Dissemination of Satellite Imagery - selected architectural issues". Traditional dissemination techniques like tapes and CDï¿½s require time-consuming transfer of the physical media. Given the content limitations of metadata users often must view and work with an image before they can assess its usefulness. The WWW allows users to view a source data archive directly. Users can evaluate imagery by thumbnail images or more sophisticated previewing techniques.

Joe Thurgood from SpaceImaging EOSAT had a presentation on "Value Adding - What is the Future Role of Data Providers?" In the 1990:s: the development within remote sensing has focused on the product and market segments, there has been an increasing pressure to commercialise, and the private sector is finding new remote sensing ventures. The enlarged value added community is now overlapping photogrammetric industry. The present trends are that mapping and remote sensing technologies converge in the areas of: positioning, photogrammetric processing, DTM extraction, orthorectification and mosaicing and digital foundation. The satellites are becoming smaller, the resolution becomes higher and data are registered in more bands (hyperspectral). The number of sensors is also increasing. The role of data providers is changing and is increasingly driven by commercial motives. Future trends are believed to involve: spatial information as an enterprise resource, acceptance of spatial information in corporate and government operations.

Dennis Nazarenko from Radarsat International presented "Radarsat Distribution - Now and in the Future". The group of radar imagery users is growing and Radarsat is working on decreasing the delivery time of registered data. It should be possible to get data within two and a half hours from registration.

Management and Exchange of Meta Data in Heterogeneous Environments

John Broadhead from MacDonald Dettweiler presented "Global Access and Distribution of Geospatial Information: an Operational Reality". By providing an umbrella data access and management system that present a consistent view of geospatial information that is independent of the physical storage structure and local semantic context of the stored data it is possible to deal with the reality of large quantities of legacy data that can never be practically converted. LandData BC and CEONet (Canadian Earth Observation Network) are two systems that address these challenges from different perspectives. Both are running operationally, providing global access and distribution of geospatial information via the WWW. At the most basic level, the system provides a common infrastructure on top of the Internet allowing users with varying computing equipment to browse and access data/products, request desired data and receive the data in selectable formats. The system lets users

know what data/products exists, for what geographic areas and how to get at the data, even if the information is part of another Earth observation network.

Ray Ford from the University of Montana presented "An Object-Oriented Database for Cataloguing, Archiving, and Disseminating Spatial Datasets and FGDC-Compliant Metadata". The Ecosystem Information System (EIS) uses an object-oriented paradigm to organise a network-accessible index to information from a variety of ecosystems and natural resources management applications. The design goals for EIS are to support cataloguing, archiving, and dissemination functions of spatial datasets, metadata descriptions, and spatial processes. EIS has evolved in conjunction with the rise in popularity of the World Wide Web and Federal Geographic Data Committee initiatives supporting the creation and distribution of metadata standards. EIS is linked to the Web and can be used to complement Web-page descriptions of information holdings, providing comparable information in a form much more amenable to the indexing of key spatial properties than simple textual descriptions.

Concluding discussion

The last session of the workshop was a discussion where the following questions were discussed:

1. What were the most important news that were presented?
2. What is the most difficult unsolved problem?
3. Was anything missing?
4. Which is the most important factor for improving the user access of EO data?

The following are the main conclusions from the discussions:

1. The most important news are all the efforts to create new tools, and the increasing use of Java. Also the applications-efforts accessible on the web are of high importance. Key components have and are changing, focus has been and is now on FTP, http, the Web, Java, Corba. The question is if people see these components as solutions, or if they are critical? Will we continue on the same track?

2. Some of the difficult questions are how to make it possible to get data over the net in developing countries, where the resources are limited. On the other hand the advances in communications will probably take care of this, it is not/will not be very expensive. But it might still be a lot of money in some countries.

One problem is that various people are working on the same thing. Co-ordination is missing, different organisations make their own search protocol and services.

3. It had been desirable if more users had attended the conference. Now there were many more producers than users. This seems to be a trend, in the 80ï¿½s a lot of users attended meetings, however, in this workshop we were mainly discussing details which the users not have influence on.

4. The distribution of data has to be very quick. Today’s situation with a distribution time of two to three weeks is not satisfactory. In some areas people are not yet connected to the net, but we are anyhow discussing on how to get the distribution time down to a couple of hours or less. We are becoming more and more used to the web,

which usually is quick, and from on-line service we expect quick response. But are these persons who are frequently using Internet the ones who will use remote sensing data (organisations, municipalities, etc.)? Does the delivery time have to be that low? Right now it is impossible to have a delivery time of an hour. The data are read from tape, transformation from raw data are made, which takes time. Data are usually packed on slow media. For processed data there is a need of ground control point access, maps are needed, and all this takes a couple of days. There is a difference if the data are archived, then the user is probably willing to wait longer. However, if there will be a demand and a willingness to pay, the capacity for very quick delivery will probably be there. It should also be easy to improve the delivery time from weeks to days. The requirements differ however among the users and there is a need to categorise them.

The future user was discussed; low level users, e.g. news media who will use satellite images instead of maps for illustration purposes are believed to be of importance. In the future also the individual will be a user of remote sensing data. The delivery speed is important, but the search capability is important too. The search engines will probably be improved, there is a need for organised information. Now one problem when a search on the web is done is that the first hits usually refer to the same site. There will probably be a growth of standard interfaces.

The question whether there will be a division into two parts, high resolution for commercial purposes, and lower for research was brought up. Earthwatchï¿½s new satellites were mentioned as an example of this division. Finally the importance of quality controls was mentioned. There are no solutions to the problem of quality control yet, but it is a very important issue.