UNITED
NATIONS

E

Economic and Social Council

Distr.
LIMITED

E/CONF.92/L.12
11 April 2000

ORIGINAL: ENGLISH

FIFTEENTH UNITED NATIONS REGIONAL
CARTOGRAPHIC CONFERENCE FOR
ASIA AND THE PACIFIC
Kuala Lumpur, 11- 14 April 2000
Item 5 of the provisional agenda*

WORKING GROUP 2 REPORT - REGIONAL FUNDAMENTAL DATA

Status Report For 6th PCGIAP Meeting, Kuala Lumpur Malaysia

* E/CONF. 92/INF.1

Permanent Committee on GIS Infrastructure for Asia and the Pacific

Working Group 2

Regional Fundamental Data

STATUS REPORT

FOR 6th PCGIAP MEETING
KUALA LUMPUR, MALAYSIA
11-14 APRIL 2000

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Report for
PCGIAP Working Group 2 - Regional Fundamental Data

Activities undertaken since 14th UNRCC-AP, Bangkok, Thailand, February 1997:

Activities of this Working Group since the last UNRCC-AP can be found at the following web address:

- Activities from 1997 to 1998, reported at the 4th PCGIAP Meeting in Tehran, Iran - http://www.permcom.apgis.gov.au/tehran/teh_rop.htm
- Activities from 1998 to 1999, reported at the 5th PCGIAP Meeting in Beijing, China - http://www.permcom.apgis.gov.au/beijing/rop/proceedings.htm

Recommendations from Beijing Meeting:

The PCGIAP accepted the following recommendations by the Working Group at the Beijing meeting:

a. That PCGIAP endorse the membership of the WG2 Executive Group;
b. That PCGIAP endorse the four workplans of WG2:
   i. Workplan for Policy for Sharing Fundamental Data
   ii. Workplan for Regional Fundamental Datasets
   iii. Workplan for APSDI Data Nodes
   iv. Workplan for Regional GIS Application Demonstrations
c. That PCGIAP note the amendments to the draft policy on sharing fundamental data.
d. That PCGIAP members complete the questionnaire on regional fundamental datasets and return to the Secretariat within two months.

Activities undertaken since 5th PCGIAP Meeting, Beijing, China, April 1999:

The 1998 - 2000 Work Plan for WG 2 was reaffirmed by the PCGIAP Executive Board – at the Executive Board meeting in Melbourne, Australia on 28 October 1999. The four key tasks for WG2 remain the same as those stated above:

Highlights from each task are listed below and Attachment 1 shows the status of each action for each Task.

1. Policy for Sharing Fundamental Data

- A draft policy for the sharing of fundamental data has been developed. Guidelines on the custodianship of fundamental data have also been developed.
- Input and comments have been provided by Working Group members and the PCGIAP Executive Board.
- A number of PCGIAP and non-PCGIAP countries have provided information on policies in their country regarding the sharing of data. Relevant issues have been included in the PCGIAP draft.

- Policy has been distributed to all PCGIAP members at this meeting for their consideration and endorsement at the 6th PCGIAP meeting in Kuala Lumpur. The Policy is described at Attachment 2.

2. Develop Fundamental Datasets

- The University of Melbourne, under contract to AUSLIG, representing the Working Group, is conducting research into the nature and relationships of SDI's with a particular focus on the APSDI. Mr Abbas Rajabifard, from Iran, will be making a major contribution to this project over the next three years as part of his PhD studies at the university.

- A technical questionnaire has been distributed by WG2 to member countries. The purpose of the questionnaire is to determine what fundamental data exists within each country, where it is, its availability and its quality - it has supplemented the Taskforce questionnaire on development needs. Mr Rajabifard and Professor Ian Williamson from Melbourne University have undertaken a major analysis of questionnaire responses. This analysis can be found as Attachment 3.

- A strategic report on the nature of spatial data infrastructures and the justification of the Asia-Pacific Spatial Data Infrastructure will also be prepared as part of Mr Rajabifards work.

- Australia, through the WG2 Executive Officer, has tested the prototype Pan-European dataset PETIT, produced by MEGRIN. The experience MEGRIN has had with this dataset will be a useful pointer for WG2 to learn from, particularly in relation to the way administrative boundaries and other trans-border features have been dealt with. [The report on the assessment of the dataset is at Attachment 4]

- The technical specification for Asia-Pacific Spatial Data Infrastructure (APSDI) fundamental datasets will be aligned with the Global Mapping project specification. Further work needs to be done by the Working Group in specifying these datasets. For further information on the Global Map technical specification please visit the following web site:
http://www.auslig.gov.au/mapping/global_m/specv1_0.htm

- Administrative boundaries pilot project - 3 possible projects areas were debated at the Executive Board meeting in Melbourne, October 1999. Analysis on dataset has yet to be conducted. See Attachment 5 for a description of the preliminary work undertaken thus far in this area.

3. Develop Network of APSDI Data Nodes

- The Task Coordinator has written two papers. One on the rationale and functions of a Data Node. The other on a draft design for APSDI data nodes.

- The rationale and functions paper has been circulated to Working Group members for comment. Feedback has been received from Australia and Iran. The second paper on a draft design for APSDI has also been circulated to Working Group members. As yet there has been no feedback.

- A status report on this project can be found as Attachment 6.

- Further discussion is required on the establishment and operation of the Data Nodes as well as technical issues such as the proposed architecture.

4. Develop Regional GIS Application Demonstrations

- No action to report on this task. A decision needs to be taken at the 6th PCGIAP meeting on whether, and how, this particular task should be persued.

Future Activities of a Regional Fundamental Data Group

There are a number of current Working Group 2 projects which have actions started and not yet completed. It would be particularly important to continue the following:

- Fundamental Datasets.

    1. The technical questionnaire has proved to be a very useful document which describes in detail the standards, spatial datasets and organisational infrastructure of member country agencies. With 17 of the 55 member countries responding it would be useful to obtain answers from the remaining 38 countries.

    2. The administrative boundaries pilot project. This project is important to continue with as it will help identify the problems likely to be encountered when starting to collect data for the fundamental datasets of the APSDI and it's implications for the policy on sharing fundamental data.

    3. Definition of APSDI regional fundamental datasets and development of draft technical specifications for these datasets.

- APSDI Data Nodes. The most important activities within this task over the next 2 years should be to:

    1. Develop a demonstration / prototype data node operational (including architecture and functionality) and

    2. Develop a draft implementation plan for a regional data node network.

- Regional GIS Application Demonstrations requires further consideration and discussion.

Acknowledgments

It has been a pleasure and a privilege for me to chair this important PCGIAP Working Group in the period since the 14th UNRCC-AP. The Working Group has, I believe, made significant progress towards meeting the challenging objectives in the work plan, and has made a major contribution to the development of the APSDI,

All of the credit for this success is due to those hard-working individuals who, either as Working Group members, or as interested observers, have taken on this task in a voluntary manner and in addition to their day-to-day work responsibilities. To these individuals, and their host organisations, I extend my thanks.

I cannot mention all of the contributors to the Working Group by name, there are far too many. Several people, however, must be acknowledged openly – Professor Jun Chen, Professor Jiang Jingtong, Mr Saeid Busherhi, Mr Evengeniy Zhalkovskiy, Dr Munahbaatar Enkhbayar and Mr Abbas Rajabifard – have all played key roles. The individual who deserves most credit is my work colleague Mr Glenn Johnstone, who has performed his duties as Executive Officer to the Working Group in an exemplary manner, and who has kept my sight focussed on the task at hand.

Attachments:

1 Status of actions from WG2 Work Plan 1998 - 2000
2 Policy on Sharing Regional Fundamental Data (as at September 1999)
3 Report from Abbas Rajabifard on WG2 Technical Questionnaire
4 Report from Glenn Johnstone on evaluation of PETIT dataset
5 Report from Glenn Johnstone on Administrative Boundaries Pilot Project
6 Report from Prof Jiang Jingtong on APSDI Data Nodes

Working Group 2 – Regional Fundamental Data

Task 1: Policy for Sharing Fundamental Data - Task Coordinator: WG 2 Executive Group

Action	*Responsibility*	*Target Date*	*Status*	*Description*
1. Identify the relevant work done by the previous WG4, including relevant actions endorsed at Tehran meeting	Australia	January 1999	Completed	See www.permcom.apgis.gov.au/tehran/teh_rop.htm + policies have been provided by EUROGI, CERCO, FGDC, Canada, Finland and New Zealand.
2. Identify the Global Mapping policy for sharing data	Australia	February 1999	Completed	The formal policy is still being developed by ISCGM. WG2 will keep in contact with ISCGM regarding this issue.
3. Draft PCGIAP policy for discussion at the Beijing PC Executive Board meeting	WG 2 Executive Group	April 1999	Completed	Presented at the Executive Board Meeting
4. Draft policy discussed at working group meeting in Beijing. Amendments to draft policy tabled for endorsement at 2nd Plenary Session in Beijing	WG2	April 1999	Completed	See www.permcom.apgis.gov.au/beijing/rop/proceedings.htm
5. Distribute draft policy to all PC members for comment	WG 2 Executive Group	July 1999	Completed	Distributed to all PCGIAP members on 15 September 1999
6. Report on status of draft policy at PC Executive Board Meeting in Melbourne	WG 2 Executive Group	October 1999	Completed	Presented at the Executive Board Meeting
7. Define regional fundamental datasets covered by policy	WG 2 Executive Group	December 1999	Started, not completed	
8. Consider report from WG2 Project 2 - on policy implications from pilot project	WG 2 Executive	December 1999	Not completed	
9. Final discussion and endorsement of policy	All members	6th PCGIAP meeting	Not started	To be discussed at the Kuala Lumpur meeting
10. Publication of policy	Secretariat	Post 6th PCGIAP meeting	Not started	To be discussed at the Kuala Lumpur meeting

Task 2: Regional Fundamental Datasets - Task Coordinator: Iran

Action	*Responsibility*	*Target*	*Status*	*Description*
1. Obtain PCGIAP approval to use an Administrative Boundaries pilot dataset as a means of identifying issues associated with regional fundamental dataset creation within the APSDI	Iran	April 1999	Completed	In the 5th Meeting of PCGIAP in Beijing, China in 1999, a pilot project on administrative boundaries has been approved by the Committee.
2. Distribute the regional fundamental dataset questionnaire to PCGIAP members	PCGIAP Secretariat	April 1999	Completed	The questionnaire has been distributed by the PCGIAP Secretariat and the forms have been mailed to member countries.
3. Receive responses to regional fundamental dataset questionnaire	PCGIAP Secretariat	June 1999	Completed	17 countries has filled the questionnaire and submitted them to the Secretariat. Due to necessity of the Knowledge-based Infrastructure to facilitate the APSDI Fundamental Dataset and to be placed in this framework ,we recommend that the activities goes on to encourage the rest of the member countries through the regular and continual contacts.
4. Research similar projects elsewhere around the world - particularly 1:1M scale mapping the Asia/Pacific area. Also examine the approach Global Mapping use to delineate areas of interest. Prepare summary report on what exists and how the WG may utilise	Iran / Australia, seeking input from all members	December 1999	Started, not completed	MEGRIN SABE: We have downloaded Schengen sample data of Seamless Administrative Boundaries of Europe (SABE). This data is supplied in ARC/INFO® Export format. The name of the dataset is SABE Sample Data (Schengen) derived from SABE200. The dataset is a subset of the complete SABE dataset, parts of Belgium, France, Germany and Luxembourg, and is suitable for applications at scales between 1:500,000 and 1:1,000,000. The coordinate system utilised geographical in degrees (longitude, latitude) with decimal fraction, and the spatial reference system is WGS 84 (ETRF 89) with ellipsoid GRS 80. The transfer format of Data is ARC/INFO ® EXPORT single precision file containing geometry and INFO tables. Tables include attribute values of the boundary segments and areas. Country codes, Country identifiers, name of units and level of the units (0=country; 5=NUTS5 (e.g. French commune)) are also exist in a attribute table. Hierarchy details for the countries in the data set (catalogue of Internal Structures and Designations) and are unit designation catalogue relationships are considered in two individual tables.

				Source • administrative boundary datasets from European National Mapping Agencies (NMAs) • Nomenclature des Unités Territoriales Statistiques (NUTS) from EUROSTAT **Status** (the date of the situation in the real world which is represented by the dataset) 1 January 1991
5. Definition of what constitutes a regional fundamental dataset, including a definition of the technical specification for APSDI (based on Global Mapping spec)	All members	December 1999	Started, not completed	In the questionnaire, there is a part in which the requirements and expectations of member countries in terms of SDI are referenced. This would be the most important thing of the nature of a regional fundamental dataset and its components. Refer to action item 7.
6. Assess MEGRIN prototype dataset and make results available to WG members	Australia	December 1999	Started, not completed	This assessment is being done by AUSLIG and results will be presented in the 6th Meeting of PCGIAP.
7. Assess results of regional fundamental dataset questionnaire	Melbourne University	December 1999	Completed	There is a regular contact between Iran and Mr. Abbas Rajabifard in the Department of Geomatics, University of Melbourne, especially for data analysis and preparing the overall results of the questionnaire. Mr. Rajabifard has completed this task and we believe that these results have to be used as the base information for the WG2 targets. (see Attachment 3)
8. Conduct research on the Administrative Boundaries pilot dataset - what is available, formats, structure and how this matches with Global Map specification	Iran	December 1999	Started, not completed	Pilot areas have been defined at the Executive Board Meeting in Melbourne in October 28, 1999. It consists of 9 countries in the region and some parts of data can be addressed through the filled questionnaire forms. Countries participating in the pilot are: Sri Lanka; India; Bhutan; Nepal; China; Mongolia; North and South Korea; and Japan.
9. Develop the Administrative Boundaries pilot dataset and report on issues identified during the pilot project	Iran	6th PCGIAP meeting	Started, not completed	So far data has been received from 3 countries. Due to regulations, different Administrative Systems and some other problems, the target date of this item must be revised in the 6th Meeting of PCGIAP.
10. Develop a draft APSDI technical specification for fundamental datasets	Iran and Australia	6th PCGIAP meeting	Not started	Regarding the needs for the fundamental dataset in the Asia-Pacific region, we again recommend that the activity goes on to encourage the rest of the member countries through the regular and continual contacts.

11. Make results of the various steps above available on WWW	Australia	On-going	On-going	Information on the above action items, where appropriate, has been made available on the WWW.

Task 3: APSDI Data Nodes - Task Coordinator: China

Action	*Responsibility*	*Target*	*Status*	*Description*
1. Present information on rationale and functions of a Data Node	China	April 1999	Completed	Paper on Rationale and functions of an APSDI data node was distributed to WG2 members in February 1999. Comments were received from Iran and Australia.
2. Prepare discussion paper on how a Data Node would be established, how it would operate.	China	April 1999	Completed	Paper on draft design for APSDI Data Nodes was circulated to WG2 members in November 1999. No comments have been received so far.
3. Identify contact points within China, Iran, Japan and Australia for a prototype Data Node network	China	May 1999	Completed	Contact points within nominated countries have been identified.
4. Design the prototype Data Node network, including architecture and functionality, for demonstration. Nodes will be located in China, Iran, Japan and Australia	China	October 1999	Started, not completed	Based on the Chinese fundamental dataset, the 1:4M-scale Database of the National Fundamental Geographic Information System (NFGIS), a demonstration concept for this task is being worked out. The dataset consists of international and provincial boundary, the main rivers and lakes, the main roads and railways, the cities and counties, etc.
5. Set up prototype Data Node network. Link the prototype network to the pilot project admin. boundary dataset.	China	6th PCGIAP meeting	Not started	To be discussed at the Kuala Lumpur meeting
6. Develop a draft implementation plan for a regional data node network, including coordination arrangements for fundamental dataset generation, based on the experience of the prototype network	China	6th PCGIAP meeting	Not started	To be discussed at the Kuala Lumpur meeting
7. Make results of the various steps above available on WWW	Australia	On-going	On-going	Rationale paper has been made available on the web site.

Task 4: Regional GIS Application Demonstrations - Task Coordinators: Russia and Mongolia

Action	*Responsibility*	*Target*	*Status*	*Description*
1. Investigate current small-scale GIS datasets that could be demonstrated.	Russia	To be advised	Not started	
2. Create a demonstration dataset for viewing based on the national atlas of Mongolia	Mongolia	6th PCGIAP meeting	Not started	
3. Determine future GIS application projects	Russia and Mongolia	6th PCGIAP meeting	Not started	

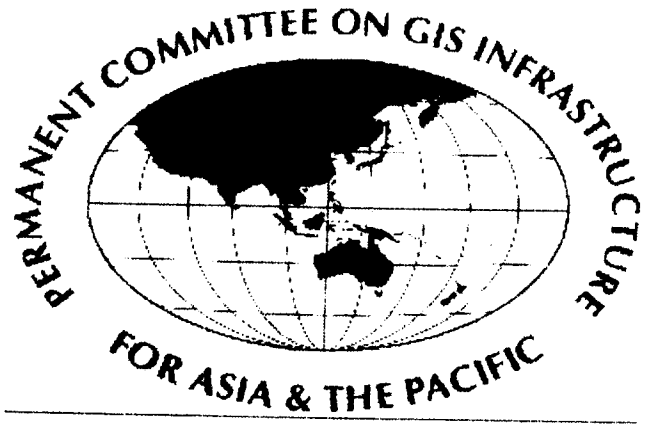
It has been very difficult to move forward on Task 4, despite the best efforts of the Task Coordinators and Executive Officer, principally because of the difficulties in communicating amongst task members. This task should be reviewed in Kuala Lumpur.

[redacted]	[redacted]						
Kiribati	**Scale: 1:25K** Progress: 100 % Format: Paper Projection System: Local TM No. of Layers: - Metadata: -	**Scale: 1:2500** Progress: 100 % Format: Digital, Vector Projection System: UTM No. of Layers: 6 Metadata: No					
Laos	**Scale: 1:100K** Progress: 100 % Format: Paper Projection System: Gauss-Kruger No. of Layers: - Metadata: -	**Scale: 1:25K** Progress: 100 % Format: Digital Projection System: UTM No. of Layers: ? Metadata: ?					
Macau	**Scale: 1:20K** Progress: 100 % Format: Digital/Paper Projection System: Hayford No. of Layers: - Metadata: -	**Scale: 1:10K** Progress: 100 % Format: Digital/Paper Projection System: Hayford No. of Layers: - Metadata: -	**Scale: 1:5K** Progress: 100 % Format: Digital/Paper Projection System: Hayford No. of Layers: - Metadata: -				
Malaysia	**Scale: 1:50K** Progress: 100 % Format: Paper/Digital, Vector Projection System: RSO No. of Layers: 8 Metadata: No						
Maldives	**Scale: 1:300K** Progress: 100 % Format: Paper/Digital, Vector Projection System: UTM No. of Layers: ? Metadata: No						
Mongolia	**Scale: 1:1M** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:500K** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:300K** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:100K** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:50K** Progress: 48.6 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:25K** Progress: 28.3 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:5K** Progress: 100 % Format: Paper/Digital, Vector Projection System: Gauss-Krueger's No. of Layers:? Metadata: Yes

ATTACHMENT 2

Policy on Sharing Regional Fundamental Data (as at September 1999)

DRAFT FOR PCGIAP MEMBERS ONLY



Permanent Committee on GIS Infrastructure for Asia and the Pacific

Working Group 2

Regional Fundamental Data

Draft Policy for Sharing Fundamental Data

September 1999

DRAFT FOR DISCUSSION

CONTENTS

Purpose 1

Background 1

Scope 2

Principles 2

Advantages of Sharing Spatial Data 4

Implementation 4

Definitions 6

Custodianship 8

~~Sponsorship~~Ongoing Policy Development 8

Working Group 2 – Regional Fundamental Data

Project 1 Draft Policy on Sharing Fundamental Spatial Data

PURPOSE

The Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP) has vision for an Asia-Pacific Spatial Data Infrastructure (APSDI) that is a network of databases, located throughout the region, that together, provide the fundamental data needed by the region in achieving its objectives: economic, social, human resources development and environmental.

The Committee believes that:

- the availability of fundamental data from member countries is essential to the:
  - development of the Asia-Pacific Spatial Data Infrastructure;
  - realisation of the economic, social and environmental benefits; and
  - and the implementation of the United Nations Conference on Environment and Development (UNCED) Agenda 21;

and that:

- data sharing avoids wasteful duplication of resources and facilitates data integration; and
- better data for decision making and expanded market potential ~~to~~will be provided ~~better data for decision making and expanded market potential~~.

This Policy establishes a set of principles for the responsible management of this critical regional resource and commits all countries in the region to cooperate in the implementation of the APSDI that will give effect to those Principles.

BACKGROUND

A spatial data infrastructure is a powerful tool for economic and social development, and environmental management, enabling the full potential of GIS technology to be realised in supporting decision making processes at the local, national, regional and global level. In that regard the APSDI will help confront regional and global issues such as environmentally sustainable development, a prime element for the implementation of Agenda 21.

Additionally, the PCGIAP is playing an important role in helping countries develop national spatial data infrastructures (NSDI) and to incorporate them into the APSDI. Some nations in the region are well advanced in their efforts to implement a NSDI while others are just beginning to take steps in this direction. In time the NSDIs can be combined through the regional model into the Global Spatial Data Infrastructure (GSDI). In this way the PCGIAP's activities demonstrate the *"think globally, act locally"* approach, a major principle of Agenda 21. Development of the APSDI by the PCGIAP is in keeping with the goals of Agenda 21.

Spatial data is the key to planning, sustainable management and development of our natural resources at national, regional and global levels. It is also fundamental to the development of the economic and social infrastructure, provision of community services, effective government administration and resolution of community conflicts.

As the key role of spatial data has become increasingly recognised, regional governments have initiated a variety of cooperative arrangements to ensure that such information is consistent and available. However, there is no regional framework within which all existing arrangements can operate and which can provide the basis for future cooperation at the national, regional and global levels.

This policy has been developed by the PCGIAP in order to provide such a framework and is based on a similar policy developed by the Australia New Zealand Land Information Council (ANZLIC). Similar policies within the European Commission, the Canadian Government, the Baltic Sea region and the USA have also been investigated to compliment and harmonise this policy.

SCOPE

Recognising that the management and use of intra-government spatial data is the responsibility of the relevant country, this Policy applies to:

- Specified ~~forms of~~ fundamental spatial data (see definitions)
- the collection, management and use of fundamental spatial data in the regional interest, whether application is at national, regional or international levels
- the use of fundamental spatial data by governments, industry and the community.

accordingly, all member countries agree to strive to adopt the following principles.

PRINCIPLES

PCGIAP believes that the adoption of the following Principles will ensure that management practices for fundamental spatial data are regionally consistent to achieve the benefits of the Asia-Pacific Spatial Data Infrastructure.

1 Responsibility	Each member country accepts responsibility for the creation and maintenance of that component of the APSDI covering the region over which it holds ~~recognised~~ sovereignty
2 Access	Member countries shall ensure that the APSDI component for which they are responsible is made available to other member ~~countries~~ governments under Access Conditions determined by the PCGIAP.
3 Access Conditions	The PCGIAP shall determine Access Conditions that facilitate the use of the APSDI to address regional

economic, social and environmental issues.

All sectors of the community should have easy, efficient and equitable access to fundamental spatial data where technology, data formats, institutional principles, location, costs and conditions do not inhibit its use.

4 Compliance ~~and Compliance Specifications~~

Each component of the APSDI shall be in the form of a database of geographic information that satisfies a Compliance Specification determined by the PCGIAP from time to time.

Custodians of fundamental spatial data should ensure that these data sets conform to the APSDI Compliance Specification to achieve a consistent level of quality that can meet the needs of the various users in the region and/or globe. The Compliance Specification may include specifications for data themes, content, scale or resolution, accuracy, currency, compatibility, documentation, quality assurance and accessibility, or any other aspect that the PCGIAP may, from time to time, determine.

5 Data Content

The PCGIAP shall determine and periodically review what fundamental spatial datasets are needed ~~by all sectors of the community~~ to support regional and global economic, social and environmental development and well being ~~should be available~~of member countries.

6 Relationship to NSDI

At the discretion of each member country, the APSDI component for which they have responsibility may be a component of their national spatial data infrastructure (NSDI), an extract from it or a stand-alone product.

Whichever approach is adopted by the member nation, every endeavour shall be taken to ensure that the APSDI component reflects the ~~best~~ most appropriate available information for ~~the~~ regional applications.

7 Relationship to GSDI

Member countries agree that the APSDI shall represent the region's contribution to the Global Spatial Data Infrastructure (GSDI) and that the PCGIAP shall represent the region's views on access, content and standards for the GSDI. This does not limit member countries from expressing their own views on the GSDI in other fora.

8 Sensitivity

Management of fundamental spatial data will include arrangements to preserve confidentiality, privacy, security and intellectual property rights which will protect the rights of data custodians and all sectors of the community.

ADVANTAGE OF SHARING SPATIAL DATA

People need to share spatial data to avoid duplication of expenses associated with generation and maintenance of data and their integration with other data. Moreover, GIS benefits are increased by data sharing among organisations and nations. Often, the spatial data produced for one application can be applied in others, thus saving money by sharing data. For many nations, building and using a GIS for especial applications at the regional level requires enormous amounts of current and accurate digital data. Significant time, money, and effort can be saved when the burden of data collection and maintenance is shared among nations. This is important, not only to the nations looking for the data, but also for the nations with the data. The more partners there are, the more the savings and the greater the efficiency.

Furthermore, sharing data can also improve data quality by increasing the number of individuals who find and correct errors. Savings realised on the production of common data can be used for other vital areas, such as application development. In addition, resources that would be used to collect repetitive data can be diverted into quality control, data management, and collection of other needed data.

Working together in a geographic area can also provide data coverage in a common form over a wider area. This aids cross-jurisdictional or cross-national analysis, decision making, and some types of operations. For example, adjoining jurisdictions may have a common interest in an environmental issue. A transit operator may serve a region, rather than stopping at country boundaries. Moreover, sharing common interest geographic data that any countries have been created also enable them to defray some of the costs of producing and maintaining those data.

Mechanisms to facilitate the use and exchange of spatial data are a major justification for developing and expanding any type of spatial data infrastructures.

IMPLEMENTATION

The Permanent Committee on GIS Infrastructure for Asia and the Pacific is charged with implementing this Policy by:

- Supporting and promoting the implementation of the Principles expressed in this Policy;
- Continuing to provide an effective regional coordination and consultative mechanism for governments;
- Establishing effective regional consultative arrangements between governments;
- Providing leadership, consultation and coordination for the development of the APSDI with the following characteristics:

- a network of countries databases which, collectively, satisfy the region's need for consistent fundamental datasets;
- a suite of technical standards, endorsed by PCGIAP and, where appropriate, submitted to ISO for consideration as a global standard, which facilitates the sharing of data between countries and which provides the necessary consistency and compatibility to enable the fundamental datasets to be combined to develop value-added products;
- principles to facilitate the equitable sharing of data between countries in the region;
- administrative principles and policies that facilitate access to fundamental data under conditions that promote better decision making based on good quality fundamental spatial data;
- an Asia-Pacific Spatial Data Directory (APSDD), implemented as a distributed network of country based directories, complying with standards endorsed by PCGIAP.

All jurisdictions will contribute to the implementation of this Policy by striving to:

- Adopt and promote the implementation of the Principles expressed in this Policy;
- Actively participate in, support and promote the work program of PCGIAP and its associated coordination arrangements;
- Establish and support effective jurisdiction coordination principles to give effect to PCGIAP initiatives;
- Implement country based spatial data infrastructures that conform to and contribute to the implementation of the APSDI;
- Make metadata available by establishing nodes as conforming components of the APSDD;
- Adopt and encourage the implementation of technical standards that facilitate the implementation of the APSDI;
- Use their best endeavours to adopt and implement administrative principles and policies that give full effect to the APSDI, facilitate industry and community access to fundamental data, and encourage sharing of data between agencies and jurisdictions.

DEFINITIONS

PCGIAP	The Permanent Committee on GIS Infrastructure for Asia and the Pacific. The regional committee for coordination of spatial data management in Asia and the Pacific
APSDD	The Asia-Pacific Spatial Data Directory. A key component of the APSDI that will provide to the community information about the availability, characteristics and quality of spatial data held by governments and the private sector and how that information may be obtained.
APSDI	The Asia-Pacific Spatial Data Infrastructure. A network of fundamental spatial databases maintained by custodians and linked through the adoption of consistent standards, policies and administrative principles.
custodian	A recognised body having the responsibility to ensure that a fundamental dataset is collected and maintained according to specifications and priorities determined by consultation with the user community.
fundamental spatial data	Spatial data for which there is a justified need for national consistency by multiple users in order for those users to meet their objectives. Fundamental spatial data include data about main roads, railways, hydrography, administrative boundaries, populated areas, geographic names, hypsography and vegetation at the national level. A fundamental dataset may comprise a number of compatible databases maintained by custodians in several countries.
Metadata	~~Information about data~~Data about the content, quality, condition and other characteristics of data.
spatial data	Spatial data, often called geographic information is the location and name of features that are associated with a position on, above or beneath the surface of the earth. It includes data about road, railways, hydrography, airports, harbours, public utilities, property boundaries, climate, atmosphere, community features and facilities, tenure, valuation, landform, geology, marine, demography, soil type, vegetation, human and economic geography, elevation and administrative boundaries.
spatial data infrastructure	A term that describes the fundamental spatial datasets, the standards that enable them to be integrated, the distribution network to provide access to them and the policies and administrative principles that ensure compatibility between jurisdictions and agencies.
~~sponsor~~	~~An organisation having a special interest in ensuring that the dataset is widely available to the community as part of a regional spatial data infrastructure and has a structure~~

	~~and resources to support its implementation~~
user community	Means all PCGIAP members and users within nations who deal with applications on a national or regional level. Users may range from individual citizens to national government organisations.

CUSTODIANSHIP

A key feature of the infrastructure model is the emphasis on custodianship. The Permanent Committee actively supports the concept of custodianship and has developed the following definition;

> *A **custodian** of a fundamental dataset, or a component of that dataset, is a body that would be recognised by the PCGIAP and identified as having the responsibility to ensure that a fundamental dataset is collected and maintained according to specifications and priorities determined by consultation with the user community. The custodian would be encouraged to make these data available and accessible to the community under conditions and in a format that would conform with standards and policies established for the Asia-Pacific Spatial Data Infrastructure.*

Typically, the responsibilities of custodian bodies would include some or all aspects of data acquisition, storage, maintenance, quality assurance, security, access, documentation and distribution. Custodians would be encouraged to consult with ~~sponsors~~ the user community in the administration of their functions and the PCGIAP would work with ~~sponsors~~ the user community and custodians to assist in the development of custodianship responsibilities.

In return for these responsibilities, custodians may retain certain clearly defined rights. These rights would be developed with assistance from the PCGIAP.

Criteria which may be considered in the allocation of data set custodianship include operational and business needs, technical capability and availability of resources. Where many organisations have an interest, capability and capacity, the organisation that requires the highest standards of quality may be the most appropriate custodian. This does not preclude development of partnerships or joint custodianships between organisations that effectively harness resources to achieve the required outcomes.

A separate paper on Custodianship has been developed and is attached to this draft policy.

~~SPONSORSHIP~~

~~To ensure that the development of spatial data infrastructures meets the needs of the community, the PCGIAP supports the concept of sponsors for the individual fundamental datasets. A sponsor is defined as follows:~~

> ~~*A **sponsor** of a fundamental dataset is an organisation having a special interest in ensuring that the dataset is widely available to the community as part of a regional spatial data infrastructure and has a structure and resources to support its implementation. These data would relate to the core business of the organisation.*~~

~~In doing so the sponsor would be encouraged to:~~

~~- liaise and cooperate with the PCGIAP and other sponsors in order to ensure that the Asia-Pacific Spatial Data Infrastructure is assembled, maintained, delivered and accessible in a consistent way;~~

~~- consult with the members of the PCGIAP to determine specifications, standards and priorities for collection and maintenance of the data;~~

~~- consult with and assist in coordinating the activities of the custodians of the individual datasets comprising the regional dataset to the extent required to ensure that those datasets are collected, maintained and delivered in conformance with standards, specifications and priorities that enable a regional dataset to be assembled from the component parts in accordance with the overall model for the Asia-Pacific Spatial Data Infrastructure.~~

~~Until such time as appropriate sponsors are identified for each of the fundamental datasets, the PCGIAP will undertake these functions.~~

ONGOING POLICY DEVELOPMENT

The policy for sharing fundamental data will evolve over time as the APSDI is implemented. The vision of the APSDI, as described in Publication No. 1 "A Spatial Data Infrastructure for the Asia and the Pacific Region", contains a number of issues that will impact on the development of the policy. These include such issues as data pricing, licencing, conditions for access and use, sponsorship, custodians rights, compliance specifications and copyright.

These matters will be the focus of PCGIAP activities in the future.

ATTACHMENT 3

Report from Abbas Rajabifard on WG2 Technical Questionnaire

DRAFT

THE UNIVERSITY OF
MELBOURNE

Report on

Analysis of Regional Fundamental Datasets Questionnaire

March 2000

ABBAS RAJABIFARD and IAN P. WILLIAMSON

Department of Geomatics, University of Melbourne
AUSTRALIA

Prepared for
PCGIAP-Working Group 2

Regional Fundamental Data

Content

Foreword	
Executive Summary	1
Introduction	4
Section A	6
Existing National Datasets	**6**
Method of Updating	8
Quality Control and Quality assurance	11
Metadata	13
End products from National Datasets	14
Existing Hardware & Software	16
National Data Program/Project	17
Data Exchange	19
Problems/Difficulties in Exchanging Data	20
Joint Project along the Borders	22
Section B	23
National Datasets and ISO/TC211	**24**
Data Exchange Standards	24
Section C	25
Restriction to National Datasets	**26**
Data Charge Policy and Intellectual Properties	26
Section D	27
Expected Users/Users Expectation	**28**
General	28
Barriers	**30**
Other Comments	30
	32

Foreword

The Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP) has a vision for an Asia-Pacific Spatial Data Infrastructure (APSDI) that is a network of databases, located throughout the region. Together, they provide the fundamental data needed by the region in achieving the PCGIAP objectives. These include economic, social, human resource development, environmental management, research, GIS analysis and planning objectives.

Recognising that the fundamental dataset is the most important component of SDIs, and:

1. Considering Resolution 1 of the 14th United Nations Regional Cartographic Conference (UNRCC-AP) which recognised;

   ..the fundamental role played by the spatial data infrastructure in ensuring the successful implementation of the initiatives of Agenda 21 and in facilitating sustainable development..

2. Item C of Recommendation 3, of Resolution 12 of the conference that recommends PCGIAP;

   ..provide a generic template with which nations can report the status of surveying, mapping, and GIS activities, including relevant national issues actions taken and associated rationales for those actions.

3. Noting Recommendations 2 and 3 of Resolution 14 of the conference that;

   ..The United Nations urge all Governments in Asia-Pacific to consider participating in the work of the Permanent Committee in establishing the APSDI; and

   ..The United Nations urge the PCGIAP to endeavor to link the APSDI into the Global Spatial Data Infrastructure.

4. And that these recommendations were endorsed and supported by the PCGIAP.

The Permanent Committee, through its Working Group 2 (WG2), believes that the availability of fundamental data from member countries is essential to the:

- development of the Asia-Pacific Spatial Data Infrastructure;
- development of regional knowledge infrastructure;
- realisation of economic, social and environmental benefits for the region; and
- the implementation of the United Nations Conference on Environment and Development (UNCED) Agenda 21;

and that:

- data sharing avoids wasteful duplication of resources and facilitates data integration; and

- provides better data for decision making and thus expands market potential.

There is currently a general lack of transparency in the Asia-Pacific region as to what (mainly national) data exists regarding the commercial conditions of their usage and their scope and quality. In order to ensure access to data, directories are required to enable the location of existing information and its sharing for different purposes. Potential users of geographic information need to know what data exists, where it is located, who owns it, and how it can be accessed and purchased.

This is the background providing the justification for development of an Asia-Pacific Regional directory. However, there is a need to document the existing availability of national datasets in a standardised way to enable its collation. In order to overcome this situation, WG2 defined a project to assist its effort to fulfil its tasks regarding development of Regional Fundamental Datasets and to create a Metadata system for them. The overall objective is that member nations are aware of the existence of regional data, can make informed decisions based on the data's fitness for a given use, and can assess the suitability of data for their regional applications.

The Department of Geomatics, University of Melbourne, which currently has an active research group working in the field of SDI undertook the project for WG2. The Department was asked to design and analyse the results of an technical questionnaire to determine what data exists, where it is, its availability, and its quality.

In pursuing these objectives, and receiving support from the 5th meeting of PCGIAP in Beijing, April 1999, the questionnaire was distributed to all 55 countries in the region regarding national fundamental datasets, GIS facilities, and standardisation initiatives in each member countries. This questionnaire was developed to provide WG2 with a better appreciation of the situation existing in the countries of the region with respect to fundamental datasets, and the sharing and exchange of geo-referenced data at the national level. This information will help WG2 to better focus and manage the steps required for developing regional fundamental datasets and accurately identifying the proper coverage, scale(s), format, and the other important aspect of the Asia-Pacific regional fundamental datasets.

The questionnaire contains five sections. Section A includes information about the existing national datasets including national base map series, hardware and software and institutional arrangements for using and sharing Geographic Information in member nations. Section B provides information about the current use and knowledge about spatial data and data exchange standards in member nations. Section C provides information about the data policy, pricing and copyrighting issues involve with their national datasets. Section D provides information about the potential users of, and expected coverage of spatial data in the Asia-Pacific regional fundamental dataset, and number of personnel active in the field of national datasets. The last section (General),

includes information about anticipated technical and political barriers expected when developing regional fundamental datasets.

This Report summarises the key findings from that survey on Regional Fundamental datasets.

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Executive Summary

This questionnaire was developed to provide WG2 with a better appreciation of the situation existing in the member nations of the region with respect to fundamental datasets, and the sharing and exchange of geo-referenced data at the national level. Responses were returned by 17 organisations from 17 countries out of 55 countries from the Asia-Pacific region. All of the organisations who returned the questionnaire were engaged in surveying and mapping.

There is more than one organisation in half of countries which produce/provide national datasets. The number of organisations responsible for producing or providing national dataset ranges from 2 to 7 in these counties with all being Governmental Departments.

There are large amounts of digital data available at different scales in the region that could be useful for the creation of a regional Fundamental dataset. Four countries have data only in a paper format. The availability of national datasets ranges from small to large scale depending on the size of the counties. The range in scale is from smaller than 1:5,000,000 to larger than 1:2,500. There are also many common layers in different datasets that could be used for a possible regional fundamental dataset.

Almost all the countries have adopted national standards for the preparation of their datasets. Very few countries have commenced converting their datasets into the ISO/TC211 standards. However most countries have indicated that they plan to adopt the ISO/TC211 standards in the near future.

In the existing datasets of most countries, the main items of available Metadata are comparable. This similarity should facilitate the development of a common Metadata system for the region. It would be useful to prepare a regional directory concerned with the availability of national datasets using a common metadata system for the region.

Regarding organisational infrastructure based on availability of the hardware systems, the dominant hardware used are Personal Computers (88 percent of countries). More than two-thirds use Workstations, and a minority use Mainframes. Large format plotters and digitisers are installed at over 85 percent of countries, two-thirds of countries have large format scanners and a few countries have Film writers.

ARC/INFO and ArcView are the most widely used software and are installed in 65 percent of countries. Other GIS and graphical software include MapInfo, Microstation and MGE (Intergraph).

Almost all countries indicated that they are planning to undertake some form of national mapping project within the next five years. The scales of these projects are mostly 1:250,000, 1:100,000 and 1:50,000. The main sources of data collection are aerial photos and satellite imagery.

The main problems and issues experienced during data exchange between organisations within different countries includes security, cost recovery, copyright, non-standard data formats, metadata and the quality of datasets.

Only seven countries indicated that they have joint projects along their national borders with other countries. The total number of countries from the Asia-Pacific region that are involved in such joint projects is 17.

Almost all countries have their own cost recovery or charging policies for digital data which includes useful suggestions which may be used in the preparation of a regional data exchange policy.

Over 82 percent of countries are exchanging data within their countries. Their organisations typically exchange large volumes (range from >100 MB to 150 GB) of data infrequently, from twice-monthly to once a year. Only three countries indicated that they do not exchange data between organisations.

Storage media (disks, CDs, ...) are used most commonly for both types of data exchange between and within organisations. The second commonly used method is Local Area Networks (LAN). Very little use is made of World Wide Web (WWW) and Wide Area Networks (WAN), a reflection of the fact that very few organisations are interconnected.

DXF and ASCII files are the most common formats used for the exchange of data. The most important datasets which are desired by different users (over 70 percent) to be in a regional fundamental dataset include Geodetic, Topography, Hydrologic and Costlines, Transportation, Environmental data, Place names, Statistics data, and Landuse and Forestry data.

The most anticipated political barriers regarding the establishment of a regional fundamental dataset includes access to datasets for security reasons, lack of resources, national administrative boundaries as a data layer, and copyright issues. Regarding technical barriers, the important issues are using different standards, lack of technical expertise, lack of valid information, lack of uniformity in dataset specifications, and differences in geodetic reference frameworks and lack of basic infrastructure in the area of GIS.

Introduction

The regional fundamental technical questionnaire was sent to all 55 countries in the Asia-Pacific region through Working Group 2 (WG2). There were only 17 countries that responded. A list of the countries and organisations providing information is given in Table 1. All responding organisations are national representatives in the PCGIAP.

Table 1: List of Countries Responded

Australia	Australian Surveying & Land Information Group (AUSLIG)	Government
China, People R. of	State Bureau of Surveying and Mapping (SBMS)	//
Hong Kong, China	Survey and Mapping Office, Land Department (SMO)	//
Iran, I.R. of	National Cartographic Center (NCC)	//
Japan	Geographic Survey Institute (GSI)	//
Kiribati	Land Management Division	//
Laos	National Geographic Department	//
Macau	DIRECCAO DOS SERVICOS DA CARTOGRAFIA E CADASTR (D.S.C.C.)	//
Malaysia	Department of Survey and Mapping Malaysia	//
Maldives	Ministry of Construction and Public Works	//
Mongolia	State Administration of Geodesy & Cartography	//
Nepal	Survey Department	//
New Zealand	Land Information New Zealand (LINZ)	//
Palau, R. of	Bureau of Lands and Surveys	//
Singapore	Survey Department	//
Soloman Islands	Survey & Mapping	//
Tuvalu	Lands and Survey Department	//

SECTION A

This section provides information about the infrastructure and institutional arrangement in different countries for creation and use of spatial data.

A list of key responsibilities and names of organisations which are the main producers and/or providers of National Datasets (including National base maps seris/Topographic maps and any other types of Spatial datasets such as: Thematic, Cadastral, Administrative boundaries, Geodetic Control points, and state or provincial datasets which are aggregated to a national level) is provided in Table 2. According to this table, almost all-44 organisations involved in providing and/or producing national datasets are government organisations. Based on the nature of major activity and key responsibilities of producer/provider of national datasets, organisations are classified in Figure 1.

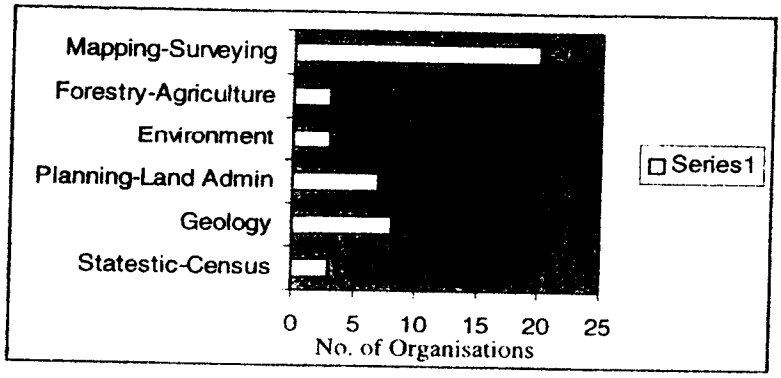


Figure 1: Type of Organisation/Agency

Table 2: List of Producer/Provider of National Datasets

[redacted]	[redacted]	[redacted]	[redacted]
Australia	AUSLIG	Topographic Mapping, Geodetic Info., Maritime Boundaries	Industry, Science & Resources
	AGSO	Geological Information	//
	ERIN	Environmental Information	Environmental Australia
	PSMA	Statistical/Census Information	Each State/Territory
	ABS	Statistical Information	Treasury
	NLWRA	National Resources Audit	Environmental Australia & AFFA
China, People R. of	National Geomatics Center of China (NGCC)	Managing, Producing and Providing National Datasets	State Bureau of Surveying and Mapping (SBMS)
Hong Kong, China	Survey and Mapping Office, Land Department (SMO)	Geodetic, Standard, Maps, Plans for all Land development, Land transactions and administration purposes	Hong Kong Government of Special Administrative Region
Iran, I.R. of	NCC	Base Mapping, NTDB, Geodetic Info., National Atlas, Maritime Boundaries	Plan & Budget Organisation
	Geology Survey	Geological Mapping	Ministry of Mines and Industry
	Agriculture Statistics & Information Dept.	Agricultural Map and Statistics	Ministry of Agriculture
	Soil & Water Resource Orga.	Soil & Land Capability Mapping	//
	National Iranian Oil Com.	Topographic Mapping	Ministry of Oil
	Watershed Management Dept.	Soil and Water Conservation Mapping	Ministry of Jihad
	Forest & Rangland Dept.	Forest and Rangeland Mapping	Ministry of Jihad
Japan	GSI	Topographic Mapping, Thematic maps, Administrative Boundaries, Geodetic Info.	Ministry of Constraction
	Hydrographic Department	National Charts, Aeronautical Charts	Maritime Safety Agency, Ministry of Transport
	National Land Agency	Cadastral Maps	?
Kiribati	Land Management Dept.	Survey and Mapping	Home Affaires
Laos	National Geographic Dept.	Base Map & other Topo maps, (producer and provider)	Prime Minister Office
Macau	D.S.C.C.	Base map, Topo maps, Cadastral maps, Thematic maps, Geodetic control points	Government Department
Malaysia	Dept. of Survey and Mapping	Land Survey and Mapping, Geographic Info. Dissemination	Government Depatment
	Public Works Dept.	Infrastructure & facilities Development & Management	//
	Geological Survey	Geological Surveys, Maps & Info	//
	Agricultural Dept.	Regulating Agricultural Land use	//
	Drainage Land Irrigation Dept.	Water Resource Management	//
Maldives	Ministry of Construction and Public Works	National Mapping	MCPW
	Ministry of Atolls Administration	Mapping for Urban Planning	MAA
	Male Municipality	Cadastral Maps of Male municipal area	MW
	Environment Section	Regulating Environmental Issues	Ministry of Home Affairs
	Projects Section	National Planning	Ministry of Planning
Mongolia	State Administrative of Geodesy & Cartography	Topo maps, Geodetic Control Points, Cadaster maps	Government Department
Nepal	Topographical Survey Branch	Base Maps, Thematic and Administrative Maps	Survey Department, Ministry of Land Reform and Management
	Geodetic Survey Branch	Geodetic Control Points	//
	Cadastra Survey Branch	Cadastral Maps	//

Continue.....

[redacted]	[redacted]	[redacted]	[redacted]
New Zealand	Land Information New Zealand (LINZ)	Geodetic Systems, Cadaster Survey and Mapping, Geographic Names, Administrative Boundaries, Topo database, Hydrographic & Bathymetric Database	Government Department
	Land Care Ltd.	Soils, Land Use Capability	Crown Resource Institute (CRI)
	Institute of Geological and Nuclear Sciences (IGNS)	Geology	CRI
	Statistics New Zealand	Statistical Info., Environmental Related Databases	Government Department
Palau, R. of	Bureau of Lands and Surveys	GIS	//
Singapore	Survey Dept.	Cadastral Mapping	Ministry of Low
	Mapping Unit	Topo Mapping	Ministry of Defense
Soloman Islands	Survey & Mapping Division	National Mapping, Land Registration	Ministry of Lands & Housing
Tuvalu	Lands & Survey Dept.	Topo Maps, Cadastral Maps, Bathymetric Maps	Ministry of Natural Resources

[redacted]

There are many national datasets in the region. The specification and characteristic of these datasets are varied from country to country in terms of scale, type (Topographic/thematic data), available format, validity, quality, etc. The information provided on these datasets can collectively form input for the metadata directory system of the region. Based on the information provided by different countries, only 4 countries do not have any national datasets in the digital format.

The amount of digital datasets in the region can facilitate WG2 fast-tracking different actions on the preparation of the Asia-Pacific regional fundamental dataset. However, due to the different characteristics of the available national datasets, there are difficulties involved with datasets that might cause delay on the progress of WG2 or increase the number of steps required for creation of the regional fundamental dataset. These difficulties include lack of a common dataset scale in digital format, as well as in paper format; availability of datasets in different projection systems; and different standards and specifications used for collection of these datasets. To address these difficulties, WG2 would be required to undertake additional actions that may need extra budgetting. Information about the existence of national datasets within different countries is provided in Table 3.

According to this table, the availability of national datasets in a digital form ranges from small scale (1:9,000,000) to large scale (larger than 1:2,500) depending on the size of the countries. There are also many common layers in different datasets that could form different layers of the regional fundamental dataset.

Table 3: Existing National Datasets (Base Map/Topo Database)

[redacted]	[redacted]						
Australia	**Scale: 1:9M** Progress: 100 % Format: Digital, Vector Projection System: Simple Conic No. of Layers: 3 Metadata: Yes	**Scale: 1:5M** Progress: 100 % Format: Paper Projection System: Simple Conic No. of Layers:- Metadata: -	**Scale: 1:2.5M** Progress: 100 % Format: Digital, Vector Projection System: Simple Conic No. of Layers: 2 Metadata: Yes	**Scale: 1:250K** Progress: 100 % Format: Digital, Raster Projection System: UTM No. of Layers:3 Metadata: Yes	**Scale: 1:100K** Progress: 100 % Format: Paper Projection System: UTM No. of Layers: - Metadata: -		
China, People R. of	**Scale: 1:1M** Progress: 100 % Format: Digital, Vector Projection System: Geographic Coordinate No. of Layers: 17 Metadata: Yes	**Scale: 1:250K** Progress: 100 % Format: Digital, Vector Projection System: Geographic Coordinate No. of Layers: 14 Metadata: Yes	**Scale: 1:50K** Progress: 100 % Format: Digital, Raster Projection System: Geographic Coordinate/ Gauss-Kruger No. of Layers: - Metadata: Yes				
Hong Kong, China	**Scale: 1:20K** Progress: 100 % Format: Digital, Vector Projection System: UTM No. of Layers: 16 Metadata: No	**Scale: 1:2500** Progress: 100 % Format: Digital, Vector Projection System: UTM No. of Layers: 13 Metadata: No					
Iran, I.R. of	**Scale: 1:2.5M** Progress: 100 % Format: Digital, Vector Projection System: Lambert No. of Layers: 7 Metadata: No	**Scale: 1:1M** Progress: 100 % Format: Digital, Vector Projection System: Lambert No. of Layers: 30 Metadata: Yes	**Scale: 1:250K** Progress: 100 % Format: Digital, Vector Projection System: UTM No. of Layers: 37 Metadata: No	**Scale: 1:50K** Progress: 100 % Format: Paper Projection System: UTM No. of Layers: - Metadata: -	**Scale: 1:25K** Progress: 30 % Format: Digital, Vector Projection System: UTM No. of Layers: 169 Metadata: Yes		
Japan	**Scale: 1:1M** Progress: 100 % Format: Paper Projection System: UTM No. of Layers: - Metadata: -	**Scale: 1:500K** Progress: 100 % Format: Paper Projection System: UTM No. of Layers: - Metadata: -	**Scale: 1:200K** Progress: 100 % Format: Paper/Map image, Raster Projection System: UTM No. of Layers: 4 Metadata: Yes	**Scale: 1:50K** Progress: 100 % Format: Paper/ Digital, Raster Projection System: UTM No. of Layers: 4 Metadata: Yes	**Scale: 1:25K** Progress: 100 % Format: Paper Projection System: UTM No. of Layers: - Metadata: -	**Scale: 1:10K** Progress: 100 % Format: Paper Projection System: UTM No. of Layers: - Metadata: -	

Continue.....

[redacted]	[redacted]						
Kiribati	**Scale: 1:25K** Progress: 100 % Format: Paper Projection System: Local TM No. of Layers: - Metadata: -	**Scale: 1:2500** Progress: 100 % Format: Digital, Vector Projection System: UTM No. of Layers: 6 Metadata: No					
Laos	**Scale: 1:100K** Progress: 100 % Format: Paper Projection System: Gauss-Kruger No. of Layers: - Metadata: -	**Scale: 1:25K** Progress: 100 % Format: Digital Projection System: UTM No. of Layers: ? Metadata: ?					
Macau	**Scale: 1:20K** Progress: 100 % Format: Digital/Paper Projection System: Hayford No. of Layers: - Metadata: -	**Scale: 1:10K** Progress: 100 % Format: Digital/Paper Projection System: Hayford No. of Layers: - Metadata: -	**Scale: 1:5K** Progress: 100 % Format: Digital/Paper Projection System: Hayford No. of Layers: - Metadata: -				
Malaysia	**Scale: 1:50K** Progress: 100 % Format: Paper/Digital, Vector Projection System: RSO No. of Layers: 8 Metadata: No						
Maldives	**Scale: 1:300K** Progress: 100 % Format: Paper/Digital, Vector Projection System: UTM No. of Layers: ? Metadata: No						
Mongolia	**Scale: 1:1M** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:500K** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:300K** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:100K** Progress: 100 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:50K** Progress: 48.6 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:25K** Progress: 28.3 % Format: Paper Projection System: Gauss-Krueger's No. of Layers: - Metadata: -	**Scale: 1:5K** Progress: 100 % Format: Paper/Digital, Vector Projection System: Gauss-Krueger's No. of Layers:? Metadata: Yes

[redacted]	[redacted]						
Nepal	Inaccurate Information						
New Zealand	**Scale: 1:4M** Progress: 100 % Format: Paper Projection System: Paper No. of Layers: - Metadata: -	**Scale: 1:3M** Progress: 100 % Format: Paper Projection System: Lambert, Conic No. of Layers: - Metadata: -	**Scale: 2M** Progress: 100 % Format: Paper, Projection System: NZMG No. of Layers: - Metadata: -	**Scale: 1:1M** Progress: 100 % Format: Paper Projection System: Lambert, Conic No. of Layers: - Metadata: -	**Scale: 500K** Progress: 100 % Format: Paper, Projection System: NZMG No. of Layers: - Metadata: -	**Scale: 50K** Progress: 100 % Format: Paper/Digital, Vectore Projection System: NZMG No. of Layers: - Metadata: Yes	**Scale: 25K** Progress: 100 % Format: Digital, Vector Projection System: UTM No. of Layers: - Metadata: No
Palau, R. of	**Scale: 25K** Progress: 100 % Format: Paper, Projection System: ? No. of Layers: - Metadata: -						
Singapore	**Scale: 5K** Progress: 100 % Format: Digital, Vector Projection System: Cassini No. of Layers: < 68 Metadata: ?						
Soloman Islands	**Scale: 3M** Progress: 100 % Format: Paper, Projection System: UTM No. of Layers: - Metadata: -	**Scale: 1:1M** Progress: 100 % Format: Paper, Projection System: UTM No. of Layers: - Metadata: -	**Scale: 1:250K** Progress: 0.02 % Format: Digital Projection System: ? No. of Layers: - Metadata: -	**Scale: 1:150K** Progress: 98 % Format: Paper, Projection System: UTM No. of Layers: - Metadata: -	**Scale: 1:50K** Progress: 100 % Format: Paper, Projection System: UTM No. of Layers: - Metadata: -		
Tuvalu	**Scale: 10K** Progress: 100 % Format: Digital/Paper Projection System: UTM No. of Layers: - Metadata: -						

Method of Updating

With regard to the procedure for maintaining and updating national datasets in the region, different methods are utilised. Most of the countries are using Aerial photos, Field surveying, and Satellite imagery with figures of 41.50, 23.55 and 11.80 percent respectively for maintaining and updating of their national datasets. The period for updating is varied from 3-15 years in different countries and it depends usually on the national

ATTACHMENT 4

Report on evaluation of PETIT dataset

Permanent Committee on GIS Infrastructure for Asia and the Pacific

WORKING GROUP 2

Regional Fundamental Data

Comments on the Pathfinder towards the European Topographic Information Template (PETIT) spatial dataset produced by MEGRIN

Glenn Johnstone, Executive Officer, PCGIAP WG2

6th PCGIAP MEETING
KUALA LUMPUR, MALAYSIA
11-14 APRIL 2000

Contents

	Page
Executive Summary	1
Introduction	1
Objectives of PETIT	2
Technical Aspects	2
Geographical Spread	2
Comparison of PETIT with Global Map	3
Validation and Quality Assurance Testing	3
MEGRIN & User Testing	4
AUSLIG Testing	4
Institutional aspects	6
Legal and Ownership Issues	6
Commercialisation	7
EuroMap Production Preparation	7
Generic Issues	8
Conclusion	10
Issues for further consideration	10
References	10
Attachment 1 - Area of PCGIAP Member Countries vs. European Countries	11

EXECUTIVE SUMMARY

MEGRIN has now completed the prototype phase of creating a pan-European topographic dataset and is starting to move onto planning the next phase - examining the feasibility of producing EuroMap, PETIT's successor.

This report examines the technical and institutional aspects of PETIT and how these might be applied to the APSDI.

Briefly, the technical aspects cover such issues as: geographical spread - Europe is fairly well concentrated in one particular area, the PCGIAP on the other has countries spread across 184 degrees of longitude and 132 degrees of latitude; data models - Vmap Level 1 versus Vmap Level 0; a brief comparison between PETIT and Global Map; quality assurance testing of PETIT has been extensively carried out by MEGRIN and European agencies. AUSLIG was unable to carry out such testing mainly due to the effort required in customising its ARC/INFO scripts to suit the PETIT data structure. An observation is made that the lack of a field containing country code information in all but three of the 90 feature types may limit the use of some datasets - particularly those that cross borders.

The institutional aspects cover such issues as: legality and ownership - the complexity of different laws in Europe is a hindrance to establishing and maintaining a product like EuroMap; commercialisation - users will only pay for harmonised, edge-matched and integrated topographic datasets that have consistent data and feature representation and consistent resolution; preparation of EuroMap production - looks at the steps in general organisation, technical development and gathering source data; generic issues - a variety of languages and legal systems all combine to create significant variations in the take-up of GIS.

Creating the APSDI and populating it with fundamental data is an enormous task. The PCGIAP can learn a lot from MEGRIN's experience as there are a number of similarities in the two SDI initiatives. There are also a number of issues the PCGIAP will have to consider further, in light of the PETIT experiment.

INTRODUCTION

At the 4th PCGIAP meeting in Tehran, Iran it was determined that action item 6 for Task 2 (Regional Fundamental Data) of Working Group 2 was to "assess the MEGRIN prototype dataset and make results available to WG members".

This report examines the technical and institutional aspects of the PETIT dataset as well as reporting on quality assurance testing conducted on the dataset by the author.

Most of the text below has been sourced directly from the MEGRIN web site and the publicly available final report on the PETIT project.

PETIT is a project determining the feasibility of creating a pan-European topographic dataset, at a scale of 1:250 000, using the VMap Level 1 specifications defined by the US National Imagery and Mapping Agency. Aspects being investigated include

- technical feasibility of the military VMap specification and the modifications necessary for civilian use,

- possible legal constraints concerning Intellectual Property Rights (IPR) in the data, and
- market requirements for such a dataset.

Objectives of PETIT

The objectives for the PETIT Implementation Phase have been:

- to create a common set of specifications for the PETIT product and to learn and present recommendations for the production of a pan-European topographic dataset;
- to assess the main market sectors, with the aim of producing a solid business case allowing decisions on production of the dataset PETIT product to be made;
- to produce the agreements necessary to undertake such production;
- to create a prototype of the dataset enabling further refinement of the final product specifications;
- to create a WWW demonstrator to reach a wide audience;
- to create the marketing and distribution plans for the PETIT product.

One of the first tasks MEGRIN undertook was to find out who the target users of such a pan-European data would be - what are their needs, which market sectors have the greatest need and what do they do with the data.

MEGRIN has now completed the prototype phase and has evaluated the feasibility of producing a new pan-European base-map based on VMap to be named EuroMap, the successor to PETIT.

TECHNICAL ASPECTS

PETIT consists of nine thematic layers: boundaries, hydrography, population, elevation, transportation, vegetation, industry, physiography and utilities. For more detailed information on the feature types and attributes see

http://www.megrin.org/PROJECTS/PETIT/Prototyp_desc.html

User testing conducted by MEGRIN has identified some key issues. These include geometric and topologic inconsistency; portrayal criteria and classification of features different between producers; attributes having to be added and harmonised; generalisation parameters varying between producers, and currency and variety of data sources.

Geographical Spread

The aspect of geographical spread or "scale" is one major issue the APSDI will have to deal with. Europe is fairly well concentrated in one particular area, the PCGIAP on the other has countries spread across 184 degrees of longitude - from Russia (27°E) to French Polynesia (149°W) - and 132 degrees of latitude from Russia (81°N) to New Zealand (51°S). It is also interesting to note the difference in the area of Europe versus the area of Asia-Pacific as outlined in Attachment 1. The APSDI will have to deal with an area almost 10 times larger than the area EuroMap hopes to cover (52.7 million square km vs. 5.9 million square km) and more than 260 times larger than the area PETIT has

covered. The nominated base scale for APSDI data has been set at 1:1 Million scale while PETIT is 4 times larger than that with data being shown at 1:250 000 scale.

Europe

PCGIAP member countries

Comparison of PETIT with Global Map

PETIT uses the data model based on the ESRI Data Dictionary of VMap Level 1 specifications while Global Map have based theirs on VMap Level 0. The basic differences between this are:

- Level 1 is the specification for mapping at 1:250 000 scale so it physically shows more features as well as more feature classes and more attributes.
- Level 0 is the specification for mapping at 1:1 million scale and by definition a simpler set of features and attributes than the Level 1 dataset.

Global Map uses the ITRF94 coordinate system as the reference coordinate system. The GRS80 ellipsoid will be adopted to represent the position of spatial objects in longitude and latitude. As the difference between these coordinates and WGS84 coordinates is negligible at the scale of this product, data in WGS84 will be taken to be in ITRF94.

No tiling system has been employed in the PETIT prototype, ie. it is a seemless database

PETIT is a vector-only dataset and contains no raster layers of data unlike Global Map which has 4 of it's 8 layers in raster format.

The APSDI, given the nominal scale of 1:1 million, should be closer in data format and structure to Global Map than PETIT.

VALIDATION AND QUALITY ASSURANCE TESTING

There has been extensive validation and quality assurance testing performed on the PETIT dataset by both MEGRIN and users in the European GI community (public and private sectors).

Since AUSLIG has undertaken a comprehensive QA procedure on all its 1:250K scale topographic datasets for the past 5 years the original thought was to run various ARC/INFO validation scripts over the PETIT dataset to see what results it yielded.

MEGRIN & User Testing

Vmap1 data which are the direct sources for PETIT Prototype are produced according to the recommendations of VMap1 Concept of Operations. These are:

- Verifying the compliance of the data format, topological structure, and the content with the dataset specification.
- Checking the attribute assignments, completeness and spatial accuracy by comparison of check plot from the digital data with the analogue source.
- Interactive digital evaluation. Spatial queries are conducted on each feature in the digital dataset, and returned values are checked against the source material.

Organisations providing data for PETIT ensure that 90% of the features in the Transportation, Hydrography, Utility, Elevation and Industry layers have been accurately checked. Other layers are checked to the maximum extent possible.

The data providers perform automatic checks using a "validator". The validator checks the topology, structural consistency, the validity of feature types and attribute values.

At the edge-matching state, visual checks are made along the boundary being matched.

The final dataset is validated in ARC/INFO format after harmonisation.

For the PETIT prototype, data quality parameters resulting from the QA/QC procedures are described in the lineage file and the data quality table.

MEGRIN has produced a web based demonstrator of the PETIT prototype which can be found at:

http://www.megrin.org/WEBPETIT/default.htm

AUSLIG Testing

Due to the structure and large number of separate data layers (9 thematic layers and 90 feature types) within PETIT it was determined that extensive testing of the dataset using AUSLIG validation scripts could not be performed as there would be too much time taken in:

a) Merging, converting the shape files into ARC/INFO coverages and grouping the 90 feature types into the 9 broad categories; and

b) customising the AUSLIG ARC/INFO scripts to suit the PETIT data structure. These scripts would check for errors in truth-in-labelling, positional accuracy and topological integrity. More information on these tests can be found at <http://www.auslig.gov.au/products/digidat/publictn/usr_gde/chapter5.htm>

Figure 1 shows a sample of the roads from PETIT and illustrates why there would be a lot of work in running the AUSLIG scripts. These roads are shown without the bridge shape

files. Figure 2 shows a sample from the AUSLIG TOPO-250K product where bridge features are already incorporated into the roads coverage – thus making testing far easier.

Fig 1: Some of the transportation feature types from PETIT

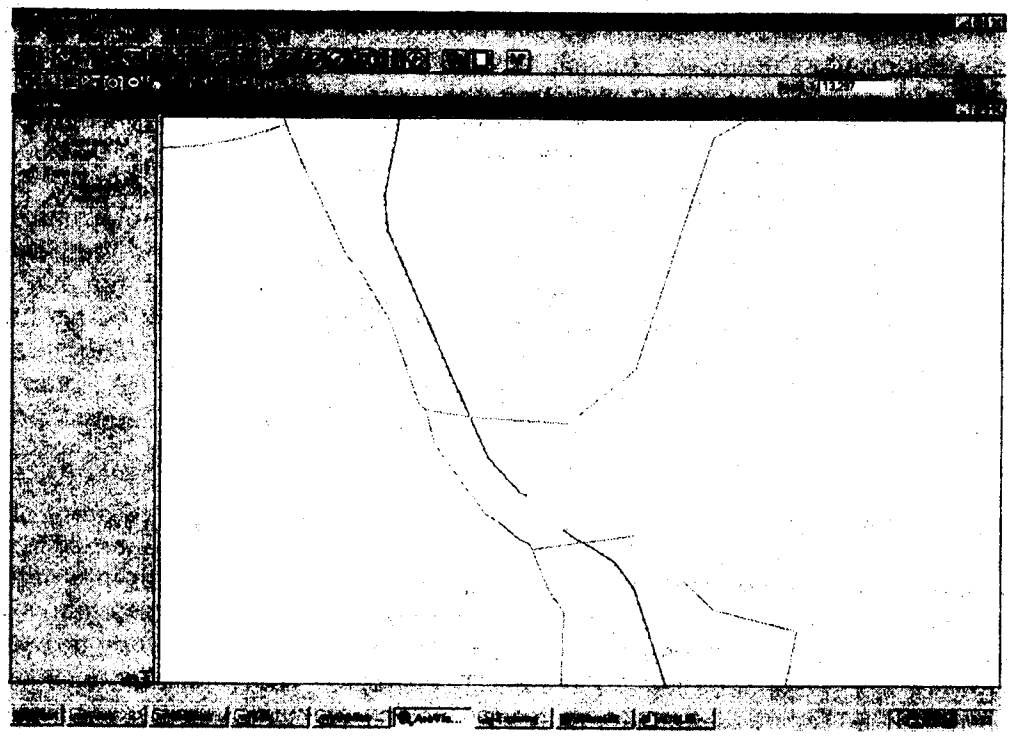


Fig 2: Road and Railway coverages from AUSLIG's TOPO-250K product

Observations of the PETIT prototype dataset include that:

- there is only one layer (3 features) that deal with country code information - administrative boundaries. The lack of a field indicating which country the data is located in - particularly for those layers like roads and railways - make it difficult to do analysis on a country by country basis.
- To do any sort of route analysis is going to take some time to prepare because of the data structure. For example each of the feature types in the road network (8 in total, including bridges, tunnels, ferry crossings, trails, cart tracks and interchanges) have to be merged into a single layer before analysis can be performed. The AUSLIG TOPO-250K data structure incorporates all these into one layer to begin with.

INSTITUTIONAL ASPECTS

This section of the report examines the institutional aspects MEGRIN has had to deal with during the production of PETIT and how these relate to what the PCGIAP is trying to achieve with regional fundamental datasets for the APSDI.

Legal and Ownership Issues

The legal issues involved in making Pan-European mapping include aspects of intellectual property law, competition law, torts and contract law.

By its nature VMap data has a complex production history with associated ownership problems. A general study was undertaken to better understand the legal issues and problems, which may exist using VMap data for the development of the pan-European topographical information template. The issue was addressed by sending a questionnaire to European National Mapping Agencies, where they were asked regarding their involvement in the VMap production. From the answers a more detailed study of the issues was carried out since there are clear differences between countries in policy, attitudes and understanding of the legal position in respect of exploitation of the VMap product's IPR. Some NMA's have clearly defined the ownership rights of the produced VMap. In other cases VMap has shared ownership between the military and the NMA, or even entirely by other organisations. Results from the legal study indicated that five countries are unclear or currently negotiating who owns the IPR while most others have no ownership of the copyright in VMap. Only 8 NMAs have rights to the final VMap data for civilian purposes. It is therefore proposed that high level negotiations with NATO are launched, to resolve the copyright and ownership issues. Also, individual negotiations with the military on national level must continue.

The complexity of the different laws in Europe is a hindrance to the establishment of pan-European datasets. It makes it unclear for the IPR holders as to what extent they are protected, and it makes it difficult to develop clear licence agreements. The International Institute for the Unification of Private Law (Unidroit) is working on ways of harmonising and co-ordinating the private law of States and of groups of States, and is thereby providing a legal framework which has been helpful to the PETIT project. The principles of Unidroit were used in the PETIT project to develop licences which are workable in all European countries.

Commercialisation

Given that EuroMap would cost many millions of Euro's to create and the potential benefits reaped by private sector companies in Europe will be even greater, the dataset will have recover some, if not, most of its costs.

Based on PETIT user findings, EuroMap will be targeted at the following application functions:

- Geospatial analysis - retail; site location; marketing; insurance;
- Network analysis - routing; scheduling; drivetimes; traffic management;
- Visualisation - Regional government and GISCO usage; planning, location and backdrop orientation;
- Geospatial analysis within financial and commercial applications has distinct needs for boundary and demographic/lifestyle information, topologically consistent with the base data. These expectations for full topological consistency across features are an especially important issue for the administrative boundaries (SABE) product and its integration with EuroMap.
- Network analysis requires link and node networks, connectivity and high attribution.
- The telecommunications sector requirement is for DEM height information and network analysis. EuroMap product design has not considered satisfying this demand due to the resources required to make the raw height data homogenous across Europe and also the imminent data availability from the NASA SRTM project.
- Visualisation and map backdrop application is particularly prominent in Regional governments - utilisation.

PETIT studies have shown that additional information must be available to maximise the potential of EuroMap. This information is essential and is required in a consistent format across Europe. In particular, boundary, census and lifestyle information is required for demographic analysis; whilst road/rail attributes are required for network analysis.

Consistent data representation, data resolution and feature representation were other essential demands for EuroMap to satisfy users needs and expectations for an integrated, harmonised, edge-matched pan-European dataset.

EuroMap Production Preparation

Before EuroMap can begin there are a number of different phases that have to be completed. MEGRIN have identified these in a EuroMap production plan, outlined below. When the APSDI reaches this stage it will be very useful for the PCGIAP to re-visit the European experience.

The production plan incorporates a number of essential pre-production components; general organisation, technical development and data gathering. If a go-ahead is given for EuroMap production, production preparations will involve these separate components. Within each area, there are a number of sub-tasks that must be conducted prior to production.

General Organisation

- Setting up steering committee/procedures for operation;
- Negotiations with NATO;
- Legal arrangements;
- Commercial arrangements.

Technical Development

- Specification notes;
- Production flow definition/data capture catalogue;
- Development of production procedures;
- Development of production software;
- Configuration of workstations /software and hardware;
- Set-up quality system;
- Training.

Gather source data

- Delivery of VMap CD's;
- Delivery of NMA data;
- Obtaining other source data;
- Updating all data.

Generic Issues

As with any spatial data initiative there are going to be a number of issues that arise regardless of its location in the world.

Many decisions being made in Europe, whether business or governmental, need accurate geographical datasets. The increasing investment in GIS technology indicates that this is a trend which is likely to continue, maybe accelerate, in the future. Access to geographical information will play a significant part in the success of European business in the future.

Unlike the United States, which has a similar population, Europe has a variety of languages and legal systems, which combine to create significant variations in the take-up of GIS. This, in turn, has clear implications for the quality of decision-making.

Although national initiatives mean that users are generally able to learn about and purchase datasets relatively easily, the issues above indicate that European initiatives are required to improve the flow of information between countries.

The investigations carried through in the PETIT project have provided real evidence that there is considerable demand for pan-European topographic datasets which:

- are of high quality , homogeneous;
- are geometrically, topologically and thematically consistent;
- can be bought by country or region as activities develop, rather than the full Europe;
- are available with a single user licence;
- are sold at a fair price.

There is evidence that users are making do with lower quality European datasets than they require, for technical and organisational reasons. The organisational issues (including many pricing, licensing, copyright terms, in different languages) create considerable problems. Technically, it is not at all straightforward to combine national datasets without investing considerable effort. Users often discover after processing that datasets do not fit together or produce unreliable results.

The challenge for the future is to provide high quality data which is easily accessible and available at a reasonable cost.

NMAs are well placed to meet this demand because individual countries have already invested massive effort and resources in developing high quality digital datasets. Additionally, the NMAs are also seen as committed and trusted sources of data: a key element for customers to make the investments. When NMAs collaborate with private sector companies, market needs can be met even more effectively.

NMAs remits and budgets do not include resources to "Europeanise" their national datasets. Despite this, they have been working together within MEGRIN to meet market needs. Without external funding, the NMAs will be unable to invest scarce resources at the level proposed by the PETIT study. If the NMAs do not proceed, it will take time before a pan-European dataset exists to meet the above requirements. This means that the competitiveness of Europe in the global information society would suffer from major drawbacks, including:

- poor policy making at European and regional levels due to insufficient information;
- all major application development would be based on "imported goods";
- Europe would be a "developing area" in the future global information society.

Creating EuroMap should therefore be seen as part of a broader strategy for geographic information in Europe. It must be implemented within the framework of a clear strategy, which aims to improve users access to geographic information if it is to meet its full potential.

There are almost 40 different documents relating to all aspects of the PETIT project, most of which have not been made publically available. When implementation of the APSDI is more advanced it would be beneficial to have further contact with MEGRIN regarding access to this documentation.

CONCLUSION

Creating the APSDI and populating it with fundamental data is an enormous, almost overwhelming task. The PCGIAP can learn a lot from MEGRIN's experience as there are a number of similarities in the two SDI initiatives.

Those similarities include the significant variations in language, geographic information policies, legal systems, and more particularly for the PCGIAP, geographic distance.

There are also a number of issues the PCGIAP will have to consider further, in light of the PETIT experiment. These include; commercialisation of the fundamental datasets that will eventually be available through the APSDI; policies on pricing, copyright; and those listed below.

There has been a vast amount of effort in getting PETIT to the stage it currently is. For MEGRIN it seems the next major challenge is to start and complete EuroMap, PETIT's successor, and to provide high quality data which is easily accessible and available at a reasonable cost.

The PCGIAP can learn much from MEGRIN's research and prototype dataset, even though it does portray data at quite a different scale to the one the APSDI will adopt.

It will be vitally important that the data structure / model be given the upmost consideration as this will 'make or break' the APSDI.

Issues for further consideration

- Tiling system for APSDI datasets. Should there be one given the large geographical area the APSDI will have to cover?
- User consultation - should there be a questionnaire to PCGIAP members similar to the one used by MEGRIN for PETIT?
- Pilot project - on the same scale as PETIT - for the APSDI?
- Close cooperation with MEGRIN - personnel secondments and/or exchanges?

REFERENCES

ISCGM, "Global Map Specifications", Version 1.0 November 1998

MEGRIN, 1998, "PETIT Prototype Description", IMP/3035/WP3/MEG/006

MEGRIN web site, 2000, www.megrin.org

Attachment 1

Area of PCGIAP Member Countries vs. European Countries

PCGIAP	
Afghanistan	652090
American Samoa*	199
Armenia	29800
Australia	7741220
Azerbaijan	86600
Bangladesh	143998
Bhutan	47000
Brunei Darussalam	5765
Burma	676578
Cambodia	181035
China	9596961
Cook Islands*	240
Fiji	18274
French Polynesia*	4167
Guam*	541
Hong Kong, China*	1092
India	3287590
Indonesia	1904569
Iran	1633188
Japan	377801
Kazakhstan	2717300
Kiribati*	717
Korea North (Democratic People's Republic of)	120538
Korea South (Republic of)	99274
Kyrgyzstan	198500
Lao People's Democratic Republic	236800
Macau, China*	21
Malaysia	329758
Maldives	298
Marshall Islands	181
Micronesia (Federated States of)	702
Mongolia	1566500
Nauru*	21
Nepal	147181
New Zealand	270534
Niue*	260
Northern Marianas*	477
Pakistan	796095
Palau	459
Papua New Guinea	462840
Philippines	300000
Russian Federation	17075400
Samoa	2831
Singapore	618
Solomon Islands	28896
Sri Lanka	65610
Tajikistan	143100

EUROPE	
Albania	28748
Andorra	453
Austria	83859
Belarus	207600
Belgium	30519
Bosnia and Herzegovina	51129
Bulgaria	110912
Croatia	88117
Czech Republic	78864
Denmark	43077
Estonia	45100
Finland	338145
France	551500
Germany	356733
Greece	131990
Hungary	93032
Iceland	103000
Ireland	70284
Italy	301268
Latvia	64600
Liechtenstein	160
Lithuania	65200
Luxembourg	2586
Malta	316
Monaco	1.49
Netherlands	40844
Norway	323877
Republic of Moldova	33700
Poland	323250
Portugal	91982
Romania	238391
San Marino	61
Slovak Republic	49012
Slovenia	20256
Spain	505992
Sweden	449964
The former Yugoslavian Republic of Macedonia	25713
Ukraine	603700
United Kingdom	244100
Yugoslavia (Serbia/Montenegro)	102173
Total	**5 900 208.49**

Attachment 1

Thailand	513115
Tonga*	748
Turkmenistan	488100
Tuvalu*	26
Uzbekistan	447400
Vanuatu	12189
Vietnam	331689
Total	**52 746 886**

NOTES:

1. These are figures for **land areas only** and do not include maritime boundary area claims or other areas of ocean.

2. * area figures from CIA World Fact Book 1999 (www.odci.gov/cia/publications/factbook/country.html)

3. All other area figures from UN Statistics Division (www.un.org/Pubs/CyberSchoolBus/infonation/e_i_map.htm)

ATTACHMENT 5

Report on Administrative Boundaries Pilot Project

Permanent Committee on GIS Infrastructure for Asia and the Pacific

Working Group 2

Regional Fundamental Data

REPORT ON ADMINISTRATIVE BOUNDARIES PILOT PROJECT

Glenn Johnstone, Executive Officer, PCGIAP WG2

6th PCGIAP MEETING
KUALA LUMPUR, MALAYSIA
11-14 APRIL 2000

At the 4th PCGIAP meeting in Tehran, Iran it was determined that action items 1, 8 and 9 for Task 2 (Regional Fundamental Data) of Working Group 2 were to:

1. "Obtain PCGIAP approval to use an Administrative Boundaries pilot dataset as a means of identifying issues associated with regional fundamental dataset creation within the APSDI;

8. Conduct research on the Administrative Boundaries pilot dataset - what is available, formats, structure and how this matches with Global Map specification; and

9. Develop the Administrative Boundaries pilot dataset and report on issues identified during the pilot project."

Results

Below are the results of these actions outlined above:

Action 1:

At the 5th Meeting of PCGIAP in Beijing, China in 1999, a pilot project on administrative boundaries was approved by the Committee.

Action 2:

At the PCGIAP Executive Board meeting in Melbourne, Australia in October 1999, those countries participating in the pilot project were determined. These countries are: Sri Lanka; India; Bhutan; Nepal; China; Mongolia; North and South Korea; and Japan (see Attachment 1). Of these 9 countries 3 have provided their administrative boundary data in a digital format; China; Sri Lanka and Japan (see Attachment 2). Nepal have supplied their data in hard copy format which, in it's current state, can not be used for this exercise.

The format of the digital data provided so far as been all in ARC/INFO coverages (as export formatted [.e00] files).

There has been varying degrees of metadata supplied with each dataset. Ranging from full documentation through to no metadata supplied.

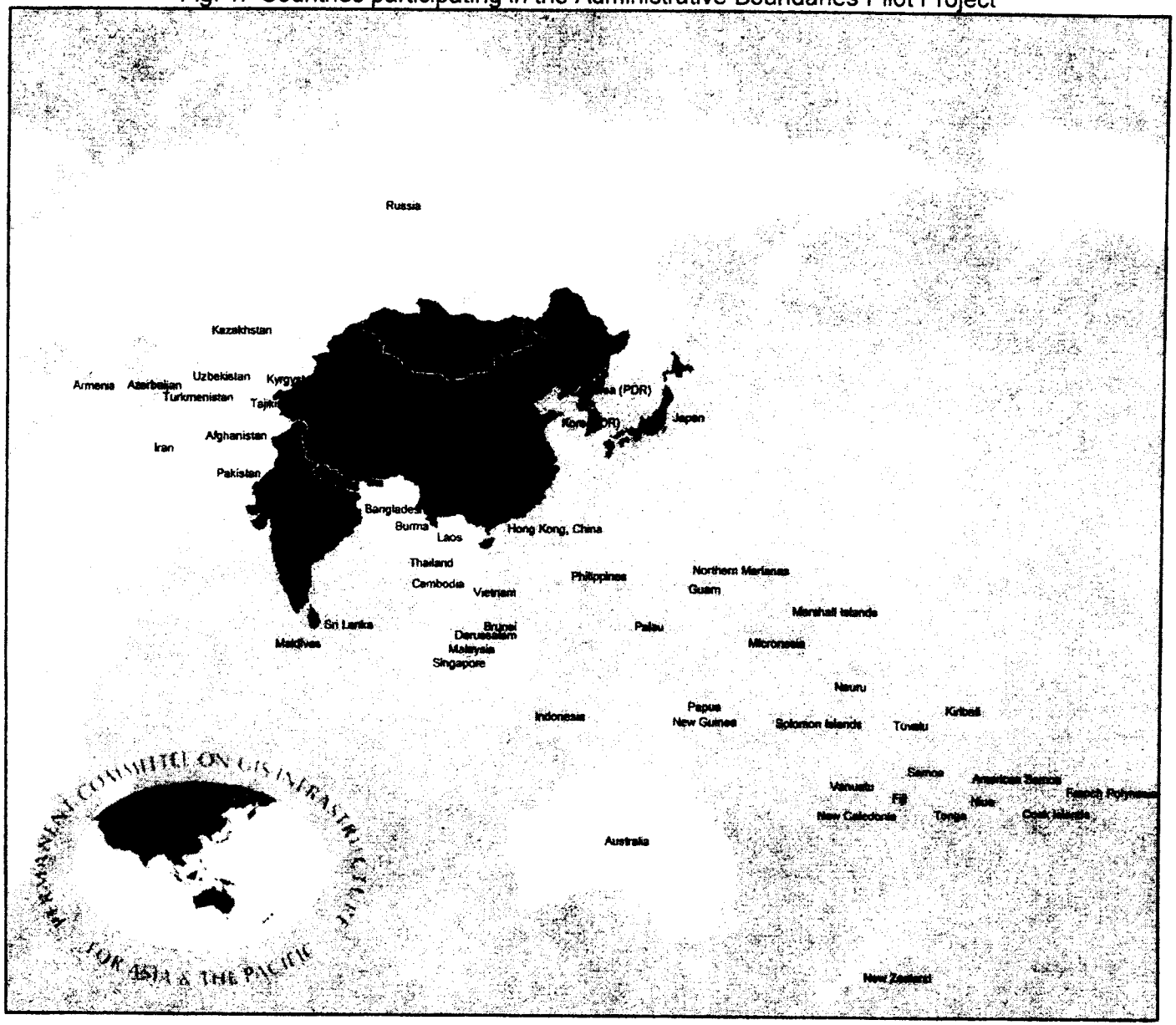
Action 3:

As only a third of the countries have responded and provided data and none of the three actually share a boundary the project requires further datasets before it is able to continue.

Future Research

- Digital data from, at the very least, 3 countries will have to be sought in order to conduct the type of research that will be meaningful to this project.
- This project is important to continue with as it will help identify the problems likely to be encountered when started to collect data for the fundamental datasets of the APSDI as well as having implications for another Working Group 2 project on the policy on sharing fundamental data.

Fig. 1: Countries participating in the Administrative Boundaries Pilot Project



ATTACHMENT 6

Report from Prof Jiang Jingtong on APSDI Data Nodes

NATIONAL GEOMATICS CENTER OF CHINA

STATUS REPORT

THE PROGRESS ON APSDI DATA NODE

2000-03-20 Beijing, China

STATUS REPORT ON APSDI DATA NODE

According to the project work plans for the period of 1999-2000 mentioned in the Final Report of the Working Group 2 (Regional Fundamental Data) of PICGIAP, including architecture and functionality, the design of Data Node for the APSDI is one of the currently 4 key tasks of WG2. Australia, China, Iran and Japan were recommended as four candidates of this project during Beijing meeting. China was the project coordinator.

1. Scope

APSDI Data Node is a node established to distribute, manage, and maintain fundamental data in each member country of the APSDI. These data nodes will provide means to advertise data collection, requirements, inventory, and quality; support documentation of basic spatial data sets. According to the project plan, Australia, China, Japan, Iran will act as demo data nodes at the first stage. Among them, Australia will be the main node of the APSDI. The output of the pilot project in regional fundamental datasets will be used for data node project. Following the project, establishing of clearinghouse could be considered.

2. Draft Design

The first draft design of APSDI Data Nodes was reached in Oct. 1999.

Two schemata for designing APSDI data nodes were considered:

- Establish an APSDI main node (or name it Gateway) in Australia, which mirrors primary contents from other nodes periodically, and equip the main node with a Search Engine. Users only need to visit the main node to get descriptive information of each node. When it is necessary for them to browse or download the fundamental data, they can access the specified data node.

- Equip the main node of APSDI in Australia and each node of APSDI in China, Japan and Iran with Search Engine individually. Users can use the main node as the entrance or gateway of the APSDI network; they could search information at every node of APSDI through the main node, and get back the results to their browser

3. Sent out for Comments

The draft design (Annex A) was sent to Australia, Japan and Iran for comments

in late Dec.1999. However, no response has come to us by now.

4. Prototype Web Site Demo Creating

Based on the Chinese fundamental dataset, the 1:4M-scale Database of the National Fundamental Geographic Information System (NFGIS), a demonstration concept for this task is being worked out. The dataset consists of international and provincial boundary, the main rivers and lakes, the main roads and railways, the cities and counties, etc. The functionality of the demo data node is the following:

- General textual information browsing: including information of node, fundamental data, services, etc.
- News about the node.
- Users counting and analysis.
- Data download.
- Display fundamental data as a map in the user's web browser, and provide some utilities for the user to zoom in, zoom out, pan the map, and identify the features on the map.
- Query fundamental data: the fundamental geo-data usually has some attached attributes, for example, every administrative division has its name, code, even population and so on. That is, users can query the data according to given conditions, and get the right features mapped in the result map image.

It can be found on the NFGIS web site at: <http://nfgis.nsdi.gov.cn>.

5. Work for the Next Step

Future work include:

1. feedback from 3 collaborative nations about the design; improve the draft design and the prototype node demo of China;
2. establish all candidate data nodes in 4 countries;
3. test the first established data nodes;
4. provide technical services for other developing countries if necessary.

The work should be based on the approval by the PCGIAP.

Task Coordinator: Jiang Jingtong
Assisted by: Zhou Xu, Liu Ruomei, Jia Yunpeng

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Annex A

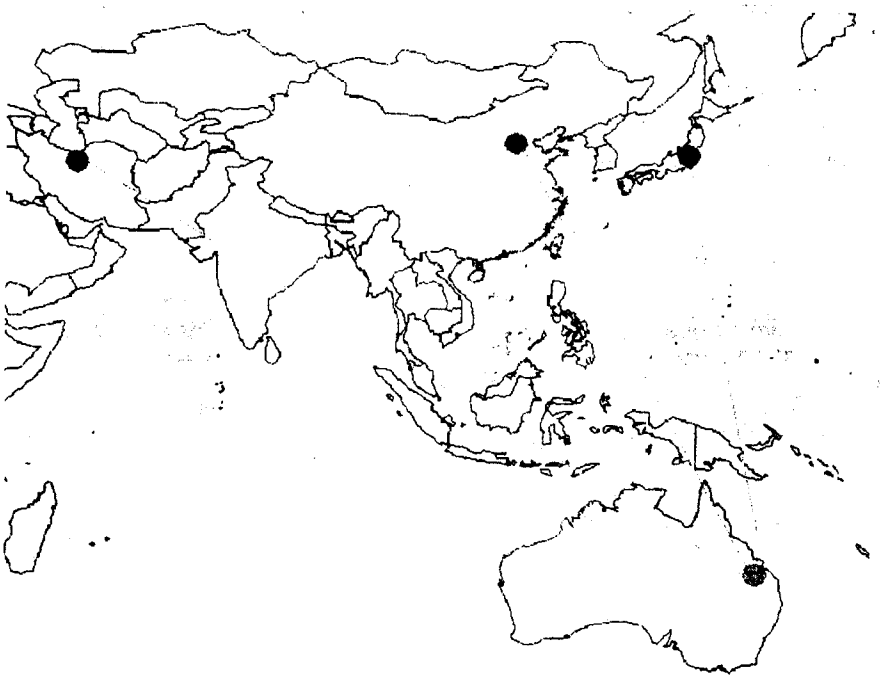
DESIGN OF THE APSDI DATA NODE

Part 1. Reference Model for the APSDI Data Node

In this part, we put the emphasis on the general principle and framework of the APSDI data node. As a precondition, first the distribution of demonstrative data nodes of APSDI Network and the schemata how the data nodes cooperate are discussed. Then the basic functions, fundamental data, metedata standard, general architecture of data node and the process of setting up a data node are dealt with. A proposed configuration of data node is also presented.

1. Distribution of Demonstrative Data Nodes of APSDI Network

APSDI Data Node is a node established to distribute, manage, and maintain fundamental data. According to the project plan, in the first stage, Australia, China, Japan, Iran will act as demonstrative data nodes. Figure 1 shows the distribution of these four demonstrative data nodes.



● **Data Node**

● **APSDI Main Node**

Fig. 1

2. Design of APSDI Data Nodes

There are two schemata for designing:

- Schema one

Establish an APSDI main node (or named Gateway) in Australia, which mirrors primary contents from other nodes periodically, and equip the main node with a Search Engine. Users only need to visit the main node to get descriptive information of each node. When it is necessary for them to browse or download the fundamental data, they can access the specified data node. (Fig. 2).

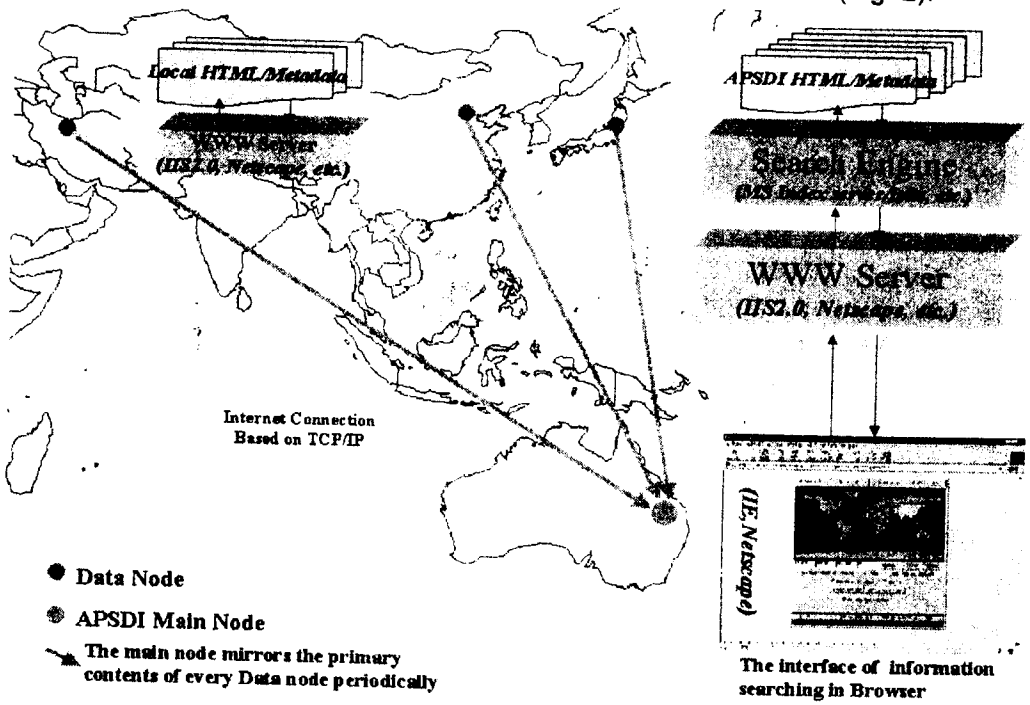


Fig. 2 Schema one

- Schema two

Equip the main node and each node of APSDI in China, Japan and Iran with Search Engine individually. Users can use the main node as the entrance or gateway of the APSDI network; they could search information at every node of APSDI through the main node, and get back the results to their browser (Fig. 3).

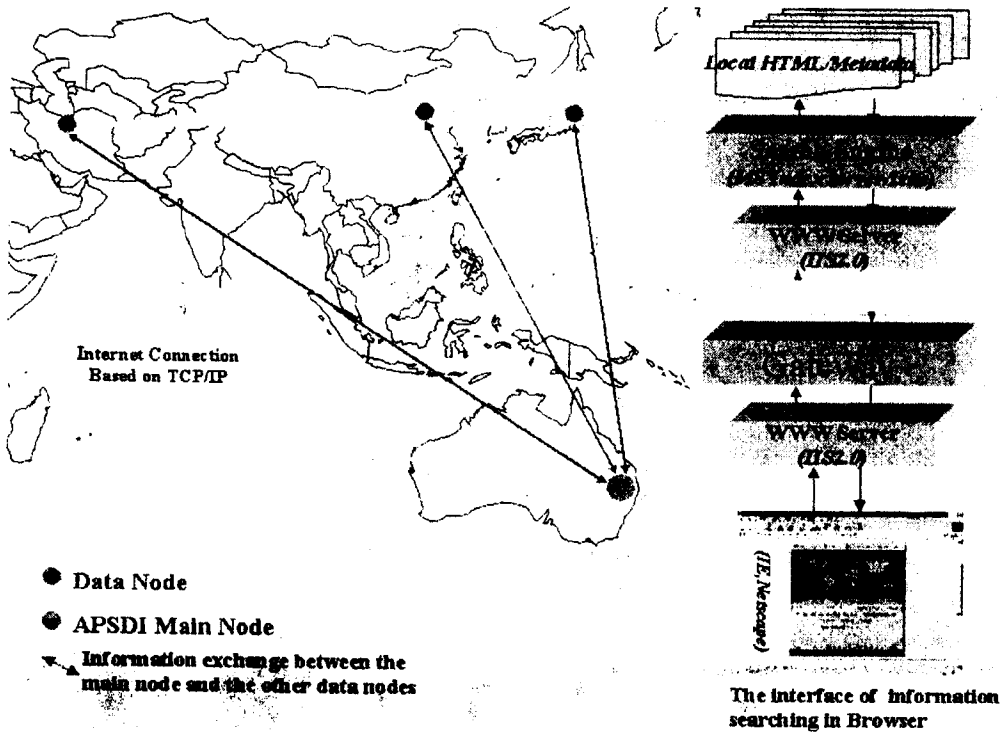


Fig. 3 Schema two

2. Basic Functions of Data Node

Actually, the more functions are available at a data node, the better this node is. But concerning the difference of technology conditions between different node, here listed is the basic ones every node should implement.

- Query information

Visitor may access the WWW station of a data node to get some information about this data node or fundamental data at this node.

- Search fundamental data

If there is large amounts of data at a data node, the data node must have the facility to make it possible to get the right data according to some search conditions from the browser.

- Display fundamental data and retrieve attributes

After the user get the information about the right fundamental data he want, he can browse the data as a map and retrieve the attributes of the specific features on the map through the web browser. So that he can have a preview and check if the data can meet his needs.

- Download fundamental data

After the user gets the data he wants, he can download it at the data node through the Internet

3. General Architecture of a Data Node

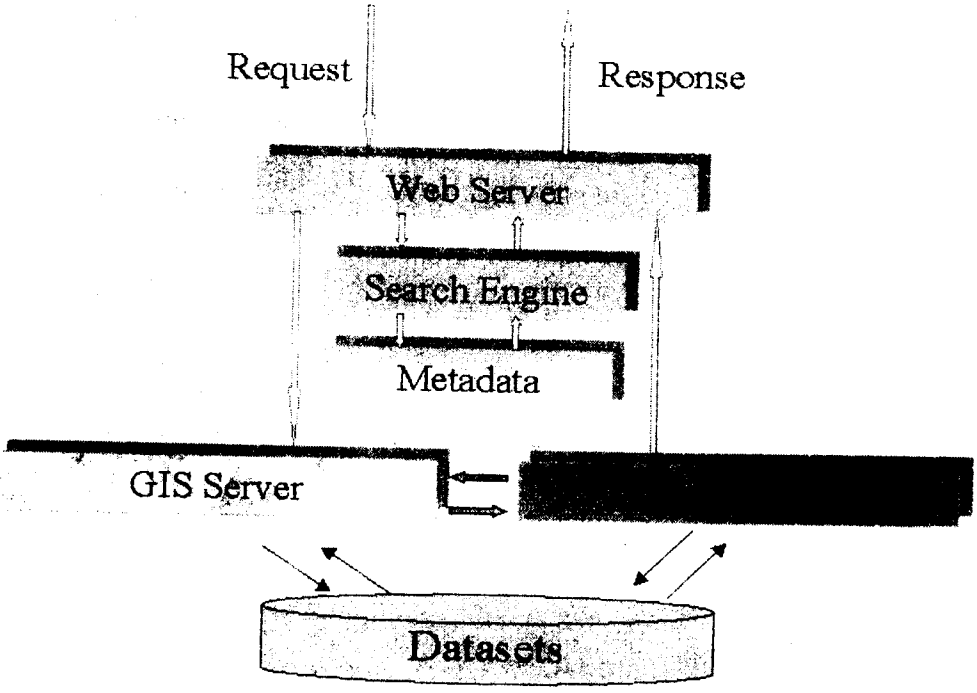


Fig. 4

In figure 4, it shows the components that compose the data node and the relationship between the components.

4. Proposed Hardware and Software Configuration for Data Node

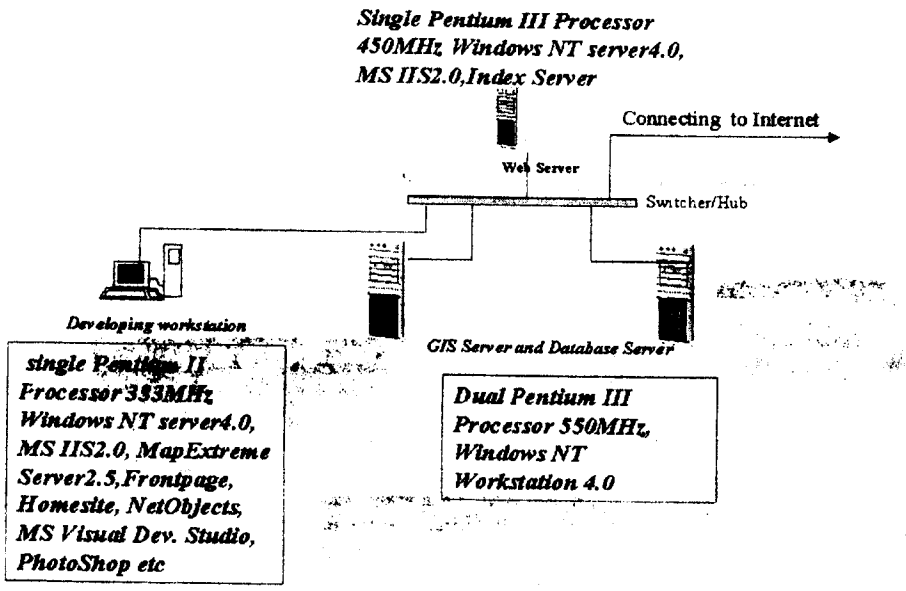


Fig. 5

5. Metadata Standard

We propose metadata standard for all APSDI data nodes should conform to the standard developed by the ISO/TC211: Geographic Information – Metadata standard (ISO 15046 – 15)

6. Proposed Contents of the Fundamental Data

Each node should make as much data as possible available. As a matter of fact, all data nodes have not the possibility or are not willing to distribute all of their data in hand because of the technology conditions and management policy. However, the basic data must be available. It is encouraged to extend the content of additional data.

- Basic data: administrative boundary
- Additional data: hydrography, residence, transportation, etc.

7. Technical Flow for Setting Up a Data Node

In figure 6, the steps for establishing a data node, and software and technology needed at each step are figured out. (Fig.6)

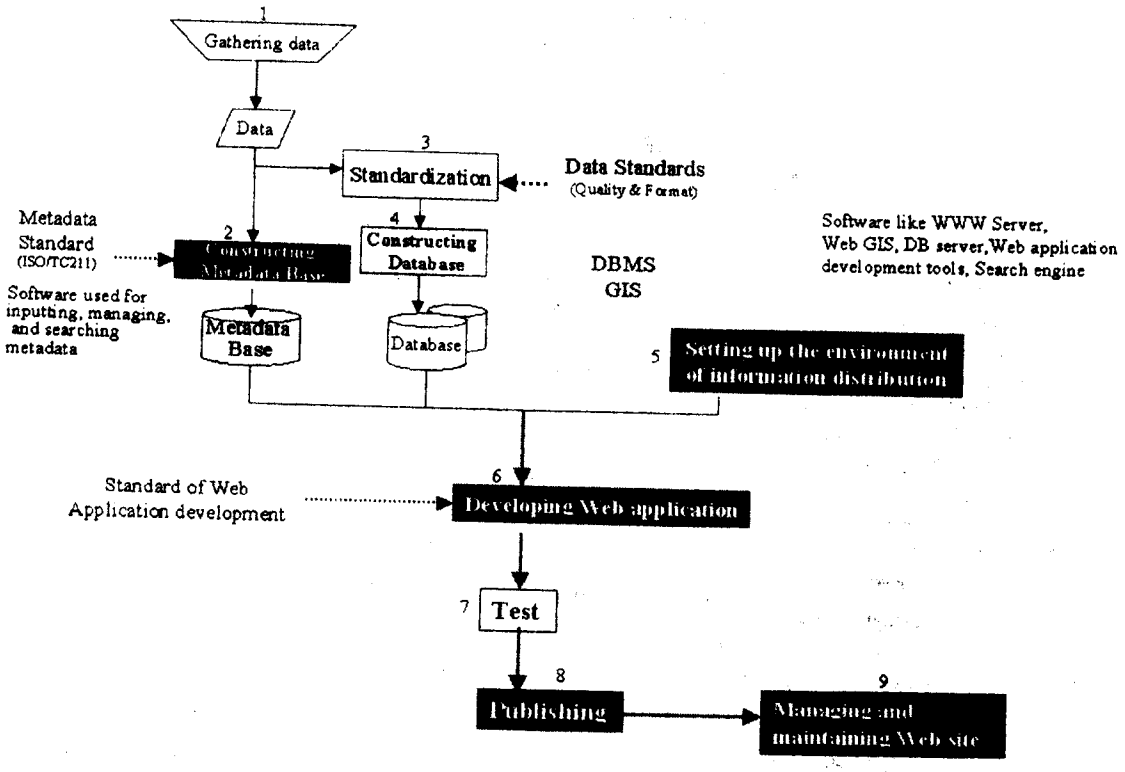


Fig.6

1. Gathering data

In this step, the data that is to be shared should be ready as a digital form stored in computer.

2. Constructing metadata base

According to the metadata standard of ISO/TC211, construct the metadata database using some necessary software tools

3. Standardization

The data must be standardized according to the relative international/national/professional standards.

4. Constructing database

Use some software tools to construct the database.

5. Setting up the environment of information distribution

The environment includes hardware and software.

6. Developing web application

In this step, the purpose is to distribute the data or information in the database by setting up a web site. There is a lot of work to do, including web pages design,

7. Testing

When the web site is set up, we should
Test the consistency between metadata and fundamental data
Test the compatibility of Web pages with different browsers
Test each function needed

8. Publishing

When the web site of the data node is tested and works well, we should publish it on the WWW net, and make it known by the other data nodes through registering on the APSDI main node.

9. Managing and maintaining web site

When the data node runs smoothly on the net, and if no more new data or contents need to be added and nothing wrong will be with the hardware devices/network, maybe nothing need to done any more. Actually, to ensure the data node working well or want it to work better, lots of management and maintenance things need to do.

Most of these technology details will be dealt with in the following part; ***Part 2. Technology Details***, here listed is just a concise version.

Part 2. Technology Detail

In this part, we will focus on the technology details in the process of setting up an APSDI data node, including metadata, functions on each server, combining access of metedata and data, testing, publishing and maintaining web site.

1. Metadata

• Metadata standard

In order to keep in line with the international standard, we propose take the metadat standard of ISO/TC211 as the metadata standard.

• Tools for metadata management

Need a series of software tools to construct the metadata base, including tools used for inputting, indexing, searching, and distributing the metadata.

• Function and interface of metadata search

Function: search the metadata base according to one or several given keywords, and return the hits as result.
Interface: http://hostname/metadataSearchCommand?key="keyword", this interface is ready for the call from main node of APSDI.

• Public interface for metadata access

At each APSDI data node, usually a series of web pages acting as a public interface for metadata access is necessary.

2. Contents at the WWW Server

- Textual information: including information of node, fundamental data, services, etc.
- News about the node.
- Users counting and analysis.
- Data download.
- Distributing the fundamental geo-data using technology of Web GIS or something like that.

3. Basic Functions and Public Interface at the Web GIS Server

• Display fundamental data

Display fundamental data as a map in the user's web browser, and provide some utilities for the user to zoom in, zoom out, pan the map, and identify the features on the map.

• Query fundamental data

The fundamental geo-data usually has some attached attributes, for example,

every administrative unit has its name, code, even population and more. So the node need present user the right data according to his conditions. That is, user can query the data by composing a condition statement using the attributes of the features.

4. Integrate Metadata Search with Data Access

If the metadata of the data includes the URL used for access the data, it's easy to integrate metadata search with data access by adding a hyperlink to the search result according to the URL. Then the user can follow the link to access the data.

5. Test

- Testing the consistency between metadata and fundamental data

  Test if the metadata has correctly described the data item by item.

- Testing the compatibility of Web pages with different browsers

  Browse the web pages using different browser to test if the pages are working well.

- Testing each function needed

  Test if the metadata search can get the right results, the map browser can display the geo-data as hoped.

6. Publish the Data Node on the World Wide Web

- How to publish the data node on the APSDI network

If schema 1: Notice the main APSDI data node, then the main data node adds a hyperlink on its web pages at the proper position.
If schema 2: Notice the main APSDI data node, then the main APSDI data node registries this new node as a member of the APSDI according to some information including host name, metadata search interface etc.

7. Maintenance

- Fundamental data maintenance

Include adding some other data to the data nodes, or updating the data out of date.

- Metadata maintenance

If the fundamental data changes, the metadata must be changed accordingly.

- Consummate and enhance functions

To make the data node perfect, maybe something more need to do.