PRODUCTIVITY COMMISSION

REVIEW OF COST RECOVERY

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

A prescribed agency within
Department of Industry, Science and Resources
www.agso.gov.au

Geoscience Australia

1. EXECUTIVE SUMMARY

As Australia's national geoscience research and information agency, the Australian Geological Survey Organisation contributes to the national geoscience knowledge base – an important national resource from which needed geoscience information can be extracted as required.

AGSO believes that its cost recovery practices and charges are consistent with best practice among government agencies.

A major issue in considering the question of cost recovery is the treatment of national interest costs in determining pricing, bearing in mind the need for consistency with competitive neutrality principles. AGSO is an information agency and has significant national interest cost elements both in the provision of pre-competitive information designed to encourage exploration investment and in the provision of information and services for the public good.

- The marginal cost of providing access is often less than the cost of recovering that cost.

- Complex, inter-operating information systems are being developed. In many cases resource based information is not a critical factor and hence cost of access needs to be low to ensure proper use.

- It is more efficient for AGSO to recover costs at the knowledge end of its activities (highest value-add/greatest perceived benefit from the client) rather than at the data end.

- High data costs encourage sectoral inefficiency through duplication of data acquisition and storage, and through the maintenance of older versions to avoid update costs.

The inappropriate application of cost recovery can adversely impact on the delivery of Government programs, for example where the Government has an on-going interest in maximising investment in resources for the benefit of the community. There is also a risk that the focus of a program will be diverted from longer-term strategic objectives to short-term imperatives that attract industry funding.

2. GENERAL STATEMENT

2.1 AGSO

The Australian Geological Survey Organisation (AGSO) is the national geological survey and is a prescribed research agency of the Commonwealth Department of Industry, Science and Resources. AGSO contributes to Government outcomes through enhancing the potential of the Australian community to obtain economic, social and environmental benefits through the application of first class geoscientific research and information. It provides independent geoscientific information to government, industry and the community to support decision-making in relation to development and management of Australia's natural resources and environment.

AGSO's outputs are directed toward four main groups:
1. Minerals exploration promotion and technical advice,
2. Petroleum exploration promotion and technical advice,
3. Marine-zone geoscience, and
4. Geohazards and geomagnetism.

Much of AGSO's research is aimed at providing a comprehensive geoscientific information infrastructure of Australia as an incentive to investment in resource exploration. The results of AGSO's research are released to industry as part of the Government's Resources Policy of producing and disseminating new geoscientific data and information and assessments of mineral and petroleum potential to encourage exploration investment. AGSO's geoscience information infrastructure also contributes to informed decision-making in resource management and environmental protection. AGSO also contributes to community safety and protection of infrastructure through the monitoring and identification of risks from geohazards, and provides geomagnetic information for air and sea navigation.

2.2 Nature of Geological Survey Work

Geological surveys are in the geoscience information business. They exist to meet the geoscience information requirements of the nation as defined or redefined from time to time by the government (Price, 1992). Unlike many other kinds of scientific information and expertise, geoscience information and expertise have both local and universal significance. They pertain to a specific place in a specific country, as

well as to the global corpus of scientific knowledge. They are part of the knowledge base concerning the nature and present state of the country (Powell, 1997).

The national geoscience knowledge base developed, maintained and enhanced by a geological survey is an important national resource from which needed geoscience information can be extracted as required. Information collected initially for one purpose can also contribute significantly to another. For example, seismic data and remote sensing data collected to provide information to encourage exploration on the North West Shelf is also being used to understand the controls on distribution of carbonate mounds and particular marine ecological systems. Similarly, integrated geological and geophysical studies in the Gilmore area of NSW designed to attract mineral exploration have contributed significantly to the understanding of land salinisation in the area with implications for land management strategies. In each case the clients for the information range from commercial companies through government bodies at Commonwealth local and State level, land holders and other researchers all with different objectives, financial interest and capacity to pay. The broader benefits that flow through to the community at large through the use of geological maps and related information to achieve superior land use decisions has been clearly shown to have net positive value to society (Bernknopf et al., 1993).

AGSO also plays an important role in providing information and advice on geological hazards such as earthquakes, landslides, and tsunamis, and on potentially dangerous changes in the Earth's magnetic field, as well as alerts on nuclear explosions. AGSO, therefore, has a role as part of the emergency management community in the Australian region and in international peacekeeping.

2.3 Role of Government Pre-competitive Information in Resource Exploration

Providing new ideas, data and knowledge to companies is a critical component in government's strategy to attract exploration interest in the mineral and petroleum industry. This activity is carried out within the framework of a global industry where countries are in competition for exploration investment. Government in a sense is a very real equity holder in exploration in that the resources (in the ground) are owned by the Crown and companies pay an economic rent through secondary taxation for the right to develop the resources once found. Without exploration, resources are not found let alone developed.

Pre-competitive information is therefore provided by government at low cost to encourage companies to consider the opportunities available and because companies cannot internalise the benefit of the cost of data acquisition unless they win ownership of a specific lease through a competitive process. Moreover, the company cannot exclusively capture the benefits of the pre-competitive data provided by government as an incentive to invest even if when they are successful in obtaining a petroleum or mineral exploration lease. This is primarily because the data is regional in nature and designed to be used for area selection only. In general, the data is not sufficiently detailed or specific to be directly applicable at the lease/tenement scale: the company will acquire more detailed data to augment the regional datasets prior to generate targets for drilling at its own cost.

Government expenditure in the provision of pre-competitive data is offset by the secondary taxation that flows from the economic rents for the right to develop the resource once discovered. For example, in 1999 approximately $1 billion was paid to all Australian governments from the oil and gas sector, most of which flows to the Commonwealth; the revenue to the Commonwealth is expected to be much higher in 2000 as a result in higher oil prices. A survey undertaken for the Minerals Council of Australia indicates that for the period 1998-99, the mining industry paid $1.55 billion in direct taxes and a further $513 million in indirect taxes to government.

2.4 Geoscience Information for the Public Good

Public safety and protection of investment from the effects of natural hazards, as well as provision of relief after natural disasters, are responsibilities acknowledged by all levels of Government in Australia. The Commonwealth recognises that the Constitutional responsibility for the protection of lives and property of Australian citizens lies predominantly with the States and Territories, but accepts that it has a broad responsibility to support the States/Territories in developing emergency management capabilities.

AGSO is one of several Commonwealth agencies that, together, deliver a range of services in national emergency management coordination and planning. There is a new emphasis on disaster-mitigation and preparedness work to complement disaster response and relief efforts. This reflects Commonwealth concern about the economic and social costs of natural disasters, as well as the need to develop and implement

disaster-mitigation strategies that might reduce those costs. Indeed, disaster-mitigation activities are gaining more prominence at all levels of government with recognition that risks are increasing as populations grow and as more development of infrastructure takes place in Australia. Collection of more precise information on the nature of disasters and their true costs is an emerging requirement for Commonwealth Government agencies in terms of, for example, provision of Commonwealth disaster relief through the Natural Disaster Relief Arrangements (NDRA).

AGSO's marine work contributes to the basic geoscience knowledge of the Australian Marine Jurisdiction to underpin effective environmental management of the oceans and coastal areas.

3. COST RECOVERY IN AGSO

Although not a designated cost-recovery agency AGSO commenced implementation of cost recovery principles in 1988, including charging for many types of information. Prior to that, information was provided to clients at the cost of reproduction.

In 1994 the Government, in its response to the Richards Review of AGSO in 1993, set AGSO an external revenue target of 30% of its 1994/95 budget appropriations by 1995/96 with AGSO retaining all revenue up to the target and revenue in excess of the target to be shared on an 85/15 basis between AGSO and the Consolidated Revenue Fund. The Government also determined that AGSO funding be based on the principles of:

- public interest programs being funded by appropriation;
- functions primarily benefiting industry to be funded by industry; and
- functions benefiting industry and the wider community to be jointly funded.

AGSO is presently largely funded from appropriation to deliver outcomes defined by government policy, and its work program with specified outputs is endorsed annually by the Parliamentary Secretary to the Minister for Industry, Science and Resources.

In addition, AGSO undertakes the following on a cost recovery basis:

- Consultancies and professional opinions;
- Joint ventures and collaborative research; and
- Commissioned research or service work.

There is no legislative basis for cost recovery of these activities. However, AGSO has an agreement with the Department of Finance and Administration under Section 31 of the *Financial Management and Accountability Act 1997* to retain all revenue from cost recovery activities, up to a specified limit each financial year. Revenue from cost recovery (both sale of information and services) is retained by AGSO and used in support of its program. This enables a wider range of outputs to be produced for a wider range of clients. AGSO has a formal pricing policy and this is being reviewed at present with an expectation that this will be completed by December 2000. AGSO regularly reviews and benchmarks the prices of its information products.

In determining prices for its products (maps, publications, data, etc.) AGSO recovers the cost of materials, reproduction, handling and postage, and marketing.

In setting the price of its geoscientific services (consultancies, commissioned research, etc.) AGSO incorporates staffing costs (days of input and classification of staff involved) and details of direct operating expenses such as travel, equipment, consultants (if appropriate), legal expenses, etc. An allowance for tax-equivalent regime and proxy rate of return is also included in determining the price, except where the research has a national interest consideration.

3.1 AGSO's program

AGSO's program comprises 4 main output classes (see above) and is funded by appropriation consistent with the public benefit nature of the program. Key features of AGSO's core program are:

- the outputs contribute directly to the Government's objectives;
- the outputs are of public interest or pre-competitive in nature, do not provide direct benefit to individuals or individual companies, and are disseminated rapidly through publication/release into the public domain; and
- most of the outputs, with some exceptions, are distributed at prices that are at or near the cost of transfer, consistent with the public interest nature of the work.

AGSO endeavours to ensure that all sectors of the community have access to AGSO products and information. AGSO's products are distributed through its own Sales Centre and accredited distribution agencies, including the Geological Survey of Western Australia and the

Australian Mineral Foundation (AMF). Data and information are available in hard copy and digital formats on a range of media, including CD-ROM.

AGSO's products are advertised in *AUSGEO News* (published 6 times per year) and on AGSO's web site (http://www.agso.gov.au). The AGSO web site contains a searchable database of new and existing products, supplemented by a flexible map interface to make searching easier. Products can be ordered through secure e-mail and the Internet and electronic transfer is available for selected products. AGSO has introduced secure on-line access to its considerable information holdings as part of its policy of providing enhanced information access, especially to benefit small to medium enterprises and the community, and is seeking to expand this.

3.1.1 Minerals exploration promotion and technical advice

AGSO's minerals program is largely undertaken in collaboration with State/NT geological surveys to provide a modern framework for mineral exploration. The cost of data acquisition and development of research products is normally funded by appropriation. The prices of information products (maps, publications, and digital datasets of geology, geophysics, geochemistry, mineral deposits etc) derived from these programs by collaborative effort with State/NT government are determined by mutual agreement but are not less than the cost of transfer. AGSO also provides national scale maps and publications to industry and researchers to provide a national framework for exploration and research. These are made available at the cost of transfer. Customised and other value-added products derived from AGSO databases are priced on a fee-for-service basis which includes the full cost of preparation (labour and materials) and transfer.

As well as encouraging exploration investment AGSO also provides geoscience information to assist informed decision-making about resource management and environmental protection. Clients for this information are predominantly resource and environmental decision-makers and managers at the Federal, State and local government level. This work is undertaken primarily in the public interest and funded by appropriation. Products are priced to maximise their use for the public interest and, consistent with the ANZLIC policy on Spatial Data management for non-commercial environmental management purposes, are provided at cost of transfer. This policy applies to standard products in AGSO formats.

3.1.2 Petroleum exploration promotion and technical advice

AGSO undertakes geoscientific surveys and research to promote and encourage uptake of exploration licences and investment in exploration of Australia's offshore petroleum resources by national and international companies. AGSO's research is aimed at reducing exploration risk by providing a comprehensive and accessible infrastructure of geoscientific data, concepts and knowledge. AGSO has an important national role in determining the distribution of possible petroleum resources (including gas hydrates) in the frontier regions of Australia's marine jurisdiction. Much of the information offshore is made available in industry-standard format through partnerships and commercial arrangements with the private sector. These arrangements include collection and/or processing under joint venture arrangements with third parties. Prices for these products reflect market norms and the particular commercial arrangements. Prices of products under these arrangements are set with consideration of the commercial interests of the joint venture party and the promotional aims of government.

AGSO cooperates with the States and Territories to identify the prospectivity of onshore basins. The cost of data acquisition and development of research products is normally funded by appropriation. Prices of products are set to maximise the uptake and effective use of the information in the interest of maximising exploration investment. The prices of maps, publications, and datasets produced by collaborative effort with State/NT government are determined by mutual agreement but are not less than the cost of transfer. AGSO also provides national scale maps and publications to industry and researchers to provide a national framework for exploration and research. These are made available at the cost of transfer. Customised and other valued-added products derived from AGSO databases are priced to include the full cost of extraction of information, product preparation (labour and materials) and transfer.

As with minerals, AGSO also provides petroleum geoscience information to resource and environmental decision-makers in order to assist sound resource management and environmental protection. (See 3.1.1)

3.1.3 Marine zone geoscience

AGSO's marine work is designed to contribute to the basic geoscience knowledge of the Australian Marine Jurisdiction to underpin effective environmental management of the oceans and coastal areas. Clients for

this information are government agencies concerned with definition of Australia's marine jurisdiction, regional marine planning, establishment of marine protected areas and management of the coastal zone. The cost of data acquisition and development of research products is normally funded by appropriation. Commissioned studies are funded by the client. Where there is a national interest consideration, the research is charged at marginal cost with no overhead or proxy for rate of return. In the case of commercial contracts, all costs are recovered including all overheads and an allowance for tax-equivalent regime and proxy for rate of return.

3.1.4 Geohazards and geomagnetism

AGSO's research programs in this output group are aimed at contributing to safer communities and transportation as a result of knowledge of, and access to, information on geohazards and geomagnetism and their respective impact on Australia's infrastructure and navigational safety. AGSO also contributes geoscientific expertise to assist in the mitigation of international disasters and to meet other foreign and trade policy objectives. The clients for AGSO's geohazard and geomagnetism research services are predominantly government emergency management agencies, State and local governments, navigation management agencies, and the community. AGSO's services are provided in the interest of community safety and are either provided free under AGSO's public information program or at minimal cost.

3.2 Co-funded or collaborative research with both a public and a private benefit

In general, these projects enhance or extend AGSO's core program and contribute to or enhance the national geoscience knowledge base. Knowledge resulting from these projects is placed in the public domain although there may be a lag in publication because of confidentiality periods agreed with the private sector client. Most of AGSO's involvement with the Cooperative Research Centres program, and sponsored research through the Australian Minerals Industry Research Association (AMIRA), the Australian Petroleum Industry Research Association (APIRA), and other multi-client arrangements are of this nature. Project costs are shared in proportion to balance of private benefit and public interest, and any confidentially period is defined accordingly.

3.3 Commissioned research

This category includes all commissioned or fully funded work from either the public or private sector. AGSO's customers are typically petroleum or mineral exploration companies, other government bodies and cooperative research centres. Research in this category is generally only undertaken on a non-competitive (generally invited) basis where AGSO has unique capacity or skills, and the work complements AGSO's strategic program and /or there is a benefit to AGSO through enhanced knowledge or technology transfer. For example, because of its expertise in geohazards, AGSO has been called upon to provide independent evaluation of the risk posed by geological hazards to strategic facilities in the public and private domain. It has also been commissioned by AusAID to undertake development assistance work in the field of geological hazard assessment and mitigation. Such projects however must satisfy AGSO guidelines for acceptance including assessment of appropriateness and risk.

Charges for commissioned research and service work are set by reference to AGSO's pricing policy and vary according to the nature of activity undertaken. The level of AGSO charges is determined by our prevailing cost structure and the application of pricing rules. Competitive neutrality principles apply. AGSO's current cost recovery methodology is based on "Guidelines for Costing Government Activities" issued by the former Department of Finance in 1991.

Research with a national interest consideration is charged at marginal cost with no overhead or proxy for rate of return. In the case of fully commercial contracts all costs are recovered, including all overheads and an allowance for tax-equivalent regime and proxy rate of return. Cost elements usually include direct labour, and reimburseable expenses such as travel, material, contractors etc. Outputs prepared specifically under commissioned research to meet the needs of the private sector are priced to reflect the private benefit gained and include costs of preparation and transfer unless covered under separate cooperative agreements. Where AGSO's research is funded by other Government agencies the products are made available under agreed arrangements.

AGSO's cost recovery charges on research and service work both ensure that the costs of work for private benefit are fully recovered and act as a rationing device. Such work is at the discretion of the client: the client can assess the relative worth of AGSO's service before deciding whether to proceed. The charges for large projects are prohibitive for small

business and smaller companies generally prefer to participate in collaborative (multi-client) research through CRC's or AMIRA etc where both the cost and the benefits of the research are shared.

4. ISSUES RELATING TO THE IMPACT OF COST RECOVERY ON GOVERNMENT PROGRAMS

In AGSO's experience the inappropriate application of cost recovery can adversely impact on the delivery of Government programs in several important ways.

4.1 Impact of cost-recovery targets on program

4.1.1 Government priorities and return on investment

The appropriateness of cost recovery needs to be considered in the context of the outcomes sought by Government and how the community benefits from the government outlays. In the case of AGSO the Australian community gains economic, social and environmental benefits through the application of first class, independent geoscientific research and information. The bulk of AGSO's program is the provision of pre-competitive geoscientific information to identify and promote minerals and petroleum exploration by the private sector. AGSO undertakes geoscientific surveys and research to promote and encourage uptake of exploration licences and investment in exploration of Australia's minerals and petroleum resources leading to new discoveries by the private sector. The key government objective is to maximise the uptake of licences and the level of expenditure on exploration since this provides the best means of enhancing discovery of new resources and the realisation of benefits stemming from public ownership of the resource in the ground.

The application of cost recovery to such programs is inappropriate, as the government is an equity holder in the resources with responsibility for the custodianship and management of the resources in the interests of the community. The Government, therefore, has a genuine, on-going interest in maximising investment in the resource. The benefits are returned to the community through the discovery and development of new resources. These benefits include the direct financial benefits:

- resource rent tax (petroleum) and royalties (minerals),
- company tax,
- other secondary taxes, and
- income tax on employees,

as well as the indirect benefits such as:

- regional development, especially in remote areas
- employment, and
- increased infrastructure to support rural and regional Australia.

Experience both in Australia and overseas indicates that every $1 spent by government in provision of modern high quality geoscientific data can generate exploration expenditure by the private sector of $4-$10 and lead (over a period of 10 years or more) to the discovery of new resources with an in-ground value of $100-150 (Lambert, 1999; AGSO unpublished information). Clearly, these benefits vastly outweigh any effort to recover part of the $1 spent by government in providing pre-competitive information to attract the investment.

Case History: Southern Margins Frontier Project

The Southern Margins Frontier (SMF) project was initiated in 1998 under the auspices of the Frontiers of Petroleum program to encourage exploration in Australia's Great Australian Bight. This is a prime frontier area that may contain significant liquid hydrocarbon resources. The SMF project set out to provide a basic framework study of the area, while at the same time addressing critical exploration issues, eg the presence of a working petroleum system in the deep water.

The project was undertaken at a cost of $5M over three years.

Project findings and products were promoted and as a result, three new exploration permits in the Great Australian Bight have recently been awarded to a consortium of three companies that made extensive use of products produced by the SMF. The consortium's work program commitment includes regional seismic studies and two exploration wells to a total value of up to $90M over six years.

Cost recovery from the sale of products from this project is inconsequential when compared to the investment in exploration that has been generated.

Case History: Broken Hill Exploration Initiative

The Broken Hill Exploration Initiative (BHEI) is a Government initiative involving both Federal and State Governments that commenced in 1994. The objective was to secure the long term economic prosperity of Broken Hill and Port Pirie, both of which faced an uncertain future following industry predictions that the Broken Hill ore body would be exhausted within 10-12 years.

Following commencement of the project, the pace of exploration activity in the area has amplified enormously so much so that the region is now regarded as one of the hot spots for mineral exploration in Australia.

- Companies that had had ongoing exploration in the Broken Hill region have shown renewed commitment to the province, commonly with new exploration strategies based on new data and ideas generated by the BHEI.
- Companies that had previously ceased exploration in the area and left have returned.
- New companies were induced to explore in the region, including a number of smaller companies that have levered involvement by majors. Several international exploration companies (such as Inco Ltd and Billiton) have commenced exploration in the region in joint venture with smaller companies.

Exploration expenditure has more than doubled and has been sustained despite a major decline in exploration activity across the country.

Expenditure on the BHEI by the three governments has totalled approximately $15-16m with the Commonwealth contribution being about $6m. This is considered well justified in terms of its impact both on the level and focus of exploration. It is anticipated that the enhanced exploration will lead to new discoveries that will provide a long-term economic future for Broken Hill and the district.

4.1.2 Potential distortion of program from strategic to tactical

Undue focus on the pursuit of cost recovery (through seeking commercial service contracts) as an objective in its own right has the potential to subvert and distort longer-term strategic Government objectives in favour

of short-term imperatives likely to attract funding from industry. This is an important issue for organisations such as AGSO where the key outcomes are of a long-term strategic nature in the national interest requiring the long-term and full-time commitment of the skilled staff and capability to deliver the agreed outputs. Any requirement to meet an arbitrary cost-recovery target (e.g. 30% as required for a number of scientific research agencies) has the potential for a loss of focus from efficient delivery of agreed key outcomes to seeking alternative sources of funding. Evidence from other agencies both in Australia and overseas indicates that for cost recovery levels above 20% the program is driven by short-term funding imperatives and opportunities rather than long-term strategic objectives (i.e. the program priorities become increasingly dominated by money rather than strategic science), and there may be a disjunct or even a conflict of interest between core program and funding opportunities. The present environment where funding is based on agreed outputs to meet defined government outcomes provides a more effective means for setting and resourcing priorities.

4.2 Impact of cost recovery applied to government information

4.2.1 Potential compromise of program objectives through inappropriate pricing of Government data/information

A major component of AGSO's program is the provision of pre-competitive geoscientific information to identify and highlight Australia's prospectivity for minerals and petroleum, i.e. Australia's undiscovered resource potential. AGSO undertakes geoscientific surveys and research to promote and encourage uptake of exploration licences and investment in exploration by both Australian and international companies to maximise the return from the nation's natural resources. Attracting investment capital is a competitive process. The mineral and petroleum industries are increasingly global and seek the best return on exploration expenditure. Nations compete to attract a diminishing share of investment capital for resource exploration and development.

A key element is the comprehensiveness and quality of information available to assess undiscovered potential and reduce the risk to explorers. The Government funds acquisition and development of research products in order to attract investors. The prices charged for products derived from these programs is a sensitive issue as prices should be set to maximise the uptake and effective use of the information in the interest of maximising the exploration investment. High prices act as a disincentive to uptake and investment, and create a conflict with program

objectives. Benchmarking of AGSO products against its international competitors indicates that under present cost recovery policies the price of Commonwealth spatial and other related data is becoming uncompetitive and a disincentive to uptake. Logically, prices need to be set at levels which maximise the uptake of the information rather than maximising the level of cost recovery.

Case History: AGSO data sale
The recent "stocktake sale" held by AGSO in June 2000 to clear product stocks highlighted the importance of price in influencing uptake levels. The success of the sale itself (some 18,000 items were purchased) suggested that many clients are interested in the data but either cannot afford it (in the case of smaller enterprises) or are not willing to pay the prices asked. For example, sales of Lachlan Fold Belt maps had been limited but experienced significant growth during the clearance when the prices was markedly reduced.

4.2.2 Impact on business and equity of access: potential for discrimination against SMEs

Cost recovery when applied to sale of information used by explorers and investors can disadvantage small-medium enterprises (SMEs), i.e. junior companies, consultants and prospectors with limited budgets. The SME sector has played a major role in the discovery of resources in Australia in the past: in the case of minerals, junior companies have discovered approximately half of all base metal deposits and 2/3 of gold deposits in Australia in the past 40 years (AGSO unpublished data). Adoption of a pricing policy based on capacity to pay would create significant additional overheads.

A formal 5 year evaluation of AGSO's onshore minerals and petroleum programs in 1998 involving both stakeholders (then Department of Primary Industries and Energy and State counterparts) and industry criticised AGSO's prices for data as being too high and recommended "AGSO reconsider its pricing policy for products in the light of evidence that the price charged for AGSO products may be acting contrary to the desired outcomes of the Program and the impact on the ability of smaller explorers and consultants to access government data and information". This evaluation included a questionnaire of some 72 external clients and stakeholders as well as internal submissions.

An interdepartmental committee (IDC) is currently reviewing the access to and price of Commonwealth spatial data with the view to developing a whole-of-government approach. The IDC will make recommendations that take account of the increased use of (digital) spatial data for decision-making at every level of government, changes in technology, the requirements of the knowledge economy, and the Government's objectives and targets for placing government information on-line (DOCITA, 2000).

In the case of the fundamental geoscientific information provided by AGSO the primary objective of Government in providing information to encourage investment is to maximise the uptake and use of the information by all sectors, consultants, junior companies, and the major companies. At the same time much of the fundamental geological information has broader applications by government agencies (especially land management agencies and local government), industry groups, community groups (e.g. land management groups), other researchers in government (e.g. CSIRO) and universities, and the general community. Many of these have little or no capacity to pay for basic information. Again, logic dictates that the price of basic geoscientific information and other services should not be an impediment to their use in all sectors of the market and in the community. For this reason, most geological surveys internationally have in the past and continue to set the price of basic geoscientific information at or very close to the cost of transfer, i.e. the cost of reproduction and handling. The rapid move to place data on-line through the use of web-based map servers etc is not only greatly increasing the availability of spatial data but lowering the costs of transfer of information and some jurisdictions now provide digital data on-line at no cost (i.e. free down-loads). This approach is setting new benchmarks for data delivery and further renders cost recovery applied to basic geoscientific information both irrelevant and a disincentive to use.

Case History. Freely available data on-line

A number of organisations offer geoscientific data online either free or at minimal cost. For example:

- In order to encourage mineral exploration, the Northern Territory Geological Survey (NTGS) provides free geophysical data online - http://www.dme.nt.gov.au/ntgs/

- The Ministry of Mines and Energy, British Columbia, Canada provides geoscientific maps online at no charge - http://www.em.gov.bc.ca/Mining/Geolsurv/MapPlace/default.htm

- The Geological Survey of Western Australia (GSWA) provides online digital geoscientific data at nominal cost aimed at recouping the cost of extracting the data from its databases and the cost of the medium on which it is provided - http://www.dme.wa.gov.au/geology/catalogues.html#datasets

4.2.3 Information, knowledge economy and sector efficiency

Science, engineering and technology advances are drivers for the knowledge economy and integral to innovation (Batterham, 2000). Information is a critical part of the knowledge economy. Resource and environmental data, including basic geoscientific and other spatial information, are part of the knowledge infrastructure that underpins both government and private sector decision-making in respect of land use management, especially the development of natural resources. Geological risk and infrastructure data are key inputs to decision-making processes about disaster mitigation and emergency management.

The application of cost recovery to the provision of basic information tends to work against the dissemination and ready access to information that is fundamental to the knowledge economy. Two factors are involved. Firstly, the cost of transfer is very low for digital data in general and for Internet delivery in particular. Hence the cost of transfer is reduced by use of modern technologies as Government agencies are able to largely avoid the significant “sunk cost” incurred by (paper) publication and the additional costs of storage and handling. Secondly, for the knowledge economy the "value" is in knowledge, not data and

base-line information. Hence, in order to leverage the greatest value-add from the broadest range of sectors, reduced cost-recovery for data and information is desirable. Sectoral efficiency is enhanced when there is one current version of any dataset, maintained by the custodian and used as required by clients, rather than copied and managed in duplicate by the client. High data costs encourage the latter rather than the former. The impact of this can be seen at various levels. For example, a whole-of-government access approach rather than one based on cost recovery at the individual agency level would generate efficiencies (indirect savings) through avoidance of the overheads imposed through data licensing agreements and inter-government charging as well as direct savings on multiple purchases by different government agencies of commonly used datasets from third parties.

New interoperable/multi-disciplinary systems and peer-to-peer services are being developed in the new economy where data and information are transferred automatically between different IT systems. The cost of building transaction/payment systems on top of these advanced applications may outweigh the additional value of data supplied. Commonly, the marginal cost of making data available online is so low that it is often not worth putting data on-line if significant additional costs are incurred in implementing a user pays cost recovery system. Since cost recovery would still apply to "knowledge services" when provided for exclusive benefit it is more efficient for AGSO to recover cost at the knowledge end of its activities (highest value-add/greatest perceived benefit from the client) rather than at the data end.

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