THE BIODIVERSITY EMPORIUM:

MARKETING BIODIVERSITY INFORMATION IN WA

A PROPOSAL

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Executive Summary

Introduction

During a tour of the WA Herbarium late last year, our Minister, Mr Peter Foss, voiced a desire to see the Science and Information Division embark on a venture that would place it centre-stage in the context of presenting and marketing information on biodiversity. He was particular anxious that this venture be international in scope and that it should employ leading-edge technology. In response to this lead we now propose the establishment of a **Biodiversity Emporium.**

Whilst we conceive that such an enterprise will centre around the WA Herbarium which has wide experience and acknowledged expertise in this arena, it will necessarily involve collaboration with the a number of WA agencies responsible for biodiversity inventory and research.

Amongst our objectives are to secure a self-sustaining resource base for biodiversity research in WA, to create a focus for the coordinated management of biodiversity research amongst the collaborating agencies, and to develop and market an innovative range of multimedia and printed products.

We are confident that the **Biodiversity Emporium** has the potential to become an international centre of excellence for innovative, technologically-based management and utilisation of biodiversity information.

Products

A wide range of products is envisaged including: Electronic Keys on CD, WA Biota Image Bank, Electronic Books on CD, Biodiversity Data Sales, Hardcopy Books, World Wide Web Site, Eco-tourism Information Modules, Computer Software.

Electronic Keys on CD deliverable within the short term (12 months) include: *Flowering Plant Families of the World, WA Genera, WA Rare & Endangered Plants, WA Flora Database, Grass Genera of the World.*

Electronic Books on CD include *Flora of the Perth Region, Flora of the Kimberley Region* and possibly *Flora of Australia.* New works envisaged which would generate international recognition and sales include accounts of the flora and fauna of other regions and countries; texts dealing with popular topics such as *Cacti, Orchids, Carnivorous Plants, Butterflies, Mammals,* as well as *Electronic Bush Books.* With the adoption of appropriate technology, such products can be multilingual where this is a requirement. Data used to assemble such CDs will be used to generate corresponding **Hard-copy Books.**

WA Biota Image Bank will bring together material drawn from outstanding private and public image collections (slides, technical illustrations, video, art-works, etc.) in a single, professionally managed collection. Its primary purpose will be to support the work of the Biodiversity Emporium, but it is envisaged that images would be marketed on a commercial basis.

Biodiversity Data Sales will market access to corporate descriptive and spatial data on the state's biota held by the participating agencies.

The **World Wide Web Site** will provide an advertising platform for the work of the Biodiversity Emporium. Additionally, it will provide a repository for data-sets in the public domain and for those which implement secure access on a user-pays basis.

Eco-tourism Information Modules include multilingual reserve-based guides (books & CDs) for use by tour leaders and for purchase by visitors. And descriptive data and images will be

managed in such a way as to facilitate their migration to other contexts in which they are currently handled manually, eg CALM's *Virtual Tours*.

Computer Software developed at the WA Herbarium and used by CALM staff in-house is already of considerable interest elsewhere in Australia. We envisage that future development of such products will render them widely marketable to agencies who handle descriptive and spatial biological data. Other opportunities include the creation of educational environmental software including games and screen-savers.

Outcomes

Projected outcomes of this venture include: the establishment of a Business for the publication of a wide range of electronic and hard-copy products; a secure funding base augmenting CRF funding to the participating agencies; the amalgamation of natural history units from relevant Government-based agencies; new employment opportunities for WA graduates; administrative rationalisation of WA natural history collections and associated data bases; increased cooperation and synergy between agencies concerned with inventory and description of the WA biota.

Business Model

We have identified the need for three major units:

A **Management Unit**, responsible for the administration of a Biodiversity Endowment Trust which would manage its funds in order to support biodiversity-related research in WA, and for fundraising, project management, strategic direction setting, facilitation and advocacy.

A **Business Unit** charged with the responsibility of developing and marketing a range of multimedia and printed products based on authoritative scientific knowledge about the WA, national and world biota, employing leading edge technology.

'Nature Base' is conceived, in effect, as a collective comprising those agencies with managerial responsibility for WA biological collections (botanical, mycological, zoological, entomological, etc.). Thus 'Nature Base' would be the custodian manager of WA biodiversity data (spatial, nomenclatural, descriptive and bibliographic) and would provide the inventory and taxonomic research underpinning our understanding of WA biodiversity.

The role of 'Nature Base' in the current context is the assembly and completion of the data sets required in mission- and business-critical areas. Funding would be from CRF, the Biodiversity Endowment Trust (see above) and via direct purchase of data by the Business Unit.

It is envisaged that 'Nature Base' will comprise a number of agencies, namely WA Herbarium, WA Wildlife Centre, WA Museum, KPBG, CSIRO WA, AgWA and WA Zoo. We envisage two scenarios by which the necessary collaboration could be facilitated. In one, the above agencies remain independent, functioning together as a consortium. In the other, a single (new) CALM agency would bring together all relevant players.

Funding Implications

We would stress that the Biodiversity Emporium is very much in its conceptual stage at present.

Clearly, substantial funding would be required to initiate this project and sustain it through to break-even point. To complete, produce and market the Electronic Keys and Books on CDs identified above as deliverable within a 12-month period a funding base of some $740,000 would be required. The single costed example of a medium term deliverable would require some $210,000 over 24 months.

Whilst the Management Unit and Business Unit will inevitably attract personnel from the current complement of staff at the WA Herbarium (and from other participating agencies), they will inevitably require the recruitment of staff with project management, business financial, and marketing skills as well as technical and secretarial assistants.

Introduction

Our mission is to create an infrastructure for marketing biodiversity information products based on sound authoritative up to date scientific information and using leading edge technology, in order to underpin ongoing biodiversity research in the state.

CALM's WA Herbarium is well-placed to provide the focus around which the new infrastructure is created. The WA Herbarium is:

- a major author of descriptive information on WA plants through Floras and interactive keys
- the authority for the recognition and documentation of plant names in the state
- the custodian of WA's herbarium specimen collection, botanical library & associated databases
- a focus for taxonomic software development in Australia
- a centre for collaborative research in these areas with other agencies such as the WA Museum, Wildlife Research Centre and Kings Park and Botanic Garden.

New technologies can provide the state with methods for coordinating the scientific expertise at like agencies to create innovative and authoritative information products concerning the state's biota. Once the model is established, the business can then apply similar methods to capture and market biodiversity information to a much larger audience.

Objectives

In order to achieve the project aim, we have discerned six main objectives. They are to:

- Secure a self-sustaining resource base for biodiversity research in WA
- Create a focus for coordinated management of biodiversity research amongst agencies in WA
- Develop and market a range of multimedia and printed products based on authoritative scientific knowledge about the WA biota
- Create employment opportunities for WA graduates in taxonomy, biology and information technology
- Implement a maintainable system for managing and providing access to biodiversity (specimen, nomenclatural, spatial and descriptive) information
- Become an international centre of excellence for innovative, technologically-based management and utilisation of biodiversity information.

Products

1. Electronic Keys on CD-ROM

These interactive applications provide identification and information retrieval using an internationally adopted system pioneered in Australia.

Through existing projects we have a number of products that can be delivered in the short term, all of which are botanical in scope. Given WA's status as a world centre of plant biodiversity, and that one of the projects in particular has worldwide significance, we consider this bias to be appropriate in order to achieve short term outcomes. However, to give an idea of the general applicability of this approach we have also included products deliverable in the medium and long term across a much greater range of the biota.

Deliverable short term

Across all projects these resources are needed for an outcome in a 12 month timeframe:

application + CD design	1.0 FTE
image processing and management	1.0 FTE
map generation	1.0 FTE
Flowering Plant Families of the World (12 months to market)	
data validation	1.0 FTE
image acquisition	1.0 FTE
WAGENERA (12 months)	
data completion	2.0 FTE
application development	0.5 FTE
RED - Rare and Endangered Flora Database (6 months)	
data validation and spatial data capture (from KA)	0.5 FTE
image acquisition	0.5 FTE
application development	0.5 FTE
WA Flora Database (DESCAT) - (12 months)	
additional data capture	1.0 FTE
image acquisition	0.5 FTE
application development	0.5 FTE
Grass Genera of the World (12 months)	
image acquisition	0.5 FTE
application development	0.5 FTE
To achieve the production of all these products will require:	
12 FTE @ $30K	$ 360,000
5 x CD production & packaging	$ 50,000
Marketing	$ 30,000
45% on-costs	$ 200,000
TOTAL estimated costs	**$ 640,000**

Deliverable medium term

Macro Fungi of Southern Australia (2 year timeframe)

data capture/validation (additional to Bougher/Syme)	1.0 FTE
spatial data capture (including geocoding)	1.0 FTE
image acquisition (scanning Fuhrer + Syme)	1.0 FTE
application development	0.5 FTE
production and marketing	0.5 FTE
4 FTE @ $30K =	$ 120,000
CD production & packaging	$ 10,000
Marketing	$ 10,000
45% on-costs	$ 70,000
TOTAL estimated costs	**$ 210,000**

[if CDs sold @ $50 each then requires that 4000 copies sold]

- Marine organisms, eg corals, fish, sea-grasses) -- collaborate with Chris Simpson
- Vertebrate Animals of WA/Australia (bats, marsupials, reptiles, birds)
- Insects of WA/Australia (butterflies, jewel beetles)
- *Phytophthora* species of the world
- Soils of WA/Australia – in collaboration with Richard Harper
- Economic plants - food (including Aboriginal), medicinal, crop, ethnic

Deliverable long term

A number of possible commercial products have been identified.

2. Electronic books on CD-ROM

Some multilingual - requires translation costs. Perhaps with ISYS search tool packaged on each CD. Suggested projects below require classification into short, medium and long term.

Some existing texts which could be reworked into the new format include:

- Flora of Perth Region –(text rekeyed and images scanned + hypertext)
- Flora of Kimberley Region -- (images scanned + hypertext)
- Flora of Australia – (scanned + hypertext)

Some new works, both scientific and popular which would generate international recognition and sales:

- Flora of New Guinea --collaboration with B. Conn, NSW (multilingual)
- Cactus/Orchid/Bromeliad/Carnivorous plants of the world (multilingual)
- Electronic Bush Books - Bush CDs (multilingual)
    - 100 Flowers of (regional) WA (images + text) Eg.:

100 Flowers of Stirling Range:

data capture/validation	0.3 FTE
spatial data capture (where can you see it!)	0.2 FTE
image acquisition	0.2 FTE
application development	0.4 FTE
production and marketing	0.4 FTE
1.5 FTE @ $30K	$ 45,000
image scanning (PhotoCD)	$ 250
CD production & packaging	$ 10,000
Marketing	$ 10,000
45% on-costs	$ 35,000
TOTAL estimated costs	**$ 100,000**

[if CDs sold $20 each -> 5000 copies sold]

3. Hardcopy books

- Floras
- Bush books
- Census

4. Eco-tourism information modules

- Databased descriptive data can be multilingual
- Data easily migrated to WWW sites and other platforms, eg. for use by Virtual tours, eg *WA Naturally* (currently manually entered)
- Reserve-based guides for use by tour leaders (books, CDs)
- Reserve-based guides for purchase by visitors (books, CDs)

5. WA Biota Image Database

- Run as a professional image bank (cf. ANBG image collection)

6. Biodiversity data sales

- Charging for access to corporate data on the state's biota

7. World Wide Web site

- To function primarily as an advertising platform in the short term:
  - for products
  - to attract collaborators
  - advocate methodology
- Repository for datasets in public domain
- Repository for DELTA Newsletter
- Could host DELTA-L
- Repository for product datasets once user registration or user-pays per hit can be implemented.

8. Computer software

- Descriptive database management tools
- Enhanced user interfaces, eg to INTKEY
- SEDIT/HERBIE taxonomic software
- Educational environmental software games eg. Sim-Earth
- Computer Screen Savers + mouse mat.

Outcomes

Business

- Establishment of a 'Nature Base' Business Unit
- Break-even point within 5 years of commencement
- Publication of a wide range of electronic books, interactive identification tools and information retrieval applications on CD ROM, and Internet presentations, as well as traditional printed materials which present accurate, well-researched and up-to-date information concerning the WA, Australian and international biota.

Scientific

- Secure funding-base for taxonomic research to augment CRF
- On-stream within 5 years of commencement
- Presentation of descriptive, biological and horticultural data via media hitherto little explored by taxonomists.
- Source of novel projects for biology students
- Promulgation of DELTA methodology
- Ongoing development of DELTA standard

Political

- Amalgamation of natural history units within a number of disparate WA Government-based agencies, namely WA Herbarium, elements of WA Museum, Kings Park & Botanic Garden, Agriculture WA, CSIRO (WA)
- Creation of a new and dynamic WA-based industry
- Employment for opportunities for WA graduates in biology, information technology, marketing

Administrative/Managerial

- Rationalisation of the administration and management of collection & nomenclatural databasing, scientific research and advisory services concerned with the inventory and description of the WA biota
- Increased cooperation and synergy between currently isolated agencies

SWOT Analysis

Strengths

- We (the authors) have a unique combination of skills
- We all have professional (tertiary) qualifications in the biological sciences, one to PhD level. Two of us also have professional tertiary qualifications in computing science, and management respectively
- Between us we have a total of some 60 years experience working as professionals in the field of plant taxonomy at herbaria in Sydney, Perth, Paris and London.
- Each of us is well-published in the field of plant taxonomy
- We are all nationally and internationally recognised in our field, for example two (possible all three) of us have been ABLO, and thus have developed a wide network of professional contacts around the world
- Two of us have extensive editorial experience of a number of professional *journals (Nuytsia, Kingia, Australian Systematic Botany, DELTA News)*
- Each of us has considerable experience managing institutional computerised database systems. We have a record of innovation and design quality.
- In the field of descriptive, specimen and nomenclatural taxonomic databasing we have an national and international profile through our work with HISPID, TDWG, IOPI; our editorship of DELTA News; our participation at Science Conferences in Hobart, Melbourne, Perth, Xalapa (Mexico); and our organisation of a national forum on descriptive taxonomic databasing in conjunction with the ANZAAS Conference held in Perth. Currently one member is the national convenor of the Australian Herbarium Information Systems Committee and another is on the council of Australian Systematic Botany Society.
- Our vision embraces considerable flexibility of concept and platform, and the adoption of an open systems approach rather than misplaced loyalty to a single, proprietary system or focus on a single product (eg interactive key) or language (ie English)

Weaknesses

- We lack marketing skills
- We lack business financial skills

Opportunities

- Due to our institution's commitment to date with implementing Information Systems, and in particular the application of DELTA methodologies in a corporate manner, we are among a handful of organisations world-wide with the skills and understanding required to establish the proposed system
- There are already a number of important products nearing completion, which could be brought to market in the short term
- Our group has a strong ongoing working relationship with the main DELTA software development group and envisage continuing to contribute to software features, design and implementation

- Our existing collaborative projects in this arena with other departments and agencies would be more readily leveraged if a rearrangement of these agencies were to occur

Threats

Competing softwares

- We are not wedded to a single system but will use software appropriate to the task in hand and the clients wishes
- LUCID -- part of our own toolbox, but useful for identification only in which it is decidedly inferior to INTKEY or PANDORA
- PANDORA --Flora Europea; difficult to use; DOS-based; small, 2-man outfit
- VIRIDANS -- as yet a crude electronic book; used for a Flora of Victoria CD
- Internet -- eg Tree of Life, DELTA site, etc.
- Others – including ALICE, BONAP, TROPICOS, SMASCH, Webster's Frogs, Birds, Reptiles, Mammals; MS products etc.

Competing groups

- ETI (Expert centre for Taxonomic Identification) -- inferior data management but ahead of us
- LUCID -- aggressive and may pick the eyes out of available data sets, eg. *Eucalyptus*, but inherently more limited in scope and focussed on their own software, (ie. they have an Achilles heel!)

Business Model

The features of the three major units of the business model are outlined below. Refer also to the Proposed Organisational Schema (Figure 1).

1. Management Unit

Responsibilities

- **Administration of the Biodiversity Endowment Trust.** The trust will be a capital fund, the investment of which would be managed by professional fund managers, overseen by the Trustees. The Management Unit will provide a secretariat for the Trustees, including the supply of accounting services, and administration of the process of funding researchers.

  The Trustees would be an appropriate group of people who would be responsible for the maintenance of the capital value of the endowment fund in perpetuity, for increasing the fund, and for disbursing the funds for biodiversity related research in Western Australia through a process of applications and grants.

- **Fundraising.** The raising of funds for research and operating budgets, from the corporate and government sectors, will be an important function of the Management Unit. The main focus would be major funding requiring coordinated applications, or multidisciplinary projects requiring expertise from more than one of the 'Nature Base' agencies.

- **Coordination of projects, databases and science strategy.** Major biodiversity projects, comprehensive information systems and overall science strategy all exceed the scope of individual institutions involved in biodiversity work, especially with the present allocation to separate agencies. The Management Unit would provide professional management of large projects, database coordination, overseeing of the consultative process for strategy setting, and involvement in the origination of strategy.

- **Facilitation.** The organisation would have a role in international standards setting and maintenance for biological data gathering and handling, it would advocate use of modern methods and technology, and would conduct appropriate education, within the affiliated agencies and externally.

Role (with respect to the 'Nature Base' agencies)

- **Scenario 1.** Separate organisation providing funding and serving as a resource centre for professional project management expertise, and as a central contact for interstate, federal/state, and international contacts in biodiversity.

- **Scenario 2.** A peak management body overseeing the state government institutions/organisations conducting biodiversity work (the 'Nature Base' agencies).

Scope

- **Endowment trust:** Western Australian biodiversity work, i.e. taxonomy or closely related research and collecting including conservation focussed systematics that has a significant W.A. component, or that is conducted by W.A.-based people.

- **Coordination of projects, databases and science strategy:** Western Australia, especially of government.
- **Facilitation of international standards, advocacy and education:** Chiefly Western Australia (government, education sector and private sectors) with involvement nationally and internationally, particularly with regard to the international DELTA data coding standard and related software products implementing the standard.

Funding

Income

- CRF for operating costs including salaries.
- Income from sale of biodiversity products and information, derived from the profits of the business, used to establish and augment the endowment fund.
- Contributions from the private sector to the endowment fund.
- Government (state and federal) for specific projects.
- Corporate sponsorship of specific projects.

Expenditure

- Dispensing of research grants from the income of the endowment fund.
- Expenditure of specific-project grants and sponsorship.

2. Business Unit

Responsibilities

To successfully develop and market a range of multimedia and printed products based on authoritative scientific knowledge about the WA, national and world biota, and using leading edge technology.

Role

- Develop, implement and manage the corporate business strategy
- Fund biodiversity data capture projects and manages product development
- Package, publish and market biodiversity products
- Oversee software and user interface design and development
- Provide consultancy and training services to the biodiversity industry
- Develop strategic partnerships with other agencies and companies

Scope

A semi-independent business unit initially focussed on state and national products but developing an international market in the medium term with quality products of significant general, or specific interest overseas.

Funding

The Business unit will be funded:

- via seed money for initial setup
- via management unit from corporate and government bodies for specific projects
- via sales of biodiversity products

Structure

The Business unit will be developed as a business under the general guidance of the Management Unit. Will require a number of staff including a general manager, a marketing manager and an education, training and consultancy manager.

Other required staff positions will include graphics and software design, project officers for editorial and liaison work, and skilled data operators

3. 'Nature Base'

Responsibilities

- Custodian and manager of WA biological collections
    - Botanical
    - Mycological
    - Zoological
    - Entomological
- Custodian and manager of data pertaining to WA biodiversity:
    - Spatial
    - Nomenclatural
    - Descriptive (including images)
    - Bibliographic
- Authority for recognition and documention of scientific names of WA biota.
- Inventory and taxonomic research on WA biota.

Role (with respect to Biodiversity Emporium)

Assembly and completion of authoritative high-quality, integrated data sets in mission- and business-critical areas identified by or in consultation with the Management Unit. These products are then packaged and marketed by the Business Unit.

Scope

Taxonomy or closely related research and collecting including conservation-focussed systematics that has a significant W.A. component, or that is conducted by W.A.-based researchers.

Funding

- CRF
- Biodiversity Endowment Trust
- Direct purchase of data by Business Unit

Structure

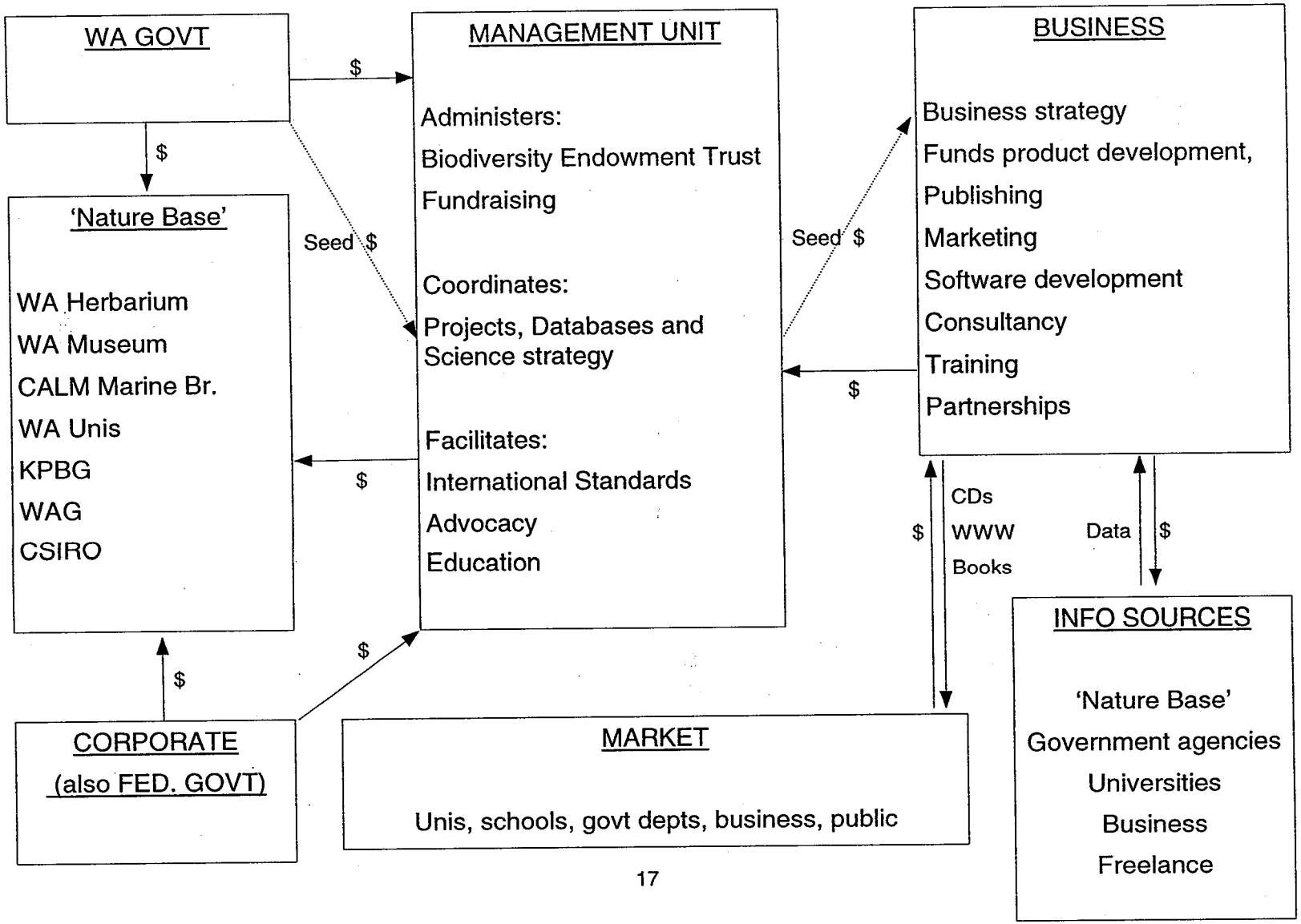
It is envisaged that in whole or part the following agencies will contribute to 'Nature Base':

- WA Herbarium
- WA Museum (natural history units)
- Kings Park & Botanic Garden (taxonomic & horticultural research & data)
- CSIRO WA (mycological collection)
- AgWA (entomological collection, mycological collection)
- WA Zoo

Scenario 1. Separate organisations functioning together as a consortium, the management of which would be facilitated by the Management Unit.

Scenario 2. A single (new) agency within CALM bringing together all relevant components of the above agencies under the direct management of the Management Unit.

Figure 1. Proposed Organisational Schema



GLOSSARY OF TERMS

ANBG	Australian National Botanic Gardens
CD-ROM	Compact Disc format for distributing computer programs and files
CITES	Convention on International Trade in Endangered Species
DELTA	Descriptive Language for Taxonomy, an International standard for codifying taxonomic information
DELTA-L	Internet Mailing List for DELTA users
DESCAT	WA Flora Database (formerly A Descriptive Catalogue of WA Plants)
ETI	Expert centre for Taxonomic Identification, a European initiative
FTE	Full Time Equivalent staff position
GUI	Graphical User Interface
HERBIE	Electronic Collecting Book developed by CALM
HTML	Hyper Text Markup Language
INTKEY	Interactive Key program based on DELTA standard & developed by CSIRO
LUCID	non-standard Interactive Key program
RED	Rare and Endangered Flora Database
SEDIT	Species Editing Software application developed by CALM
WAGENERA	WA Generic Flora Database
WACENSUS	Census of Western Australian Plants
WAHERB	Western Australian Herbarium Specimen Database