


The Cybercartographic Atlas of Antarctica Development Framework


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Objectives of Session

- ◆ To invite critical review and promote debate on a functional development framework for the Cybercartographic Atlas of Antarctica
 - ◆ Develop concepts and project management strategies rather than technological approaches
 - ◆ Establish a preliminary “Table of Contents” for the Atlas prototype, SCAR XXVIII
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Presentation Overview


- ◆ Evolution of Atlas Development framework
 - ◆ Evaluation of existing framework
 - ◆ Extension of Conceptual Framework
 - ◆ Preliminary Table of Contents
 - ◆ Discussion
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Evolution of CAAP Development Framework

Review

- ◆ Chronology of Development
 - ◆ Conceptual Framework
 - ◆ Technical Framework
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Chronology of Development

- ◆ SCAR Tokyo, July 2000
 - ◆ July 2001, Sienna Italy
 - ◆ Workshop 1, Puerto Madryn, December 2000
 - ◆ Workshop 2 Ottawa, May 2002
 - ◆ Meeting with U.S.G.S./UNH, March 2003
 - ◆ AntGIS '03, Freiburg, April 2003
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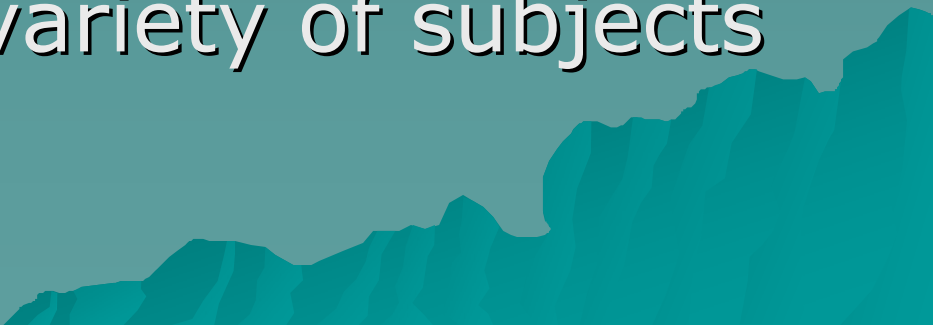
Review of Conceptual Framework

Definition of an Atlas


Electronic Atlas (Netherlands Cartographic Society): An *information system* set up for *interactive* consultation of *digital geographic databases* concerning a certain area or theme and containing data comparable in terms of level of generalization and the resolution at which data were collected.

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Cybercartographic Atlas

- ◆ Multisensory
 - ◆ Multimedia
 - ◆ Interactive
 - ◆ An information package
 - ◆ Produced by interdisciplinary teams
 - ◆ Forms new partnerships
 - ◆ Applied to a wide variety of subjects
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Characteristics of Antarctica and Antarctic Science

- ◆ Antarctica an important and integral part of global environmental systems
 - ◆ Unique geopolitical entity
 - ◆ Interaction of physical, biological and human influenced characteristics and processes are of prime scientific and policy importance
 - ◆ Sensitive environments that are subject to dramatic or catastrophic alteration
 - ◆ Large area resulting in great disparity of scale of data coverage
 - ◆ Data and information collected from observations, measurements and research by scientist and monitoring or survey agencies from many countries, using a variety of techniques, languages, standards and verification procedures
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Primary Goals of CAAP

- ◆ Comprehensive atlas of Antarctic region
 - ◆ Holistic view of a variety of topics to a broad range of users
 - ◆ Tool to better understand Antarctic in a global, sustainable development context
 - ◆ Increased cooperation and information exchange among agencies
 - ◆ Respond to user needs
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Initial Design Strategy

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- ◆ Proposed by Pulsifer (2001)
 - ◆ Conceptualization
 - ◆ Design
 - ◆ Content Development
 - ◆ Product Construction
 - ◆ Promotion and Distribution

Identification of Users

- ◆ Three user groups targeted:
 - Antarctic scientists and researchers (SCAR)
 - Antarctic managers and decision makers (CEP, ATCM)
 - General public (i.e. students)

Design Objectives

- ◆ Utilize existing intellectual and data resources
 - ◆ General presentation to be accompanied by specific case studies (multi-scale)
 - ◆ Integrate and portray information from a wide range of studies and observations
 - ◆ Include temporal dimension in analysis
 - ◆ Incorporate quantitative and qualitative data
 - ◆ Use Internet technologies
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Partnerships

- ◆ In keeping with the requirement to maximize use of existing resources, partnerships are key:
 - Argentina, Australia, Bulgaria, Chile, China, Germany, New Zealand, Norway, Poland, South Africa, U.K., U.S.
- ◆ Build on existing infrastructure: AAD, BAS (ADD), USGS Atlas of Antarctic Research, China, RAMP, UNEP GRID and others
- ◆ Data – partner agencies, SCAR GIG, global initiatives


Proposed Themes

- ◆ General Themes:
 - Climate change
 - Role of Ice and Water
 - Ecosystem change
 - Environmental Protection
 - Geoscience
 - Physical Science
 - Life Science
 - Human history
 - Natural History

Proposed Topics/Studies

- ◆ Support ATCM and CEP
 - A means of monitoring and displaying changes, the results of response actions, & assessment of impacts for management of liability decisions (CEP) (Roots)
 - ◆ Human activity – (overview and support of COMNAP)
 - ◆ Ice shelf breakup
 - ◆ Geodesy (Manning)
 - ◆ Penguins and seals as an indicator of Antarctic environmental (Vergani & Stanganelli)
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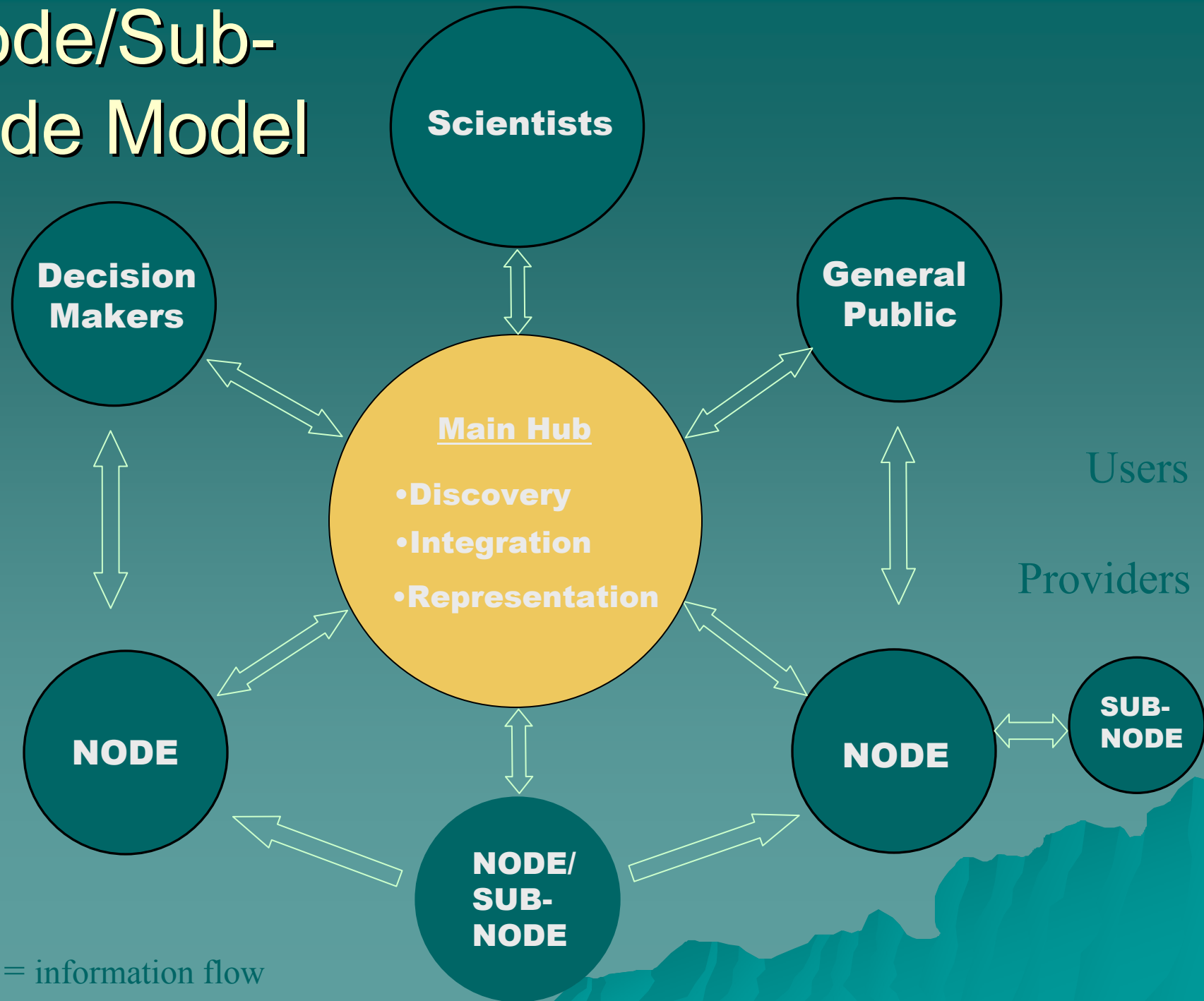
Proposed Topics/Studies cont.

- ◆ Impact of climate variability on the Antarctic Ecosystem (Stanganelli et al.)
 - ◆ National Antarctic Atlases (U.S., China)
 - ◆ Others i.e. national histories in Antarctic exploration context, subglacial lake exploration etc.
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Management Structure

- ◆ A coordinating hub with a series of independent nodes and sub-nodes in participating countries
- ◆ Work through existing GIG (formerly GGI) structure

Node/Sub-node Model




Resulting Project Objectives

- ◆ Create an innovative new product and methodology to compliment discovering, utilizing, presenting and distributing existing information and data about Antarctica to a wide variety of users, including scientists, decision makers and the general public
 - ◆ Facilitate increased cooperation and information exchange between Antarctic stakeholders under the terms of the Antarctic treaty
 - ◆ Through international cooperation, to develop and link National Atlases of Antarctica
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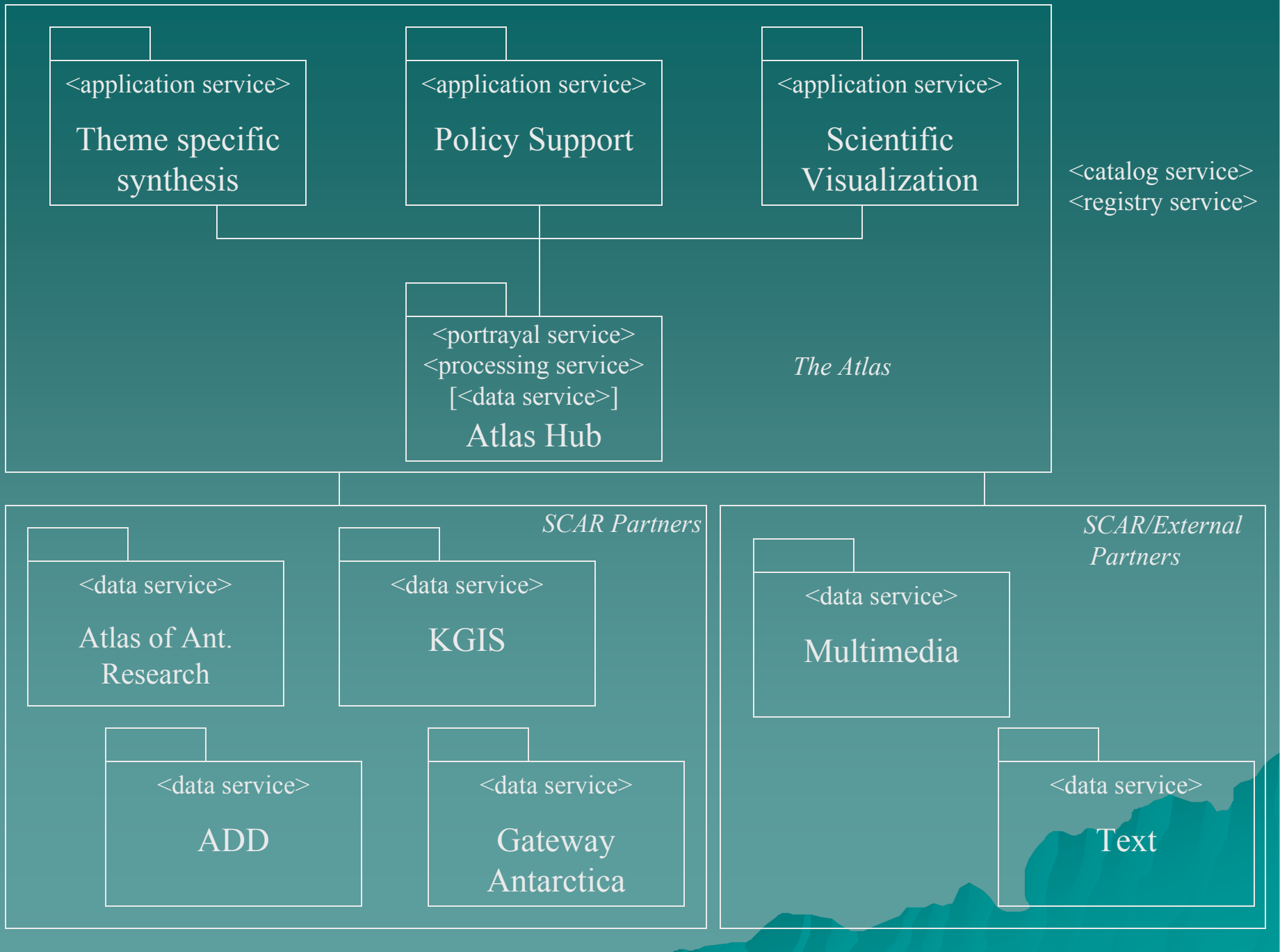
Review of Technical Framework

Preliminary Technical Framework

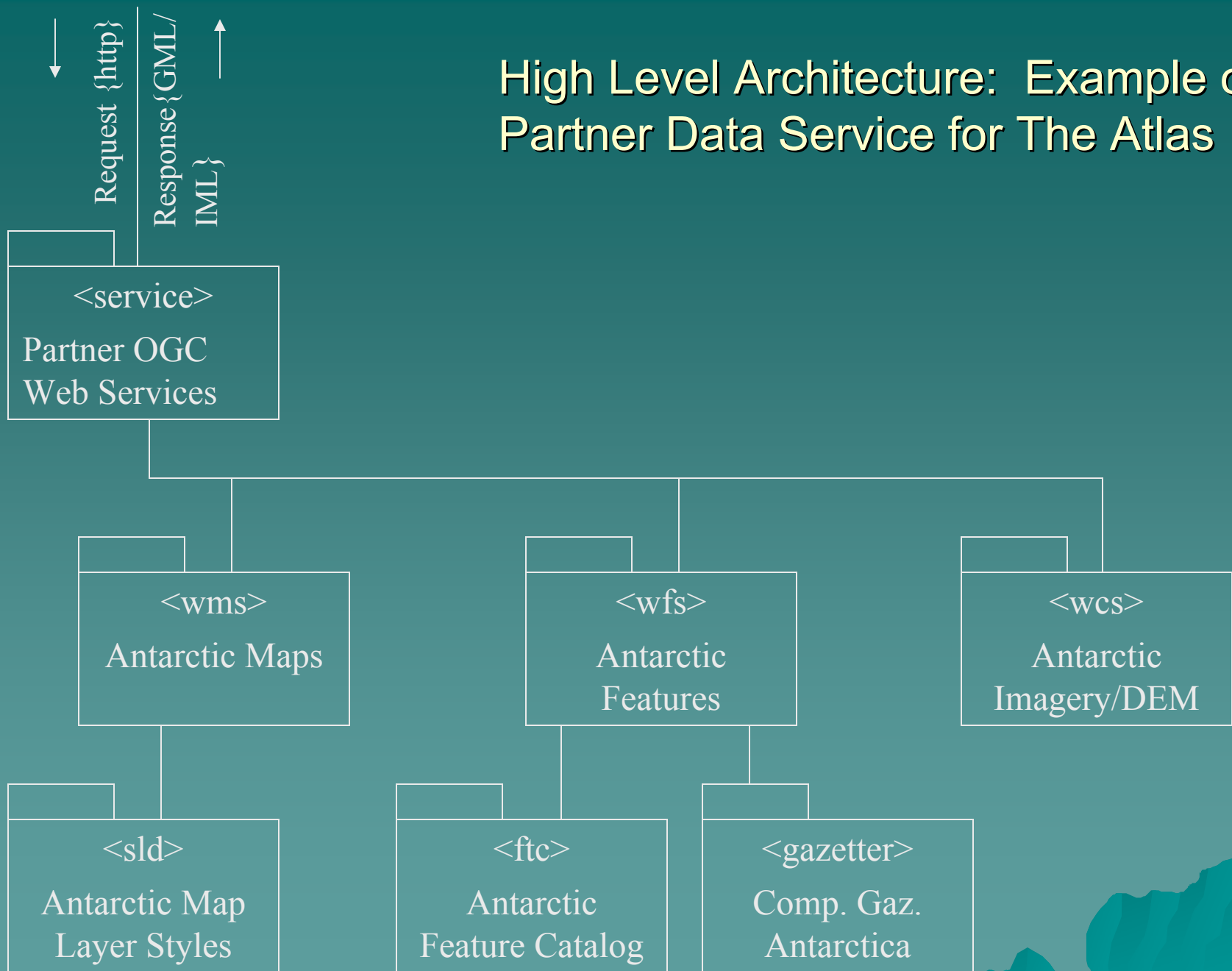
- ◆ Presented at Puerto Madryn Workshop (December 2001)
 - ◆ Based on interoperability work from Geographic Information Science
 - ◆ Metadata identified as key element of system
 - ◆ ISO/OGC suggested but not central
 - ◆ Tools such as OGDII proposed for exchange
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Current Technical Framework

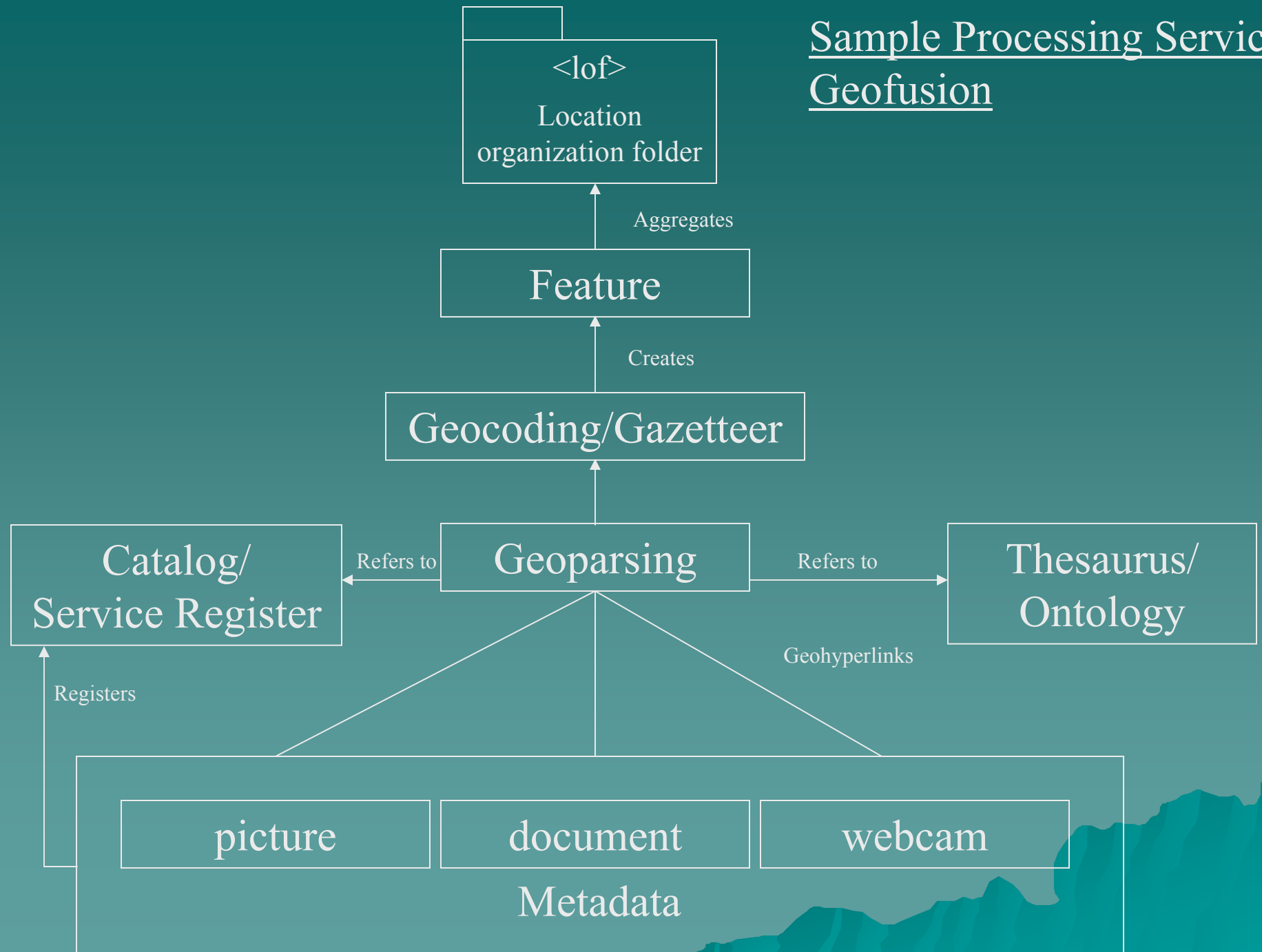
- ◆ Most recent technical framework presented at AntGIS '03
- ◆ Based on an ISO/OGC Web services approach
 - Application services
 - Portrayal Services
 - Processing Services
 - Data Services
 - Registry Services
- ◆ Current development work being carried out using this framework



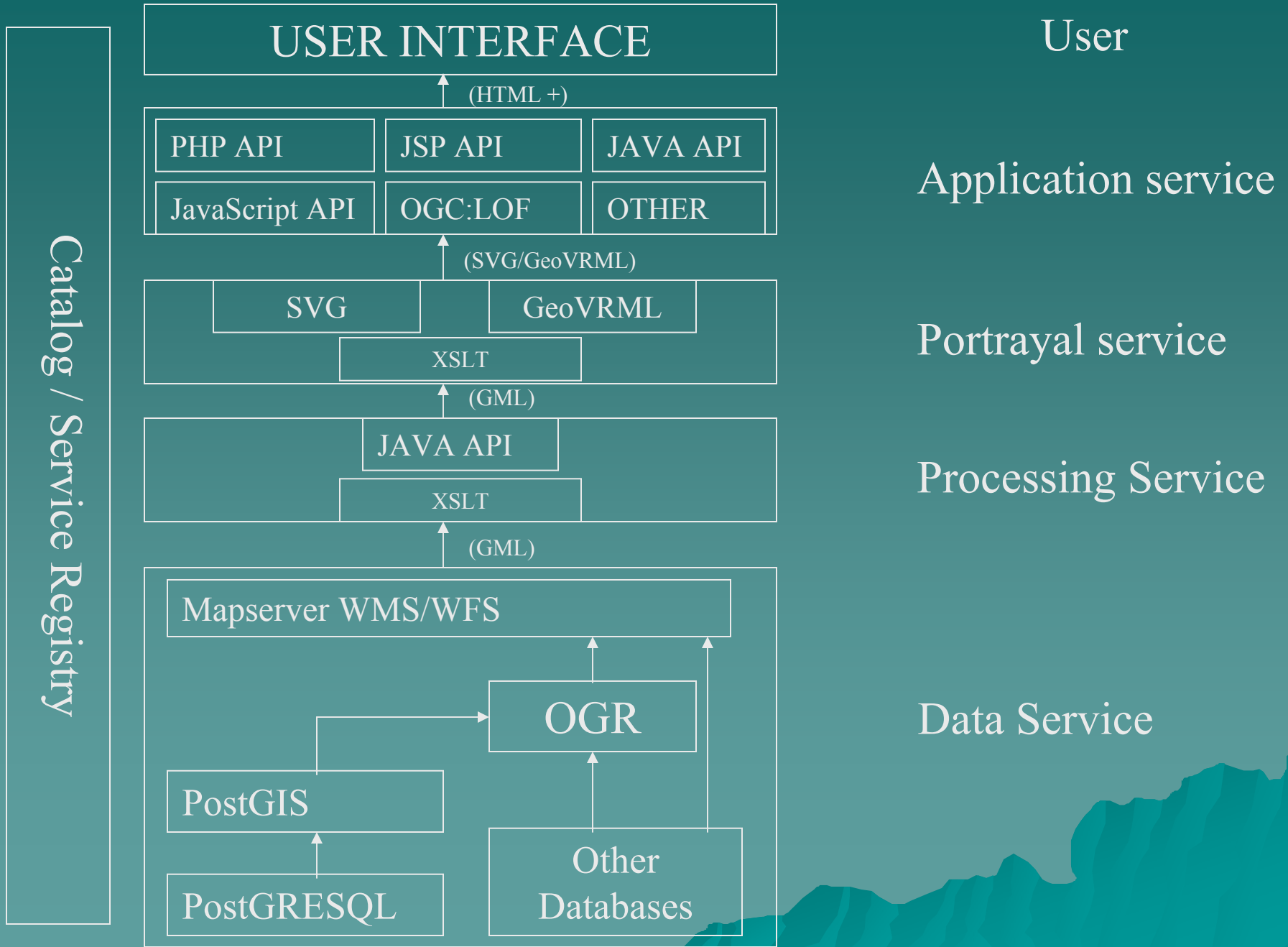
High Level Architecture: Example of Partner Data Service for The Atlas



Sample Processing Service: Geofusion




Mapserver Implementation: Public Domain Approach



Evaluation of Existing Framework


Evaluation of Existing Framework

- ◆ The design model previously presented is iterative
 - ◆ Previous conceptual and technical framework can be considered the first iteration
 - ◆ Evaluation of first iteration is required before moving forward
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Changing Realities

- ◆ Since inception of project, there have been a number of developments
 - SCAR restructuring
 - Significant developments in GIG program
 - Developments in geographic information standards and technology
 - GCRC secured relatively long-term funding (4 years)
 - ◆ Funding is research rather than production based -> implications for production

Conceptual Framework Evaluation

- ◆ Provides a solid foundation for the rationale behind the Atlas and the objectives
 - ◆ Identifies key design elements (i.e. multi-scale)
 - ◆ Recognizes the importance of partnership and information exchange in the spirit of the Antarctic Treaty
 - ◆ Specific content elements of the Atlas are not firmly established
 - ◆ Responsible parties for specific content elements are not yet established
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Technical Framework Evaluation

- ◆ Provides a current and forward thinking strategy
 - ◆ Standards approach allows for less dependency on specific technological approaches
 - ◆ Strategy for how data and content will be shared needs to be developed – i.e. details of intellectual property, security etc.
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Extension of Conceptual Framework

The Second Iteration

- ◆ Requirement of next phase of conceptualization
 - Clear definition of high level themes and topics
 - Specificity in terms of defining content that will address themes
 - Content directed at target audience groups
 - Consideration of SCAR scientific program context and other stakeholders
 - Measure of quality control
 - Assign ownership


A Paper Atlas Approach to a Cybercartographic Atlas

- ◆ Approach Atlas as comprised of *volumes* which contain *chapters* which in turn contain *sections*
- ◆ *Section* can be seen as the smallest unit for this design iteration
- ◆ Expectation that these sections may be used to support more than one *chapter* or *theme* - thus they will be termed *Content Modules*


Content Module Definition (Draft 1)

- ◆ A Content Module is:
- ◆ A component of the atlas containing cartographic, descriptive and multimedia elements for the purpose of examining a particular question, topic, area or phenomena related to the Antarctic region.
- ◆ Associated with one or more *Chapters* and *Themes*
- ◆ Evaluated for quality
- ◆ Owned
- ◆ Developed for a particular audience
- ◆ Described by a well defined set of properties


The Content Module

- ◆ It is proposed that the focal point for further development of the Cybercartographic Atlas of Antarctica be the *Content Module*
 - ◆ The term *Content Module* is similar to the term vignette previously used
 - ◆ Term must be more clearly defined
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Defining Volumes and Chapters

- ◆ A wide range of potential themes and topics
 - ◆ For the purposes of the framework, these themes and topics can be labeled *Volumes* and *Chapters*
 - ◆ Based on review of project documents the following outline can be proposed
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Atlas Volumes

- ◆ Volume 1: Antarctica in a Global Context
 - ◆ Volume 2: The Continent of Antarctica
 - ◆ Volume 3: Antarctic Science
 - ◆ Volume 4: Human Activity in Antarctica
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Volume 1: Antarctica in a Global Context

◆ Examples of Chapters and *Content Modules*:

– Antarctica and Global Environmental Change

- ◆ *The Antarctic Ice Sheet: Implications of Global Climate Change*

- ◆ *The Antarctic Ozone Hole*

- ◆ *Global Circulation Models and the Southern Ocean*

– Antarctic Geopolitics

- ◆ *The Antarctic Treaty System*



Volume 2: The Continent of Antarctica

◆ Examples of Chapters and *Content Modules*:

– The Antarctic Peninsula

◆ *Hope Bay*

– Ross Sea Region

◆ *McMurdo Dry Valleys*

– Sub-Antarctic Islands

◆ *King George Island*

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Volume 3: Antarctic Science

◆ Examples of Chapters and *Content Modules*:

– Geoscience

◆ *Subglacial Antarctic Lake Exploration*

– Life Science

◆ *Antarctic Seals*

– Physical Science

◆ *Environmental Research*

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Volume 4: Human Activity in Antarctica

- ◆ Examples of Chapters and *Content Modules*:
 - Protecting the Antarctic Environment
 - ◆ *The Committee on Environmental Protection*
 - Human Impacts on the Antarctic Environment
 - ◆ *Tourism in Antarctica*
 - Living in Antarctica
 - ◆ *Human Response to Harsh Environments*


Refining Volumes and Chapters

- ◆ Due to “modular” nature of Content Modules defined *Volumes* and *Chapters* may be redefined and extended to incorporate multiple perspectives and new knowledge
- ◆ *Content Modules* are then reintegrated under new scheme


Content Module Quality

- ◆ Propose several data quality ratings:
 - Link
 - Peer Reviewed
 - SCAR Peer Reviewed
 - GCRC Research Module

Link

- ◆ On-line Atlas or site containing geographic information identified as relevant to a particular *Volume* and *Chapter*
 - ◆ Not reviewed for quality
 - ◆ Identified as a link without quality rating (i.e. disclaimer)
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Peer Reviewed

- ◆ Reviewed by an editor or editorial board
 - ◆ Reviewed for quality and relevance to *Volume* and *Chapter*
 - ◆ Quality permitting, review board can recommend inclusion in different *Volume* and *Chapter*
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SCAR Peer Reviewed

- ◆ Same process as previous plus..
- ◆ Research has been carried out under the auspices of a SCAR research program
- ◆ Ideally will use SCAR recognized standards (i.e. feature catalog, symbols) and framework data
- ◆ *Content Module* must be registered with Antarctic Master Directory


GCRC Research Module

- ◆ Same as previous plus..
 - ◆ *Content Module* will be used as an object of study for researchers collaborating on the Cybercartography for the New Economy project
 - ◆ Development process subject to User Centred Design
 - ◆ Used for experimental methodology (i.e. multi-modal representation)
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Owned

- ◆ A researcher, organization, collaborative unit or other recognizable entity takes ownership of *Content Module*
 - ◆ Owner responsible for development
 - ◆ Owner given recognition
 - ◆ Need to investigate the potential of assigning academic reward for ownership (i.e. citation)
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Developed for a Particular Audience

- ◆ Content Module designed with consideration of target audiences (general public, decision makers and scientists)
 - ◆ Higher level content (general public) may be of interest to a variety of users (i.e. inter-disciplinary scientists)
 - ◆ All modules may use similar data infrastructure (GIG/AMD)
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Described by a Well Defined Set of Properties

- ◆ In collaboration with stakeholders, *Content Modules* need clear definition
 - ◆ Module parameters recorded
 - ◆ *Content Module* definitions used for a variety of purposes from quality evaluation to site indexing
 - ◆ Metadata standard such as ISO 19115 may be suitable for storing metadata
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Sample Generalized Description of Content Module

Content Module	Seals and Penguins as an Indicator of Antarctic Ecosystem Change
Volume	Antarctic Science
Chapter	Life Science
Study SCALE	Local
Audience	Scientists
Owner	Vergani & Stanganelli
Nationality of owner	Argentina
Collaborators	Pulsifer and Taylor
Major functions	Communication of scientific research Contribution to global environmental initiatives

Generalized Description of Content Module cont.

Data used	{Metadata}
Services used	{Service Metadata}
Dependent modules	{Metadata}
Dependent services	{Service Metadata}
Software system (server)	UMN Mapserver, Windows Media
Software system (client)	Standard Web Browser
Access limitations	None

Preliminary Table of Contents

Workshop Activity: Define Table of Contents (Content Modules)


- ◆ Start the process of defining the thematic framework and specific content for the Atlas
 - ◆ This will be an on-going task
 - ◆ Decisions made after review by larger community (GIG and others)
 - ◆ Additions can be stated during meeting conference call
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Table of Contents (v. 1)

CM Title	Volume	Chapter	Audience	Quality	Owner
Hope Bay project: integration of penguin biological data into a GIS system	Antarctic Science	Life Science	Science	SCAR Peer Rev'd	Stanganelli et al.
Canada and the CEP	Human Activity in Antarctica	Protec'g the Ant. Envrmt.	Decision Makers	GCRC Rsrch Module	Pulsifer & Taylor

Table of Contents (v. 1)

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Table of Contents (v. 1)

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Discussion





