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Managing and Communicating Uncertainty by Providing Innovation in the Environmental Services Economy

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Outline

- What is the **services economy**?
- How is **innovation** achieved for the services economy?

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- What is the **environmental** service economy?
- What contribution can the **quantitative sciences** make to the environmental services economy?
  - a case for “managing and communicating uncertainty”

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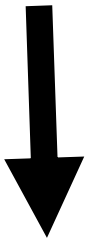
- What is the **environmental** service economy?
- What contribution can the **quantitative sciences** make to the environmental services economy?
  - a case for “managing and communicating uncertainty”

- **Some examples**
  - *creating markets through measurement* - global carbon monitoring
  - *risk informed decision making* - optimisation of water resource management

What is the “services economy”?

Sectors of industry

- Primary – agriculture, fisheries, mining
- Secondary – manufacturing
- Tertiary – service sector/industry
- Quaternary – sharing of information



Services Sectors

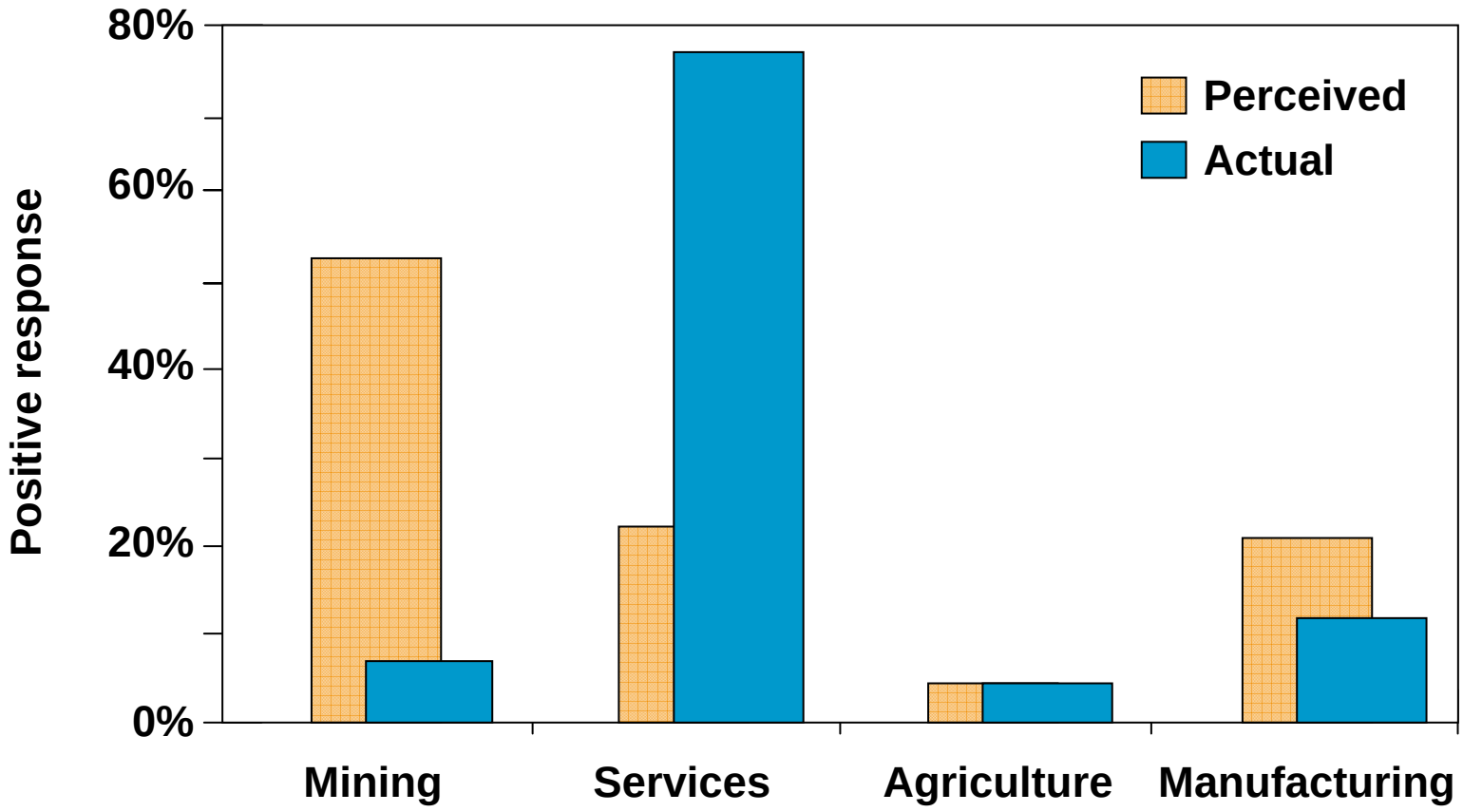
What is the “services economy”? cont…

Services Economy

- Services are those activities in which there is an interaction between provider and client that creates and captures value
- Majority of value is intangible Vs residing in a physical product
- Spans private and public sectors

At the core of the challenge?

Q: Which do you think makes the greatest contribution to the Australian economy?

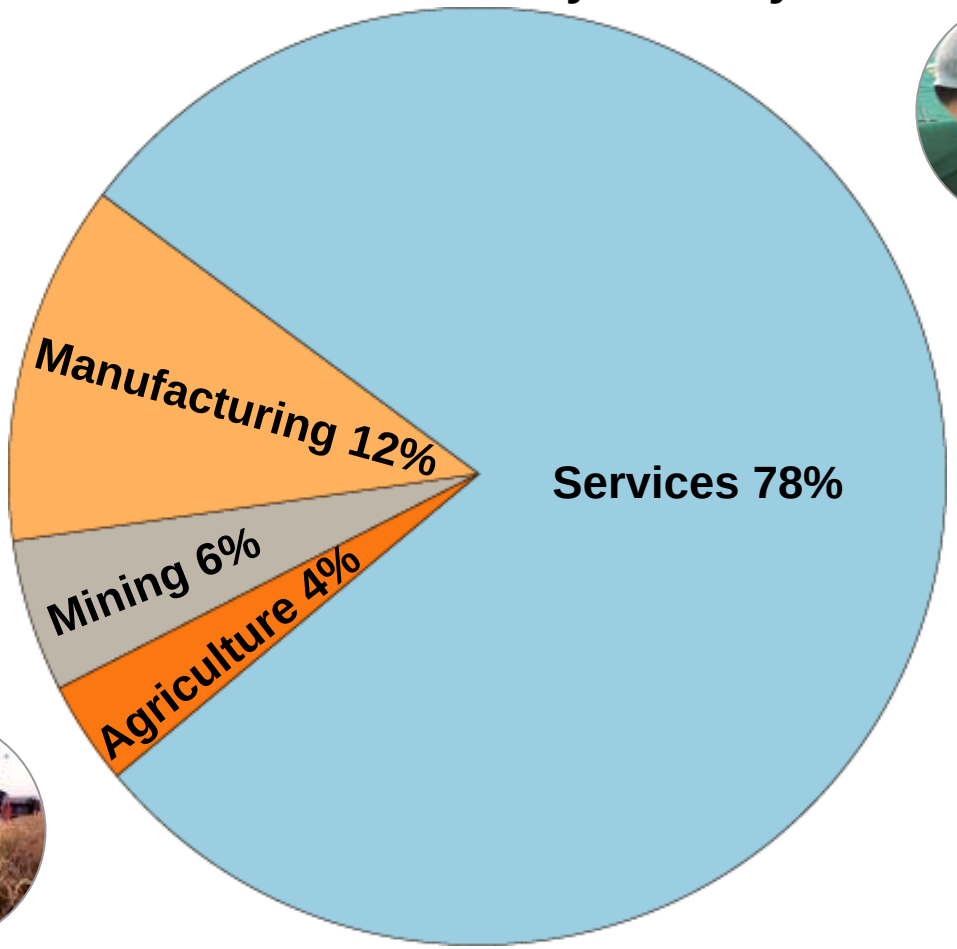


Source: Market Research Australia

A statistical snapshot of Australian services

Services in relation to the Australian economy

Gross value added by industry sector



Australian services[1]

- 85% of employment
- 21% of exports

1. ABS data, which includes construction, electricity and gas services

Australian Bureau of Statistics, 2006: Gross Value Added - difference between the value of goods and services produced and the cost of raw materials and other inputs used in production.

What is the “services economy”?

Services have a number of common features

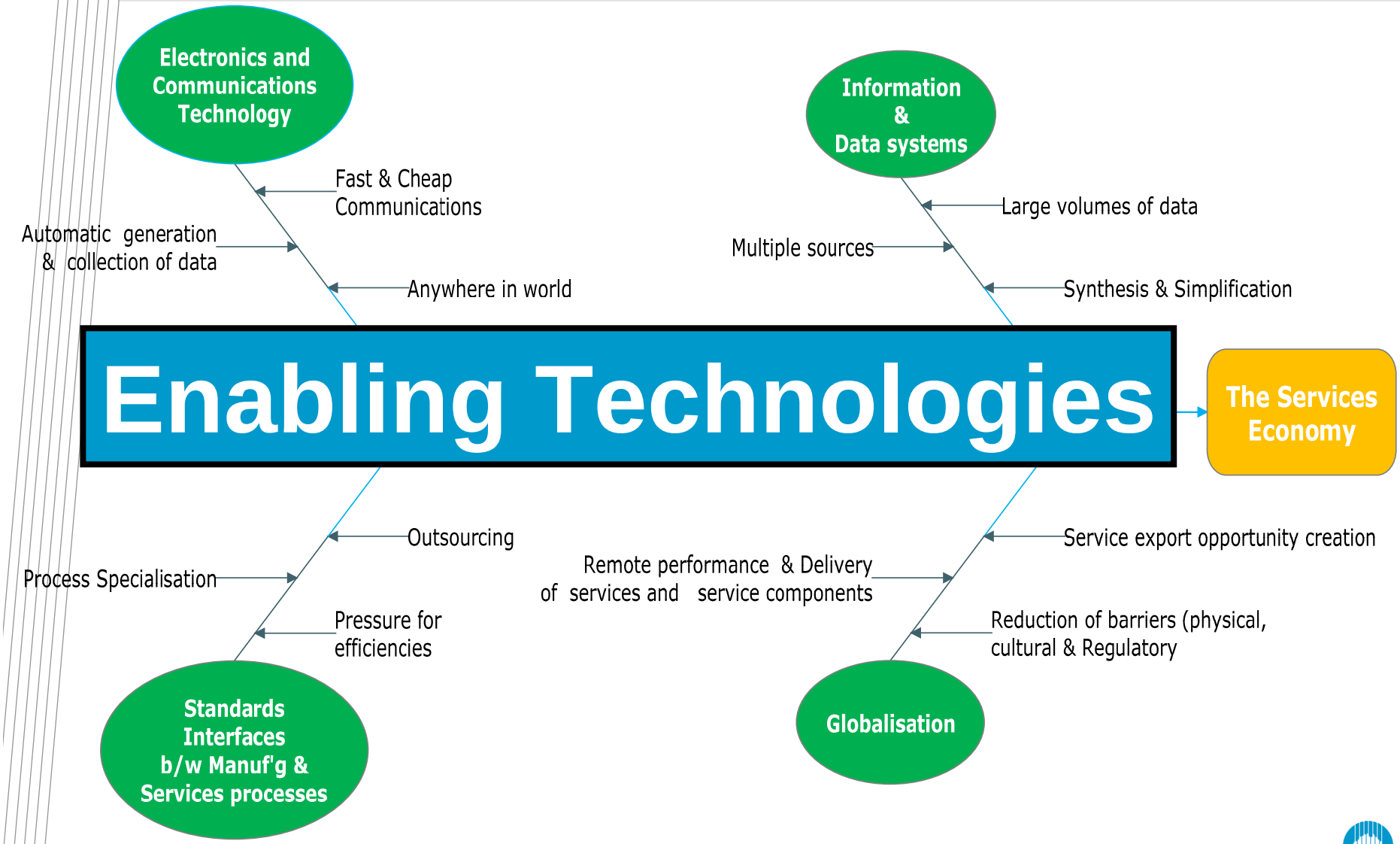
- intangible
- create benefits
- interactions surrounding the delivery of an outcome or product
- result of a collaboration between two or more entities
- associated with a product but are not the end product itself
- “greater than the sum of its parts”

- **Critically important is the client and market relationship**
  - Eg1 – harvesting, transport, distribution and sale of goods from a winery to a bottle shop
  - Eg2 – provision of a service - waste water treatment
  - Eg3 – goods transformed - maintenance of mining truck tyres

How is innovation achieved for the services economy?

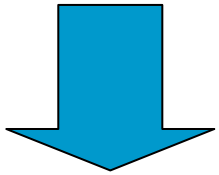
- Although the service economy has been very prevalent for at least a decade, there have been few focused research efforts to support and enhance the service economy
- Governments of advanced economies around the world are increasingly realising that their countries' competitive futures lie in services
- Science is only indirectly related to services innovation, but enabling technologies are intimately involved in services innovation

Drivers for change and growth in services



The Unmet Innovation Need For Services

Efficient methods for managing and modelling uncertainty in services decision making

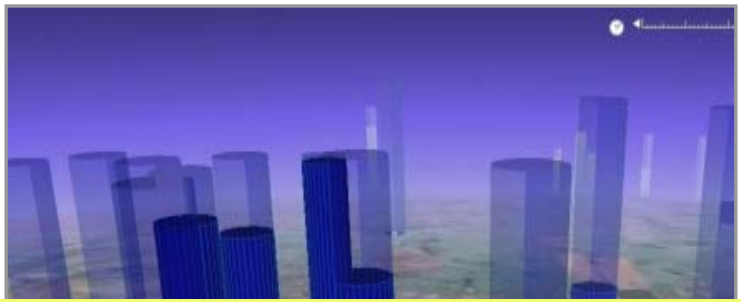


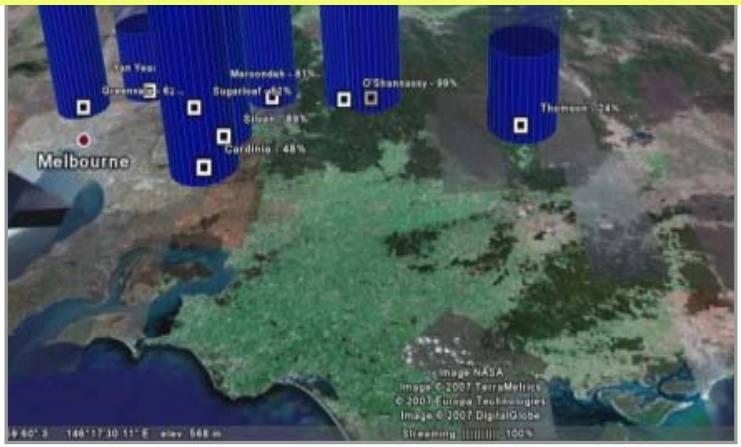
Provide decision makers with the knowledge to act with confidence

What is the “environmental services economy”?

Carbon Monitoring and Markets

Water Monitoring and Futures Trading





Creating markets through measurement

High impact environmental services with high value returns through quantitative sciences

- Global Carbon Monitoring System
  - $20B per year in prevented deforestation (and prevention of irreversible climate change)
- Reliable abundance measures for Sustainable Fisheries Management
  - Northern Prawn Fishery ($80M), Southern Bluefin Tuna ($250M), Minke Whales
- System Optimisation to support Coal Terminal Upgrade
  - Additional throughput of 6M tonnes coal per annum
  - $50M investment, $600M pa benefit
- Biomarkers for specific diseases in native fauna
  - Potential to save faunal species, maintaining biodiversity

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Contribution of the quantitative sciences?

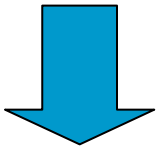
- Enabling technologies for smarter information use
  - creating evidence based decision making tools

- Reducing and managing uncertainty
  - across environmental & business systems

1. “quality assurance”
   - reducing variability, improving measurement systems
2. measuring, modelling and predicting processes
3. optimisation of resource use
4. understanding, quantifying, managing and hedging risk

Contribution of the quantitative sciences?

- Computational mathematics and modelling
- Mathematical and statistical modelling and inference
- Image segmentation and classification
- Simulation and optimisation



Knowledge turned into services

Technology or Software Converted to a service
Eg: Climate modelling,
Weather prediction

Technology or Software for use by others to convert into a service
Eg: methodology for spatio-temporal modelling and used for reporting water quality “sold” to SME – deployed by SME for local, regional, state and federal govt environmental reporting

Path to Impact – A Service Development Paradigm

Customer

Work closely with customer:
- to address a need
- simplify the complex

Market

Develop technology base to deliver service to more customers

Business

Make technology more robust, support more features and markets – deploy (or commercialise)

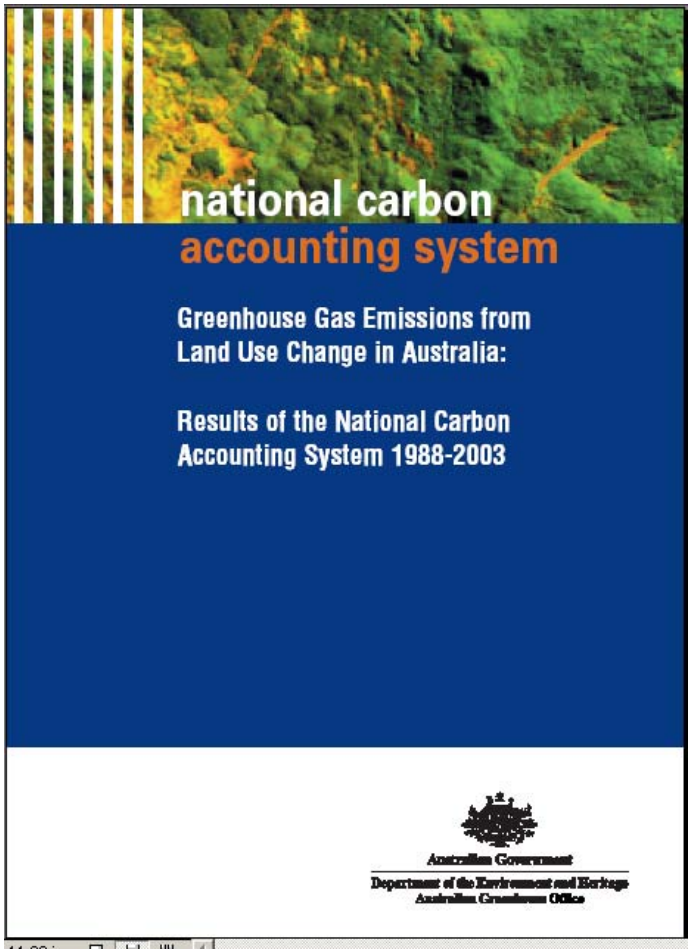
Eg1: Creating markets through measurement

Carbon Trading & Accounting: Establishing the Need

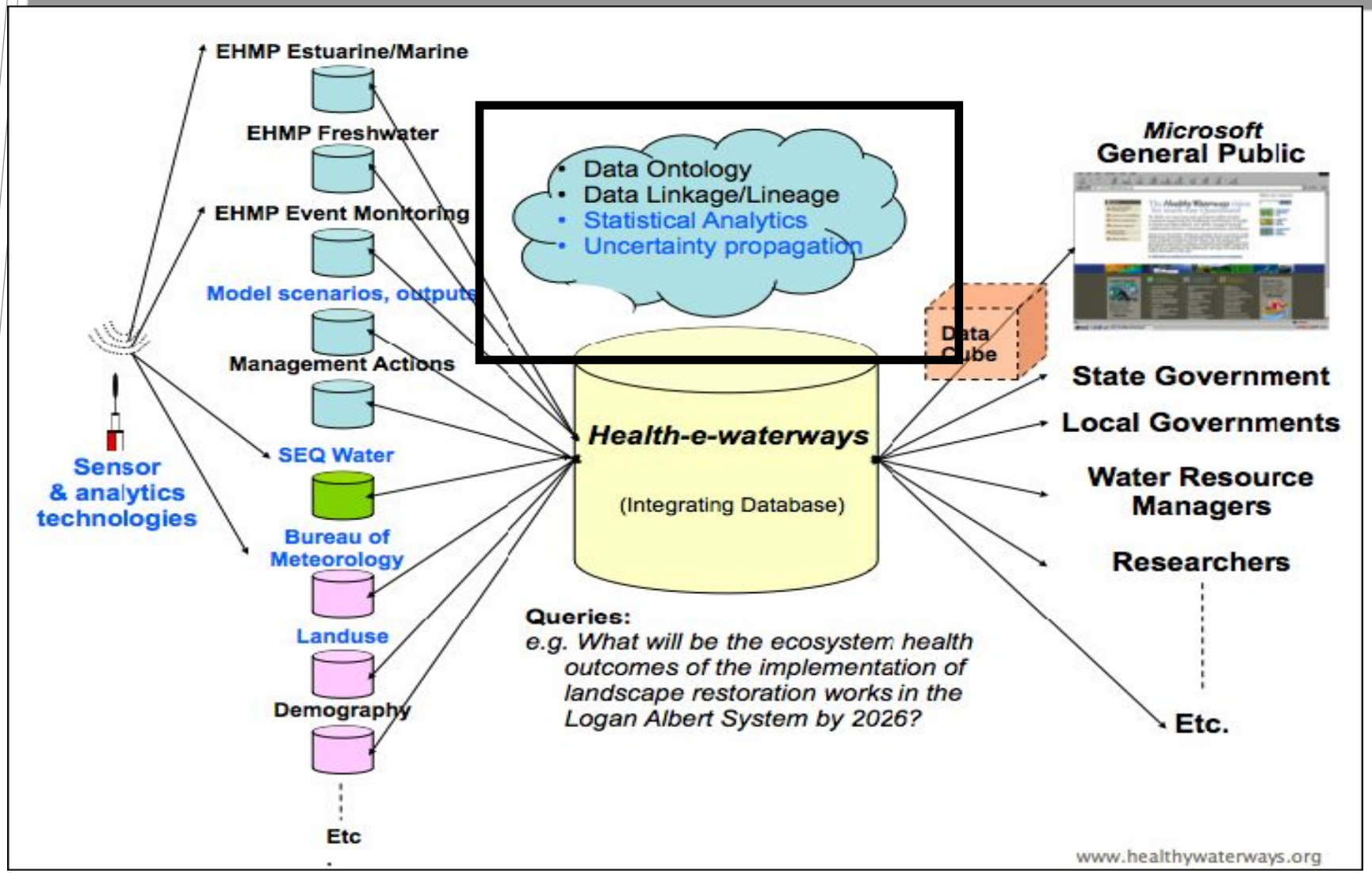
- think… water, energy, carbon…
- key tool to more efficient allocation of natural (scarce) resources
- reliable and accurate accounting is a precursor for an active trading scheme
  - market based but require consistent, robust and reliable information to underpin operations and investment
- reliable and accurate accounting is a precursor for institutionalising a “natural resource” tax market

Carbon Accounting

- What “services” does a carbon accounting system underpin:
  - robust “technology” that is licensed to service providers
    - depicting trends in natural systems (due to climate or land management)
    - local, regional and broad-scale carbon emission estimates from perennial and other vegetation “systems”
  - potential to underpin a carbon trading system

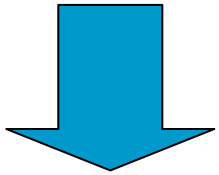


Risk informed decision making for water management



Summary:
The Unmet Innovation Need For Services

Efficient methods for managing and communicating uncertainty in environmental services decision making



Provide natural resource managers with the knowledge to act with confidence

Uncertainty

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Thank you

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