Earth Observation for Environmental Management

International trends & developments

Earth observation applications

Business development

Capacity building

0. Introduction

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HCP international:
consulting, marketing of earth observation

Project director EOPOWER:
project for promotion & capacity building of earth observation applications

Sequence:

- General assessment of the state-of-the-art of earth observation
- Major trends and developments in the application field
- Description of earth observation solutions
- Assessment of market potential for earth observation solutions and marketing instruments
- Capacity building for successful application of earth observation solutions

Earth Observation helps you:

save money

save lives

save the environment

Earth observation applications

- On the verge of reaching new user communities
- These new user communities need to be involved
- Weakest link / last mile aspects are important
- Marketing needed: promotion & capacity building

Life cycle of products & services

Initialization

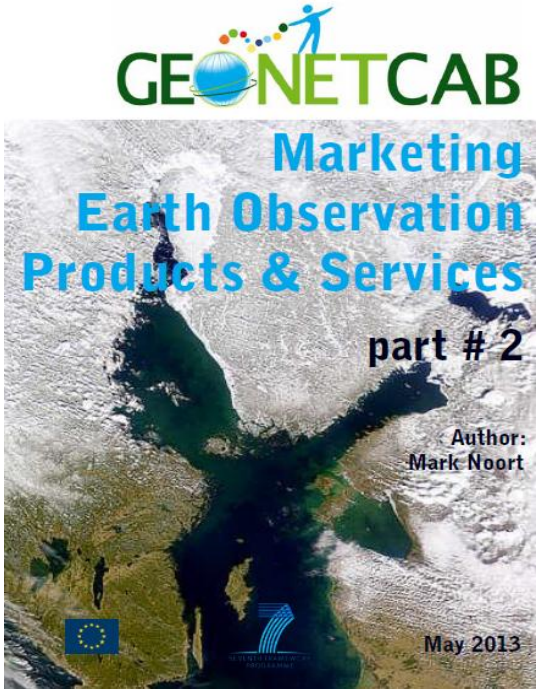
System analysis & design

Rapid prototyping

System development

Implementation

Post-implementation



Scope (1)

The term “environment” may be defined as:
the sum total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth as well as of danger and damage

“Ecology” can be described as:
the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time

“Biodiversity” can be described as:
the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems

Scope (2)

A definition of “Environmental resource management” is: **environmental resource management is the management of the interaction and impact of human societies on the environment**

Climate aspects will be dealt with more in detail in the climate toolkit; the marine environment toolkit and the forest management toolkit cover environmental aspects related to these topics.

Assessment of business & funding opportunities

- Categories of environmental management products & services
- Life cycle phase of product or service
- Regional context, level of technological & economic development
- Optimum marketing mix

1. International trends & developments in environmental management

Issues & trends in environmental management

- Addressing **environmental challenges**; leading to a
- Move towards a **green economy**; including
- **Payment for ecosystem services.**

Drivers

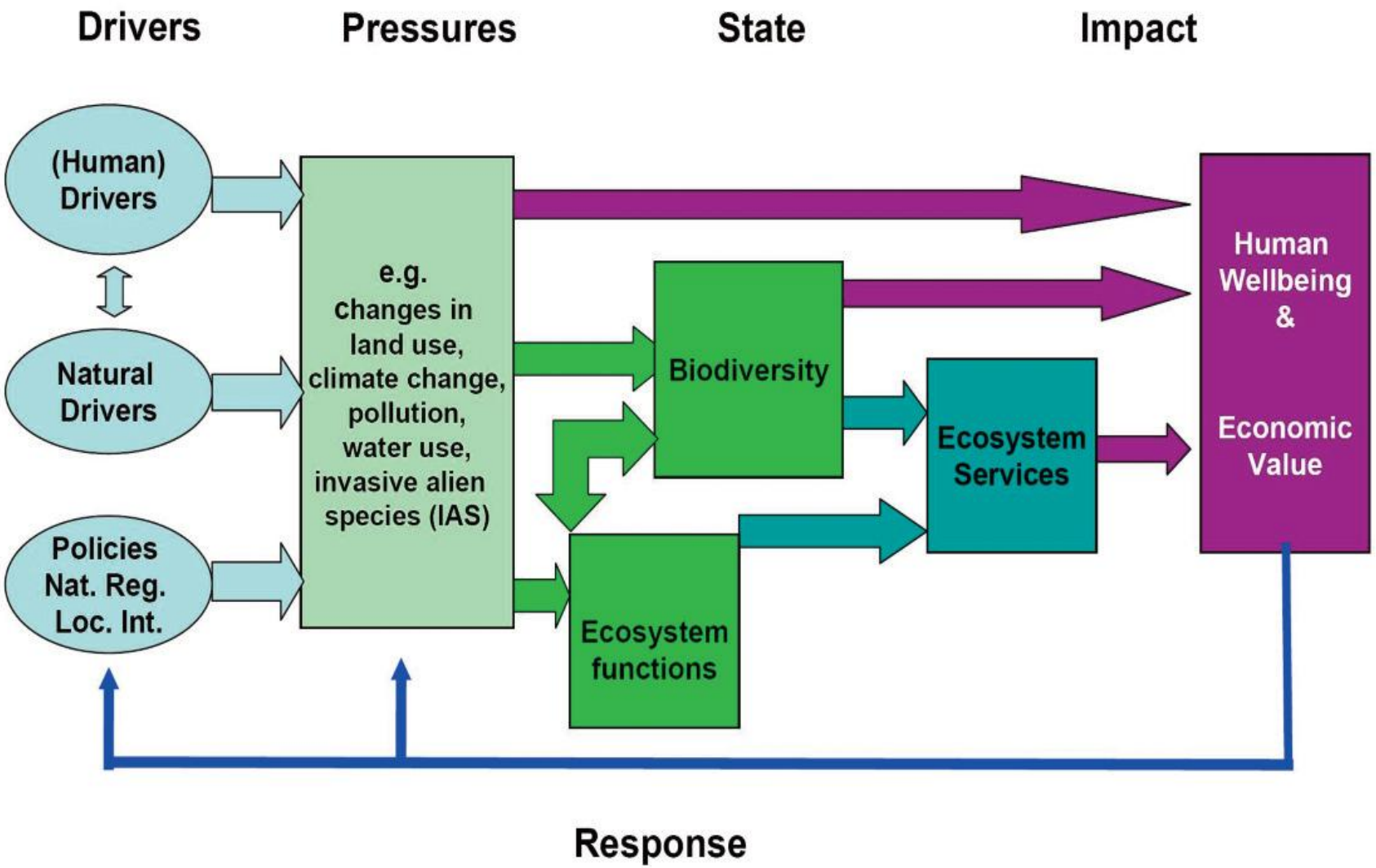
- Economic growth;
- Population growth;
- Overexploitation of resources, such as in agriculture and fisheries;
- Environmental assets are not valued or undervalued in the current economic system;
- Lack of awareness, knowledge and consensus about what affects the environment and what the consequences are.

Environmental challenges

There are many environmental challenges, classification and priorities depend on viewpoints and aspect perception:

- Freshwater scarcity, climate change, habitat change, invasive species, overexploitation of oceans, nutrient overloading (TEEB for business);
- Cross-cutting issues, food – biodiversity & land issues, freshwater & marine issues, climate change issues, energy – technology & waste issues (UNEP);
- Depletion of natural capital, climate change, biodiversity loss, emissions & waste generation, pollution (EEA);
- Climate change, energy efficiency & renewable energy sources, management of ecosystems & biodiversity, forest loss, desertification & and degradation, water resources (EC).

In schematic form: DPSIR framework



Resulting in: policy priorities

- Better implementation and further strengthening of current environmental priorities;
- Dedicated management of natural capital and ecosystem services;
- Coherent integration of environmental considerations across the many sectoral policy domains;
- Transformation to a green economy.

European Environment Agency

More information:

Global environmental outlook 5 (UNEP; 2012) and regional environmental outlook series

21 issues for the 21st century (UNEP; 2012) results of the UNEP foresight process on emerging environmental Issues

The European environment (EEA; 2010) state and outlook + updates

Green economy

Environmentally oriented policies and public investment as life insurance (rather than luxury);

Policy tools:

- Toolbox of good practices
- Green economy indicators
- Green economy roadmap
- Sustainable development goals (SDGs);

Distinction between green/sustainable growth or green economy:
green economy has absolute decoupling (resource use declines irrespective of the growth rate of the economic driver) as aim.

More information:

Towards a green infrastructure for Europe (Actema, Ecosystems, RIKS, TERSYN, CSIC; 2009) *developing new concepts for integration of Natura 2000 network into a broader countryside*

Creating a national strategy for environmental intelligence (IGES; 2011) *the forum on earth observations 5*

Green economy in the European Union (UNEP; 2012) *supporting briefing*

Green economy in action (UNDP; 2012) *articles and excerpts that illustrate green economy and sustainable development efforts*

Key Issues on Green Economy at Rio+20 (IGES; 2012)

Payment for ecosystem services

- Measures to represent benefits: monetary, quantitative (indices, indexes, risk), qualitative (stories, maps, perception);
- Market profiles:
  - **Carbon:** compliant & voluntary carbon forestry
  - **Water:** compliant water quality trading, voluntary watershed management payments, government-mediated watershed PES
  - **Biodiversity:** compliant & voluntary biodiversity offsets, government-mediated biodiversity PES, individual fisheries quotas
  - **Bundled:** certified agricultural products;
- Certification & labelling.

More information:

The economics of ecosystems and biodiversity (TEEB)
many reports, such as "Natural capital at risk: the top 100 externalities of business" (TEEB; 2013)

System of environmental-economic accounting (SEEA, UN)
many (strategy) reports + central framework report (2012)

The global partnership on **wealth accounting and the valuation of ecosystem services (WAVES)**
many (annual) reports on activities and systems in different countries

Environmental performance index (EPI, YCELP, CIESIN; 2012) + *pilot trend environmental performance index*

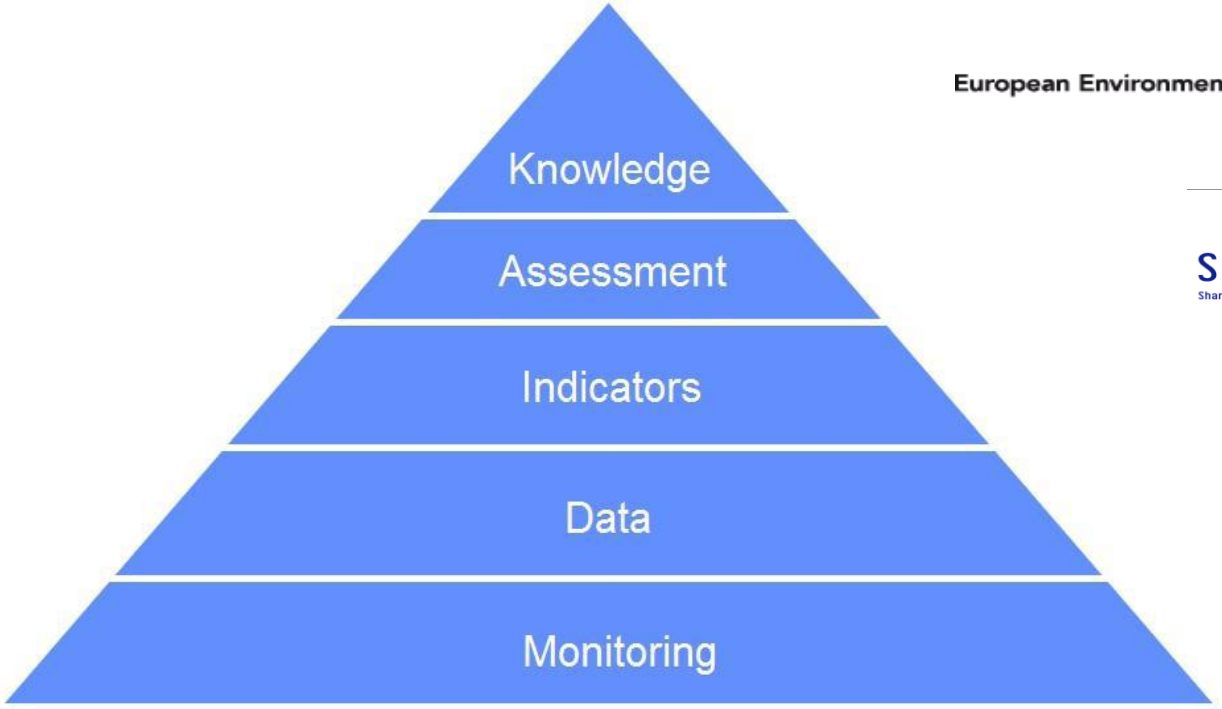
PES and cocoa (CREM; 2011) *securing future supplies and preserving biodiversity by paying cocoa farmers for ecosystem services*

2. Earth observation applications

Earth observation for environmental management

European Environment Agency

SEIS
Shared environmental information system



Shared environmental information system (SEIS)

Earth observation contribution

- **Terrestrial and freshwater ecosystems**, identification and monitoring at global or continental level (for marine and coastal ecosystems see climate toolkit),
- **Bio-geophysical variables**,
- **Local applications,** for national parks and other protected areas,
- **Biodiversity modelling and monitoring,** including invasive species monitoring and ecological forecasting**,**
- **Environmental accounting.**

Note: there is quite some overlap between the different categories

Example terrestrial and freshwater ecosystems

Conversion from forest to rangeland and farmland from 1978 to 2010 in Gishwati former forest reserve, Rwanda (Source: Atlas of Rwanda's changing environment, 2011)

Terrestrial and freshwater ecosystems

- Earth observation is an excellent instrument for mapping and monitoring of land cover, land use, changes, classification and historical trends
- Earth observation is a valuable tool for assessing the status of ecosystem goods and services, provided by the regulation, habitat, production, and information functions of ecosystems
- Evaluating ecosystem services in support of sustainable ecosystem management requires the use of (spatial) models
- Until now mainly government or scientific activity
- Cost estimate: on case-by-case basis.
- Main challenges: cost, capacity, data access, business model

Examples:

A new map of standardized terrestrial ecosystems of Africa (AAG; 2013) *overview of integrated and comprehensive ecosystem mapping exercise*

A new map of standardized terrestrial ecosystems of the conterminous United States (USGS; 2009) *overview of integrated and comprehensive ecosystem mapping exercise*

Access to global land cover reference datasets and their suitability for land cover mapping activities (GOFC-GOLD; 2014) *presentation that compares current global land cover datasets for different purposes*

Examples of datasets: **GlobCover (ESA), 30 meter global land cover product (China)**

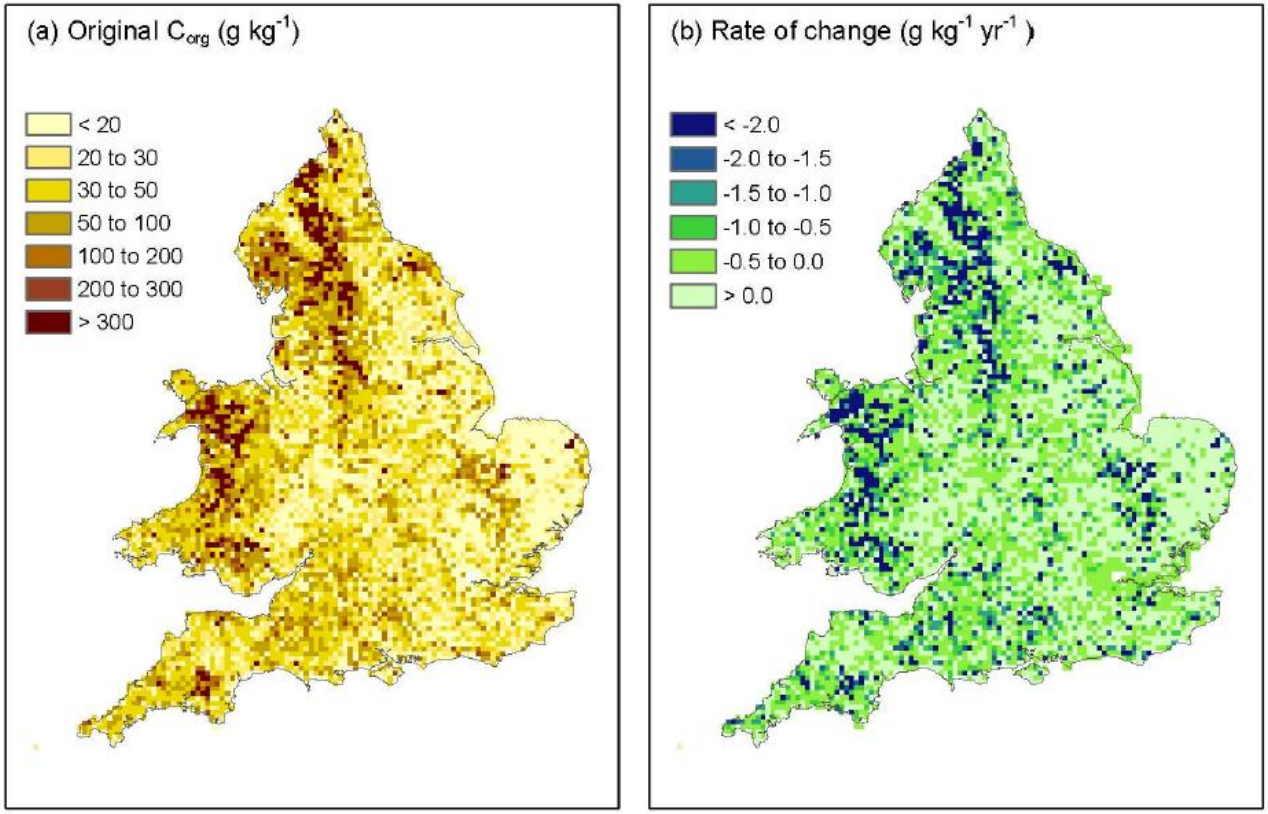
More examples:

Mapping wetlands using earth observation techniques (MEDWET; 2007) *overview of integrated and comprehensive ecosystem mapping exercise for Mediterranean wetlands*

Earth observation for aquatic ecosystems (CSIRO; 2012)
overview presentation of earth observation for water quality monitoring and management in Australia

Atlas of Rwanda's changing environment (REMA; 2011)
implications for climate change resilience covering hotspots, such as population growth, urbanization, wetlands, forests, mining and transboundary issues

Example bio-geophysical variables



Change in soil organic content in England and Wales between 1978 and 2003 (source: Bellamy et al., 2005)

Bio-geophysical variables

- Earth observation facilitates measurement and assessment of individual bio-geophysical variables, such as vegetation, soil, radiation, water cycle and essential climate variables (ECVs)
- Bio-geophysical parameters provide the backbone for analysis and decision-making in environmental management
- Data gathering and analysis mainly carried out by governments, international organizations and academia; private sector uses / assembles / analyses bio-geophysical data mainly for specific purposes, such as precision agriculture
- Cost estimate: on case-by-case basis
- Main challenges: cost, capacity, data access.

Examples:

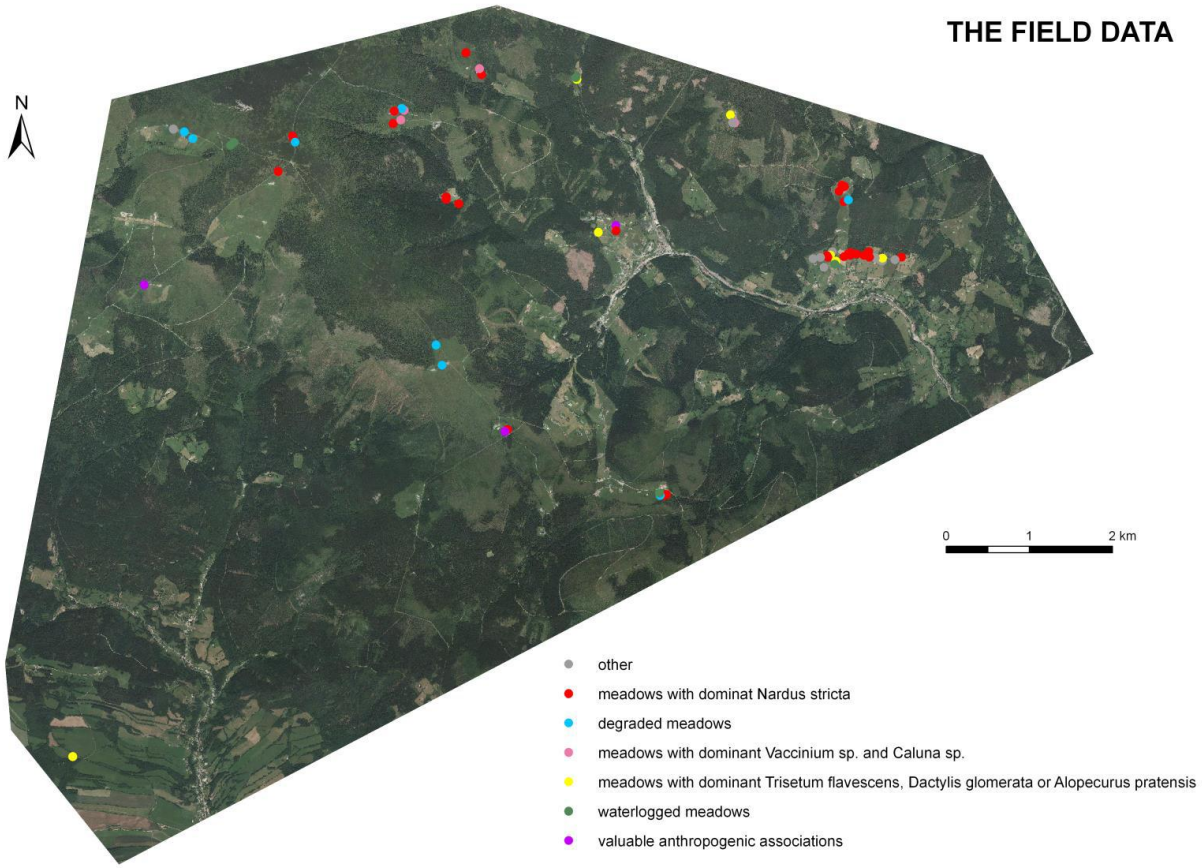
Global energy and water cycle experiment (GEWEX)
www.gewex.org

Essential climate variables (ECV; GCOS)
www.wmo.int/pages/prog/gcos/index.php?name=EssentialClimateVariables

The state of soil in Europe (JRC, EEA; 2012)
update on soil of "the European environment" (EEA; 2010)

More background info in the toolkits on water management and climate

Example local applications



Monitoring of meadows and forest health In Giant Mountains national park (Czech Republic)

Local applications

- Earth observation helps managers of national parks and protected areas improve park management
- Earth observation provides valuable information on plant health, habitats, changes and relations between different factors that cannot be derived, or only at high cost, by in-situ analysis
- Earth observation is instrumental in delineating optimum national park borders and environmental corridors
- Cost estimate: on case-by-case basis
- Main challenges: capacity, data access, business model.

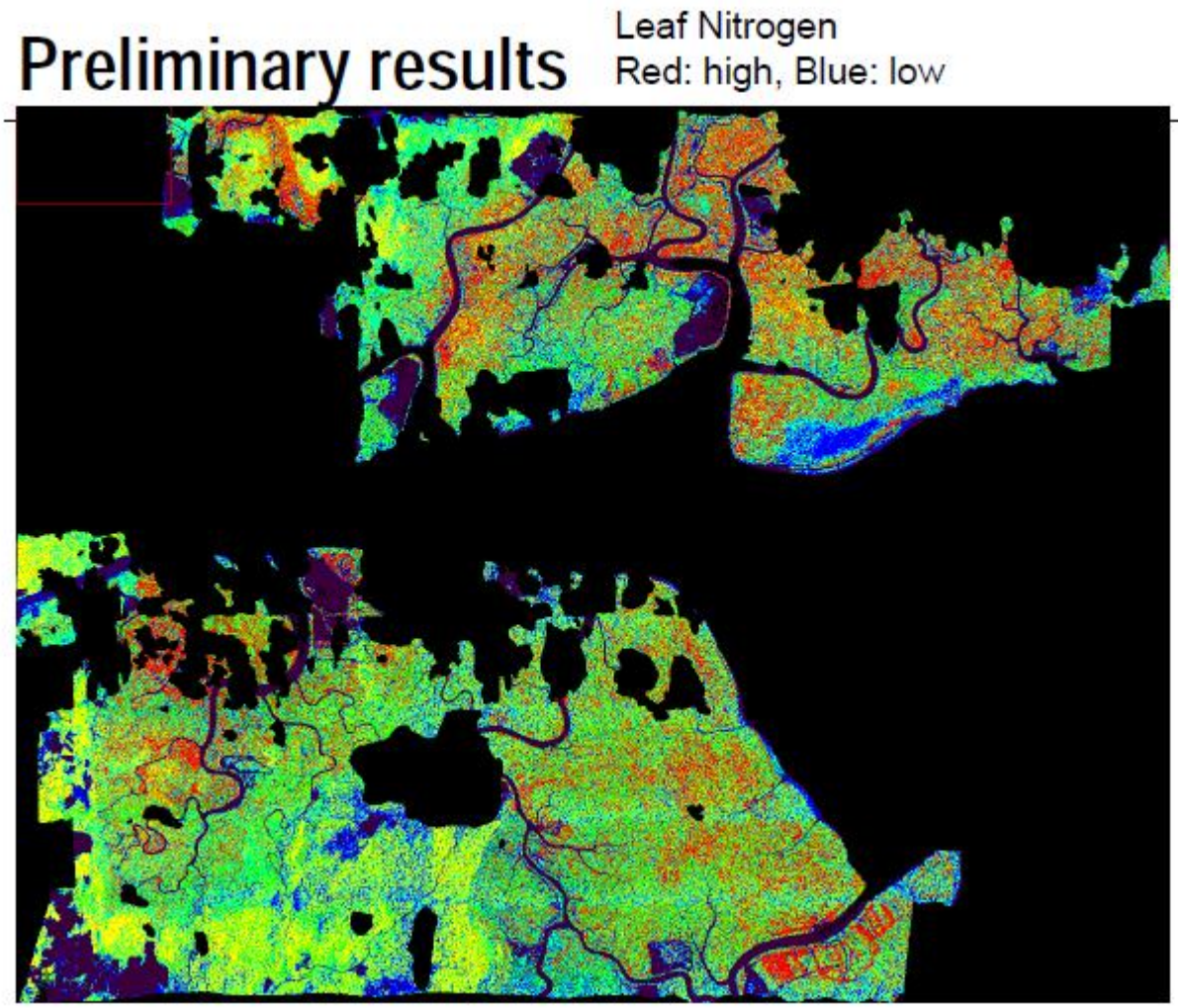
Examples:

Impact of oil palm plantations on peatland conversion in Sarawak 2005 – 2010 (SARVision; 2011) *study using remote sensing showing deforestation for oil palm expansion*

Satellite-based monitoring of protected natural areas of the Samara Region (Scanex; 2013) *description of monitoring of a protected area in Russia to detect changes from natural causes, fires and anthropogenic impact*

Cooperation with **Giant (Krkonoše) Mountains national park** *(on forests, meadows, snow cover, land use development, cover temperature, etc.) and* **Šumava national park** *(bark beetle pest) in the Czech Republic* **(Charles University)**

Example biodiversity modelling and monitoring



Mangrove degradation using leaf nitrogen as (an) indicator: damage declines the level of nutrients

(Source: ITC, 2010)

Biodiversity modelling and monitoring

- Earth observation helps predicting the impact of habitat loss and fragmentation on biodiversity elements and ecosystems processes
- Earth observation facilitates the inclusion of individual species or functional types in ecosystem modelling and models (linked to carbon)
- Models of landscape dynamics, using geospatial data, generate maps of suitable habitat over time for input to meta-population models
- Cost estimate: on case-by-case basis, 110 k€ / year (globally) for general monitoring of invasive species
- Main challenges: capacity, data access.

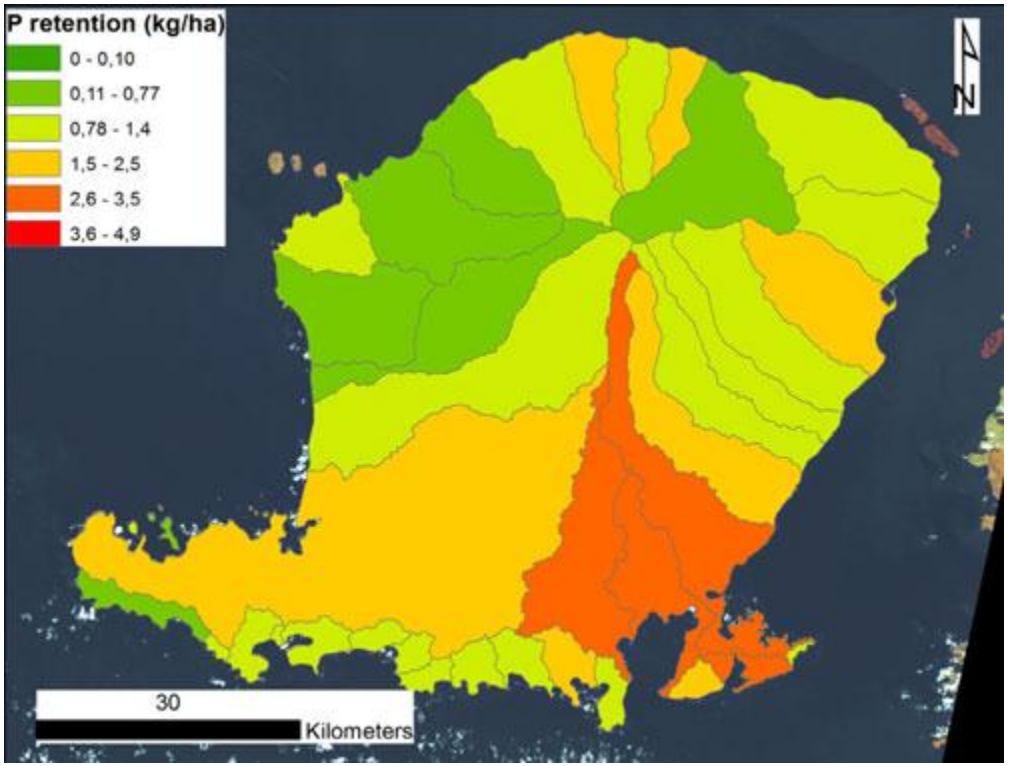
Examples:

Adequacy of biodiversity observation systems to support the CBD 2020 Targets (GEOBON, 2011) *comprehensive overview of needed and existing observation systems for the Convention on Biological Diversity by the GEO Biodiversity Observation Network*

Phenology related measures and indicators at varying spatial scales (EBONE; 2012) *investigation of phenology information for habitat classification using SPOT VGT and MODIS NDVI data*

Geospatial tools address emerging issues in spatial ecology (Skidmore et al; 2011) *overview of the usefulness of geospatial applications for biodiversity and ecology*

Example environmental accounting



EO-derived phosphorus retention map for Lombok, Indonesia, in support of nutrient retention policies (source: Metria, 2014)

Environmental accounting

- Earth observation provides the basis for monitoring, reporting and verification for environmental accounting
- Increased precision of quantification of carbon stocks and ecosystem type classification with EO result in more precise proxies for PES schemes
- Cost estimate: 350 k€ / year for update of ecological footprint, same for water footprint, 10 k€ / year / country for nitrogen footprint, same for carbon footprint; payment for ecosystem services on case-by-case basis, incremental cost for reaching observation adequacy globally estimated at 1,000 – 10,000 k€ / year
- Main challenges: capacity, access to data & technology, business model


Examples:

Remote sensing for payment for ecosystem services is increasingly used by organizations, such as the World Wide Fund for Nature (WWF) and Conservation International.

Quite a number of pilot projects are implemented:

- 4 different trials in Asia and South America (Metria, GeoVille, Argans)
- Indigenous territories in the Mataven area, Colombia, the gorilla habitat in the Great Lakes region of Africa and the peat swamps of Kalimantan, Indonesia (SarVision)

Growth potential for earth observation

- **Mapping and monitoring of terrestrial and freshwater ecosystems and biodiversity**.
  Main clients: government, NGOs.
- **Protected area management.**
  Main clients: government, national park management, NGOs.
- **Measurement, reporting and verification for environmental accounting (including payment for ecosystem services).**
  Main clients: government, environment agencies, NGOs, CSR of big (multinational) companies, local communities.

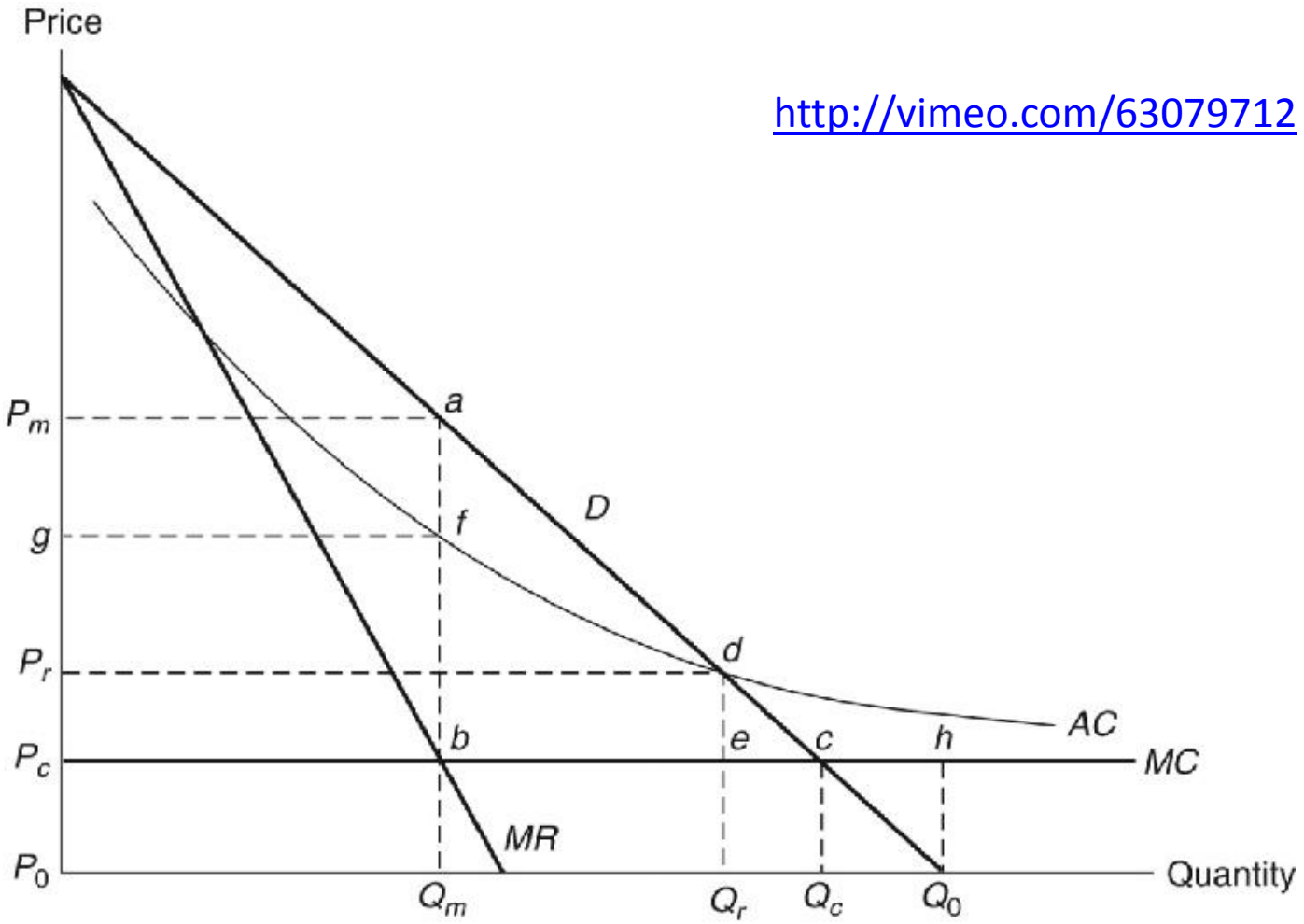
3. Business development

Why is marketing / promotion of earth observation needed?

- Public sector information (PSI)
- Externalities (environmental accounting & payment for ecosystem services)
- Global datasets, open access, data sharing, compatibility (GEO)

If public sector information is made available free-of-charge, demand will increase and, in the end, government revenue also, as companies will derive income from value-added products and services, and consequently pay more taxes (see figures in following slides).

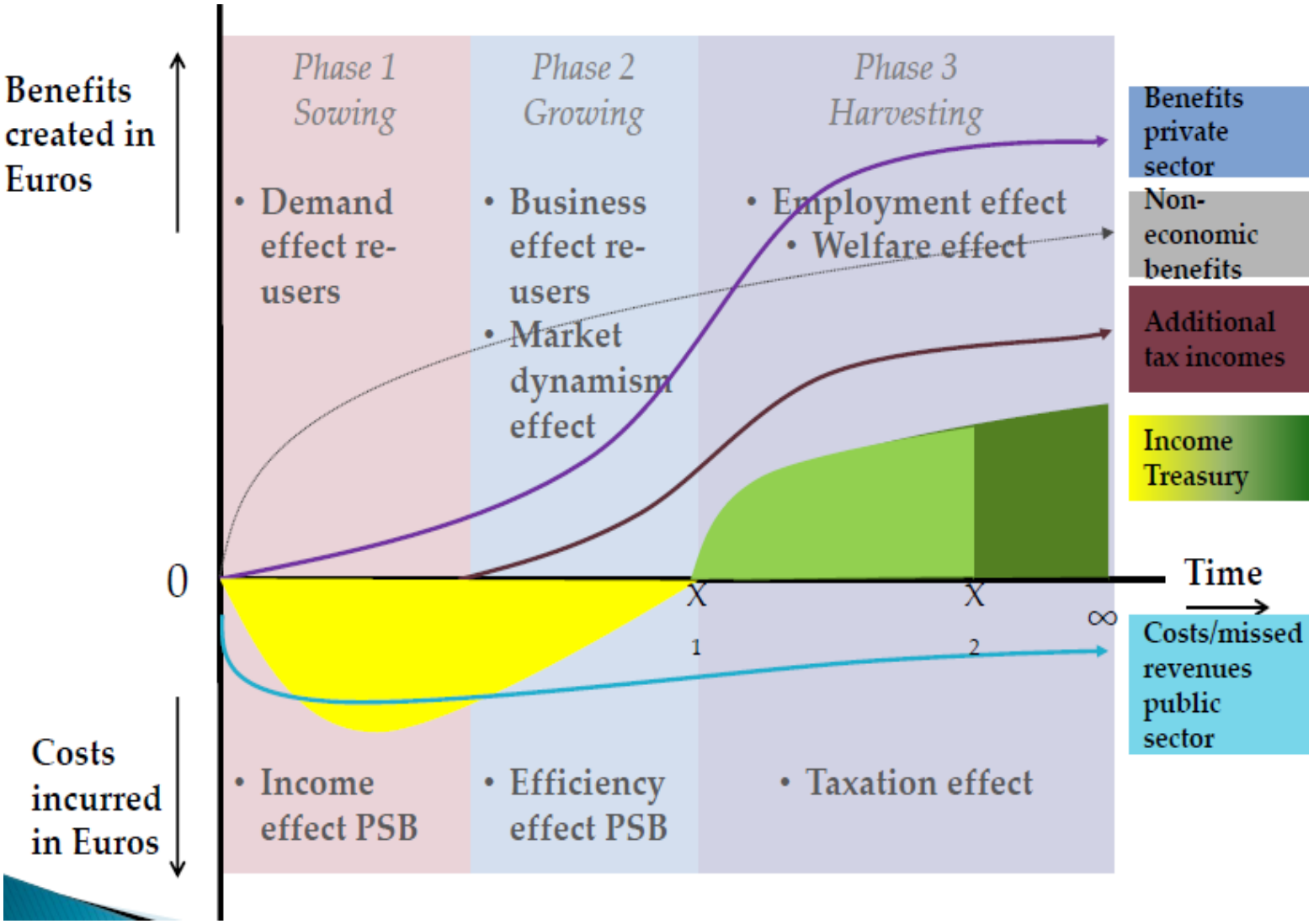
Supply & Demand Public Sector Information



http://vimeo.com/63079712

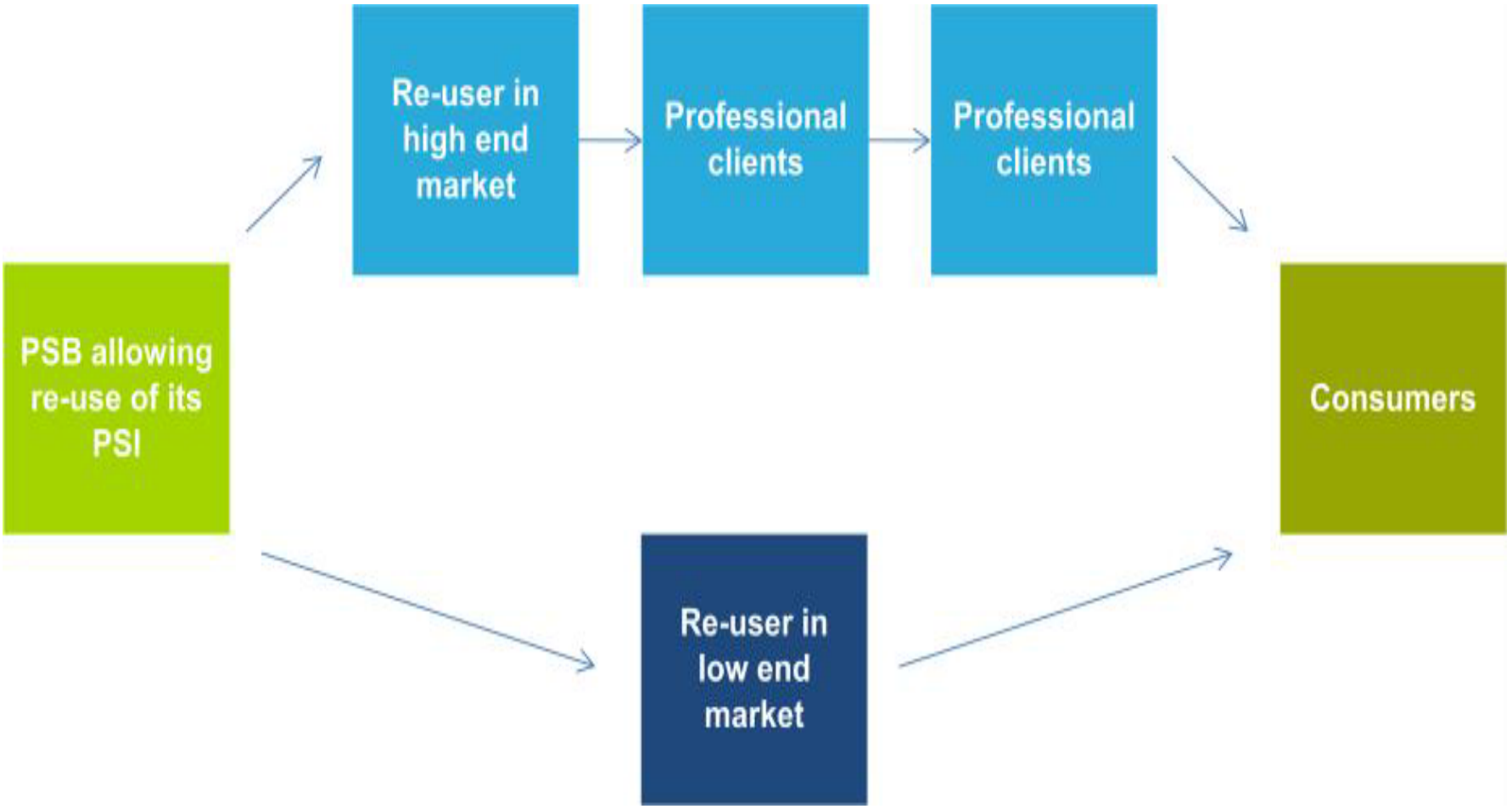
Source: About GMES and data: geese and golden eggs (Sawyer, de Vries 2012)

Cost-benefit Public Sector Information



Source: About GMES and data: geese and golden eggs (Sawyer, de Vries 2012)

Re-use of Public Sector Information

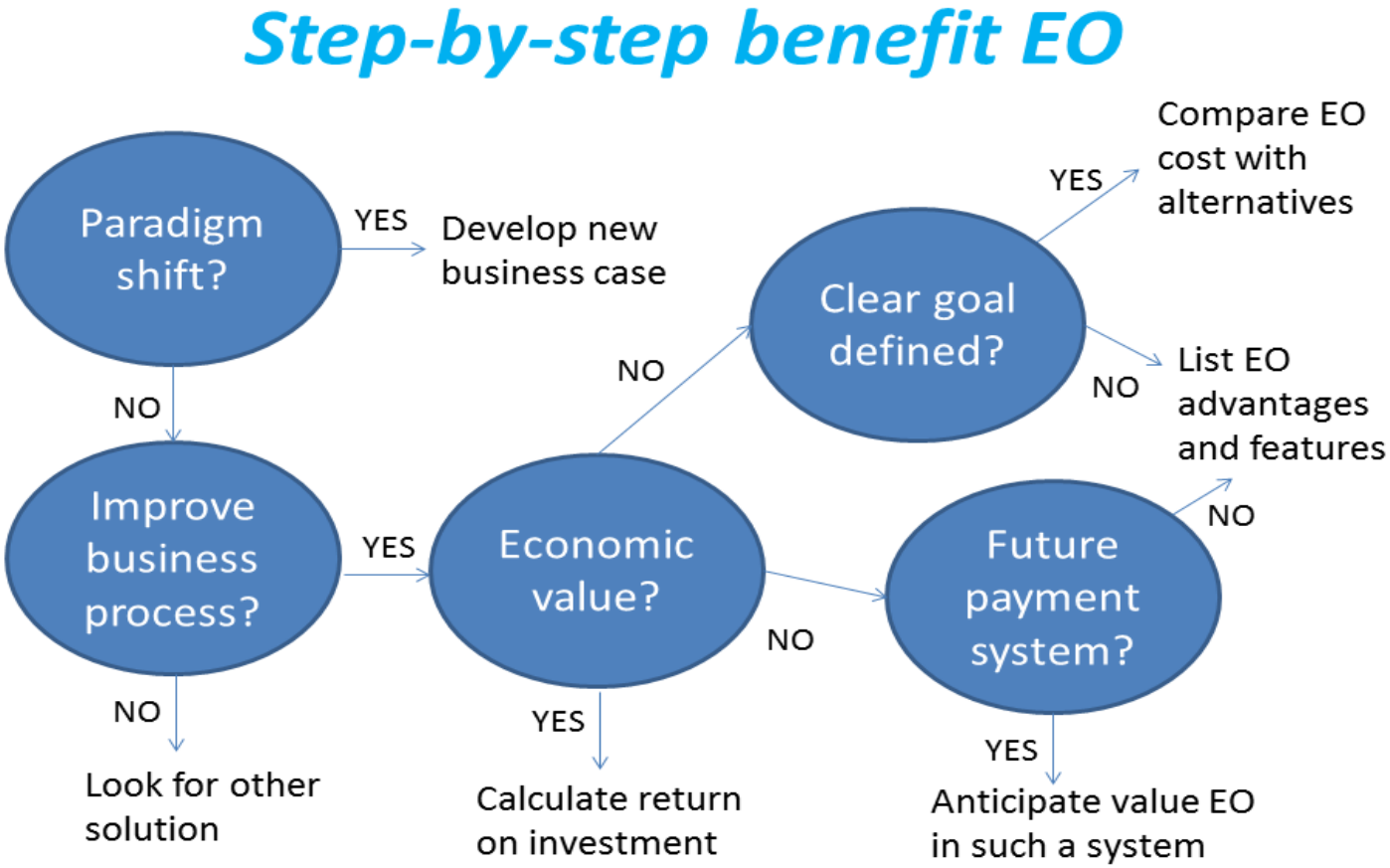


Source: About GMES and data: geese and golden eggs (Sawyer, de Vries 2012)

Most earth observation applications deal with so-called externalities, such as impact on the environment.
It is difficult to capture these in terms of conventional cost-benefit models.

To tackle this, the following framework for analysis of earth observation applications is developed:

Framework for analysis



Step-by-step analysis of the benefits of earth observation (source: GEONetCab, 2013)

Key questions

- Does the new application cause a paradigm shift?
- Is the current business or organization process improved?
- Does the application provide economic value that can be quantified?
- Is a clear measurable goal defined to which the earth observation application contributes?
- Is a future payment scheme or other economic mechanism foreseen in which the earth observation application fits?

Assessment of geospatial solutions

Rating of **characteristics** of geospatial solutions:

- fit-for-purpose
- comparative advantage
- complexity to user / ease- of-use
- elegance
- cost-benefit,
- sustainability
- resilience
- reproduction capacity / flexibility
- acceptance
- level of knowledge transfer required
- ethics, transparency, public accountability, objectivity & impartiality

Rating of **business environment**:

- **Willingness to pay** (by clients)
- **Embedding** (in organizational processes)
- **Openness** (transparency and ease of doing business, access to markets)
- **Institutions** (is the institutional environment conducive to doing business, acceptance of new solutions?)

Fit-for-purpose

An important, but often forgotten requirement:
Does the product or service do what it is supposed to do to solve a certain problem?

In other words: is it really a solution or just an attempt towards a solution?

- Quantitative: not applicable
- Qualitative (on scale of 1 to 5): based on description of what the EO solution actually does

Comparative advantage

What it does significantly better than other solutions to the same problem.

For earth observation usually the comparative advantages of greater accuracy, better resolution in time and space, comprehensive overview of large areas and near real-time information provision are mentioned as comparative advantages.

- Quantitative: calculation of degree in which the EO solution is better than alternatives
- Qualitative (on scale of 1 to 5): based on listing of comparative advantages

Complexity (to user) / ease-of-use

At all levels in the value chain the users (professionals and end-users) are able to work with the product or service.

- Quantitative: not applicable
- Qualitative (on scale of 1 to 5): based on user testimonials and user surveys

Elegance

Once you get the idea behind this product or service, you want to be part of the community that uses it.

This sense of belonging facilitates the formation of user groups that provide valuable feedback.

- Quantitative: none, or it should be the size of the user community
- Qualitative (on scale of 1 to 5): based on user testimonials and user surveys

Cost-benefit

The cost-benefit of the product or service is quantified and sufficiently attractive, also in the long-term.

- Quantitative: cost-benefit calculation
- Qualitative (on scale of 1 to 5): based on quantitative assessment

Sustainability

The product or service can be delivered when it is needed.
There is a long-term perspective that guarantees delivery.

Sustainability concerns the following aspects:

- ✓ Long-term data availability
- ✓ Availability of finance/funds to provide the solution continuously for present and future use
- ✓ Long-term institutional / governmental interest and support
- ✓ Long-term user interest for a solution that addresses real needs

- Quantitative: not applicable
- Qualitative (on scale of 1 to 5): based on sensitivity analysis of the EO solution

Resilience

In case of extremes or breakdown in the value chain, the product or service can still be delivered at an acceptable level. Alternatives (plan B) are available (and developed).

- Quantitative: cost-benefit calculation of plan B
- Qualitative (on scale of 1 to 5): based on risk analysis of the EO solution

Reproduction capacity / flexibility

The product or service can be easily applied or adapted for use in another region or another situation, while still providing the solution without (too much) extra cost.

- Quantitative: calculation of reproduction costs for application in other regions or situations; measurement of spreading of actual use
- Qualitative (on scale of 1 to 5): based on quantitative assessment and description of EO solution

Acceptance

The users intuitively get what the product or service is about and are interested. They accept it as a solution to their problem.

- Quantitative: none, or survey results about acceptance. After introduction of the solution: number of clients and/or users
- Qualitative (on scale of 1 to 5): based on user testimonials and user surveys

Level of knowledge transfer required

The training requirements for professionals and other users along the value chain are clear and associated costs and efforts are acceptable.

- Quantitative: cost and time required to get the users at the desired knowledge and skill level
- Qualitative (on scale of 1 to 5): based on knowledge transfer plans and evaluation of training activities

Ethics, transparency, public accountability, objectivity & impartiality

Application of Earth observation increases the level of objectivity and impartiality in decision-making processes, including conflict resolution. The application improves transparency and public accountability. It raises no ethical issues or if it does, as in the case of privacy concerns, these are resolved in a satisfactory way for all parties concerned.

- Quantitative: not applicable
- Qualitative (on scale of 1 to 5): based on user testimonials and user surveys

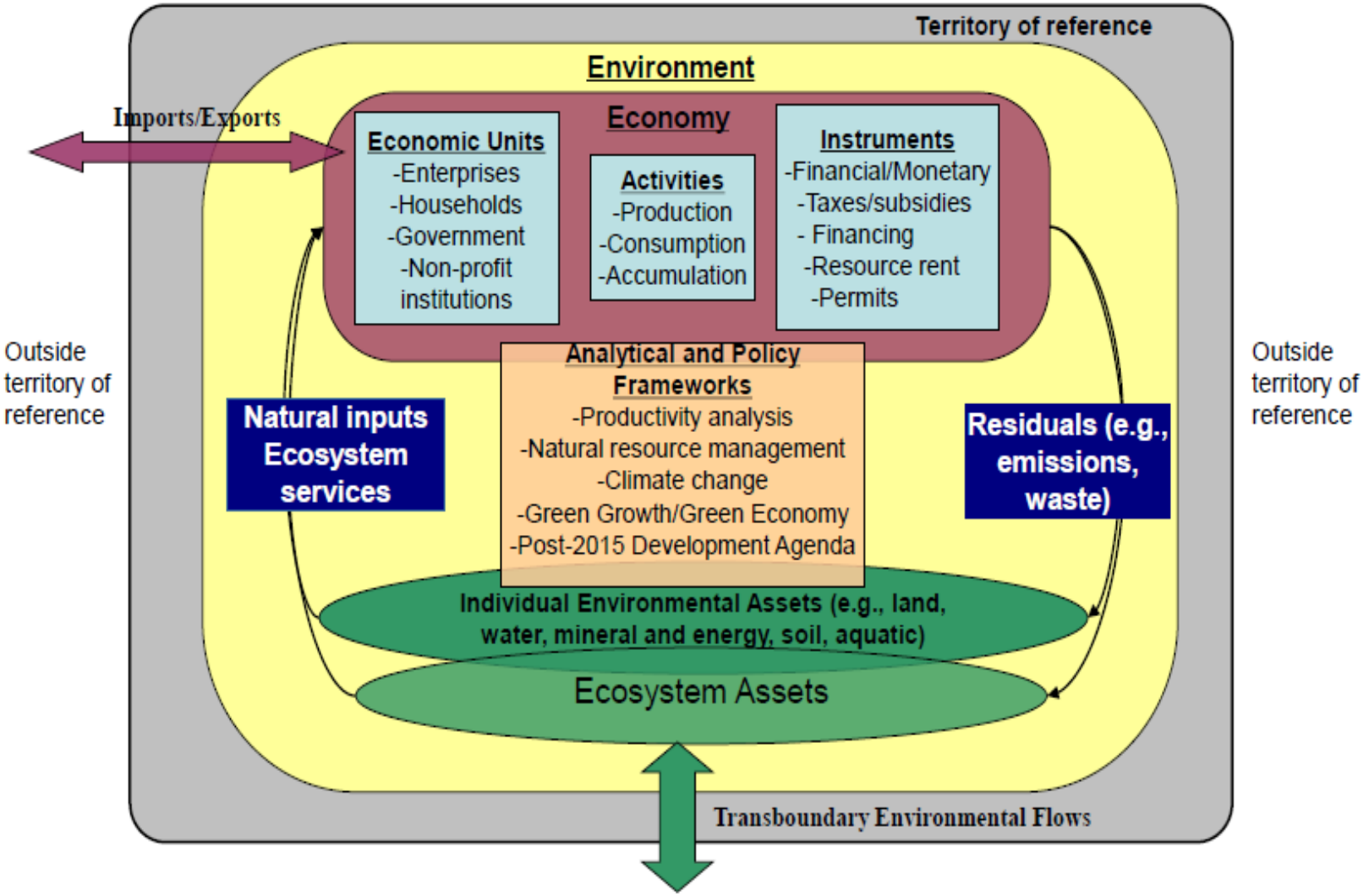
Several attempts have been made to introduce environmental accounting and to enlarge the sphere of the conventional economy to include and quantify impact on ecosystems.

The following slides give some examples:

Environmental accounting & payment for ecosystem services

- **SEEA:**
  System of Environmental-Economic Accounts
  (EC, FAO, IMF, OECD, UN, WB)
- **WAVES:**
  Wealth Accounting and the Valuation of Ecosystem Services (global partnership, led by World Bank)
- **TEEB:**
  The Economics of Ecosystems and Biodiversity
  (group led by UNEP)

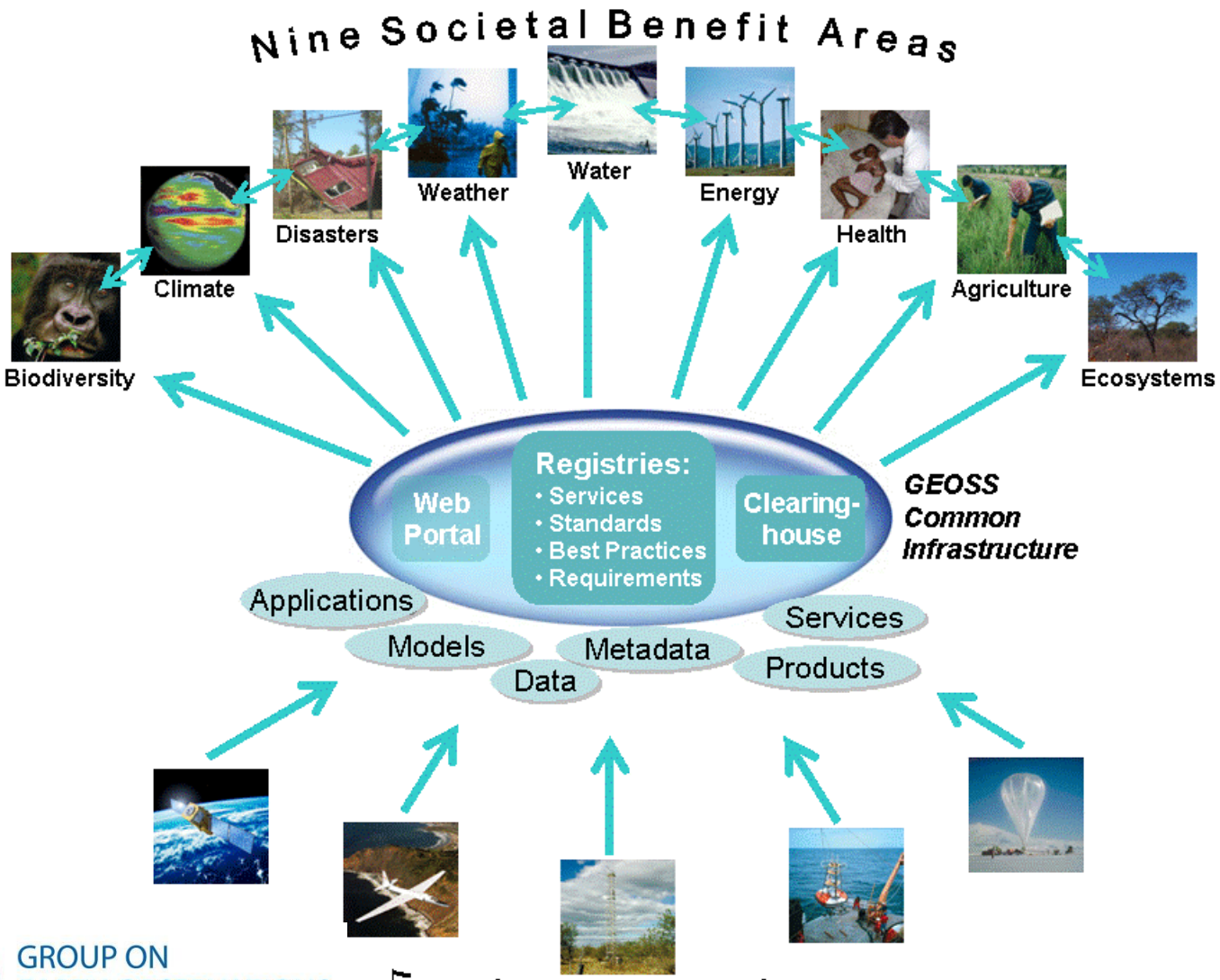
SEEA Conceptual Framework



Source: SEEA conceptual framework report (EC, FAO, IMF, OECD, UN, WB 2012)

For earth observation the work of the Group on Earth Observations (GEO) is essential to achieve the goal of a Global Earth Observations System of Systems (GEOSS), resulting in the shared GEO common infrastructure (GCI):

Group on Earth Observations



GROUP ON EARTH OBSERVATIONS

Marketing elements

- Customer value propositions
- Crossing the technology chasm
- Creating shared value
- Promotion tools

Customer value propositions capture the unique value of a product or services as perceived and appreciated by the customer.

Interestingly, they can differ completely from the features that the provider considers most important:

Customer Value Propositions

VALUE PROPOSITION	ALL BENEFITS	FAVOURABLE POINTS OF DIFFERENCE	RESONATING FOCUS
Consists of:	All benefits customers receive from a market offering	All favourable points of difference a market offering has relative to the next best alternative	The one or two points of difference whose improvement will deliver the greatest value to the customer
Answers the customer question:	"Why should our firm purchase your offering?"	"Why should our firm purchase your offering instead of your competitor's?"	"What is *most* worthwhile for our firm to keep in mind about your offering?"
Requires:	Knowledge of own market offering	Knowledge of own market offering and next best alternative	Knowledge of how own marketing offering delivers value to customers, compared with next best alternative
Has the potential pitfall:	Benefit assertion	Value presumption	Requires customer value research

Source: Customer value propositions in business markets (HBR 2006)

Buyer behaviour & motivation

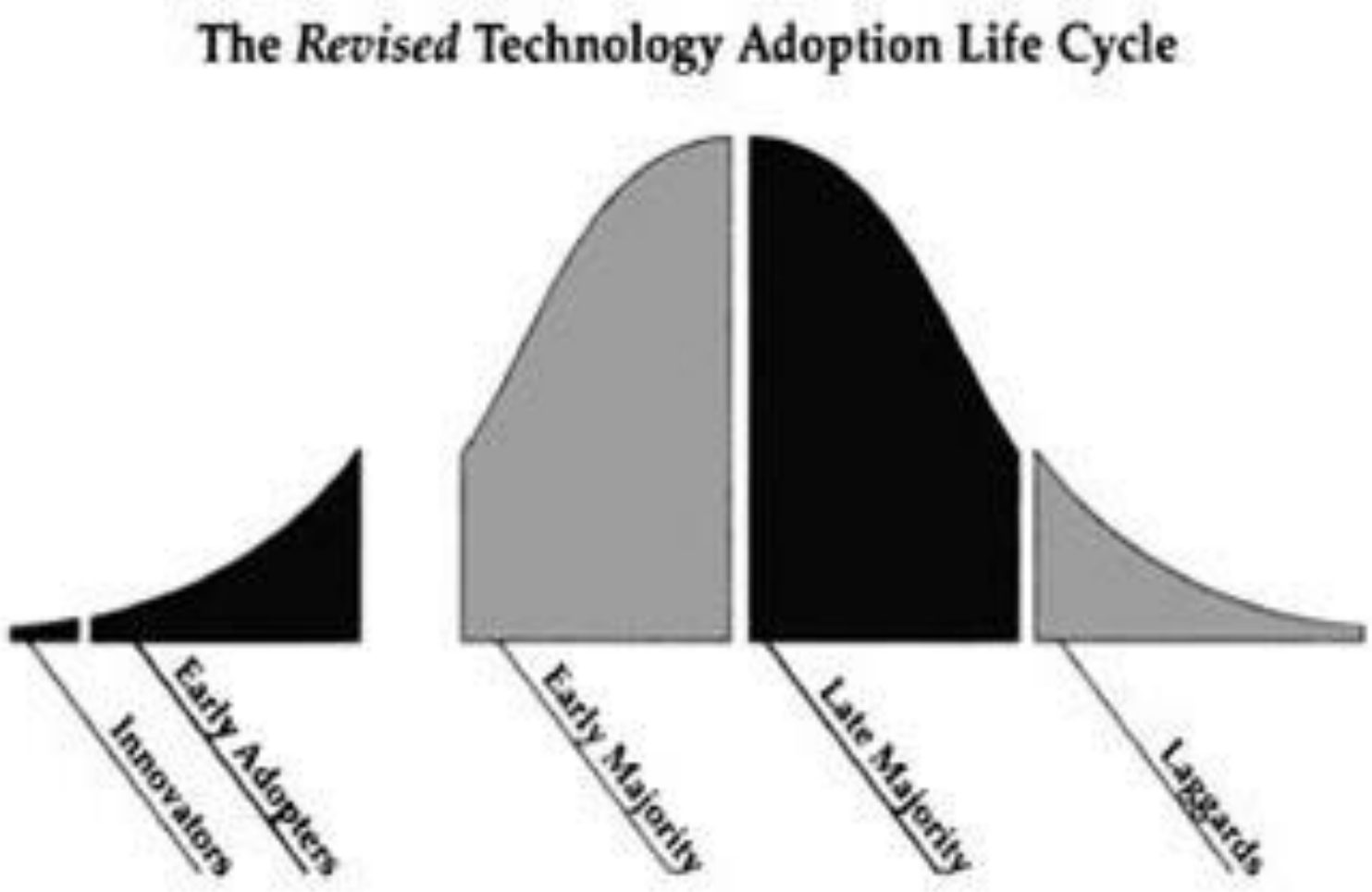
Type	Buyer behaviour	Motivation
Transactional sales	Intrinsic value buyers: “keep it cheap and easy to do business”	Understands the product Perceives it as substitutable Cost focus Resents time ‘wasted’ with sales people
Consultative sales	Extrinsic value buyers: “I don’t know the answer: help me analyse and solve the issue	Focus on how the product is used Interested in solutions and applications Values advice and help Needs the sales person

Source: Rethinking the sales force (Rackham, de Vincentis 1999)

Even when customer value propositions are well captured and formulated, introduction of solutions that involve new technology will have to overcome some hurdles.

This is called “crossing the technology chasm”:

Crossing the technology chasm



Source: Crossing the chasm (Moore 1991)

Crossing the technology chasm

- Most clients of EO products and services belong to the early and late majority.
- They are pragmatists and are not prepared or willing to take substantial risk: the solution should work and be reliable.
- Once convinced, the pragmatists will be long-term clients.

Source: Crossing the chasm (Moore 1991)

More information:

Creating & delivering your value proposition
– managing customer experience for profit
(Barnes, Blake, Pinder; 2009)

Customer value propositions in business markets
(Anderson, Narus, van Rossum [Harvard Business Review]**; 2006)**

Rethinking the sales force:
refining selling to create and capture customer value
(Rackham, de Vicentis; 1999)

Crossing the chasm
– marketing and selling high-tech products to mainstream customers
(Moore; 1991)

Creating shared value is a key element of successful implementation of earth observation solutions.

To achieve this, in most cases earth observation applications have to be integrated into more general (business or organizational) processes:

Create shared value

Involves cooperation between:

- **Public sector**
- **Private sector**
- **Social sector**

Opportunity for earth observation (integrated) solutions:

- Integrate EO in general business / organizational process
- Integrate different EO (and GIS and navigation) functionalities

Based on all considerations dealt with in the previous slides, there are some practical approaches that can be applied in combination to promote earth observation applications:

Tools for earth observation marketing:

- Success stories (in non-technical language, feasible, replication capacity, sustainable)
- Marketing toolkits (international trends, earth observation examples, references)
- Pilot projects, innovation funds, quick-wins (demonstration that EO actually works)
- Promotion outside EO community (fairs, seminars, lunch-bag meetings, magazines)
- Resource facilities for reference and capacity building (distributed, but connected, in different languages)

Source: Marketing earth observation products and services (Noort 2013)

Business elements

Business elements:

- **Proposal writing**
- **Business procedures**

Proposal writing is an art in itself.

During the GEONetCab and EOPOWER projects templates have been developed for writing successful proposals:

Proposal outline

1. Introduction / relevance
2. Objective(s)
3. Activities
4. Output
5. Management & evaluation
6. Risk assessment
7. Time schedule
8. Budget

Annexes

(more detailed version in separate document,
see www.eopower.eu or www.hcpinternational.com)

Other guides that may be useful:

- Civicus: writing a funding proposal
- Michigan State University: guide for writing a funding proposal
- ESRI: writing a competitive GRANT application
- REC: project proposal writing

If you run a company, compete for assignments and manage projects, a structured approach towards responsibilities, tasks, implementation and documentation is needed.

The following business procedures may be helpful:

Business procedures

1. On acquisition
2. On offers
3. On negotiation
4. On contracts
5. On project management
6. On travel & deployment
7. On deficiencies & complaints
8. On internal organization
9. On finance

(more detailed version in separate document,
see www.eopower.eu or www.hcpinternational.com)

Again:

- **SHARED PROBLEM**
- **SHARED LANGUAGE**
- **SHARED SOLUTION**

4. Capacity Building

General

Marketing is promotion + capacity building.

Especially for the introduction of new technologies capacity building is important at all levels.

Capacity building is the instrument to increase self-sufficiency and make solutions work.

General references for capacity building, open data and success stories

GEO Portal: www.earthobservations.org

Capacity building resource facility www.eopower.eu
compilation of tutorials, references, open-source software, etc.

Satellites going local: *share good practice* **(Eurisy handbooks)**
www.eurisy.org

Earth observation for green growth (ESA, 2013)

General references for capacity building, open data (2)

Bringing GEOSS services into practice:
how to use data from the GEO portal and how to provide input
www.envirogrids.net

Science education through earth observation for high schools: *basic tutorials on all kind of subjects, including environment-related topics*
www.seos-project.eu

Copernicus briefs:
information on satellite applications for different topics
www.copernicus.eu/pages-secondaires/publications/copernicus-briefs/

Capacity building resources for environmental management (1):

The GBIF data portal: a practical "hands-on" tutorial
user guide to Global Biodiversity Information Facility www.gbif.org

Guidelines for Biodiversity Monitoring and for Protected Areas (UNEP) *practical guide on how to go about it: definitions, scope, approach, sampling, monitoring*

LULC applications – ESA advanced training course on land remote sensing **(Caetano, 2009)**
presentation with practical EO examples for land use / land cover

Capacity building resources for environmental management (2):

AfroMaison
documents and examples on environmental decision-making
www.afromaison.net

enviroGRIDS – the story of data on the environment
http://www.youtube.com/watch?v=9SKOwQDFhYI&sns=em

Sourcebook on remote sensing and biodiversity indicators (CBD, 2007) *description of how remote sensing can be used for biodiversity monitoring with examples*

Capacity building resources for environmental management (3):

Mapping wetlands using earth observation techniques (Fitoka & Kiramitsoglou (eds), 2008)

part II gives an overview on how to use EO and part III provides case studies

Further details:

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