GEO Model Web to answer "what if" questions

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How Food connects all the SDGs
[credits: Johan Rockström and Pavan Sukhdev]
[Illustration: J. Lokrantz/Azote]
DIKW PATTERN

(connect and understand) Who, What, Where

(connect and understand) How

(connect and understand) What if ....
**DATA... IS RAW. IT SIMPLY EXISTS AND HAS NO SIGNIFICANCE BEYOND ITS EXISTENCE (IN AND OF ITSELF). IT CAN EXIST IN ANY FORM, USABLE OR NOT. IT DOES NOT HAVE MEANING OF ITSELF**

**INFORMATION... IS DATA THAT HAS BEEN GIVEN MEANING BY WAY OF RELATIONAL CONNECTION. THIS "MEANING" CAN BE USEFUL, BUT DOES NOT HAVE TO BE**

**KNOWLEDGE ... IS THE APPROPRIATE COLLECTION OF INFORMATION, SUCH THAT IT'S INTENT IS TO BE USEFUL**
DATA is raw. It simply exists and has no significance beyond its existence (in and of itself). It can exist in any form, usable or not. It does not have meaning of itself.

Information... is data that has been given meaning by way of relational connection. This "meaning" can be useful, but does not have to be.

Knowledge... is the appropriate collection of information, such that its intent is to be useful.

SDGs Communities must be deeply involved.

- KNOWLEDGE ... is the APPROPRIATE COLLECTION OF INFORMATION SUCH THAT IT'S INTENT IS TO BE USEFUL.
INFORMATION SPACE: GLOBAL CHANGES

• FROM DATA TO «WHAT-IF»

EO & Socio-economic Data

Data → Information → Knowledge → Wisdom

EVs creation → Indicators generation → Target Assessment

(who, what, where, when) (how) «What-if»
FROM DATA TO INFORMATION SPACE: GLOBAL CHANGES

CONNECTING & UNDERSTANDING DATA/INFORMATION
MODELING and SIMULATIONS using

Data → Information

EVs creation
Indicators generation
Target Assessment

Business Processes execution
EXAMPLE OF «INTEGRATED MODELING ANALYSIS» TO GENERATE AN INDICATOR

- IMAGE TIME SERIES PROCESSING FOR AGRICULTURE MONITORING (NDVI GENERATION), [HERMAN EERENS ET AL., ENVIRONMENTAL MODELLING AND SOFTWARE]
Example of “What-if”

- Socioeconomic Fossil Fuel Use Model
- Global Climate Model
- Data
- Regional Climate Model
- Data
- Observational Data (environment & vector distribution)
- Health
- Infection Rate Model
- Data
- Infection Rates

- Biodiversity
- Deforestation/Disturbance Model
- Data
- Vector Niche Model
- Data

- Climatology
- How will CC affect infection rate of dengue fever in Vietnam?
Process to support policy development and environmental management ("WHAT-IF")

Integrated Modeling analysis

Problem statement
Conceptual Integrated Modeling Design
Integrated Modeling Execution
Analysis of the Result

IM1
IM2
IM3
IM4

Scientist
IT Professional

The GEO Model Web initiative
A dynamic web of models, integrated with databases and websites, to form a consultative infrastructure where researchers, managers, policy makers, and the general public can go to gain insight into “what if” questions.

Credits: Stefano Nativi (ESSI-lab of CNR-IIA) and Gary Geller (GEO sec)
The Model Web Basic Principles

Basic principles that facilitate organic and opportunistic growth

- **Open access**
  - anybody can create a service to share their model and anybody (or any machine) can access it
- **Minimal barriers to entry**
  - minimize the entry barriers of both resource providers and users
- **Interface-driven approach**
  - Model access is provided by an Interface (service or resource based)
- **Scalability**
  - Distributed approach
What is the **GEOSS Model Web**?

- The Model Web is not a Dedicated Tool
- The Model Web is not another Model Framework
- The Model Web is not a Workflow Framework

- The Model Web is a *Facilitating* Framework
- The Model Web is a *Service Middleware* Framework
- The Model Web is an *Intermediation* Framework
The Model Web architecture

**Abstract**
- Distributed system
  - Resources distribution
- System of Systems
  - Organic Growth
  - No Single Point of Failure
  - Interoperability Arrangements
  - Systems autonomy

**Implementation**
- Web-as-a-Platform
  - Scalability
  - Low entry barrier
  - Organic Growth
- Semantic Web
  - Reasoning;
  - Conceptual Composability
- Web 2.0
  - Low entry barrier
  - user-centered design
  - collaboration on the WWW
The Model Web architecture

Abstract

- Distributed system
  - Resources distribution
- System of Systems

System of Systems using Web 2.0 and 3.0 Patterns

Implementation

- Web-as-a-Platform
  - Scalability
  - Reuse
Main Challenges

Technical challenges
- Information modelling
- Minimal interoperability agreement
- High performance
- Long-term access

Non-technical challenges
- Model-Related challenges
- Cultural, and Social, challenges
- Organizational and Institutional challenges
Information Modeling challenge
Information Modeling challenge

Geo Model Web: Answering "what if" questions

Business Process Editor
(understand & connect)

WF platform(s)

BP Broker

Resources (discovery, and access)

Thank you!

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