

Sub-task Number: AR-09-02d

Sub-task Title: Model Web Development

Overarching Task: Interoperable Systems for GEOSS

Area: ARCHITECTURE

Relevant Committee: ADC

Related Targets: (to be included in 2009)

Sub-task Definition (as given in the 2009-2011 Work Plan):

Develop a dynamic modelling infrastructure (Model Web) to serve researchers, managers, policy makers and the general public. This will be composed of loosely coupled models that interact via web services, and are independently developed, managed, and operated. Such an approach has many advantages over tightly coupled, closed, integrated systems, which require strong central control, lack flexibility, and provide limited access to products.

Leads (GEO Member or PO, Entity carrying out the work, Contact: e-mail):

IEEE, Point of Contact: Gary Geller, gary.n.geller@jpl.nasa.gov

USA (NASA), Gary Geller, gary.n.geller@jpl.nasa.gov

Motivation/Background

Current capabilities for predicting the various impacts of climate and other changes are inadequate, and the Model Web is one of several approaches that can help address this shortcoming; it focuses on enhancing interoperability of existing models and making their outputs more accessible. This will facilitate the gradual development of a modelling infrastructure that can address "what if" questions and so support managers needing information on possible impacts of climate and other change, as well as alternative management and other scenarios. It will also benefit researchers by making it easier to run model experiments and model comparisons or ensembles, as well as help highlight areas needing further development.

Outputs (e.g. products and services which result from the activities of the Task/sub-task; outlined in the form of deliverables with timelines)

Planned:

- Conceptual framework white paper (December 2009)
- Workshop. A workshop (physical or virtual) is needed to facilitate discussion and achieve agreement and buy-in of potential modeller participants. (First half 2010)
- NOTE: These dates have been adjusted due to time constraints on the POC.

Produced (current status):

- Basic concept developed and discussed with many (~20) potential modellers, and other participants.
- Preliminary demonstration system created by connecting GBIF IP3 to the NASA TOPS model
- Paper published in special Climate Change issue of Biodiversity focused on how a future Model Web could help protected area managers address climate change issues (Geller, GN and F Melton, 2008. Looking forward: Applying an ecological model web to assess impacts of climate change. Biodiversity 9:79-83)

Activities (operations or work processes through which resources are mobilized to produce specific outputs; outlined in the form of milestones including timelines)

Planned:

- Develop conceptual framework white paper (Oct 09 – Dec 09)

- Plan workshop (Nov 09 – Jan 09)
- Communication with other GEO tasks that have a modelling component, to enlist wider participation and collaboration (ongoing)
- Look for possible "core" systems in areas other than Ecosystem (such as hydrology or air quality) (ongoing).
- Continue working with Monterrey Bay Aquarium Research Institute (MBARI) to assess the appropriateness of marine fisheries forecasting as a possible model web candidate
- Outreach. Talk at Monterrey Bay Aquarium Research Institute on Model Web and related topics, 14 October 2009

Progress (current status):

- A tentative "Initial Framework System" has been proposed in the Ecosystem area that can act as a core upon which additional models can be added.
- Outreach activities are underway, including a meeting with NCEAS (25 February 2009), and presentations at UCLA (13 March), Stanford (16 March), Berkeley (17 March), GIS group that meets at Google (17 March), ISCMEM (USGov Interagency WG on environmental modeling; 24 March), George Mason University (25 March), talk and brainstorming session at IEEE local chapter (20 May), George Mason University international group (7 July), Ecological Society of America annual Meeting (5 August). Plans in progress at other venues.
- April, 2009. The NASA TOPS model developers have been funded to create a Virtual Modeling Environment to facilitate model and modeller interaction. While not specifically a model web, this is a related activity that will also enhance model and model output sharing.
- March-July, 2009. Recently, there has been a shift towards broadening the scope slightly to include other approaches for enhancing the sharing of models and their outputs, including encouragement of community modeling and use of Virtual Modeling Environments, particularly that which will be provided by the TOPS developers. This shift is motivated largely by the nature of the funds supporting the POC's time.
- August, 2009. Participated in a meeting of the Central and Northern California Ocean Observing System focused on modeling, held at Monterrey Bay Aquarium Research Institute.

Resources (indication of resources – e.g. financial, human – contributed by GEO Members or Participating Organizations to produce outputs)

NASA is supporting the POC (Gary Geller), who is working part time on this sub-task, and has supported Rama Nemani and colleagues, who were key developers of the preliminary demonstration system and will be developing the TOPS Virtual Modeling Environment.

IEEE is supporting Siri Jodha Singh Khalsa, who is contributing time and expertise. Dr. Khalsa is helping put Model Web concepts into the GEOSS context.

IEEE is supporting Stefano Nativi and colleagues, who are contributing time and expertise. Dr. Nativi was a key developer of the preliminary demonstration system and will also be key in development of the Initial Framework System.

Architecture and Data Component

1) Please briefly describe any task-related Earth observation resources (data set, system, website/portal) and any related Web Service interfaces that are contributed to GEOSS. State whether these items are or will be registered with the GEOSS Component and Service Registry for access via the GEO Web Portals, and whether any associated standards or other interoperability arrangements will be registered in the Standards and Interoperability Registry.

2) Please also describe what data and information your activity/system needs that you would request to be accessible through the GEOSS Common Infrastructure.

Capacity Building Component

(capacity building is defined to include the development of capacity related to: (i) Infrastructure and technology transfer (Hardware, Software and other technology required to develop, access and use EO); (ii) Individuals (education and training of individuals to be aware of, access, use and develop EO) and (iii) Institutions – building policies, programs & organizational structures to enhance the value of EO data and products).

1) In accordance with the above definition does this Task have a capacity-building component? If so, please provide a short description of this component including a description of end users.

The ultimate goal of this task is to enable the development of a modelling infrastructure; Earth observations would be a primary input to the models involved. To some extent, this will require a shift in how institutions view the development and use of models—a more holistic, integrated perspective will be encouraged whenever possible, as this will facilitate the development of the infrastructure.

2) Have any additional CB needs for this Task been identified? Please provide a short description.

It is felt that an explicit vision for a modelling infrastructure is needed by institutions that support model development; this should be an international, shared vision. Such a vision would guide institutional decisions about how--and why--models are funded and developed, and would reflect the understanding that it is no longer sufficient to simply fund individual models without regard for the larger picture.

User Engagement Component

(please briefly describe to what extent end users are engaged in this Task and influence the nature of the outputs produced)

Users are driving the need for improved access to assessments on the impacts of change. However, their involvement at this early stage is focused on maintaining contact with them so as to stay in touch with their needs.

Science and Technology (S&T) Component

1) Please briefly describe the elements of scientific research or technological development contained in this Task.

Scientific research is only indirectly contained in this sub-task — this is the additional science needed to improve the models. However, that science is performed by the model developers, whereas this sub-task focuses on bringing those developers, and their models, together, rather than model development.

Most of the technology needed to get started already exists, however, as the model web develops some additional technology (or, at least, tools) will likely be needed. A mature model web will need mature ontologies, for example, as well as descriptors of models and the services they offer (some or all of the latter need is likely already met by the GEOSS Registry). To keep entry barriers to a minimum at this early stage, however, reliance on these tools is minimized.

2) In relation to the S&T component(s) of this task, please describe gaps, priorities, continuity needs, barriers, scientific expertise and additional resource needs (this information will be used for developing a gaps and needs assessment in Task ST-09-01)

Members and POs' Contributions to Outputs and Activities above:

(Input is optional. This section gives the chance to Members and POs to provide more details (3-5 lines) on their individual activities, making a clear connection with the Outputs and Activities outlined above).

USA

Co-lead for the "Access Services-Products, Sensors, Models Transverse Technology Working Group." Also serves as the technical point of contact for the National Operational Model Archive and Distribution System contribution to the GEOSS Architecture Implementation Pilot.

European Commission

EuroGEOSS will contribute interoperable analytical models across three thematic areas (forestry, drought, biodiversity).

Participation (Table to be filled in 2009):

The following are the most active participants:

Type	Member or PO	Representing	Contact Name	EmailAddress
Lead (PoC)	IEEE	IEEE	Gary Geller	gary.n.geller@jpl.nasa.gov
Lead	USA	NASA	Gary Geller	gary.n.geller@jpl.nasa.gov
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