

## Commodity Governance for Communities of Communities

**Cecelia DeLuca**

*University of Colorado. NOAA Environmental Software Infrastructure and Interoperability Group*

New paradigms for governance are needed to support projects that are virtual organizations comprised of “Communities of Communities” (CoCoVOs). Such projects utilize distributed resources and development teams nationally and internationally, integrate many levels of tools and standards, and may address multiple agency and organizational missions, goals, and user communities. Although they require responsive and effective decision making, they may not have a single project manager, or a single institutional lead. They require rethinking governance, promotion, communication strategies, and collaborative tools. Examples in the Earth sciences may be found in research (the Community Earth System Model/CESM), operations (National Unified Operational Prediction Capability/NUOPC), infrastructure development (Earth System Grid Federation/ESGF), and coordinated assessments (5<sup>th</sup> Coupled Model Intercomparison Project/CMIP5). **These projects are characterized by a need for complex, integrated deliverables in a highly distributed development environment, with multiple leads of comparable influence.** If the Earth Cube effort is to effectively integrate national data resources and services, it will likely fall into this category as well.

CoCoVOs may include and rely on groups engaged in more traditional toolkit and standards development. Shareable, focused tools (netCDF, THREDDS, PIO, ESMF) have had large impact on Earth sciences, as have standards bodies such as the Climate and Forecast (CF) conventions and Open Geospatial Consortium standards. These building blocks are essential prerequisites for large-scale integration, but their development is a different sort of process than large-scale integration, and the steps in going from one to the other are not necessarily straightforward.

Our team’s participation in both toolkit development and several of the large-scale integration projects mentioned above (CESM, NUOPC, CMIP5, ESGF) has led us to conclude that a different approach is required for leading and governing a CoCoVO. The remainder of this short paper explores the characteristics of effective governance for these sorts of organizations.

For a group that is primarily a developer of toolkits, intensive institutional promotion is natural and useful. The historical path to success is in acquiring more resources for the institution, in continuing a primary leadership role, and in setting up governance that is broad but largely advisory in nature. In contrast, for an organization that is assuming a leadership role in a CoCoVO, intensive institutional promotion is often detrimental, since it lessens trust that the institution will act fairly on behalf of its partners. Instead, it will tend to promote the collaboration rather than its own institution, to distribute development and divide resources to

the extent possible to broaden ownership, and to create governance that is actively participatory rather than advisory.

Issues of trust and transparency arise again when constructing decision-making processes that involve CoCoVOs. Multi-agency or multi-national partners may actively resist the idea of a single lead organization, and decision-making can require a structured mediation process. A governance body such as a Change Review Board can be used to formally organize development under these circumstances. Our team has worked with CRBs that include informed user representatives who prioritize development tasks and directly set the contents of releases and schedules for the collaboration. The body meets sufficiently frequently, usually quarterly, to maintain control over development. This approach has some key advantages for multi-lead organizations: it creates shared responsibility for decisions and for reconciling goals with resource limitations. Although there is no overarching line management, this kind of a body creates a clear line between a sponsoring institution and how its funds are used.

Cyberinfrastructure plays an important role in how a CoCoVO functions. Sprawling organizations often have multiple repositories, multiple trackers, multiple wikis, and constituent bodies that wish to retain their own primary affiliation, infrastructure, and management practices while also contributing to development. Tools are needed to help organize the contribution streams and to help the collection of leads track development. To the extent possible, it is useful to identify and propagate standard governance practices throughout the partner organizations. CI can be used to create environments in which projects and project artifacts are appropriately linked, and cross-organization visibility can be maintained. Our software development group is currently working with a set of physical scientists and a set of social scientists to examine how governance practices can be “commoditized” and encoded into development and analysis environments so that co-development can be initiated more easily and dynamically, under a NSF-funded “Commodity Governance” effort.

These concerns are relevant for the Earth Cube because NSF data service needs are closely tied to the resources of NASA, DOE, NOAA, USGS, and other agencies. It’s time to envision broader collaborations, organized in ways that take advantage of emerging CI and look to new patterns of distributed leadership.