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Principles of data integration and interoperability in the GEO Biodiversity Observation Network

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The goal of the Global Earth Observation System of Systems (GEOSS) is to link existing information systems into a global and flexible network to address nine areas of critical importance to society. One of these “societal benefit areas” is biodiversity and it will be supported by a GEOSS sub-system known as the GEO Biodiversity Observation Network (GEO BON). In planning the GEO BON, it was soon recognised that there are already a multitude of existing networks and initiatives in place worldwide. What has been lacking is a coordinated framework that allows for information sharing and exchange between the networks. Traversing across the various scales of biodiversity, in particular from the individual and species levels to the ecosystems level has long been a challenge. Furthermore, some of the major regions of the world have already taken steps to coordinate their efforts, but links between the regions have not been a priority until now. Linking biodiversity data to that of the other GEO societal benefit areas, in particular ecosystems, climate, and agriculture to produce useful information for the UN Conventions and other policy-making bodies is another need that calls for integration of information.

Integration and interoperability are therefore a major theme of GEO BON, and a "system of systems" is very much needed. There are several approaches to integration that need to be considered. Data integration requires harmonising concepts, agreeing on vocabularies, and building ontologies. Semantic mediation of data using these building blocks is still not easy to achieve. Agreements on, or mappings between, the metadata standards that will be used across the networks is a major requirement that will need to be addressed early on. With interoperable metadata, service integration will be possible through registry of registries systems such as GBIF’s forthcoming GBDRS and the GEO Clearinghouse. Chaining various services that build intermediate products using workflow systems will also help expedite the delivery of products and reports that are required for integrated assessment of data from many disciplines.

Going beyond the Service Oriented Architectures which now are mainstream, these challenges have lately been addressed in the business world by adopting what is called a Semantic Enterprise Architecture. Semantic portals have been built, in particular, to address interoperability across domains, where users may not be familiar with concepts of all networks. We will discuss the applicability of these approaches for building the global GEO BON.