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Cyberinfrastructure for Data Authorship, Publication and Application Interoperability

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Since the mid-1990s, at the San Diego Supercomputer Center (SDSC) at the University of California, San Diego (UCSD), we have been building digital library systems for a range of disciplines and evolving the underlying cyberinfrastructure components through generations of deployed, operational systems. These include applications for coastal resource management (California Coastal Atlas), blue-water oceanography (SIOExplorer), deep-ocean drilling (Integrated Ocean Drilling Program Site Survey Data Bank), atmospheric science (Center for Multi-scale Modeling of Atmospheric Processes (CMMAP)) and geospatial data-sharing across the State of California (CSDI). SIOExplorer and IODP SSDB are operational for about ten years under the control of staff at SIO using earlier versions of the technologies we propose to leverage here. Recently, CLIDEEP (Climate Impacts on the Deep Ocean), a part of International Network for Scientific Investigation of Deep-Sea Ecosystems (INDEEP), has been added to the list of projects to which this technology will be applied thereby entraining a new community of ecologists in best-management practices for scientific data and data publication. Since those earlier systems were made operational, continuing developments have led to the evolution of the Digital Library Framework and Digital Library System technologies to facilitate the production of multi-lateral metadata conforming to a variety of metadata standards (e.g., Dublin Core, FGDC, ISO19139) and to automate the production of the metadata required to obtain a digital object identifier (DOI) from the CrossRef system and DataCite cross-referencing systems. Since the emergence of CrossRef, there is now also a citation service called DataCite. For about the past two years, a Data Citation Standards and Practices Task Group under the International Council for Science / Committee on Data for Science and Technology (ICTSI/CODATA) was formed to develop a report for its international membership, including the US

National Academy of Sciences, and the scientific community at large. As part of the process, an international symposium and workshop, co-sponsored by US CODATA and the Board on Research Data and Information in collaboration with CODATA-ICSTI Task Group on Data Citation Standards and Practices was held Berkeley, California in August, 2012. The report will be available sometime in 2012. As funding sources for scientific research have begun to require data management plans as part of their selection and approval processes, it is important that the necessary standards, incentives, and conventions to support data citation, preservation, and accessibility be put into place. This promise depends upon the ability to reliably identify, locate, access, interpret and verify the version, integrity, and provenance of the digital datasets. The goals of this on-going work are to develop the software necessary to (1) enable widely-used, open-source and proprietary data analysis tools to be enabled to intrinsically integrate DOIs into their dataset writing to enable data citation to be an organic part of data analysis, (2) produce the pedagogy and course materials to teach this practice as part of standard undergraduate training at an evolving college with an under-represented student population, (3) publish these resources according to open-access community practice.

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