Executive Summary

New digital technologies are transforming the practice of science. Science is now increasingly computational, data-intensive, and collaborative because digital technologies provide new ways for scientists to both create scientific information, and to communicate, replicate, and reuse scientific knowledge and data. These same technologies are creating important opportunities for international funding agencies to promote scientific collaboration and to foster the replication and reuse of scientific information.

The U.S. National Science Foundation (NSF) held a workshop titled "*Changing the Conduct of Science in the Information Age*" on November 12, 2010, to promote international cooperation in such policy areas as the promotion of data access, the development of technical solutions for open data platforms, and attribution for research contributions. This report describes the discussions, findings, and suggestions generated by the distinguished group of international workshop participants.

Participants identified a number of key findings with respect to data access. They noted that the primary social barriers to data access include insufficient intellectual property rights, the difficulty of documenting data for reuse, and problems associated with protecting confidentiality and privacy. They also noted that a host of technical issues must be addressed, including data control, security, long-term preservation, and stewardship. Participants agreed that scientific information should be broadly defined to include both data and code, and that knowledge sharing encompasses a variety of modes and methods. They noted that scientific attribution is critical to establishing trust in the research community and thus promoting knowledge access.

Workshop participants outlined a vision for the future that includes a framework for openness and international standards for data and knowledge; reliable and unique identifiers for individual researchers, organizations, and publications to create linkages between publications and their appropriate data; continuous investment for data preservation and access; and formal and informal training of students, researchers, and funding agency personnel.

There was a strong consensus that this vision could be achieved with the help of a concerted, collaborative effort by international funding agencies to:

(1) Establish a system of persistent identifiers for researchers and their outputs;
(2) Develop national and international pilot projects that compare different technical solutions for establishing and maintaining open data platforms, fostering the replication of scientific research, and ensuring attribution for the intellectual contributions of researchers; and
(3) Foster formal and informal training to develop scientists' skills in knowledge and data access, as well as data analysis.