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The Role of Data Systems to Enable Open Science

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Open science is a concept that represents a fundamental change in scientific culture. This change is characterized by openness, where research objects and results are shared as soon as possible, and connectivity to a wider audience. Understanding about what Open Science actually means differs from various stakeholders.

Thoughts on Open Science fall into four distinct viewpoints. The first viewpoint strives to make science accessible to a larger community by focusing on allowing non-scientists to participate in the research process through citizen science project and by more effectively communicating research results to the broader public. The second viewpoint considers providing equitable knowledge access to everyone by not only considering access to journal publications but also to other objects in the research process such as data and code. The third viewpoint focuses on making both the research process and the communication of results more efficient. There are two aspects to this component which can be described as social and technical components. The social component is driven by the need to tackle complex problems that require collaboration and a team approach to science while the technical component focuses on creating tools, services and especially scientific platforms to make the scientific process more efficient. Lastly, the fourth viewpoint strives to develop new metrics to measure scientific contributions that go beyond the current metrics derived solely from scientific publications and to consider contributions from other research objects such as data, code or knowledge sharing through blogs and other social media communication mechanisms.

Technological change is a factor in all four of these viewpoints on Open Science. New capabilities in compute, storage, methodologies, publication and sharing enable technologists to better serve as the primary drivers for Open Science by providing more efficient technological solutions. Sharing knowledge, information and other research objects such as data and code has become easier with new modalities of sharing available to researchers. In addition, technology is enabling the democratization of science at two levels. First, researchers are no longer constrained by lack of infrastructure resources needed to tackle difficult problems. Second, the Citizen Science projects now involve the public at different steps of the scientific process from collecting the data to analysis.

This presentations investigates the four described viewpoints on Open Science from the

perspective of any large organization involved in scientific data stewardship and management. The presentation will list possible technological strategies that organizations may adopt to further align with all aspects of the Open Science movement.