



The Policy Studies Organization

**Speaker**

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**Topic**

**“The ‘Big Data’ Initiative and Great Expectations for Shifting the Worldview Paradigm”**

Recently, the White House Office of Science and Technology Policy (OSTP) launched the “Big Data Research and Development Initiative” [1]. This initiative promises to help to solve some of the Nation’s most pressing challenges by improving our ability to extract knowledge and insights from large and complex collections of data. Most significantly, this initiative is aimed at advancement in scientific research, environmental and biomedical developments, education, and societal decisions. It is elatedly expected that extracting useful information from large and diverse data sets will accelerate knowledge discovery and lead to new fields of inquiry that would otherwise not be possible.

The National Institutes of Health is particularly interested in molecular, cellular, electrophysiological, chemical, behavioral, epidemiological, clinical, and other data sets related to health and disease. The world’s largest set of data on human genetic variation is now established on the Amazon Web Services cloud and is publicly available for free. The presented 200 terabytes – the equivalent of 16 million file cabinets – is a prime example of Big Data so massive that few researchers have the capabilities to make best use of them. The Department of Energy strives for Scientific Discovery Through Advanced Computing by extensive simulations producing inundation with secondary data of increased size and complexity. For Earth System Science the Big Data projects should improve our understanding of issues such as species response to climate change, earthquake recurrence rates, and the next generation of ecological indicators. (continued on next page)



# DUPONT SUMMIT 2012

..... Pressing Issues Amid the Political Maelstrom

December 7, 2012 \* Carnegie Institution for Science, Washington, DC  
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The Big Data endeavor clearly divides into two completely distinct parts: technological and scientific. Seemingly, the progress in the first part should immediately move forward the second part. The state of affairs, however, is more involved. It reminds the struggle with the data avalanche in centralized planning of national economy, as encountered in the former Soviet Union [2]. As long as some detailed economic information is available it can definitely underpin concrete micromanagement efforts, however, the abundance of related information at low levels cannot lead to best decisions at higher levels. To be efficacious, the complexity of the organization of an economic system has to be handled essentially differently by using a distributed rather than centralized scheme of information control. Analogously, Big Data manipulations in application to scientific research effectively support specific lines of reasoning. But to attain a decisive shift of the worldview paradigm is a distinct activity. As an operational concept by itself the Big Data computational model being associated with cloud computing and stream processing, can resourcefully contribute to the formation of innovative ideas in quantum processing and organization of the brain. A possibility of this kind is outlined in [3].

The ultimate goal of a scientific theory is comprehension. Technological success can thrive on incomplete or even wrong theories. But at certain moment further progress stalls. It appears that such a condition has been reached nowadays in research areas of biomedical problematics and alternative energy. Enormous investments in these areas do not produce outcomes **commensurable** with what is anticipated. Monotonous treatment of data just creates more data, and nothing more. Eventually, in one way or another all scientific enterprises meet with the fundamental question of how to comply with a global paradigm for the Nature of Things. Formation of corresponding knowledge needs a creative breakthrough by an ingenious apprehension of Big Data. This is an urgent demand, not merely for prosperity, but for survival. (continued on next page)



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## References

- [1] "Big Data" Research and Development Initiative, OSTP  
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- [2] S. Ya. Berkovich and Yu.N. Ivanov, “The organization of an Information System for Problems in Economics – INES”, Proceedings of the Joint US – USSR Seminar on Data Models and Database Systems, Moscow, November 14-23, 1977, pp. 120 – 127, Institute for Computing Science and Computer Applications, The University of Texas at Austin
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