Electronic Mapping Systems, Inc.
10340 Democracy Lane, Suite 302
Fairfax, VA 22030
Website: www.e-mapsys.com

Phone: 703-385-9320 **Email: e-maps@e-mapsys.com** **Fax: 703-385-0999**

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BIG DATA AND ONTOLOGY

This paper introduces and discusses the role in Big Data of ontology, the science of representing reality across disciplines and IT systems.

Big Data needs to be understood and exploited because of the ever-increasing volumes of data being (1) generated by sensors and other computer-based data generators and (2) made accessible through computer networks. The question now is how and not whether to exploit Big Data.

Exploiting Big Data starts with understanding that while the computer-based tools that give us today's Big Data challenges and opportunities are relatively new, Big Data challenges have arisen and been mastered repeatedly throughout history. When the ancient Greeks created data and information on a wide range of subjects from mathematics to architecture and medical science, Aristotle saw the need for and wrote out theory and methods for categorizing elements of reality consistently across individual subjects. These concepts are the core of today's concepts and methods of ontology and are used in IT systems that produce a few elements of important information from large volumes of data that have little value until processed.

Ontology's primary contributions and value *are concepts and methods for categorizing elements of reality consistently across disciplines and IT systems*. Google Maps demonstrates the importance of ontology. A Google Maps user enters a street number and name, city, and state and gets a quick response regardless of the city or state. This capability is possible because cities inventory addresses within their boundaries for 911 systems, tax rolls, and predicting school enrollment. Google Maps can exploit these inventories because cities addresses are composed of standard categories of data (i.e., street number, street name, city, state, and zip code).

Users of Google Maps are impressed by the software - the interface, the detail of the maps, and the clever icons for stores and houses. Google's success at applying IT to create and maintain this capability to exploit data produced by thousands of organizations around the world depends as much on the theory and methods of ontology as on databases, networks, and other elements of IT. Google maps would not exist without the IT, but selecting and tailoring the IT rests on understanding and exploiting the concepts and methods of ontology.