Fusing Geology, Geography, and Economics
Within a Cloud Computing Environment to
Improve Natural Disaster Planning and Response Training

By
Christopher John Maxin
Master of Science in Geological Sciences
San Diego State University, 2015

Disaster response is everyone's responsibility. If a disaster occurs, the person sitting next to you is the "first responder" not a fireman, policeman, or emergency medical technician. This means that everyone should have some type of training on how to respond, take action, and provide aid to his or her family, friends, and neighbors. So why do we need to learn these skills? Because natural disasters cannot be thought of as a singular event, but rather a series of interconnected, cascading consequences (dominoes) that are initiated by a single, calamitous event. With the modern world becoming increasingly integrated, the peoples of the various nations on the planet are interconnected through families, marriages, and shared experiences. Therefore, the human element of disasters is experienced far from the actual disaster location. Finally, the economics of this planet are interconnected like never before and just like the human element, the economic elements affect people far from the disaster location.

Currently, natural disaster response planning and training are individually conducted by most emergency response agencies, security agencies, healthcare agencies, and aid agencies. While these groups do a journeyman's job in responding, their focus is generally limited to their organization's specialty. The purpose of this thesis is to examine how modern response planning for natural disasters relies on interconnected disciplines such as Geology, Geography, and Economics. Fusion of these and other disciplines via cloud computing offers an extraordinary opportunity to better respond, but only if this larger perspective is exercised and appreciated for the interdependent global system and potential response capabilities provided by the cloud. So, just like first responders, businesses, Municipalities, States, and the Federal government need to train on how to respond to natural disasters.

First, the stage is set by examining general background information on how Geology, Geography, and Economics influence the type, severity, and duration of natural disaster impacts. Secondly, cloud computing is considered as a global capability to provide the near real-time information and fusion capabilities to increase response efficiencies. Thirdly, the integration of multiple disciplines is reviewed and analyzed from Hurricane Katrina and other, more recent disasters to identify "Lessons Learned" that could be applied to future disaster planning and responses. How such Lessons Learned can assist with decision support during disasters is the focus of this effort for appropriately planning and executing disaster-response exercises.

Upon completion of the above three tasks, business and military strategic planning methodologies are analyzed to identify strengths, weaknesses, interrelationships, and dependencies. After choosing a methodology to use for such disaster exercises, "how to" instructions are outlined on choosing the appropriate disaster specifics such as choosing the location, developing a structure, selecting a staff, conducting the research, and creating a

science-based, disaster response exercise. Finally, after designing and developing such a disaster exercise including with assessment parameters and measures of effectiveness, a pathway toward improved exercises with greater community involvement is discussed with a focus on building community resilience and developing collaboration of military and civilian groups.