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Angela Sheffield*. *Next-Generation AI: We're pushing AI beyond ML, and we need your help.*

For highly-specialized, scientific, and high-consequence industries like research and national security, most off-the-shelf machine and deep learning models do not work. We're drowning in data, but have few (if any!) labels or examples of what we're looking for. Our methods must obey the laws and fundamental principles of physics and social science and leverage awareness from these domains to improve performance. And we may develop, train, and validate our models on data that is statistically different from the data the model will encounter once deployed. In the world beyond cat videos and retrieval systems . in the world of nuclear security . we need new, multidisciplinary AI methods grounded in mathematics and statistics. And we need mathematicians like you to help us build them!

In this talk, I will discuss research at the DOE National Laboratory Complex that is pushing the state-of-the-art to develop the next-generation of AI approaches and technologies to address the nation's toughest scientific and security challenges. (Received April 1, 2020)