LEAD II participated in Vortex2 May-June 2010. Vortex2 is an NSF funded field effort to gather information about tornadoes. Teams of researchers with heavily outfitted vehicles traveled the Plains states, Texas and Midwest over 6 weeks.

LEAD II contributed by producing 240 short term forecasts and over 9000+ weather images for researchers in the field (see top left photo of LEAD images in use in Vortex2 vehicle.)

LEAD II explored a hybrid model of workflow. Using the Trident scientific workflow workbench as the entry point workflow system, the LEAD team demonstrated hybrid execution by execution across Windows HPC Server and the linux-based supercomputer Big Red at Indiana University.

It utilized the Trident Management Studio scheduler to invoke workflows on hourly schedule every morning, and consulted a data index service ("query mediator") to obtain real time data for use in the workflow. Final data products are delivered to smart phones.

The kind of short term weather forecast workflow we did requires the most recent weather data to initialize the model. Too, the workflow was required to complete within a strict 1 hour timeline. The workflow partitioning across Windows and Linux HPC resources had to take these requirements into account. Considerable effort was expended in optimizing the workflow to complete within the hour timeframe included automated initialization, parallel execution of the NCL graphics scripts, optimizations to data movement and data indexing services, and minimization of queue waits at the supercomputer. In future work we continue to refine the hybrid workflow model (called combined workflow model) to include execution on Azure, and to explore alternate models for subworkflow execution and control.