

## **Applications (Chris Sander)**

Applications of systems biology derive from predictive models based on extensive and comprehensive data collections. The models must be capable of predicting the outcomes of new experiments: to accurately predict the result of natural or externally introduced changes in the system, such as alterations of the normal state in disease, perturbation by drug intervention, or genetic variation (mutations). The general ability to model systems in quantitative detail provides the basis for biological engineering, perhaps the most important downstream application of systems biology.

Cindy Stokes (Entelos, Inc.) provided an overview of various systems biology approaches to integrating biological data from diverse sources and making such integration useful in pharmaceutical, environmental, and basic biomedical research. Specific examples in industry and government and academic labs were described. In addition, the logistics and infrastructure required to successfully implement systems biology to make progress understanding complex biological systems were discussed.

Steven Wiley (PNNL) described efforts to engineer an efficient pipeline for data collection, including automation and the integration of experimental knowledge from diverse technologies. He illustrated the power of such data in modeling pathways involving the regulation of gene expression as a key to understanding cellular control processes. Wiley also underscored the collaborative opportunities with PNNL in systems biology.