

Appendix 5

Summary List of Findings from Introduction

Finding 1: The emergence of systems biology as a research paradigm and approach to DOE missions is founded on the dramatic increase in the volume of data from a new generation of genomics-based technologies. Data management and analysis are critical to the viability of this approach.

Finding 2: The GTL program has several large and highly focused research efforts in, for example, systems biology, bioenergy, and genomics. Each area is investing in and dependent on rapidly growing capabilities for data resources and management, making the associated needs of each an ideal initial focus for GTL Knowledgebase development.

Finding 3: Development and use of the GTL Knowledgebase require a comprehensive, flexible policy and supporting programs that will meet GTL's current and emerging research needs.

Finding 4: Researchers require the integration of a wide range of high-volume data and a computational environment designed to support modeling, derivation of predictions, and exchange of data.

Finding 5: Systems biology is contingent on the ability to integrate and utilize a wide variety of types of data and computational technologies to systematically address a progression of problems leading to effective modeling of organisms.

Finding 6: The GTL Knowledgebase should lead to the creation of abstract models that demonstrate increasing correspondence with the underlying physical reality. These models would play increasingly important roles in addressing major applications of interest to DOE.

Finding 7: Other agencies and groups, most notably the National Institutes of Health, have developed integrated databases for studying organisms related to human diseases. These community-driven efforts have dramatically impacted biomedical research. A similar effort in systems biology for bioenergy, carbon cycling and biosequestration, and environmental remediation will significantly aid these DOE missions.

Finding 8: DOE's national laboratory enterprise, collective and individually, has developed much of the necessary infrastructure to rapidly deploy components of the GTL Knowledgebase. A concerted effort would be needed to integrate these elements.