



Biosciences and Biotechnology Division

March 8, 2013

To the R&D 100 Awards Committee:

As the Division Leader for the Biosciences & Biotechnology Division in the Physical and Life Sciences Directorate at Lawrence Livermore National Laboratory (LLNL), I oversee the development of new technologies that will help to improve and accelerate biomedicine and core biotechnologies.

An area of particular interests is the building of an infrastructure for the accelerated therapeutic community. The goal here would be to extend and/or develop new technologies to improve accessing of biological data for the purpose of accelerating drug design and development. To achieve this goal, an underlying computational infrastructure is needed to facilitate the exchange of biological data to allow the integration of data from many existing experimental efforts in genome sequence, structural genomics, biochemical kinetics, and pharmacology. These data would be used in massive-scale systems biology representations of biochemical pathways (endogenous and xenobiotic metabolism, and regulatory mechanisms) within the human body, detailed as interconnected compartmentalized organs.

This infrastructure will allow an integrated system to be developed, including: 1) system-level bioinformatics data (e.g. genomics, transcriptomics, proteomics); 2) protein interaction data (e.g. kinetic characteristics of enzymes) based on atomistic protein structure function and cheminformatics); and 3) adverse outcome data (side effects) from clinical trials and elsewhere. The technical motivation for the infrastructure is based on the success of the Earth System Grid Federation (ESGF) and the status that it has achieved over the past decade in the climate domain—demonstrating the capability to help a scientific community self-organize to build an information and knowledge infrastructure that has revolutionized how climate modeling is done.

Looking forward, the biology community is looking to applying the successful ESGF infrastructure to meet our needs and the possible integration of cross-discipline study between the biology and climate.

Sincerely,

Kenneth W. Turteltaub
Division Leader
Biosciences and Biotechnology Division

