OFFICE OF RESEARCH AND ECONOMIC DEVELOPMENT
2017 STRATEGIC PLAN
Biological, Biotechnology & Biomedical Research (B3 R)

Credit for the great advances made in understanding genetic, molecular, and disease processes belongs largely to the development of sophisticated genomic sequencing and data analysis technologies. Expanding interdisciplinary biomedical research and emphasis on 'translational research' has become a priority for the NIH. A recognized research strength at LSU is the faculty expertise in areas such as structural biology, computational biology and bioinformatics, environmental chemistry, bioengineering, evolutionary biology, and infectious diseases. In order for LSU to remain competitive and at the forefront of genomic and biomedical research, it will be critical for the LSU scientific community to remain cutting-edge in scientific technology and data analysis. LSU will also provide the best training to the LSU student population by strengthening the research efforts in B3 R. To enhance LSU research efforts, a Center for Translational Research merits consideration for promoting collaborative faculty efforts between multiple research disciplines.

At the ORED Retreat, held October 27, 2016, faculty participants identified three areas as critical to enhancing the future biomedical research goals of LSU. During a follow-up ORED Town Hall meeting held on February 24, 2017, faculty discussed these topics:

Cellular-Molecular Translational Technology - The fast pace of development in molecular and genomic technologies require continuous researcher training and sophisticated computational and bioinformatics analysis of complicated data sets. It is critical that the molecular and computational infrastructure at LSU is available to support genomic and biomedical research. For translational research, current and future investigators will need to integrate genomics, structural biology, and functional studies to answer basic questions on human health at the molecular and cellular levels. Retention and recruitment of faculty researchers who interface between different research areas, (e.g., biology and chemistry) are critical to advancing translational research at LSU. Studies comprising metabolomics or proteomics as well as microbiome dynamics and infectious diseases depend on computational and bioinformatics analysis for meaningful interpretation. Coupling of bioengineering and stem cell biology is a major research focus by several investigators at LSU. Pivotal to the translational research approach is the technology and technical expertise that core facilities provide for the LSU research community. Ability of core facilities to be efficient and low cost to researchers is extremely important by faculty for LSU biomedical research. Significantly, an emphasis on translational research could lead to increased economic opportunities for LSU.

Molecular Therapeutics - A focus on translational medicine expects to lead to novel therapeutics in treating diseases such as cancer, cardiovascular and metabolic diseases that affect the Louisiana population, and a number of infectious diseases, for example, those caused by newly emerging pathogens such as Zika, which theoretically could affect Louisiana since the mosquito vector host is present in Louisiana. A focus on the collaborative efforts of chemists, structural biologists, and infectious diseases researchers coupled with computational and bioinformatics analysis could establish LSU as a leader in biomedical research, especially in the design of new therapeutics. Developing a pipeline wherein chemists and structural biologists could design new drug compounds for faculty researchers to test and demonstrate efficacy against pathogens such as, cancer, diabetes, or even neurological disease. Another focus of the NIH's strategic plan for the future is the sharing of big data and its utilization by the biomedical community at-large. For example, the NIH envisions the use of large shared databases for clinical toxicology data submitted from numerous laboratories to achieve risk and hazard assessments for human

exposures. Thus, LSU should be pro-active in building a biostatistics and bioinformatics infrastructure to anticipate these new directions. Recognizing that each of the research strengths identified in the first ORED town hall likely require a bioinformatics strength, one could envision that ORED could supply funding to support a bioinformatics/biostatistics core facility through the LSU Center for Computation and Technology (CCT), with the remaining funding geared toward supplying seed funds for multi-disciplinary, collaborative studies among LSU faculty.

Evolutionary Dynamics - In evolution, LSU's main growing strength is in the dynamic field of genomics, the technology it comprises (molecular biology, bioinformatics, computation, etc.), and the outcomes it promises (information on gene function, population dynamics, biodiversification, conservation genetics, wildlife management, etc.). In ecology, LSU's strengths range across species-interactions (e.g., the causes and consequences of disease), population dynamics (e.g., the conservation or invasion biology of individual species), community assembly (e.g., the maintenance of diversity, including some of the highest-diversity communities on Earth), and ecosystem studies (e.g., Gulf coastal consequences of global change). In both areas, studies concern applied problems with connections to human well-being (economic, health, etc.), as well as curiosity-driven research that illuminates the ecological and evolutionary processes that give rise to patterns in the natural world. In respect to needs, the most effective way to improve interdepartmental collaboration would be to fund graduate student and postdoctoral positions that span research areas.