

2017 Research Development Fund – Cover Page

Data-Informed Decision Making in the Age of Integration and Open-Access

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Key Participating Units:

AgriLife: Wildlife & Fisheries, Ecosystem Science & Management, Genomics & Bioinformatics

College of Science: Geography, Oceanography, Math/Statistics

College of Engineering: Computer Science & Engineering

University Libraries: Maps & GIS Services

Anticipated Request Amount: **\$1,290,000**

Executive Summary

Scope: A Compartmented Decision Framework (CDF) will be devised to structure the analysis of multi-component problems. Such problems are expected to be tiered to include control options, uncontrolled or unknown factors, inherent processes (causal cascades), and value-defined outcomes. Each tier's data are also expected to be *Big Data* of the "wider-than-long" variety.

Objective: We aim to create a *generalizable method to integrating Big-Data for applied decision-making and basic science discovery*.

Research gains: The objective and scope above require multidisciplinary collaborations that will yield benefits in each component discipline. A primary research gain will be the development and applications of new analytical innovations. This group already planned to develop and integrate at least 8 new or cutting edge *Big Data* methods as part of building a CDF for coastal ecosystem assessment and control and discovery of new bio-physical functional mechanisms. Completion of the CDF we have planned in any domain will be translatable to many domains in each component discipline.

Research infrastructure enhancement:

Our project is fundamentally about using *Big Data* to make applied decisions in a structured framework that can be applied in multiple disciplines. The workings involve analytic innovation, machine-learning, and massive computation. Advances in each of these areas will enhance the TAMU research community to grow from the foundations laid. The analytical advances may translate to efficiencies and accuracy improvement in many *Big-Data* research programs. Extramural funding created by these advances will directly support the human and IT capital of TAMU.

Units to benefit from the RDF: Initially the participating units listed above will benefit by human capital support but domain-expansion and the application phase of the work could benefit any unit on campus making heavy use of *Big Data*.

Enhancement of external funding: We anticipate that all preliminary results and a finished application of the CDF will support bids by all collaborators and TAMU groups to apply for funding to solve data-informed projects. The gains of being among the first major problem-solvers for Big-Data decision-making problems are profoundly important to society's basic needs and economic aspirations, so all funding providers (government, nonprofits and industry) should be accessible.

Expected Outcomes: 1) A working CDF running in a high-performance-computing environment a machine-guided, structured modeling optimization to solve problems. 2) A proliferation of enhanced funding opportunities for specific applied problem-solving.