

## The Nexus of Scientific Integration with Behavioral and Social Sciences

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Iowa State University has a commitment to solving societal problems and improving people's lives. Globally, boundaries are becoming less defined which presents opportunities for solving these challenges. The university believes that the knowledge required to improve quality of life and to face the most important challenges of society can only be solved through the integration of science and creative inquiry – social and behavioral sciences. We believe the university's research enterprise can have a tremendous impact on resolving these challenges based on our tradition of excellence in the life and agricultural sciences, the arts and design, the social and human sciences, and engineering, and given the major societal challenges—food, the environment, energy, and health.

The decisions and action steps that are necessary to solve these challenges will not be determined using quantified information from scientific discovery alone. The decisions and processes are better understood if resolved in the form of social action. This is the result of a negotiated social contract that is grounded on both quantitative and qualitative considerations responding to individual and collective needs of different groups that comprise communities – in other words, solving problems at the nexus of scientific integration with the behavioral and social sciences. Indeed, the National Academies of Science calls for the “New Biology” or scientific integration to provide a deeper understanding of biological systems for biology-based solutions to societal problems, but falls short of including in the equation the integration of behavioral and social sciences.

In a recent strategic planning process, the university developed and implemented a research enterprise plan that balances the multiple goals of the institution while taking into consideration public and private interests. Research focus areas identified are as follows:

- Quality of Life – integration of behavioral and social sciences with the other research focus areas
- Integrated, Innovative Health - health, food, nutrition, and safety
- Biorenewables – products and energy
- New Technologies - materials to systems
- Environment – climate change and ecosystem degradation

These specific research focus areas take advantage of existing university faculty and program strengths. There is a wealth of opportunities for individuals willing to work and network across disciplines and programs. Faculty are encouraged and rewarded for working across disciplinary lines. The solution of complex problems needs a diversified approach or contributions from multiple disciplines and thus, must be promoted from a transdisciplinary scholarship perspective. A diversified intellectual capital portfolio—including humanities, the arts, design, and social sciences, in addition to the life and physical sciences and engineering—will in fact facilitate the development of a university-wide research innovation ecosystem. The resulting programs will form creative catalysts “merging emotive and pragmatic explorations” that lead to visionary planning which promotes growth and impacts and results in generation of income, enhanced technology transfer, creation of value, and program excellence. This approach will also allow us to study the past, to imagine the future, and to synthesize the constantly changing technology, viewpoints, and culture through creative inquiry – the behavioral and social sciences.

Adopting a “New Biology” or “Grand Challenge” approach for the research enterprise will enhance our ability to target faculty hires and leverage resources in strategic areas. By daring to be different and using a transformational systems approach for the research enterprise, we are able to prioritize and integrate our research activities and thus, better able to set achievable and targeted goals and metrics that meet so-

cial challenges and public/private interests. For example, the world’s human population is expected to increase from 6 to 9 billion in the next 40 years. This growth will increase food demand from arable land that is nearly completely utilized, understanding that nearly two-thirds of the current global population is either undernourished or obese. These existing global inequities in nutritional adequacy and access to food will continue to be exacerbated and accelerate exponentially in the very near future. Global climate change will also contribute to this problem by changing agricultural productivity and disease incidence and altering the distribution of plants, animals, and humans. This will alter and threaten global food production and, in general, the quality of life globally. Unequal resource distribution will contribute to increases in population densities and political unrest in countries. Thus, a new research approach is needed that recognizes the critical role of humans, governments, and organizations in changing behavior and in being open to adopting new practices that better balance global concerns while targeting environmental sustainability and improvement of health and well-being in plants, animals, and humans. “Such an approach will require fully integrated perspectives from the physical, natural, and social sciences. In particular, there is a compelling need to reshape how scientists think about the impacts of their research on global problems and to explicitly focus on the economic and social aspects of knowledge transfer to facilitate effective adoption of new knowledge.” To enhance this concept a step further, we are constantly bombarded by con-

cerns associated with the impacts that nutrition-related degeneration and infectious diseases in populations (e.g., plants, animals, humans) will have on costs, disparities in treatment and prevention strategies, appropriate nutrition within populations, and the emergence of infectious diseases. Concerns are even greater elsewhere in the world where infrastructure does not yet exist for food security and the effective treatment and prevention of disease. The development of effective strategies that ameliorate, mitigate, or prevent nutrition-related degeneration and the occurrence of disease caused by infectious diseases has the potential to change the ability to deal with these challenges. Working at the intersection of biology, engineering, physical sciences, and behavioral and social sciences, the university has a basic

foundation of talented faculty and research accomplishments to build successful food security, nutrition, and infectious disease portfolios at the interface between plant, animal, human, and environmental health.

Iowa State University has significant transdisciplinary research strengths that can be integrated to create a unifying and systems-wide vision for resolving society-related challenges such as health, energy, food, and environment. This vision will be achieved by creating a seamless research program that spans basic, applied, and translational research and exploiting synergies among the life sciences, the physical sciences, engineering, and the social and behavioral sciences to create platform technologies and solutions for the significant challenges facing society.