

Thoughts on Agriculture, Food and Natural Resources Research Funding by FFAR: A Proposal for Convergence

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By

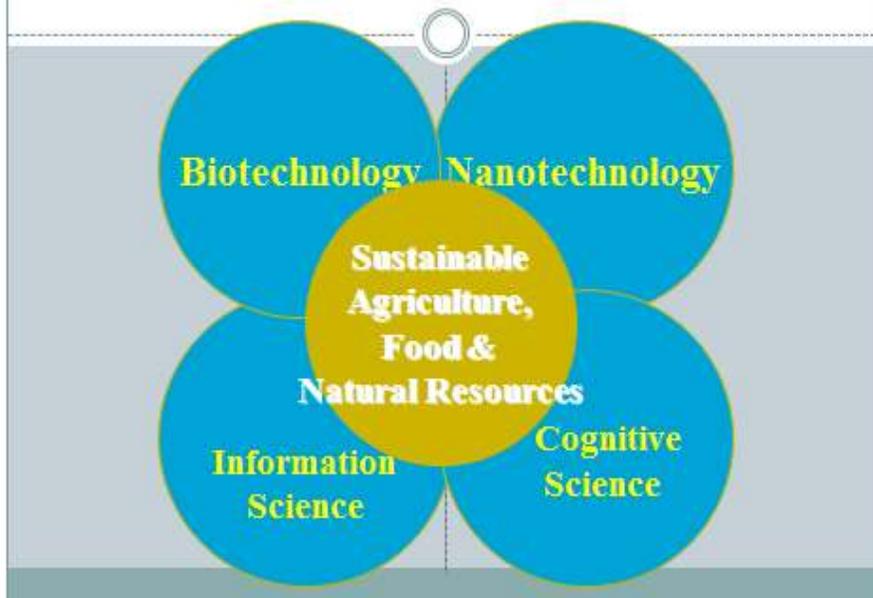
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While there are many specific areas of research which I might suggest, all which are extremely worthwhile, I want to focus on the concept of convergence to address the big issues. We face the daunting challenge to meet the needs of a growing world population to approximately 9–10 billion people in 2050 with the need to provide about 60–70 % more food than now being produced. However, it is more than just agricultural productivity to produce food and feed because the system must function within the space of climate change; minimum negative impacts on the environment; reduced greenhouse gas emissions (GHG); reduced water usage; and availability and cost of energy. This area has recently taken on the acronym of INFEWS (Innovation Nexus for Food, Energy and Water Systems) by NSF which seeks to develop an integration of these highly interdependent areas. Specifically, there is a need to transcend the debate between the vocal constituencies rooted in ideological solutions and rather invoke and encourage a broad recognition that many different approaches are needed to coexist to meet this huge challenge. Thus, there is no system more in need of and more likely to benefit from a comprehensive application of convergence technologies embodied in nanotechnology, biotechnology, information sciences, and cognitive sciences.

Convergence thinking – the application of insights and approaches from seemingly distinctly different disciplines – is suggested as a way to develop fundamental ways to create new solutions for “big” problems in areas such as FEWS. Convergence thinking engages approaches to problem solving that transcends disciplines and integrates knowledge from the physical, biological, social, and mathematical sciences and engineering to form comprehensive and integrated thinking at the interfaces of areas. This will focus on creation of new collaborations from academia, industry, government, foundations, national laboratories, and a diverse set of stakeholders from producers to consumers. A key concept of the convergence process is not only assembling the expertise but also formation of a web of partnerships to transform results from the research to practice.

Having introduced the idea of convergence, I suggest how convergence can be adopted and applied within the agriculture, food and natural resources systems (AFNS), including FEWS. Specifically, I believe FFAR should (with other partners) support some teams that address the complex problems of AFNS with approaches of convergence through, for example, emerging platforms of nanotechnology, biotechnology, information science, and cognitive science (figure).

Figure 1. Converging Technologies



If we are to increase crop yields, create new crop varieties, develop new and improved animal production, reduce GHG, use less water and use less energy, we need to utilize more holistic thinking embodied in convergence of science and technology. This way of thinking will look at issues of both large commercial operations and smallholder farmers as well as organic and conventional farming with a partnership including the numerous players from producers, academics, government, industry and consumers.

FFAR can be the driver of convergence in AFNS research and outreach. It can catalyze stakeholders also to identify the emerging and most critical topics. One might ask whether this is a re-creation of the CAP program of the recent past by NIFA and, if not, how would it differ? A primary difference, I suggest, is not to promote a large multi-institutional project but rather mobilize, at an individual campus, the talent across the campus to engage those scientists and engineers who commit to work as a team to study the problem as a convergence of technologies. Physicists; plant scientists; animal scientists; electrical, agricultural and mechanical engineers; food scientists; computer scientists; biologists; social scientists and economists are examples, and not meant to limit the expertise of team participants. As stated previously the team will reach out to include a broad spectrum of persons from industry, governments, producers and consumers.

I suggest that FFAR consider allocating some of its funding to supporting teams that demonstrate a commitment to operating in the space of convergence in AFNS. FFAR could develop areas where it wishes to seek proposals from groups or encourage proposals from groups who will define the areas of research and outreach. In every case the team will be required to include matching funds to match with FFAR funds. This requirement is likely to insure participation of industry and others from the beginning.