Seven challenges to meeting our nation’s agricultural goals

- Be competitive in a global economy
- Add value to our future harvests
- Adjust agriculture practices to a changing climate
- Be good stewards of the environment and natural resources
- Make our agricultural enterprises profitable
- Make our families and communities strong
- Improve foods and processing for better health and safety

How can we meet the needs of diverse stakeholder groups?

Prepared by the National Association of State Universities and Land Grant Colleges (NASULGC) Experiment Station Committee on Organization and Policy (ESCOP)
The Experiment Station Committee on Organization and Policy (ESCOP) developed its Roadmap with support from a task force of nationally recognized scholars that charted the major directions of agricultural science over the next 10 to 20 years. The task force assessed the scientific feasibility of meeting the needs of diverse groups of stakeholders ranging from the food production and processing sectors to consumers and the general public. This effort included prioritizing stakeholder needs; determining the scientific feasibility of solving the most important needs with current scientific methods and tools; and predicting the positive impacts of successful research outcomes. The resulting “Science Roadmap for Agriculture” will assist decision-makers and advocates for the research and education system, as they mobilize and plan the allocation of resources for future program areas.

**THE CHALLENGES**

**New Products and Markets**

**Challenge 1.** Develop new and more competitive crop products and new uses for diverse crops and novel plant species. Our science must focus on improving the quantity and quality of crop biomass and the efficiency of agriculture production; conceiving technologies that improve the processing efficiency of bioproducts such as biofuels; developing new products, uses, and markets; and supporting the development of marketing infrastructure for bioproducts.

**Challenge 2.** Develop new products and new uses for animals. Our science must focus on improving existing technologies and developing new ones to improve production efficiency; improving the nutritional value of meats and the value of other animal products for producers and consumers; developing innovative technologies to soften the impact of animal agriculture on the environment; and developing new and enhanced technologies to improve the welfare of animals processed for food.

**Climate Change**

**Challenge 3.** Reduce the risks of local and global climatic change on food, fiber, and fuel production. Our science must focus on slowing the rate of global climate change by storing more carbon and nitrogen in soil, plants, and plant products; minimizing the effects of climate change on crop and livestock production; integrating weather forecasting, market structure, and crop and livestock management systems to optimize production of food, fiber, and fuel; and developing comprehensive models to assess the social and economic impacts, risks, and opportunities for agriculture of global climate change and extreme weather.

**The Environment and Natural Resources**

**Challenge 4.** Provide the information and knowledge needed to further improve environmental stewardship. Our science must focus on developing better methods to protect the environment—both on and beyond the farm—with cropping systems that engage agroforestry, phytoremediation, and site-specific management; decreasing our dependence on chemicals that harm people and the environment by adopting effective strategies to manage crops, weeds, pests, and pathogens; finding alternative uses for industrial and agricultural wastes; and developing economic models and incentives that ensure environmental stewardship is encouraged.

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1 Prepared by the National Association of State Universities and Land-Grant Colleges (NASULGC) Experiment Station Committee on Organization and Policy (ESCOP). November 2001. The roadmap can be found on-line at http://www.nasulgc.org/comm_food.htm
To navigate this Science Roadmap, and ensure that the food and agriculture system meets future needs, the national agricultural research system will need to harness significant new resources: nearly 5,200 additional Scientist-Years (see Figure 1) and a total of nearly $6 billion in new funding will be needed to ensure that the existing U.S. food and agriculture system is sustained and expanded to meet future stakeholder and consumer needs.

### Needed Scientists

Currently there are some 7,064 Scientist-Years located primarily in the land grant universities that sustain the current U.S. food and agricultural system. Critical personnel needs for fulfilling the seven challenges were identified in molecular biology, nutrition and metabolism, engineering, economics, and genetics and breeding. New areas of expertise needed include bioethics, biosystems modeling, logistics and transportation technology, animal behavior, business management, and biomedicine. These needs totaled 5,179 SYs.

### Needed Funding

At least $2.1 billion will be needed to support these new scientists. Although these funds would be derived from a variety of sources, a large portion of these resources must come via increased federal investment in base programs of the Land Grant University system.

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1 This summary, supporting data and analyses can be found at [www.escop.msstate.edu/draftdoc.htm](http://www.escop.msstate.edu/draftdoc.htm) under “A Science Roadmap for Agriculture”

2 A Scientist-Year (SY) is a full time person working for one year
GETTING RESULTS OUT OF THE LAB

To assure that the fruits of these research investments are realized there will be a need for concomitant investments in technology transfer and adult education. The State Agricultural Experiment Station System’s traditional partner in making science accessible to the public is the Cooperative Extension Service. Experience has shown that equal portions of investments are a successful formula for the food and agriculture system.