

# Choices and Challenges in Translating Science and Technology from Concepts to Realities

Amy K. Wolfe,<sup>1</sup> David J. Bjornstad,<sup>1,2</sup> W. Christopher Lenhardt,<sup>1</sup> Barry Shumpert,<sup>1</sup> and Stephanie Wang<sup>1</sup>

<sup>1</sup>Oak Ridge National Laboratory, <sup>2</sup>University of Tennessee

Knowledge generated by modern science and technology (S&T) must be “translated” from individual ideas and discoveries to organized production blueprints and business plans if the fruits of knowledge generation are to lead to socially valuable products and processes. Whether by institutional design or the efforts of individual actors, this translation process must support a confluence of inputs – science, technology, technology transfer and entrepreneurship activities – and take place at a number of stages during the science-to-product chain. This poster describes our preliminary research findings into the process by which large S&T centers can develop programs and procedures to help convert the scientific and technical concepts they develop into the uses that entrepreneurs can nurture for societal benefit.

Our research is beginning to identify the implications of different ways that S&T institutions organize the conduct of science, both for how research is conducted and for research translation. A number of frameworks have been used to describe how information and products flow from laboratory toward use. We draw elements from these frameworks and from data we have collected to propose a different conception that we term “ushering.” Ushering entails purposeful actions designed to move the information and products of S&T toward use, effectively extending the point at which scientists or organizations typically consider their work “done.” Thus, institutions purposefully would create an environment that not only facilitates, but expects flows of information to occur within and between organizations. Within the organization, information flows may link fundamental to basic activities, basic to fundamental activities, or may involve other activities, such as technology transfer. Outside the organization, information flows may provide assistance to downstream entrepreneurs or organizations that help them gain access to needed scientific and technical knowledge in an organized manner or to other types of information exchange.

The scientists, science managers and administrators, and personnel involved in intellectual property, technology transfer, and commercialization we have queried typically agree on the importance of translation. However, they also recognize that their participation in the ushering process is governed by a variety of internal business practices and external drivers. These practices and drivers can provide information, mechanisms, and incentives to participate in the translation process, but they can also create barriers that discourage participation. Our inquiries have identified instances where practices created to achieve other goals have the effect, perhaps inadvertently, of competing or conflicting with research translation goals.

The research described in this poster is being carried out by the ORNL Ethical, Legal, and Social Issues Scientific Focus Area. It focuses, in part, on identifying the components of and resources needed for the ushering process and on analyzing the implications of alternative organizational rules and practices for science and research translation. Data for our translation work are drawn from structured discussions

with individuals and from a day-long workshop involving 26 individuals from diverse areas of science and technology, management, and technology transfer. Our initial project efforts are focused on translating S&T toward use, within and beyond the community of scientists. Later work will expand the current set of ushering topics into broader types of support, mechanisms for providing this support, and experiences at other S&T institutions.