

While each theme in the previous chapter suggests important research questions of its own, a different set of questions emerges from a more holistic look at the research enterprise. These questions serve to highlight the interdependencies among the research ideas and the themes. They might be thought of as integrative questions, or goals that span the thematic areas and move us toward practical applications.

For example, a research project designed to identify new models of the grants process must look at the research from the perspective of value what do the stakeholders value and how do they attribute value to what they and others contribute? It must examine the flow of work through groups and organizations and explore how knowledge is or could be captured, managed, and shared. Such a project must also investigate the role and use of collaboration. New technologies to support grants making would also need attention and demand credible and comprehensive models of the enterprise and its component parts, including an understanding of the dependencies between work processes and system design. This chapter presents some of these integrative research goals.

Integrative Research Ideas and Cross-Cutting Investigative Themes					
Selected Integrative Research Ideas	Investigative Themes				
	Value	Workflow	Knowledge Sharing	Collaboration	Investing in and Using IT
New ways to identify and define the substantive goals of research initiatives	X		X	X	
New models of the grants-supported research process that make different assumptions about roles, relationships, and responsibilities.	X	X	X	X	X
Alternative strategies and new technologies to support the review and selection of research proposals.	X	X		X	X
Incentives for collaboration across disciplines, roles, and organizations	X	X	X	X	
New technologies for multimedia proposal, development, submission, and management	X	X	X		X
Information-centric processes as a tool for an enterprisewide orientation	X	X	X	X	

New ways to identify and define the substantive goals of research initiatives

The research enterprise is continuously cultivating the next generation of questions that will advance science. This entails decisions about which research topics to invest in today balanced with decisions about what initiatives to create for tomorrow. This requires that information and ideas flow freely within the enterprise and that processes exist to ensure their full consideration. Research on this topic could generate and test benchmarks for evaluating existing approaches to generating initiatives. Such research might include a comparative analysis of current practices for identifying topics, criteria for judging the success of the process, or an evaluation of the implementation of initiatives originating from different sources. It might also address the potential of new Web technologies for collaborating on the definition and selection of new initiatives.

New models of the grants-supported research process that make different assumptions about roles, relationships, and responsibilities of the various players

Web-based tools to support grants submission, review processes, and administration are under development at many organizations within the research enterprise. The motivations for these efforts range from responses to

accountability and efficiency pressures, to legislative mandates, to the need to replace outdated systems. All of these efforts include the range of organizational and technical challenges associated with enterprisewide initiatives. This research could examine alternative models of the grant proposal, submission, review, award, and management process, including the technology and organizational design implications of these models. It might demonstrate how different technical capabilities support widely different conceptualizations of the entire process. For example, the Web makes it technically possible for the research institution, not the granting agency, to retain custody of research proposals while giving program officers and reviewers electronic access. The challenges related to such a model could be identified and examined in terms of organizational, technical, process, and policy implications. In our Web example, authenticity, security, and electronic records management are just three of the issues that must be examined.

Alternative strategies and new technologies to support the review and selection of research proposals

Traditionally, technology has played a role in supporting the review process. The potential of technology to go beyond its primary role as a document delivery mechanism in the review process is great, but relatively unexplored. This research could start by mapping the various proposal review models in use. The research could identify and document these different review processes and draw out and make explicit the underlying assumptions and values for each. The results could inform the development of new strategies, new support technologies, and improve our understanding of the factors that influence success. Research is needed to meet the challenges of characterizing proposals effectively, of characterizing the skills of potential reviewers, and of using this information to quickly match reviewers to proposals. This should be studied from multiple perspectives such as knowledge sharing and natural language processing. Such a study might also identify cultural differences across communities of reviewers with respect to what constitutes a good review, a good review process, and evidence of fairness. Research could also explore how different technologies, different presentations of information, and different structures might work at various points in the process.

Whether an organization uses a peer review process, or depends more on program officer expertise, program officers are central players in the review and selection of research proposals. They depend heavily on proposal-based information and expert knowledge to move a review process forward. Research that focuses on their role and on the information flow and human interaction it requires might generate new understanding of the nature of that work, its interpersonal and organizational dynamics, and how these influence technology requirements, business processes, and overall performance.

The specific nature of the workflow, collaboration, and knowledge sharing could be identified through this analysis and used to inform the development of relevant technologies. The role of emerging technologies such as peer-to-peer networks, for example, could be examined in the context of the review process. Applications of emerging collaboration technologies could be examined, with the results informing both current and future technology development.

Incentives for collaboration across disciplines, roles, and organizations

This research might focus on defining needed collaborations and the incentives and disincentives that exist across disciplines, universities, and agencies within the grants-making enterprise. It might aim to uncover which incentives work under what conditions by examining community norms, interpersonal and organizational networks, theories of self interest and mutual interest, social exchange, proximity, shared electronic resources and facilities, physical environment, monetary incentives, or economies of scale.

This research could look at current models of group communication and operations to identify their strengths and weaknesses. The insufficiencies of these models represent a fundamental research challenge--modeling group operations for the purpose of basic understanding about how groups really work. Armed with this knowledge, we could then begin to build incentives and tools that truly support group processes.

New technologies for multimedia proposal development, submission, and management

The tools used to conduct research and to represent findings are changing. High density images, sound, video, animations, and 3-D renderings, for example, are becoming more commonplace as tools to represent research

findings. The ability of the enterprise to effectively bring this information to bear on funding decisions rests heavily on the development of technologies to support the incorporation of multimedia resources into the proposal development, submission, and management process. In many cases, however, the advanced techniques used to create, manage, and present findings cannot be demonstrated or shared within research reports to funding agencies or in follow-on proposals. The tools available to researchers to incorporate multimedia into traditional proposal structures and the capacity of granting agencies to accept proposals with multimedia components are both limited.

Information-centric processes as a tool for an enterprisewide orientation

Understanding how information is used within the research enterprise and how it flows among the participants would allow us to view information as an enterprisewide resource. Mapping the similarities and differences among the participants and exploring how particular types of information are used or not used across the enterprise could provide new insights into organizational design and system design.

An enterprisewide view of how information is created, changed, received, managed, accessed, maintained, and destroyed over time would also provide insights into the development and implementation of enterprisewide strategies for capturing, building, and managing knowledge. Understanding how information is exchanged, flows through, and is acted on by the various entities within the enterprise may suggest new strategies to facilitate this process and to examine the potential benefits of an information-centric view.