

## Five Models for Interaction Between Science Enterprises and Organization Scientists <sup>1</sup>

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*“...the same power of science which has so amazingly increased the productive capacity of mankind during the past century will be applied again, and the prizes of industrial and commercial leadership will fall to the nation which organizes its scientific forces most effectively.”* - Elihu Root, 1918, address to the NRC<sup>2</sup>

Root believed industrial management would improve creation of scientific knowledge. His belief remains important if the nation’s competitiveness depends on marshaling scientific knowledge for innovation and discovery. Modern scientific activity is interdisciplinary, computationally intensive, and geographically distributed. The small labs of disciplinary researchers have given way to “science enterprises” that coordinate activities and resources across multiple projects: centers, institutes, laboratories, universities, non-profit organizations, and for-profit companies. Science enterprise requires strengthening this special form of organizing.<sup>3</sup> Can leaders of such enterprise learn from organization scientists, and vice-versa?<sup>4</sup> If so, what are appropriate models for this interchange, and what tensions and barriers to success must be overcome?

A series of National Science Foundation funded workshops brought leaders from supercomputer centers, research computing centers, cyberinfrastructure software centers, and national labs together with organization scientists from business and management schools, public policy and public administration schools, and information schools.<sup>5</sup> The leaders of science enterprises and organization scientists expressed a desire to work together, but this was accompanied by misconceptions and misalignments of interests. Five potential models for interaction were identified:

- **Engineering model** – Organization scientists provide science enterprise leaders with ‘off the shelf’ answers with which to engineer solutions to problems. While simple and actionable, this model runs the risk of superficiality due to mistakes made with decontextualized knowledge. Good organization scientists might not wish to participate in such a relationship because they see their jobs as tied to research and not to helping practitioners.

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<sup>2</sup> May 29, 1918 Advisory Committee on Industrial Research of the NRC, *Science*, Vol. XLVIII, No. 1248.

<sup>3</sup> Cummings, J. N., & Kiesler, S. (2007). Coordination costs and project outcomes in multi-university collaborations. *Research Policy*, 36(10), 1620-1634.

<sup>4</sup> “Organization science” refers to research into administration generally, whether from scholars of business, management, public policy & admin, information, applied social science, etc.

<sup>5</sup> For a list of participants, see these web sites:

Ann Arbor: <http://managingcenters.net/leadingci/leading-ci-enterprise-participants/>;

Cleveland: <http://managingcenters.net/leadingci/virtual-organizations-workshops/voss-workshop-invited-participants/>;

Athens: <http://www.terry.uga.edu/mis/workshop/attendees.html>.

- **Research subject model** – Science enterprises serve as subjects of study for organization scientists, contributing to organizational scholarship and possibly receiving benefits in the form of actionable knowledge. While this is likely to result in useful research findings, enterprise leaders might not find the results actionable. Leaders of science enterprise might not wish to participate in such a relationship because they see their jobs as running successful science enterprises rather than furthering the cause of organization science.
- **Educational model** – Organization scientists educate enterprise leaders via custom courses that focus on relevant theoretical and empirical findings. While this might produce deeper understanding of relevant research and better profiles of what enterprise leaders need to know, it requires significant investments in curriculum development that organization scientists might be reluctant to make, and a self-sustaining model for funding that science enterprises and their supporters (*e.g.* universities, research agencies and foundations) accept.
- **Consultative model** – Organization scientists consult with leaders of science enterprise to solve relevant problems. While this is likely to appeal to experienced consultants among organization scientists, the direct costs for science enterprises could be high and top organization scientists might feel this work interferes with their academic publication efforts.
- **Interdisciplinary research collaboration model** - Organization scientists join with leaders of science enterprise as full partners in collaborative research, addressing questions that are actionable as well as academically interesting for organization scientists. This is an ideal outcome that brings together the interests of both groups, but it is unclear whether this ideal can be achieved.

This paper describes each of these models, address strengths, weaknesses, and opportunities, and relates the models to the literature on interdisciplinarity, executive education, and translational science.