A Concept Paper on Networks of Excellence for Research and Education

Suresh V. Garimella
Purdue University, sureshg@purdue.edu

David B. Janes
Purdue University, janes@purdue.edu

Anne Slaughter Andrew
former U.S. Ambassador to Costa Rica

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A CONCEPT PAPER ON
NETWORKS OF
EXCELLENCE
FOR RESEARCH
AND EDUCATION

Accelerating transformation
toward knowledge-based economic
development across the Americas

Suresh V. Garimella
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A CONCEPT PAPER ON NETWORKS OF EXCELLENCE FOR RESEARCH AND EDUCATION

Accelerating transformation toward knowledge-based economic development across the Americas

Expanding the level of innovation across the Americas can enable the economic growth required to support peace, prosperity and sustainable development across the region.

While initiatives are in place to move toward more knowledge-based economies, a foundational capability — namely, a research and education ecosystem supporting innovation — is lagging.

Networks of excellence will accelerate participation in the global ecosystem of innovation and create leapfrog platforms for more robust and sustainable economies.

With economies that tend to rely on commodities, agriculture, and natural resources, economic growth in Latin American countries has not kept pace with innovation-rich, knowledge-based economies around the world. A recent World Bank study (Lederman et al.1) described a strong culture of entrepreneurship in Latin America but concluded that the level of innovation lags behind much of the developed world. Given the accelerating pace of global technological development, countries in Latin America are likely to fall even farther behind.

Government and nongovernmental organization (NGO) leaders in the Americas recognize the imperative to increase innovation and to move toward knowledge-based economies (e.g., “Colombia 2025”2). New

The Imperative for Action

Research and education ecosystems are foundational components of knowledge-based economies.

Universities in the Americas need to transform quickly rather than evolve organically.

Targeted programs should look to leapfrog existing programs.
initiatives to increase innovation include creation of commercialization centers, direct funding and tax incentives for research and development, scholarship programs to increase the number of students pursuing graduate degrees (generally in the U.S./Europe), repatriation programs for science and technology professionals, and investments in university undergraduate programs and research projects.

While recently established programs and investments are impacting the focus areas of universities and commercialization organizations, a foundational component common to innovative economies around the world is deficient: a research and education ecosystem supporting innovation. In comparison to countries with knowledge-based economies, journal publications, research and development investment, and “Top 500” universities per GDP are generally lagging in Latin American countries (OECD Science, Technology and Industry Outlook 2014). Collectively, these metrics reflect gaps both in the research enterprise that leads to discovery or invention (knowledge creation) and in the capabilities necessary to develop highly trained personnel within emerging areas of technological relevance. Without a research and education ecosystem to fill these gaps, economic transformation will be too slow to allow full global participation, and key components of knowledge-based economies may not materialize.

To fill the required research and education roles, universities across Latin America are considering transformations toward the U.S. “research university” paradigm. However, transforming a university system is extremely challenging, particularly given the deep-rooted cultural and structural norms to be overcome. Financial resources are an important, but by no means the only, enabler. The entire ecosystem of a research

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**Building Research and Education Ecosystems**

**University:** Innovative educational programs, research focus areas, incentives, and infrastructure

**Government and Private Sector:** Funding for educational innovation, research and commercialization

**Corporate and NGO:** Partnerships with shared ownership and strong value propositions

*Multi-institutional/multi-national partnerships can provide opportunities to leapfrog existing programs*
A Columbia-Purdue workshop called the University of the Future was held at Purdue University in West Lafayette, Indiana on October 28-29, 2014. Purdue President Mitch Daniels led several discussions with the workshop participants. Representatives from the U.S. and Colombia included rectors and board members from six top universities in Colombia, along with executive directors of NGOs, government personnel from the U.S. and Colombia, and Purdue faculty and administrators.

To accelerate the development of research and education ecosystems across the Americas, the authors propose to establish “Networks of Excellence” in key focus areas. Each Network of Excellence will be multi-institutional, multi-sector (university, corporate, government, NGO) and multi-national. These multi-faceted networks will allow participants jointly to define and share programs, policies, and content, and thereby significantly leverage the resources provided for related programs. By incorporating best practices from around the world and building on the existing strengths and unique aspects in the region, targeted programs can allow universities in Latin America to leapfrog existing programs and create research and education ecosystems that are symbiotic with government and industry.

Targeted Networks of Excellence will allow institutions in Latin America to develop research and education ecosystems much more rapidly than could be accomplished under “organic” or local processes. Once in place, these ecosystems will both enable the leapfrog transformations toward knowledge-based economies and serve key roles in the networks.
required for regional innovation systems. For the U.S. and other innovation-rich countries, the associated developments would provide new collaboration partners and capabilities for research and educational programs, including partners focused on online course development and research problems based on resources and challenges across the Americas. As more companies become involved in technology development and licensing, new business opportunities will emerge for U.S. companies and for external investment in the U.S.

**Proposed Structure for Networks of Excellence**

Within each thematic area, a Network of Excellence would include a number of institutions — universities, industry, government, and NGOs. Each participating institution will provide content, resources, facilities, and/or programs. As illustrated in the figure above, the essence of a network will be in collaborative links among institutions, including network events, personnel exchanges, shared infrastructure and joint content development and delivery.

To address the challenges associated with promoting robust interactions in a geographically dispersed network, the authors propose to incorporate Purdue’s “HUBzero” platform. An outgrowth of a highly successful research and education network in nanotechnology
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(www.nanohub.org), the HUBzero cyber infrastructure platform allows users to collaborate by sharing course content and tutorials, computational tools, and other educational and design resources. These capabilities enable efficient and effective development of peer networks among groups focused in thematic areas across large distances.

Networks of Excellence enable participants to share and learn from one another.

Network participants from universities, industry, and government can sustain dialog around the future needs of the universities, region, and country.

Shared programs, content and best practices leverage programmatic investments.

Networks can advocate for policy changes and communicate the need for change to a broader population.

**Thematic Areas for Networks of Excellence**

The authors propose the following Networks of Excellence that can have an amplified impact on transformation across the Americas.

**Faculty of the Future**

This network will focus on developing future faculty through focused PhD programs with strategic partner institutions and soft landing programs for transitions into faculty positions. The network can provide a framework to resource, reward, and support both new and existing professors. Programs at Purdue — including the Colombia-Purdue Institute (CPI) and Latin American Technical, Research and Administrative Leaders (LATeRAL) — represent prototypes in this area.

**Instructional Innovation**

A network for instructional innovation will focus on curricular developments in science, technology, engineering and mathematics (STEM) areas, and novel student-focused teaching and learning approaches. This network will bring together professors from across the Americas, providing a robust support network and technical community with significant leverage through the development of shared content and tailored approaches for the region.
Institute for Latin American Academic Leadership
This network will address an “institutional infrastructure” cross-cutting theme, helping to define appropriate frameworks for symbiotic research, educational and commercialization programs. The network will expose administrators to research university culture and allow them to collectively define appropriate reward systems, resources, and release-time frameworks. In addition, the network will provide resource-rich platforms for fostering university leadership within the community and government. Funding agencies, governments and multilateral development banks could play beneficial and catalytic roles in this network.

Regional Grand Challenges
A Network of Excellence can also be organized around a specific technical focus, *e.g.*, a regional or global grand challenge. The multi-national, multi-sector participation makes a Network an ideal framework to address grand challenges such as health, energy, or climate change. Grand challenge networks can incorporate expertise from many individuals and institutions, identify common opportunities and resources across the region, and consider unique challenges in a variety of local settings. Such Networks will accelerate technical advances in the specific topic, build public awareness and catalyze action on policy and implementation strategies.

**Dedicated Funding**
While Networks of Excellence can leverage existing funding programs including national PhD scholarship programs, dedicated funding is required to support each network. This funding can provide resources for substantive personnel exchanges, collaboration platforms, infrastructure facilities, development and sharing of new content and program administration.
Authors

Suresh V. Garimella, Executive Vice President for Research and Partnerships and Goodson Distinguished Professor of Mechanical Engineering, Purdue University.

David B. Janes, Professor of Electrical and Computer Engineering and Faculty Coordinator for Institutional Partnerships, Purdue University.

Anne Slaughter Andrew, former U.S. Ambassador to Costa Rica.

For more information, please contact: UOF@purdue.edu

References


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