

Network-based Engagement for Universities: Leveraging the Power of Open Networks

Edward F. Morrison
Purdue Center for Regional Development
Purdue University
West Lafayette, IN
edmorrison@purdue.edu

Prepared for the 10th PASCAL International Observatory Conference

The Role of Higher Education in Local and Regional Social and Economic Development

Brest, France
October 29-31, 2012

Economic dislocations make the future harder to predict, but one trend is clear: Our economies have become more open and networked. This transformation changes our understanding of how wealth and prosperity emerge in economies (Arthur, 1996; Beinhocker, 2006). It changes our understanding of innovation. (Chesbrough, 2003). It also changes how we think about the role of universities in anchoring competitive economies and how universities engage their regional economies (Lester and Starauta, 2007).

This paper reports the progress being made at the Purdue Center for Regional Development (PCRD) in designing a new strategic framework to guide University engagement and regional economies. This new framework is grounded in three key components. After reviewing these components, the paper explores how universities are beginning to apply these new approaches to extend their reach and promote productive investment. The paper concludes by summarizing some of the lessons we've learned and pointed to new directions for research.

What's Going On? The Nature of Our Economic Transformation

PCRD's approach to regional transformation and university engagement is grounded in a key set of assumptions about how our economies are transforming. As knowledge becomes a larger component of the value embedded in products and services, business enterprises must move toward more networked operations to remain competitive (Logan and Stokes, 2004). The pace of change in these markets is accelerating, and network-based business models help firms keep up with these changes, while minimizing their risk (Chesbrough, 2006; Nambisan and Sawney, 2008). As business firms adopt the

strategies, they define new market opportunities. These opportunities can include a new range of collaborations with university partners.

Network-based business models represent a fundamental departure from how traditional business has organized its operations. From the early years of industrialization, businesses increased the scale of their operations by developing hierarchical organizations that vertically integrated different stages of production (Chandler, 1993). Government, university and nonprofit institutions followed suit and organized themselves in much the same way.

Hierarchical organizations have several significant advantages. Reporting relationships and levels of responsibility are clear. As job descriptions become more narrow and focused, employees develop the skills to become more specialized. Defined organizational boundaries deliver rationality, clarity and stability.

At the same time, hierarchical organizational structures generate significant disadvantages. Organizational boundaries can inhibit communication within the organization. These communication breakdowns can create the sense of fragmentation and tension which undercut coordination and productivity. Excessive specialization can build up formal procedures that slow internal operations. The organization becomes less responsive to changes taking place in its environment. As the organization becomes more specialized, it also becomes less flexible and more costly to operate, as personnel and overhead costs increase.

Both globalization — the logistical and legal integration of national markets — and dramatic advances in information technology laid the groundwork for businesses to move toward more networked forms. In the 1980's, firms began forming global production networks to take advantage of lower costs. By the 1990's, firms moved from focusing solely on supplier networks to building customer networks. The explosion of the Internet that followed the introduction of the first commercial web browser in the mid-1990's pushed businesses even faster toward network-based business models (Chesbrough, 2006; Logan & Stokes, 2004).

Universities in the U.S. face difficulties keeping up with these shifts. It is not difficult to explain. Universities have traditionally been organized around independent departments and hierarchies. These traditions, based on academic freedom, tenure and promotion, are difficult to change. More important, perhaps, university administrators lacked a strategic framework to interpret and respond to the shifts taking place in global markets. Beginning in the 1990's, small steps were underway to fill this void, to answer the question, "What is the universities role in an economy in which networks create wealth?"

Michael Porter of the Harvard Business School suggested that productivity gains in advanced economies emerge from network or "clusters" of related businesses and support organizations. In his formulation of clusters, universities play an important

supporting role (Porter, 1998a, 1998b). Yet, the strategy framework proposed by Porter to interpret clusters takes the viewpoint of the business firm, not the university. Porter suggests that clusters emerge from the interaction of five competitive forces shaping markets: the bargaining power of suppliers; the bargaining power of buyers; the threat of substitute products or services; the threat of new entrants and the rivalry among existing competitors. This strategy framework provides no guidance to universities about how to shape their role in clusters or make strategic decisions about how to allocate scarce university resources. Further, although Porter advances strong evidence in support of clusters, he provides virtually no guidance on how to design a strategy process to develop clusters. The work at the Purdue Center for Regional Development fills this void.

Purdue and the Development of Network-Based Models of Engagement

Formed in 2005, PCRD anticipated a new challenge for research universities to become more engaged in promoting regional prosperity. Our Center's work is guided by an emerging theory of change defining the role of research universities and other higher education institutions to improve the competitiveness of regional economies. A theory of change represents a model that guides interventions in a complex system to improve its performance. It includes a set of assumptions, a set of target outcomes, and a process for designing pathways to achieve these outcomes.

Two core assumptions underlie PCRD's theory. First, in an increasing number of markets, wealth and prosperity will be generated by organizational forms that are collaborative and connected through networks of purposeful relationships (Beinhocker, 2006). Second, as organizations move from hierarchical to network-based structures, there will be a growing number of opportunities to generate increasing returns (Arthur, 1996).

The Market Economy and the Civic Economy.-- We start by defining a regional economy in terms of the interaction that takes place between a market economy and a civic economy. The market economy consists of activities and investments that are publicly valuable and privately profitable. The term "privately profitable" means that an organization can capture sufficient value from its activities to generate risk adjusted returns that attract additional investment for growth. The term "publicly valuable" is closely aligned to the economists' view of public goods. A public good arises from an activity or investment that generates value which is more widely shared.

The civic economy, by contrast, consists of activities and investments that are publicly valuable but not privately profitable. In the United Kingdom, NESTA also uses the term "civic economy", but in a different sense (NESTA, 2011). NESTA uses the term to describe an organizational form. PCRD defines the civic economy by looking at activities and investments and how value is created and captured or shared. In order for

an economy to generate productivity improvements and new levels of prosperity, activities and investments in the civic economy should support activities and investments in the market economy. At the same time, the market economy generates wealth which, through taxes and charitable investments, should support continuous investment and renewal of the civic economy. While private firms dominate the market economy, the civic economy includes government, educational institutions, philanthropy and a wide range of nonprofit organizations.

Importantly, our definition of the market economy and the civic economy is not defined by organizational form. In other words, a university or nonprofit corporation can engage in market activities. For example, the Bayh-Dole Act defined how universities can generate licensing revenues from its intellectual property. Similarly, a private company can engage in activities and make investments in the civic economy. So, for example, a private sector firm engages in developing the civic economy when it forms a collaboration with a community college to define more effective career pathways.¹

In the United States, we see a wide range of examples that illustrate the symbiosis between the market and civic economies. The establishment of public land-grant universities, federal government support for the construction of railroads, the G.I. Bill, investments in basic and applied research and the interstate highway system are all clear examples of how the civic economy has operated to support continued investment and expansion of the market economy.

The Transformation in How Wealth is Created.-- PCRD depicts the transformation taking place in both our market economy and our civic economy in terms of two interlocking S curves. This perspective illustrates that the business models that define markets pass through life cycles. The first curve represents the organizational forms that emerged from the Industrial Revolution. Private sector companies, as Chandler explains, organized themselves into hierarchies in order to generate and capture wealth (Chandler, 1993). Within regional economies, civic organizations similarly organized themselves in hierarchies in order to conduct their activities. Beginning about 30 years ago, networks began to emerge as an efficient and effective way to generate and capture wealth (Arthur, 1996).

By depicting the transformation in this way, the challenge facing our regional economies becomes clearer. To be competitive, regions need to migrate standalone assets from the first curve to establish networked assets on the second curve.² We have ample evidence to illustrate what happens to a region that fails to make this transformation.

¹ Often, in the past, we have called these activities “public-private partnerships”. We are finding that this term is too narrow to describe the wide range of collaborations emerging in the civic economy.

² In presentations to the public we refer to the first curve as our Grandparents’ Economy. We refer to the second curve as our Grandchildren’s Economy. By simplifying in this way, the core idea — that our economies are undergoing fundamental transformations — becomes more accessible.

Across the United States, especially in the industrial Midwest, we confront the challenge of shrinking cities, in which both the market and civic economies are in decline. At the same time, evidence is accumulating that regions able to move assets into new networks quickly can make the transformation and continue generating new waves of wealth (Saxenaian, 1994). Recent research has shown that building innovating networks offers a promising strategy not just for entrepreneurial hotspots like Silicon Valley, but also for slower growth second-tier manufacturing regions (Dempwolf, 2012). The prescription is clear: regions that learn how to design and guide complex networks will be more competitive. They will learn faster, spot new market opportunities faster, and align their assets toward these opportunities faster.

Civic Economy Portfolio.-- The PCRD theory of change posits that regions should focus their efforts on building new networks of collaborative investment in five areas: brainpower; innovation and entrepreneurship networks; quality, connected places; new narratives; and collaborative skills. A portfolio of collaborative investments accelerates regional transformation. The university's engagement strategy should be focused on assisting regions develop networks in these areas. The logic underlying this framework runs as follows.

To be competitive in today's global economy, any region must continuously develop networks that produce brainpower with 21st century skills. To generate wealth from this brainpower, the region needs networks of support for innovating companies and entrepreneurs. To be globally competitive, the region must also focus on physical development — creating quality, connected places — because both smart people and innovating companies are mobile. They will only located in quality places that are connected within the region and globally. A competitive region also needs clear narratives — a set of stories — that point to the possibilities ahead: what could and should be. These stories align people to these new possibilities. They create coherence in complex environments and improve both individual and group productivity. Finally, the region needs to develop collaborative skills among its engaged citizens in order to design and guide these networks.

Network Analysis.-- As regions move into this new world of networks, leaders in both the market and civic economies need new tools to visualize and analyze these networks. These tools enable leaders to generate hypotheses about their competitive strengths and how these strengths might be recombined into new innovating networks or clusters. PCRD has focused on building interactive tools for both industry and occupational cluster analysis (PCRD, 2009). Other researchers are developing new network-based tools for regional innovation analysis, including exploring the application of social network analysis to cluster development (Dempwolf, 2012; Casper, 2007).

PCRD's business cluster definitions provide a valuable framework for analyzing the competitive position of regional economy. They uncover value chain connections within

related markets. Occupational cluster analysis provides insights into the talent pool within a regional economy. Exploring occupational clusters provides insights into how the skills within this talent pool match up to the needs of employers in the market economy. PCRD is combining these tools and others into a new interactive platform called Regional Decisionmaker.

Network Activation: Strategic Doing.-- Network analysis provides powerful insights into the potential for forming new networks to stimulate innovation, but the activation of these networks -- their design and management -- requires a new strategy discipline. Strategy is an ongoing process by which members of an organization or network answer two questions: Where we going? And how will we get there? Strategic planning, the traditional approach to designing a strategy, emerged in the 1960s to solve the particular problems of guiding hierarchical organizations. As business organizations more open organizational forms, the discipline of strategic planning has become less useful (Mintzberg, 1994; Morrison, 2012). PCRD has been incubating a new strategy discipline specifically oriented to guiding open, loosely joined networks. This discipline, strategic doing, provides an agile framework for members of the network to develop a strategic action plan quickly, to move toward measurable outcomes, and make adjustments along the way.

Strategic doing breaks fundamental questions of strategy into four questions. The first question -- What could we do? -- invites members of a network to learn about the assets within the network and explore how these assets can be linked and leveraged in new ways. As members of the network connect their assets, they begin finding new opportunities.

The second question of strategic doing -- What should we do? -- pushes the strategic conversation within the network to a deeper level. The question prompts members of the network to define an outcome from among the opportunities they have identified. Converting an opportunity into an outcome involves defining clear characteristics of the outcome that are measurable. As members of the network define the metrics that characterize a successful outcome, they generate a clearer sense of joint purpose and alignment.

The next question of strategic doing -- What will we do? -- begins to chart a pathway to this outcome. Converting ideas into action within a network represents a distributed responsibility. As members make commitments and move into action, they build bonds of trust that improve the effectiveness of the network. Finally, the final question completes the initial version of the network strategy. Members decide when they will come back together to assess their progress.

The last question of strategic doing -- What's our 30/30? -- pushes members of the network toward an assessment of what they did the last 30 days and what they plan to do the next 30 days. The 30 day interval is arbitrary. In some cases, networks get together

every 60, 90, or 180 days. The point of the last question is to make clear the commitment of members of the network to continue the strategic conversation and establish a clear discipline of learning by doing. When they come back together, the members of the network can again travel through the four questions and compile the next version of their strategy.

Although strategic doing is an easy process to understand, it is a difficult discipline to master. Strategic doing is a collective discipline. Its effectiveness grows as members of the network become more familiar to the discipline imposed by the process.

Examples of University Engagement with Network-based Models

Purdue and Workforce Innovation.-- Purdue launched one of the first large-scale applications of network-based approaches to regional engagement in a 14 county region anchored by its main campus. Like many regions in the Midwest, this region has suffered significant relative decline with contraction of manufacturing (Longworth, 2007).

Equipped with a \$15 million-dollar grant from the US Department of Labor to promote innovations in workforce development, Purdue organized collaborations in four focus areas: entrepreneurship support; 21st century skill development; innovation support; and leadership development. These focus areas tracked three of the five areas of regional transformation: developing brainpower, improving innovation support networks and strengthening collaboration through a disciplined process of strategic doing. Grant restrictions prevented PCRD from investing any funds in developing new narratives or in making improvements to physical infrastructure.

After four years, Purdue launched over 60 collaborative initiatives. Over 80% of these initiatives continued past the initial funding. Results included training over 1,500 entrepreneurs; training over 15,000 workers; supporting over 7,600 high school students in new STEM (Science Technology Engineering and Math) disciplines; and providing training in supply chain management over 500 companies.

Because PCRD took time to develop and follow a strategy discipline, PCRD was able to keep the administrative costs of these initiatives very low. PCRD hired an additional 1.5 full-time equivalent professional staff to manage the \$15 million investment. PCRD's experiment of using these models demonstrated that network-based models could generate dramatic improvements in the productivity of federal investments in workforce development (Hutcheson and Morrison, 2012).

University of Wisconsin and the Water Cluster.-- In 2007, the University of Wisconsin – Milwaukee sponsored a meeting in Milwaukee to explore the development of a cluster in freshwater technology. Sixty people attended the event to explore the assets within the region. These discussions led to a white paper and plans for a second

summit (White, 2008). The second summit, held July 14, 2008, included an introduction to strategic doing with a workshop provided by PCRD to the 100 or so attendees.

In the Fall of 2008, the leadership of the cluster developed their basic strategy during a 36 hour “lockdown” session. The strategy set clear outcomes in talent development (brainpower); global communications (narratives); governance (collaboration); and corporate/university linkages (innovation and brainpower). The strategy also called for the establishment of a School of Freshwater Sciences and Research Park (brainpower, innovation, and quality place). The strategic doing framework, including the portfolio for civic economy investments, guided the initial development of the cluster. The strategy is being continuously revised to identify additional opportunities to “link and leverage” the region’s assets.

Arizona State and the Solar Cluster.-- Arizona State University (ASU) has worked with PCRD to develop a strategy process leading to the formation of a solar cluster. Network-based strategy models encourage university professionals to design engagement experiences that help develop and focus the networks needed for cluster development. ASU has used these models to design engaging experiences and identify working teams within specific focus areas.

In the first summit, held August 2-3, 2011, participants received a briefing book prior to the event. ASU requested each participant to complete a homework assignment in which they identified and evaluated potential collaborations to expand collaborative investment in the cluster. Participants ranked their collaborative ideas along two dimensions: the size of the potential impact and the difficulty of implementation. During the summit working session, the participants were asked to propose their collaborations for consideration by the group. Once a preliminary list of collaborations emerged, the participants then turned their attention to ranking the collaboration using the same criteria: size of impact and easy of implementation. Text voting enabled quick assessments of each collaborative option.

The first summit led to the formation of working groups with activities falling into the framework of the civic economy portfolio. The initial four groups included: Workforce and Supply Chain (brainpower); Policy and Finance (innovation); and Applied Research Collaborations and Pilot Projects (innovation); Building and Strengthening the Narrative (narrative).

ASU held a second summit six months later on March 26-27, 2012. In addition to a program that explored the regulatory barriers to solar development in Arizona, the summit participants received updates from the working groups on their progress and their next six month agenda. ASU held its third solar summit from October 9-10, 2012. During the first day of the summit, participants took field trips to learn in more depth how solar technology and business development are taking place in Arizona. The working groups

continued to advance their work by presenting proposals for collaborative investments, as well as budgets and action plans for moving forward.

Michigan State and Regenerating Inner City Neighborhoods.-- In one of the most ambitious applications of these network-based models, professionals at Michigan State University are guiding the development of new networks to regenerate the community some neighborhoods in Flint, Michigan. Over the past 40 years, Flint has absorbed massive economic blows. Employment in the auto industry has declined from its peak of 80,000 workers to only 8,000 in 2010. The city has lost most of its tax base. With a vacancy rate of about 21%, Flint's neighborhoods are blighted with abandoned buildings and high rates of crime.

In 2010, a new neighborhood partnership formed to pursue a federal grant that encouraged applicants to take a more systems level view of their neighborhoods. The grant application was turned down, but the partners in Flint reconvened in January 2012 to explore some next steps. A core team of seven people emerged to outline principles for moving forward. These principles focused on designing practical collaborations to improve the lives of neighborhood children and youth based on available resources and assets.

From these initial steps, the core team quickly launched a new network: Neighborhoods Without Borders. By following the disciplines of Strategic Doing, they identified ten working groups to develop new collaborations: Lifelong Learning (brainpower); Jobs and Money (brainpower and innovation); Retail Renaissance (innovation); Community Safety (quality place); Gangs and Ex-offenders (brainpower); Housing (quality place); Healthy Residents (brainpower); Arts and Culture (brainpower, innovation, quality place, narrative); Opportunities for Youth (brainpower); Parks, Open Space and Greening (quality place). The core team also launched an awareness campaign, a new narrative, that stressed the importance of people coming together to improve the quality of life in Flint's neighborhoods by working on practical collaborations quickly.

Neighborhoods Without Borders continues to meet monthly in Flint with a commitment to continue to meet until March 2014 at a minimum. Over 200 people have participated in the action sessions. The participants represent different components of the civic economy including education, government, business, non-profits and faith-based organizations. The working groups are focused on collaborations such as an urban homesteading initiative; an initiative for business to adopt vacant and abandoned space around their businesses; a youth summit so that Flint's youth can communicate directly with civic leaders, such as the school superintendent, the police chief and area pastors; and an initiative to connect community gardens with food banks.

Northern Illinois University and Purdue and Collaborations in Rockford.-- Northern Illinois University and Purdue are partnering to support a project to redesign how the City of Rockford makes community development investments among over

twenty community and economic development organizations. Across the country, local governments are facing major financial challenges. Rockford is no different. The city's mayor challenged organizations funded by the city to design a collaborative strategy for the city's community and economic development investments. In response, the groups formed the Economic, Development, Education and Entrepreneurship Network also known as EDEEN.

The City Council has agreed to support this initiative, as members of the network learn to collaborate using the discipline of strategic doing. The traditional process of funding each group separately created no incentives for collaboration. By pushing the groups to develop a collaborative strategy, the Mayor and the Council encourage crossing traditional boundaries. EDEEN began meeting regularly in 2012. While results will not be clear until the first new budget cycle is completed in 2013, the progress is promising.

Summary: Lessons Learned and Next Steps

The network-based approach to university engagement is in its infancy. Purdue has incubated some promising tools and disciplines that universities can use to design and guide the networks needed to transform regional economies. We have launched a number of promising pilot projects, and we are learning some important lessons. First, not all networks of the same. A community of interest — all the fans of the Boston Red Sox, for example — represents a very loose network. The learning community, in which members of a network help each other accelerate their learning, represents a more formal network. Regional economic transformation, however, relies on a third type of network, an innovating network. Members of an innovating network share the objective of creating something new together by linking and leveraging assets within their network. Innovating networks require high levels of trust among the members. Building these innovating networks takes time and discipline.

We are learning that the collective discipline of strategic doing takes time to spread throughout the network. Like any new discipline, it takes practice to master. Universities can play an important role in supporting this learning.

We have found that metrics play a different role in networks than in hierarchical organizations. In a hierarchical organization, the top-tier management develops a strategy, and the rest of the organization is charged with execution. In this context, metrics allow top management to make sure that their directives are being carried out. In a network, metrics play a different role. They enable members of the network to learn what works. As networks evolve and become more sophisticated, members tend to embrace metrics to help them learn.

Finally, developing a new discipline of strategy for open networks needs continuous evaluation. We are working to define the protocols that will enable us to gather data

across networks. Only then can we develop reliable measures of effectiveness and set the stage for continuous improvement.

Based on the promising and dramatic results generated by Strategic Doing, Purdue has launched a new certification in the discipline. To support this new discipline nationally, Purdue is forming a network of colleges and universities. The anchor partners for this new network include Michigan State University, and The University of Akron, Indiana University, Arizona State University, and The University of Alaska. Plans are underway to convene an international gathering to develop the practice of Strategic Doing. The meeting is scheduled for Charleston, South Carolina in July 2013.

References

Arthur, W.B. , 1996. Increasing Returns and the New World of Business. *Harvard Business Review*, 74 (4), p. 100-109.

Beinhocker, E. D., 2006. *The Origin of Wealth*. Boston, Mass.: Harvard Business School Press.

Casper, S. , 2007. How did technology clusters emerge and become sustainable?: Social network formation and inter-firm mobility within the San Diego biotechnology cluster. *Research Policy*, 36 (4), p. 438-455.

Chandler, A.C. , 1993. *The Visible Hand*. Boston: Belknap Press of Harvard University Press.

Chesbrough, H. W., 2006. *Open Business Models: How to Thrive in the New Innovation Landscape*. Boston, Mass.: Harvard Business School Press.

Chesbrough, H. W. , 2003. *Open Innovation*. Boston: Harvard Business School Press.

Dempwolf, C.S. , 2012. *Network Models of Regional Innovation Clusters and Their Impact on Economic Growth* .
PhD University of Maryland.

Denning, S., 2005. *The Leader's Guide to Storytelling: Mastering the Art and Discipline of Business Narrative*. San Francisco: Jossey-Bass/A Wiley Imprint.

Duderstadt, J. J. & University of Michigan, 2000. *A University for the 21st Century*. Ann Arbor: University of Michigan Press.

Hutchson, S. & Morrison, E. , 2012. Transforming Regions Through Strategic DOING. [Article]. *Choices: The Magazine of Food, Farm and Resources*, 2d Quarter.

Available from: <http://www.choicesmagazine.org/choices-magazine/theme-articles/public-sector-options-for-creating-jobs/transforming-regions-through-strategic-doing>
[accessed October 20, 2012].

Lester, R. & Starauta, M., eds., , 2007. *Innovation, Universities, and the Competitiveness of Regions*. [Report].

Available from: <http://bit.ly/LwxLVY>
[accessed July 6, 2012]

Logan, R. K. & Stokes, L. W., 2004. *Collaborate to Compete*. Etobicoke, Ont.: Wiley.

Longworth, R. C., 2008. *Caught in the Middle: America's Heartland in the Age of Globalism*. 1st U.S. ed. New York: Bloomsbury.

Mintzberg, H., 1994. *The Rise and Fall of Strategic Planning*. New York: Free Press.

Morrison, E. , 2012. *The Emergence of Strategic Doing*. [Purdue Center for Regional Development Working Paper].

Available from: <http://ge.tt/8YvIsLP/v/0>
[accessed October 20, 2012]

NESTA, 2011. *Compendium for the Civic Economy*. [Report].

Available from:
http://www.nesta.org.uk/assets/features/compendium_for_the_civic_economy
[accessed October 20, 2012]

Nambisan, S. & Sawhney, M. S., 2008. *The Global Brain: Your Roadmap for Innovating Faster and Smarter in a Networked World*. Upper Saddle River, N.J.: Wharton School Pub.

Nolan, C., Morrison, E., Kumar, I., Galloway, H. & Cordes, S. , 2011. Linking Industry and Occupational Clusters in Regional Economic Development. *Economic Development Quarterly*, 25 (1), p. 26-35.

Organizational Reserch Services, 2004. *Theory of Change: A Practical Tool for Action, Results, and Learnin* . [Report].

Available from: <http://www.aecf.org/upload/publicationfiles/cc2977k440.pdf>
[accessed October 20, 2012]

Paytas, J., Gradeck, R. & Andrews, J. , 2004. *Universities and the Development of Industry Clusters*. [Report for the U.S. Economic Development Administration].

Available from: <http://www.heinz.cmu.edu>
[accessed October 19, 2012]

Porter, M. E., 1998a. *The Competitive Advantage of Nations*. New York: Free Press.

Porter, M.E., 1998b. Clusters and the New Economics of Competition. *Harvard Business Review*, **76** (6), p. 77-90.

Porter, M.E. , 2001. *Clusters of Innovation Initiative: Regional Foundations of U.S. Competitiveness*. [Report].

Available from: <http://www.compete.org/publications/detail/220/clusters-of-innovation-initiative-regional-foundations-of-us-competitiveness/>
[accessed October 20, 2012]

Purdue Center for Regional Development, et. al. , 2009. *Crossing the Next Regional Frontier*. [Report].

Available from:

http://www.statsamerica.org/innovation/report_next_regional_frontier_2009.html
[accessed October 20, 2012]

Saxenian, A., 1994. *Regional Advantage*. Cambridge, Mass.: Harvard University Press.

White, S.B. , 2008. *Water Summit White Paper*. [White Paper].

Available from: http://www.thewatercouncil.com/wp-content/uploads/2011/02/water_summit.pdf
[accessed October 20, 2012]

Wright, A. , 2012. *Rockford City Council discusses EDEEN plan*. [Article].

Available from: <http://www.wrex.com/story/18986520/rockford-city-council-discusses>
[accessed October 22, 2012]