

new economy strategies



making the complex simple

From Clusters of Industry to Clusters of Knowledge & Competency

Briefing Paper 1



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From Clusters of Industry to Clusters of Knowledge & Competency: Linking Know-What, Know-How, and Know-Whom for Competitive Advantage

Executive Introduction

While the role of identifying and measuring clusters of industry remains a universal economic development standard, the effects of globalization, outsourcing and offshoring are changing the dynamics of analyzing and therefore designing strategies for communities in transition. Once a standard becomes questioned, it sets in motion a number of alternative means for public and private sector interests to address the future trends in job and wealth creation of local business activity and enterprise formation. The general standard of measuring the aggregation (in economic terms: agglomeration) of employment and wages within an assigned geographic area has, in our engagements and consulting, become a questionable approach to understanding and therefore assessing the tactics for short-term resource allocations and interventions as well as long-term transformation.

What has caused this shift in our approach is not only based on our practical learning in the field, but the confirmation of transitioning corporate operating models and the internal workings of human capital management. We believe that the era of regional clusters of industry as the only model of proving regional competitive advantage is now over and that it is vital for national, state, and regional leaders to embrace strategies that respond to clusters of knowledge and competency.

“ Central to much thinking about how organizations should be restructured for the 21st century is the idea that innovation and growth will depend more and more on so-called knowledge workers, the sort of people who, to quote the title of a recent book...find themselves “Thinking for a Living..” *The Economist, 2006*

This concept of ‘thinking for a living’ confirms not just anecdotal findings from the field but a number of new reports and data captured by top business management firms and human resource agencies:

...”in some industries, such as financial services, media, and pharmaceuticals, they (McKinsey) think the share may already be as high as 25% (of the corporate labor force)...” *The Economist, 2006*

Aligned with this shift in recognizing and measuring knowledge as the key to human capital, corporations and emerging enterprises are framing their competitive structures along networked, distributed models rather than the 19th-20th century fully integrated models. For instance, large pharmaceutical companies outsource nearly 65% of their operations, and the defense industry outsources in excess of 70% of their operations. Outsourcing as a business model is now permanent – research, testing and evaluation, and production-manufacturing have long been under pressure to adopt the ‘proximity to the best minds’ approach by locating next to universities, federal laboratories, and places where a certain baseline of demand helps shape product development. It has only been the recent political and media debate about the ‘offshoring’ of work to international locations that has confused perception and policy about the long-standing evolution of the distributed, networked model. All economists and public policy

watchers understand that a key site location factor for international expansion is determined by the need to lower costs due to an array of issues in the U.S. that make for less competitive consumer prices and corporate margins (wages, benefits, health insurance, etc.) .

New Economy Strategies asserts the adoption of a global “hubs and nodes” approach for economic and workforce development interests at the regional level is now a necessary – not an optional – tactic for responding to these changes within the corporate structure and globalization.

Business 2.0, Fortune, Forbes, and BusinessWeek magazines have all begun to capture the emergence of these new responses to globalization, human capital, and reorganization of structures to fit the future. It is telling the Business 2.0 alone has run a series that links the best places for work with the future of job characteristics and knowledge: some fifteen new occupations that did not exist three years ago have become the fastest and highest paying positions in the U.S. – disease mapper, gene therapist, etc. (see table below) These are occupations that combine several skills and competencies – sometimes within one person, mainly among a team of knowledge-expertise from various fields and disciplines...and not all requiring a PhD nor post baccalaureate degree!

New Careers and Hot Jobs in the 21st Century			
<u>New Careers</u>	<u>Average Salary</u>	<u>Education</u>	<u>Technology</u>
Radio Surgeon	\$200-800K/year	Doctorate	Cyberknife
Info Engineer	\$ 70-120K/year	Associate	Data mining/ analytics
Robot Programmer	\$ 40-100K/year	Associate/4yr	Simulation tools
Disease Mapper	\$ 40-150K/year	PhD	Digital imaging
Hot Jobs: Computer Engineer, Operational Manager, Finance, Health Care, Computer Programmer			
<i>Source: Business 2.0 Magazine</i>			

Political and corporate leaders across the country recognize that a competitive economy requires a competitive workforce above all:

- “An educated, well-trained workforce is the key to our state's economic prosperity. We need to take down the no vacancy sign and ensure we are focusing on the needs of both today and tomorrow's employers.” – Gov. Christine Gregoire, State of Washington
- “If we're going to create the best business climate to create higher paying jobs and retain our young people, we're going to have to build a workforce prepared for the opportunities of the future.” – Gov. John Hoeven, State of North Dakota
- “The best economic-development tool is a well-educated workforce.” – Gov. Bill Ritter, State of Colorado
- “Keep your tax incentives and highway interchanges... We will go where the highly skilled people are.” – Carly Fiorina, past-CEO, HP

Clusters of Knowledge and Competency reach back into global economic history – the Italian crafts and artisans for example fostered a variety of trades and industries around their

competencies in leather, metal, and stone. Long-standing crafts in the distilling of and fermentation for chemical processing were transferable to the potential of other industries; locations such as Puerto Rico and Ireland have leveraged their competencies in the fermentation of rum and whiskey liquors into pharmaceutical drug manufacturing. Texas has used its basis in information, software and GIS mapping technologies to reduce the marginal costs of drilling and the reduction of hitting ‘dry-holes’ by applying knowledge in one industry to a dire situation in the advancement of energy production.

Thus, it is no longer about the one or two clusters that demonstrate the largest aggregation of employment and wage growth but the combination of transferable skills, knowledge, talent and competencies across many opportunities that distinguish the technologies and market-makers that define a region’s advantage. By approaching future analysis and planning around Knowledge and Competencies, regions will be able to minimize the potential shifts in economic fortunes through occupations and sectors in which to express those skills that handle the ebb and flow of cluster dynamics. A case in point: Austin, Texas realized too late that focusing so heavily on the semiconductor cluster put the fortunes of the region at high risk to the price fluctuations of global manufacturing, and thus diversified its competency portfolio around digital gaming, computational engineering, and artificial intelligence. There are several case studies that suggest focusing on knowledge and competencies have mitigated the impact of external forces on a local economy by broadening the opportunities across a suite or portfolio of unique technologies and sectors.

“ A job can be offshored if the skills needed to perform it are available abroad. Some low-wage countries, especially India, have produced large numbers of highly educated workers who have the skills to do some kinds of offshored technical work, such as engineering. However, although Indian engineers have routine engineering skills, evidence suggests that only have the non-routine, high-level problem solving, innovation, and communication skills that are more common among American engineers....” According to The Brookings Institution’s *The Implications of Service Offshoring for Metropolitan Economics, February 2007 report*.

Finally, by focusing on Knowledge and Competencies, a region fosters more pathways for the entire range of its demographic populations, educational attainment, and ultimately aspirations. By identifying unrealized and undervalued roles for economic opportunity vis-a-vis becoming a part of a team of expertise – high school, community and technical colleges, four year and advanced research university graduates, industry trained individuals – all serving together around the regional ‘table’ seeking to build several scenarios for stretching the competency strengths across a handful of targets for growth. Therefore, our understanding of the knowledge-competency approach indicates that workforce and skills development agencies, programs and initiatives must coordinate among a collaborative, team-like packaging of people rather than the traditional person-by-person offerings of the past.

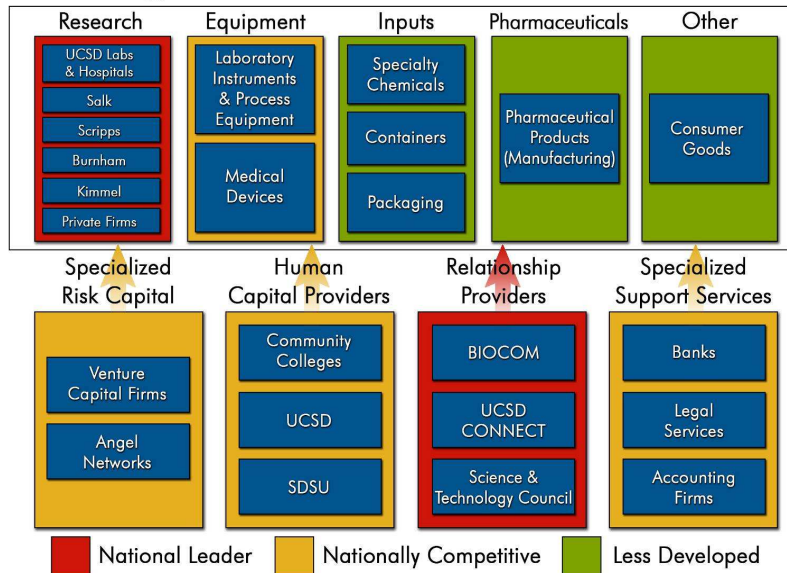
If we as a nation are to compete globally, then the current infrastructure, systems, and institutions for the development and delivery of human capital can no longer ignore a certain reality: knowledge-competency regional models demand immediate attention. Simply put, the world is not waiting for America to design, organize and launch a new solution or approach – nor are corporate and entrepreneurial firms based in the U.S. !

The End of Traditional Clusters of Industry and the Transformation to Regional Hubs and Nodes

Several factors now challenge the traditional perspective and application of ‘clusters’ of industry or sectors to local and regional economies.

The notion that all the assets, value chains, and even the skills must be contained within a proximate location to each other has been traditionally viewed as critical to the success of a specific industry sector. Harvard’s Michael Porter described these industry agglomerations as ‘clusters’, and regional economies and their policies have been viewed through this lens for decades. Clusters have been described as interconnected sub-economies that look like integrated production-based supply chains, whereby materials suppliers and component vendors provide the inputs to a large final assembly plant. Porter underscored his point with the example of Dalton, Georgia as the carpet production capital of the world. We also see that the automotive sector traditionally operated as a cluster economy (centered in Detroit). New industries such as biotechnology appear to operate as clusters (see graphic below) as operating in only a handful of communities such as San Diego based on work by the Council on Competitiveness and the Brookings Institute. Cluster theory has evolved the definition of “supply chain” to include the “soft” suppliers of workers, risk capital, social networking, and support services that help companies achieve world-class practices.

San Diego Pharmaceuticals/Biotech Cluster



Source: Regions of Innovation Project, US Council on Competitiveness

New policy responses have emerged such as creative community strategies for places like Philadelphia, where the blossoming of young professionals from the many universities in the region helped to drive a need for a clearer set of opportunities and relationships to build a brand around regional film, music, arts, and graphics. The rebound of the Inner City of Philadelphia is due primarily to a network of interests tied to the universities, museums, design houses, film

studios, and urban music scene that had created unique events – from pub crawls to monthly tours of offices where new ideas were being created every day. Older, more traditional professionals began to realize that something was changing in downtown – the number of restaurants, bookstores, and informal networks had begun to spark an increase in employment, home-based businesses, and simply the increase in the number of FedEx and UPS home deliveries. There were, however, no policies in place to support or even minimize the barriers to entry for the creative community – and thus a network of networks was formed to link interests across the sectors and communities of practices – as well as to reach out to the suburbs where even more individuals and businesses in the creative sector existed. Soon emerged a set of city and county policies that sought to preserve the talent, employment, tax base, and incentives – but now in a wholly-different sector that had not existed five years before. And most importantly, the creative community meets quarterly with traditional and legacy industries to spark innovation practices and new product development.

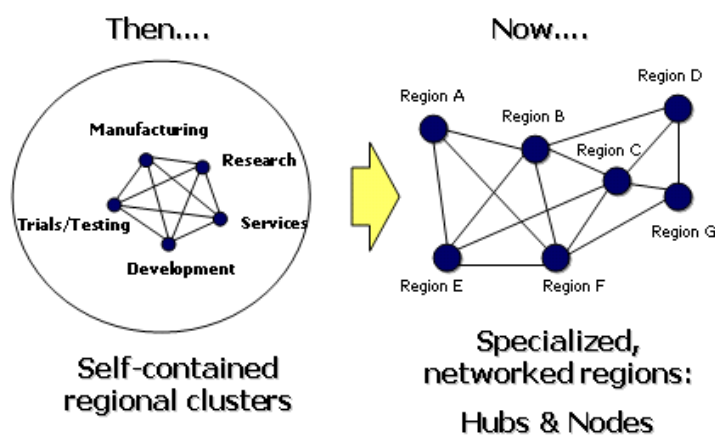
In Hawaii, one of the top film executives of TriStar pictures, the studio that brought Jurassic Park and similar blockbusters to the screen, has returned home from Hollywood to be closer to his elderly parents. But in going ‘native’ from the backlots of Los Angeles, his expertise in digital media and the newer technologies of computer-generated film –making has led to the creation of a high school and college program for students and young adults to participate in the delivery of content and services to his former employer and network. Remotely, Hawaiians ARE the new backlot for the multi-billion industry but inside former warehouses, lofts, and academic campuses – working under contract to the larger studios and forming their own ‘independent’ production companies.

New Economy Strategies, LLC continues to research and observe the evolution of industry clusters across the U.S. and world. We have come to the conclusion that **traditional cluster theory is coming to an end and a new theory of economic development must emerge.** In our view, the global economic landscape has changed in such a way that **we must challenge the fundamental belief of clusters of industry and the policies that make up cluster-based economic development.**

Successful companies and industries are now defined by their distributed, networked business models in which geographic location has been more and more removed as a functional requirement. For instance, the impact of outsourcing as a permanent business model indicates that larger, fully integrated corporate settings are more and more divested operationally and geographically. A large pharmaceutical or defense company appears like a network of smaller enterprises, divisions, and suppliers. Sourcing strategies by companies and their industries is no longer only about finding the lowest cost input that can be quickly plugged in a production model. Rather, global sourcing is viewed by CEOs as a critical piece of their entire corporate strategy, and flexibility and just-in-time responsiveness has become the top benefit of a distributed business model, not cost reduction or resource acquisition.

We offer the following concept of “**Hubs and Nodes**” as a new view of economic development and a starting point for a new theory on regional industry formation.

The cluster model is losing relevance



As it becomes clear that research, development and commercialization can be spread across thousands of miles and locations, the **Hubs and Nodes** model is becoming the new de facto standard for industries and companies. With activities of many industries already outsourced to various locations in the US and abroad, it is easy to see the extent to which this paradigm has already changed. As long as a particular location has sufficient critical mass to drive development – a Hub – or can significantly support development with complementary processes – a Node – it can easily participate in this new industry paradigm, no matter its location. Few regions in the future will ‘own’ all the assets and attributes of one industry sector.

Consider how the electronics industry relies on sourcing from countries all over the world, or how the financial services sector relies on software development done in India. Only heavy industries such as automotive and aerospace retain their tight locally-driven supply chain due to a need for just-in-time delivery and stranded costs in infrastructure, but even this model is under increasing strain.

The proposition for a hub and nodes concept is based on the realities of a changing corporate, business model as noted previously. Simply put, U.S. firms and sectors are becoming and operating like the independent film industry. The so-called studio handles the financing, production, and overall project management while all the other elements – competencies – are outsourced and organized around a network that actually creates the final product. One firm does the music, another does the script and writing, while another still does the graphics and computational designs for the ‘whiz-bang’ backdrops. Therefore, the film industry in the U.S. is no longer a fully-integrated enterprise but rather a network of loosely connected individuals and competencies tied by a common purpose of a project and a deliverable. More and more these networks are global – and work 24x7 on contributing their piece of the value chain. Some of these networks remain intact after the project, others disband until the next project!

Many regions in the U.S. have already accumulated the critical mass to compete globally in several technology-based industry clusters. These clusters are highly productive, have strong concentrations of knowledge workers, and are further complemented by strong regional assets including government labs, universities, and knowledge-creation infrastructure. The imperative

to remain competitive in industry clusters requires regions to seek out strategies that preserve current advantages while identifying and creating new opportunities. Innovation now demands significant review of the traditional clusters model and the adaptation and adoption of a new approach to the most critical elements of competitiveness: human capital, knowledge, and unique competencies.

And this shift in thinking about proximity to a more distributed, networked model is not the purview of urban, metropolitan communities. A report on rural economic development – *Rebuilding America's Productive Economy – the Heartland Development Strategy* – suggests the following perspective:

“ Another type of growth node in the Heartland is the “re-emerging hub.” These are usually small and mid-sized cities that grew up during the period of agricultural expansion in the late 19th and early 20th centuries, and then began to decline or plateau economically in mid-century. Today, such cities – among them Fargo North Dakota, Sioux Falls South Dakota, Des Moines Iowa, and Boise Idaho – are making what many might find surprising headway in the information age. They are exploiting their advantages, which include a lower cost of living, good public schools and universities, and quality of life attractions for middle-class families to lure high-end business and professional service firms, information service companies, and diversified, innovative small manufacturers.”

Moving from Clusters to Knowledge & Competencies

Reason stands that if the business model is now permanently networked, that operations are being created around hubs and nodes, and that distributed placement of the entrepreneurial firms of the future is less loyal to proximity, then how do we measure the success of economic centers, and what factors are the most important in driving local prosperity? The challenge for regions is to inventory local assets and networks, and determine combinations of local assets that are best suited to global collaboration. Given the shift to business models that are permanently networked, NES believes that concentrations of expertise, talent, skills, knowledge, and competencies are now more valuable to measure and support across the region rather than focusing on cluster development and boosting local supplier chains.

What is needed today is a shift in regional thinking from simply measuring size and concentration of local production along a value chain to looking at capabilities and capacity distributed across multiple regions and countries in a way that maximizes responsiveness to markets and reduces cycle times from idea to consumer. Since the creation of intellectual property might occur in one location; production, manufacturing, sales and distribution in others all the while corporate headquarters reside in another region it is becoming more difficult to measure the regional economic impact using traditional means. A movement toward “Clusters of Knowledge & Competency” requires that local analysis and models adapt toward global networks of innovation, production, and know-how:

Traditional vs. Knowledge-Driven Clusters

Traditional Industry Cluster Model	Clusters of Knowledge and Competency Model
All elements of the value chain reside locally	Globally distributed, networked supplier chains
Local concentration or critical mass of all or most sub-elements	Concentration and critical mass of specific and unique elements linked to other locations with complementary concentrations
Concentration of assets in skills, knowledge and the locally integrated pathway from discovery to market in a handful of enterprises	Networked, outsourced or even off-shored business model linking independent firms with large procurement entities
Formation of cluster organizations or associations that seek to promote the cluster	Formation of networks of networks around product and service creation that are often at will and dynamic
Connectivity among and around end-users or ‘exporters’ that seek to build the final products	Recognition that innovation is a social activity among a number of minds, ideas, and institutions that learn to work collaboratively about a solution or tactic
Financial, business services located proximate to the cluster activities	Recognition that open-source innovation is emerging as the means of intellectual property creation, management, exploitation whereby know-how is distributed regionally and globally
Know-how and knowledge is often driven by top-down, growth and mature enterprises	Recognition in the meritocracy that know-how, know-whom, and know-what is found among a broad set of stakeholders and interests

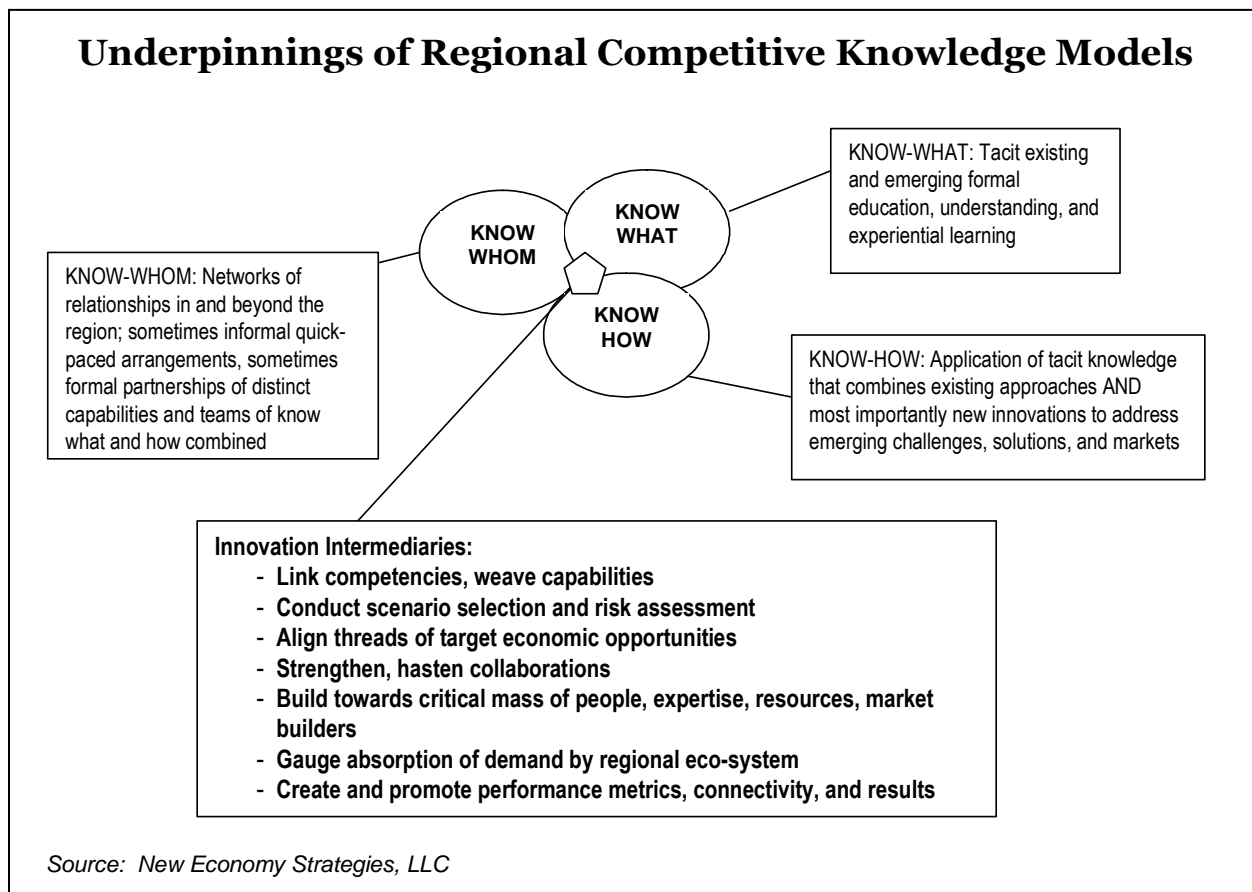
In our work around the U.S. and abroad, the challenge of measuring impact on performance, accountability, and ultimately metrics continues to foster much debate and insight from a variety of quarters. We believe that a baseline for measurement should start with acknowledging that Clusters of Knowledge & Competency reflect a new paradigm around **Know-How, Know-What, and Know-Whom**:

Know-What: Tacit existing and emerging formal education, understanding, and experiential learning

Know-How: Application of tacit knowledge that combines existing approaches AND most importantly new innovations to address emerging challenges, solutions, and markets

Know-Whom: Networks of relationships in and beyond the region; sometimes informal quick-paced arrangements, sometimes formal partnerships of distinct capabilities and teams of know what and how combined

Regional Intermediaries become the necessary link between the How-What-Whom in a region by creating Teams of Interdisciplinary science, research, discovery, applied technology, business and strategy models, trends and forecasting, and production-manufacturing-delivery. However, these teams of HOW-WHAT- WHOM are comprised of different competencies and skill levels, and more importantly are now distributed in and beyond the region.



Therefore from an operating model, it will become increasingly necessary to create **Collaborative Knowledge Teams** with new structures, measures, and relationships:

- Design around the process, not the performance – getting the job done versus how fast, how cheap
- Measure and reward the team not individuals
- Analyze and apply relevant data and collect based on the process needs not what would be cool to know
- Determine operational trade-offs, prioritize goals as immediate-near-term-long-term
- Delegate responsibility to the team for implementation and integration among other teams, organizations, and institutions – build networks!

Further, the **How-What-Whom** can then be linked back to a region's target industry sectors – here are some examples:

Logistics

- industrial design, advanced manufacturing, information systems, electronic sensors and controls, engineering, and delivery/ transportation

Biomedical

- biological sciences, computational and mechanical engineering, information systems, health and patient statistics and demographics

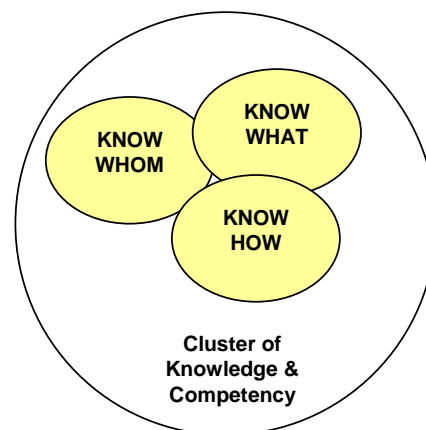
Renewable Energy:

- agribiotech, materials science, fermentation and chemical processing, mechanical engineering, farming and transport related services

To be successful, Collaborative Knowledge Teams must integrate across lines of experience and trends in technical applications around specific market, economic, and/or societal challenges.

Clusters of Knowledge & Competency are formed when the Know-How, Know-What, and Know-Whom are linked throughout a region:

Clusters of Knowledge & Competency: Linking What-How-Whom



When a region completes its asset mapping and inventory leading to a new strategy around Knowledge and Competencies – the hardest task is holding it all together. Our conclusion is that the economic and workforce communities require newer mechanisms – **Innovation Intermediaries**® – that sustain the asset mapping by linking and leveraging the networks of relationships and talent to achieve more effective and efficient use of resources, time, and leadership. Just to have mapped the How-What-Whom assets and knowledge will only produce a new “yellow pages” and document the capabilities of a the region. The most important expression of implementation will be the exploitation of those networks and competencies by a neutral third-party function or entity that all parties are comfortable with and agree upon its role and responsibilities. No one institution or organization can manage this alone – and thus an **Innovation Intermediary**® must be created in most instances to provide the platform on which to catalyze and guide – not direct nor force – the Cluster of Knowledge and Competency. There are several examples of these Intermediaries in the US and around the world – innovation zones, innovation centers, and innovation networks. What a region chooses as its intermediary will and must reflect the culture and characteristics of political and civic will, leadership, and resources based on trust and a common scenario.

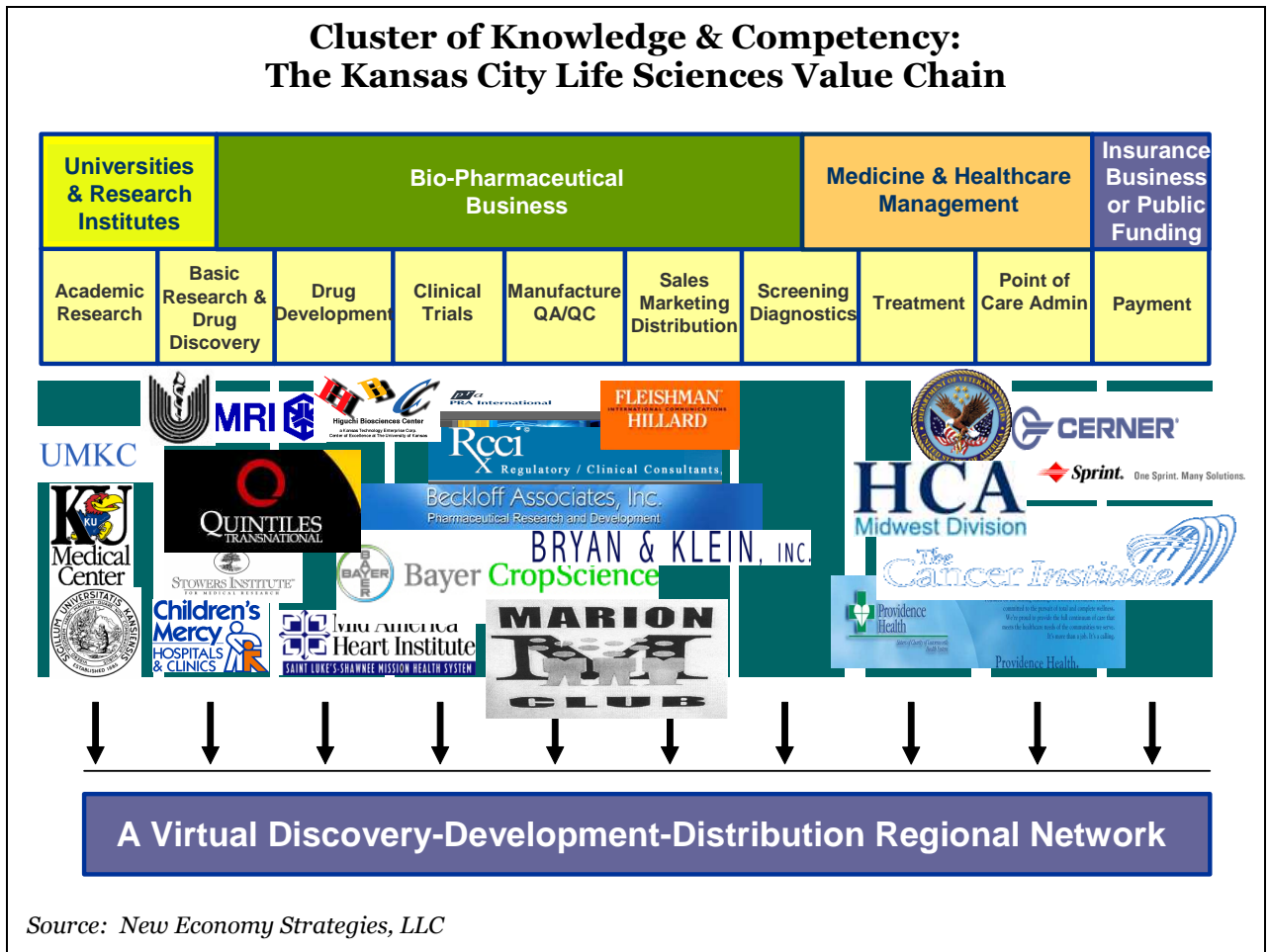
What are the benefits of adopting a model based on **Clusters of Knowledge & Competency**?

A model based on Clusters of Knowledge & Competency recognizes that a community may have a significant strength within the value chain of a cluster that should be leveraged for future growth and development. In most cases, communities should focus more on their strengths (than fill their cluster gaps), and begin network their competencies with other parts of the country and world who need them. By recognizing the competencies of a region within a cluster, we can better define the region’s path going forward.

A model based on Clusters of Knowledge & Competency also recognizes that **competencies can cross into multiple unique industry clusters**. A competency in optics can support clusters as diverse as aerospace (laser guidance), medicine (PET scanning), electronics (document imaging), and telecommunications (fiber optic routers). Why does Optics appear more like a competency than an industry? Optics is a competency because its production workers, university research, and suppliers can participate in multiple clusters. Optics is a competency because it is the portion of the cluster’s value chain that is driving innovation and the success of companies in its field. This type of competency is found in Rochester, NY, the hometown of Kodak (imaging) and now home to a diverse set of optics companies serving multiple clusters.

Finally, a model based on Clusters of Knowledge & Competency allows us to **identify new opportunities in new clusters that may not be easily found in a region** but have strong potential due the presence of a unique competency. By definition, competencies can serve multiple clusters and most do. By analyzing a region’s competencies, we discover not only what the competencies are, but which clusters the competencies are currently serving. Since we know the competencies requirements of national clusters, we can now quickly identify which additional clusters could be served by a region’s existing competencies. Cross-cutting between clusters and developing new clusters from existing clusters should become the next evolutionary step in cluster-based economic development.

Observe how a competency-driven approach in Kansas City has fed the growth of a vibrant life sciences cluster along the full value chain:

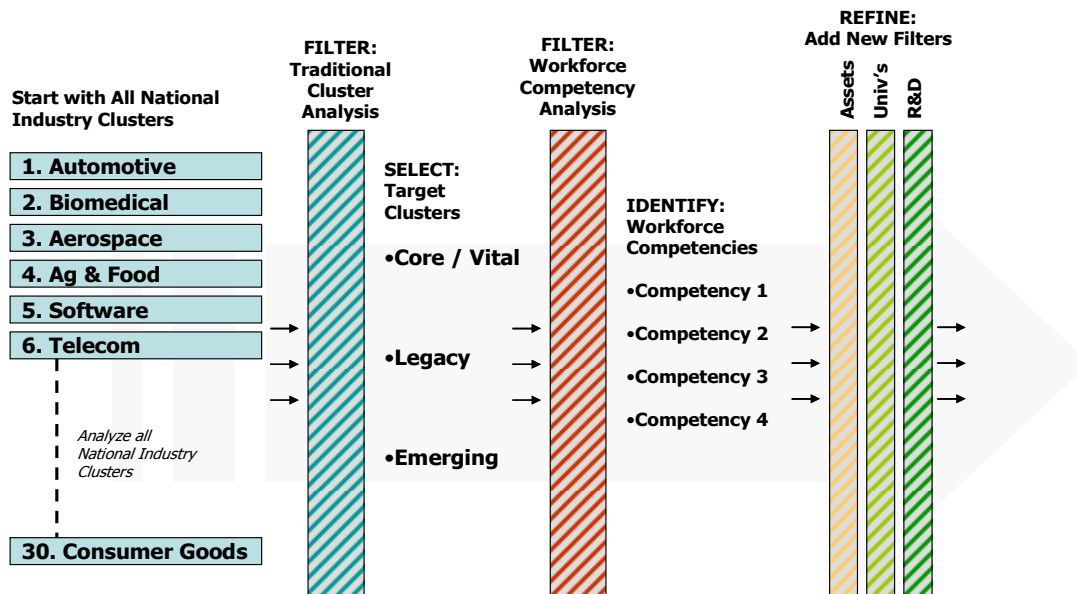


Feedback from industry executives, workforce development officials, and economic developers further validates the need for a new model that is multidisciplinary, cross-industry, and knowledge-based. Traditional attempts to view economies *in terms of their industries* have only created silos across leadership and programs. Students and workers likewise understand that their career is not levered to a single industry, but that industries ebb and flow, they will need to continue to apply their competencies to new markets, new industries, and new organizational systems.

Clusters of Knowledge & Competency: Analytical Framework

As developed by New Economy Strategies, the Clusters of Knowledge & Competency analytical framework involves a step-by-step process that refines a list of competitive advantages for a region and ultimately arrives at a region's best targets of opportunity as a Cluster of Knowledge & Competency, beginning with a traditional **Industry Cluster Analysis** of a region's existing cluster strengths to arrive at a list of core, legacy, and emerging targets.

Clusters of Knowledge & Competency ANALYTICAL SELECTION PROCESS



Source: New Economy Strategies, LLC

A **Workforce Competency Analysis** identifies workforce strengths and ultimately arrives at regional competencies in workforce, such as aerospace engineering, technology design, or finance. These competencies are much more than the traditional workforce system's competency ladder based on an individual's basic skills. Rather, these competencies are specifically define around a region's precise Know-What, Know-How, and Know-Whom !

The competency analysis is then refined further by including additional datasets in the analysis: **patents, R&D, universities, venture capital**, etc. For each, new or deeper competencies are identified, i.e. research competencies, entrepreneurial competencies, etc. The results rely on both data analysis and qualitative input from local leadership and stakeholders.

Understanding Clusters of Knowledge & Competency enable civic and political leadership to position programs and initiatives as well as resource allocations and performance measures to form the region's truly unique competitive advantages. In our minds, its always been about the people not the production, the content not the product, the collaboration not the company...and thus, the relationships not the transactions!

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