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ABSTRACT

This paper is a response to the collective interests expressed by a network of the leadership of ten U.S. community college systems to better understand how community colleges can support emerging state cluster-based economic development strategies. The intent is to proved concrete applications of a cluster-based model that inform both workforce and economic development policy and decision makers, bringing together two agendas that states usually pursue separately. The paper presents an initial model of a cluster-based workforce delivery system based on: (1) college practices observed and studied in the U.S. and around the world; (2) direct experience with cluster building strategies; (3) emerging theories and innovations; and (4) the experience and wisdom of members of the network. According to the authors, industry clusters have become the new mantra for economic development policy. Regional technical institutions are best able to focus on and respond to regional economies. Therefore, the paper argues, these institutions would do well to practice institutional and system-wide cooperation in order to develop specific expertise that will help them to become a particular business cluster's center of excellence. The paper presents an assortment of special features that some colleges have added to address the needs of clusters. The choices colleges make should reflect industry and student needs; local availability of and access to programs, services, and budgets; and long-term development plans of the state and region. (Contains 13 references.) (NB)

White Paper

Cluster-Based Workforce Development: A Community College Approach

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I. Purpose

This paper is a response to the collective interests expressed by a network of the leadership of ten U.S. state community college systems, to better understand how community colleges can support emerging state cluster-based economic development strategies. The intent is to provide concrete applications of a cluster-based model that inform both workforce and economic development policy and decision makers, bringing together two agendas that states usually pursue separately.

The paper presents an initial model of a cluster-based workforce delivery system based on (1) college practices observed and studied in the U.S. and around the world, (2) direct experience with cluster building strategies, (3) emerging theories and innovations, and (4) the experience and wisdom of members of the network. The model offers a broad array of responsibilities, activities, and functions, each of which must be considered and prioritized in the context of local needs, existing resources, and regional circumstances.

II. Rationale

Industry clusters have become, in the United States as well as in many other parts of the world, the new mantra for economic development policy. It is a fact that businesses tend to cluster in order to take advantage of suppliers and specialized services that are attracted by concentrations of customers. But in recent years practitioners have learned that clustering is first and foremost influenced by talent—by concentrations of experienced and skilled labor and by the availability of the customized and specialized education and training that produces and upgrades skills and knowledge. The key to the success of almost every industry cluster is the presence of a labor force with the appropriate skills for and knowledge of the industries located within the commuting boundaries of the cluster. Industry needs the "commodity skills" that are easily transferable but also wants industry specific skills, which are more scarce. Companies value access to a labor pool familiar with the operations of their businesses and able to apply skills to the cluster's particular work environment.

The reason that the geography of human resources is so important is that other key resources, including technology and financial capital, unlike skilled human capital, can be transferred instantly. Nothing is more important to clusters than the development of their human resources, and in no area are they more dependent on the state, which is the biggest single investor in education and training. Equally important, clusters are important to students and workers. More employers clustered in a region translate into more employment, advancement, and learning opportunities; and clusters form the basis for building effective career ladders.

Most educational institutions have inadequately recognized and acted on the specialized needs of their regions' clustered industries. Although many educational institutions have broad missions that include meeting the needs of a wide range of individuals and employers, it is primarily the regional two- and four- year technical institutions that are best able to focus on and respond to regional economies. Over the past 15 years community and technical colleges in particular have done an excellent job of responding to the needs of small and mid-sized enterprises (SMEs) and have demonstrated they can successfully juggle a variety of missions. But most colleges have not yet discovered the value to their economy of becoming a particular cluster's center of excellence, or figured out how to develop the specialized expertise needed by specific types of firms. Most are too isolated from peers in other places and benchmark practices and have too little opportunity to share experiences and work collaboratively toward common goals. Only by making hard choices and practicing institutional and system-wide cooperation can colleges develop specific expertise while meeting a range of regional needs.

The concept of a cluster-oriented community college system is based on the following set of assumptions:

- Industries are not evenly distributed, but tend to concentrate more in some locations than others.
- Every college cannot provide high quality education, training, and services to all industries; only by specializing can institutions and systems assemble expertise and resources to achieve excellence.
- Employment in any cluster spans a wide range of technical and non-technical occupations, and many of the skills apply to other clusters.
- Sustaining excellence requires continual monitoring of industry trends, benchmark practices, and new technologies.
- Every student ought to be able to access education and training for a career in any cluster of his or her choice.
- Every student should have the opportunity to pursue education to the fullest extent of his or her abilities and aspirations.
- States must carefully balance their investments in cluster centers among three considerations: what is needed, what is possible, and what is realistic.

II. Common Concerns about Specialization

The concept of specialization is not without its critics and skeptics, and indeed it can be taken too far and misused. The following eight questions are among those most commonly asked in discussions of cluster-college connections.

Shouldn't colleges serve all their students and all their industries?

Colleges should provide the core skills and foundation courses for large numbers of career choices. But they can't provide the same level or intensity of learning for each. Colleges have always had to make choices in what to teach, generally based on employer needs, student demands, and faculty interests. Those colleges that give priority to employer needs may already have chosen to specialize for a local cluster. Since few colleges are able to meet all of the needs of a region, most provide foundation courses and then make the hard choices among which programs to offer. A high existing or potential scale of demand is justification for states to concentrate a disproportionate amount of the resources of a particular community college on a specific cluster. As long as students are given options and the means to participate in a wide range of career programs—including perhaps some outside of their geographical areas—the state is fulfilling its responsibility of providing educational alternatives for students.

Aren't companies deterred from locating in places with too many other companies competing for their labor markets?

Specialized labor markets, except to the most mature and low skill clusters, improve employers' labor pools and thus make locations more desirable—not less—despite competition. Paul Krugman proved this in theory in *Geography and Trade*, but one only has to examine location and expansion decisions to find it in practice. Companies generally rank the existence of specialized labor pool high among factors influencing expansion and location decisions.

Doesn't specialization unfairly favor some colleges over others?

It is true that because there are costs associated with building specialization, funding agencies have to make difficult choices. But they can achieve fairness by using clear and transparent criteria and by allowing all colleges to develop expertise for some regionally prominent cluster.

Done correctly, a cluster approach is a means for state systems to increase efficiency and excellence at the same time. Efficiency is improved when one or more lead colleges reduce the duplication of effort within the system by monitoring what other colleges have done or are doing and by consolidating efforts such as new program development and afterward disseminating the results. Greater excellence occurs because using resources in a more concentrated way—rather than thinly spreading them throughout the system—encourages the development of higher quality programs and services. When formal and informal systems are in place to share results throughout the system, all colleges can benefit and this reduces concerns about favoritism.

Does creating a comprehensive center for industry go too far beyond the mission of the community college?

The missions of community colleges are defined by the communities they serve. Certainly there are legitimate issues in times of budget cuts that must carefully justify how community college resources are spent. Moreover, there should be negotiated agreements between colleges and local clusters on roles and responsibilities of all partners so the relationships with the clusters produce real benefits for students and for the cluster. But these issues can be resolved within the context of working with specific clusters of local firms. In most cases, what benefits these firms in terms of economic growth and profitability comes back to the students in terms of increased employment capabilities and to the institution in the development of a stronger local tax base. Community colleges have regional economic development missions, and many have assumed related responsibilities to fill gaps in their region's economy or labor market.

How do colleges that do not become lead colleges for a cluster benefit?

Cluster Centers are intended to benefit the state or a region, not only a particular college. All colleges will have full and immediate access to the expertise, information, and innovation concentrated at a Center through cluster faculty networks. If there are major costs associated with the development of a Center, the state can consider cross subsidization issues, or even ask for specific local matches. But the goal of a cluster strategy is not to have communities compete for the same clusters. Rather it is to determine which clusters make sense for which communities. In some states, there may be clusters of firms performing similar functions but located in different geographic areas of the state. In these cases, the colleges ought to work together as co-Centers. Regardless, all colleges should be able to use the curricula, skill standards, needs assessments, and connections to industry developed at any Center. Anything new developed should to be non-proprietary within the state system.

Is there a difference between industry clusters and occupational clusters?

Industry clusters stem from common economic interests and needs while occupational clusters arise through common skill sets. These common skill sets are shared by many industry clusters; at the same time the workforce of any given industry includes many such occupational clusters. But learning around industry clusters is based on a business environment context that is common to all occupations within the cluster. The uniqueness of industry clusters is context; the uniqueness of occupational clusters is content. The question the Center will address for a variety of occupations that exist within a cluster is "what are the features of this workplace that are unique or particular to the cluster?" While there are debates of which is "better," increasingly the specific nature of private sector units define the content of the job as much as its title. For example, the furniture industry, the aerospace industry, and the automobile industry all have employees who are called Computer-Aided-Design operators. But the specific nature of their jobs is quite different between these diverse industries.

Aren't clusters just sectors in new clothing?

Economic development has always recognized sector strategies. But there are important distinctions between these efforts and cluster-based approaches. Sectors are defined by products or services and the geographic boundaries of a political region. Clusters are defined

by interdependencies among firms that can be based on product but also on a variety of other factors and by the geographic boundaries within which people and companies will travel to work, access a particular service, or associate with peers. Sectors or sets of related sectors that are defined by products and limited by geographic boundaries, as most of funded initiatives have been, can be defined as one form of clusters. But by emphasizing clusters, we ask the firms themselves to define the business and learning relationships that affect their competitiveness.

Can specialized centers create clusters?

Can institutions create clusters or do the seedlings have to exist? Most of the evidence says clusters cannot be created out of whole cloth. They require a solid foundation either embedded in existing companies, local expertise, or some special resources. However, the intervention of an organization such as a new center can influence the development of clusters. The formation of the world's largest clusters occurred over long periods of time—usually many decades. They were unplanned and often unnoticed until they reached a level activity that attracted attention. Most have been historical accidents, though some stem from natural resources. Plastics in western Massachusetts had its basis in the competencies within General Electric's plastics plant and the demand for parts from its transformer and naval ordinance divisions in Pittsfield; metalworking along the Connecticut River Valley had its roots in the Springfield Armory; food processing in Chicago can be traced to its position in distribution and transportation for the Midwest agricultural sectors; and the oil and gas cluster in southern Louisiana is due to the natural resources in the Gulf. However, despite the vagaries of historical industrial development, if some core strengths exist, it may be possible to leverage that strength into something larger and eventually reach a scale that will draw the various factors associated with clusters. Institutions can catalyze and promote existing specialization, but rarely can create it.

What if a region has no clusters?

One would be hard pressed to find a place in the United States that did not have some form of economic clusters. The more relevant question is whether it is worth public resources to develop and utilize an approach to the existing clusters. In some places, there may be no groups of industries with either the scale or concentration to meet the criteria established to be recognized as a cluster. There may be clusters of firms that do not meet the expectations for wages in the community. But clusters are not "things," they are systems, and the interdependencies and collective interests within an economy offer a logical way to organize and deliver services. In rural areas, for example, community colleges may wish to expand their catchment area to include surrounding counties, look for connections (umbilical cords) to clusters in adjacent areas, focus on less obvious commonalities and more generic needs, or consider micro-enterprises and micro-clusters that may represent unique local competencies. Even in places with weak systemic relationships, treating the economy as a system can yield more benefits than simply working with individuals and single employers. Re-orienting the central theme of the cluster from some commonality of production process to a commonality related to knowledge, innovation, or entrepreneurship may also open up new possibilities for generating externalities and taking collective actions in a region.

Will specialization limit graduates' flexibility?

In a time when most young people will change jobs and careers many times, is specialized education a detriment? Not if specialization is viewed as simply a more effective way of teaching generalizable skills. Much of the learning imparted through a cluster curriculum consists of soft and generic skills valued by other clusters, but the specific applications that are used relate to the initial career choice of the individual. Over time, students will gain experiences, supplement their skills, and, with additional courses, be able to transfer them. Specialization enhances career possibilities by facilitating the initial career entry and gives workers the work experience and confidence to make subsequent changes. Furthermore, according to recent studies of education and training it is assumed this is a life long process in which workers continually retrain for jobs and develop new sets of skills. The one-way process

of moving from the foundation to more technical skills is rapidly replaced by a perspective that views the process as far more interactive and lateral.

III. The Evolution of Industry Centers at Community College

For decades many community colleges have served industry through centers oriented to meeting business needs. It is useful to consider how the concept of cluster-based centers has evolved, following earlier types of industry centers. A brief history of these efforts is outlined below.

From the 1950s to the mid-1980s, the economic development mission of community colleges around the country was to provide education and training to meet the needs and expectations of new and expanding industries regardless of product or industry location. Much of it was based on the traditional notion of vocational education, which provided entry level skills needed by younger students to enter labor markets. To support the needs of very large employers, a few colleges formed partnerships with corporations and created dedicated centers that contained the equipment and used the processes of the partner employer. The main emphasis was on the technology used by companies and transferring those company specific skills to workers. These support centers for large employers represented the *first generation* of industry centers (Table 1).

In the mid-1980s, competition from Japan and Germany raised awareness of the importance of small and mid-sized enterprises (SMEs) and their need for advanced technologies and a workforce to use them, and modernization became an economic development strategy. Many SMEs turned first to community colleges because they are less research oriented, more flexible, more accessible, and generally better positioned to help SMEs innovate and modernize than universities. This led to a *second generation* of industry centers, or "Advanced Technology Centers" (ATCs), that work with machine builders and software designers to demonstrate more advanced equipment and production systems and help companies learn how to use them more effectively. These colleges functioned, and still do, in effect as technology intermediaries.

Today, as regions and companies begin to better understand their competitive advantages in terms of place and space, economic development efforts are focusing on industry clusters. This involves production systems that are external to the company and has led to the *third generation* of centers that give similar companies access to larger and more specialized pools of workers who understand a particular business and how to apply their skills to it. The emerging third generation Centers emphasize specialized technologies and knowledge within the work context of a specific industry and work with industry organizations and address needs of firms collectively. Thus, colleges can build strengths and develop expertise not possible if spread over many types of businesses.

Table 1
Evolution of College Industry Centers

	Corporate Centers 1960s, 70s	Technology Centers 1980s, 90s	Cluster Centers 2000s
Driver	Corporation	Technology	Industry
Emphasis	Corporate culture	Hard skills	Soft skills
Major Links	Economic developers, company	Equipment vendors	Cluster councils/ associations
Content	Specific manufacturing processes	Generic manufacturing processes	"All aspects of industry"
Added Functions	Assessment & screening	Demonstration of technologies	Shared knowledge
Economic Goals	Recruitment	Modernization	Innovation

IV. The Structure of Specialization: What does it entail for a community college?

Industry Cluster Centers at community or technical colleges serve state and national interests by supporting emerging cluster-based economic development strategies, better articulating the education and training with the needs of the cluster, and expanding career pathways for students. Industry Cluster Centers are places that industry can rely on to understand their particular needs and interests, to help solve skill-related problems, and to help assure a continuing flow of new entrants and source of upgrading its existing work force. Centers are a "one-stop shop" for the firms that comprise the cluster, so that educators and trainers and workforce investment networks might more efficiently stay abreast of changes in technology and employment and develop special resources for employers.

The college in a state, or in some cases colleges, that assumes lead responsibility for a cluster can simply become the lead institution for curricula design, development, dissemination, and delivery, or it can take on a wide array of activities that complement and supplement its credit and non-credit programs. Community college based Cluster Centers may, for example, coordinate industry relationships, broker networks, and even manage incubators, quality testing labs, or technical assistance offices. The latter route enhances the college's value to the cluster and improves its status; however, it requires commensurately more resources and effort.

The balance of this paper describes cluster-specific services that have been found and shown to be effective at one or more community colleges and gives models for Cluster Centers. We begin with a set of foundational principles that should drive cluster-based approaches.

Principles underlying Cluster Centers:

These design principles stem from an array of cluster studies in various parts of the world, experiences with educational institutions that support business clusters, and knowledge of states' policies, institutions, and clusters. We have identified a number of general principles that we believe are associated with success. The system should:

Be demand, not politically, driven
Curricula, programs, and services should be influenced by current and emerging needs of the cluster as best articulated by the leaders and innovators and by best practices, not by political considerations. This can mean that on the demand side, the firms that appear to be most likely to survive and grow and offer high wage employment to the community are the clusters worth considering by the community college.

Act collaboratively and connect externally
Work closely with organizations with overlapping or complementary missions, e.g., development agencies, universities, non-profits, and other colleges, directing customers to other organizations where appropriate. Share specialized resources and expertise freely and proactively with all institutions in the state. Participate in national and international networks and associations that help the college to stay abreast of new innovation and best practices, access new materials and curricula, and build international recognition.

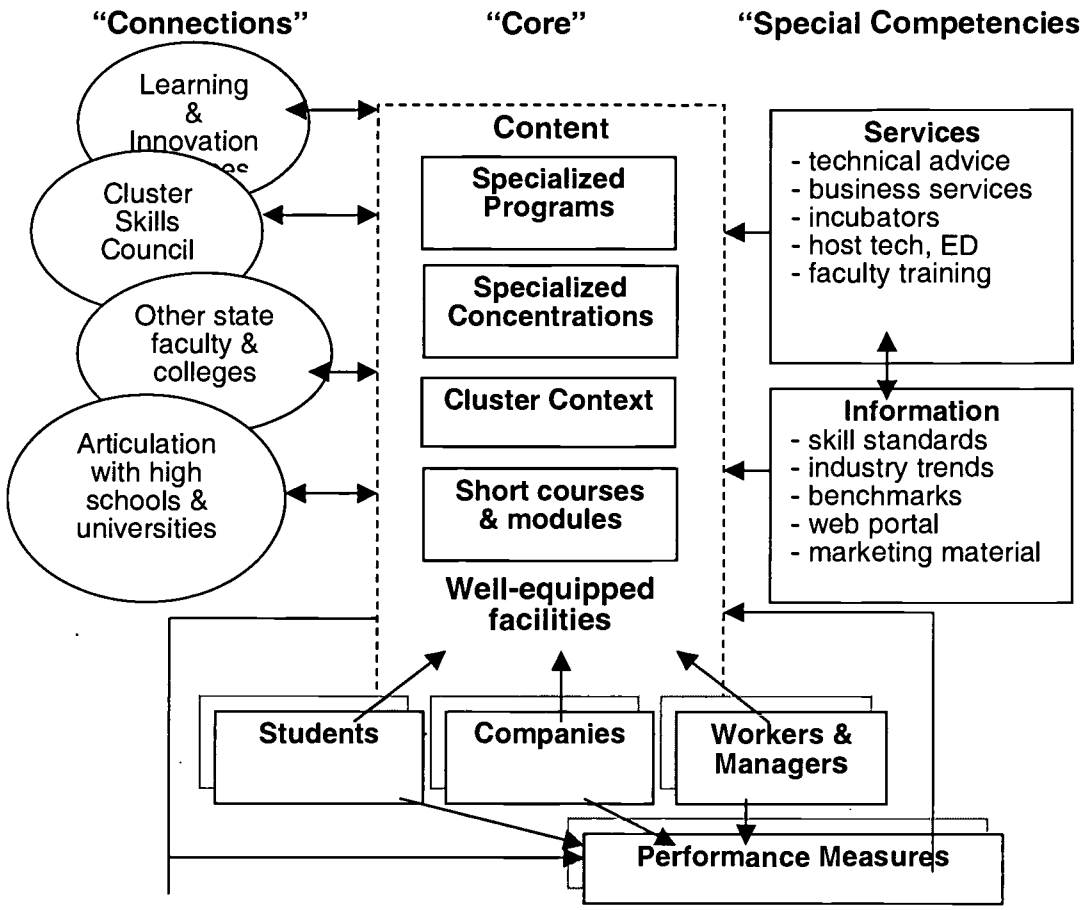
Serve as a catalyst for economic development
The Centers should not only contribute to but also be a driving force for the economic development of communities, regions, and states by helping to attract new firms and by helping existing firms expand and compete. The colleges must be flexible enough to react swiftly to changing market demands, even if it challenges some of the traditional organizational and decision-making structures of the colleges. Centers can be most effective if they hire some management and faculty with recent industry experience and encourage them to remain active in their industry and professional associations.

Stay focused on social and economic missions
Connect work-based competencies with theoretical competencies and embed theory in real experiences, using cluster-based work situations to improve the teaching of theory. Centers should target populations that have not historically held skilled positions in the industry, in order to meet employment needs and to serve the community. Rather than narrowly focusing on the firms in their immediate geographic area, successful Centers serve as a resource for the entire state. Performance outcomes and measures are necessary for continual improvement and problem solving.

V. Specialization in Concrete Terms: What Should Colleges Do?

Colleges that become centers of excellence for a particular industry cluster can take a number of approaches. The following is an assortment of special features that some colleges have successfully used to address needs of clusters—even before the term "cluster" became known. *We are not suggesting that colleges that choose to specialize assume all, or even most, of the responsibilities described below. The following section contains simply a list of possible activities and actions.* The choices colleges make should reflect industry and student needs, local availability of and access to programs services, budgets, and long-term development plans of the state and region.

Figure 1: Cluster Center Diagram



Ideally, state community college systems should establish and support a rational plan for establishing Cluster Centers throughout the state, in a way that reflects the geographic dispersion of clusters, particularly those already targeted in state economic development strategies. Part of this plan should be systems for formal and informal exchange among all the state's colleges so that Centers' benefits spread across colleges in the state, supporting increases in efficiency and quality.

A. Developing & Delivering Education and Training

This is, of course, the primary mission of all community colleges. Clusters influence course curricula on three levels: the design of a program of study, the cluster-specific courses that are available to students in other non-core programs, and a cluster-based context that can be applied to general studies and peripheral programs.

1. Programs of study and facilities

Cluster Centers assume lead (but not exclusive) responsibility for reviewing curricula content in light of employer and student feedback, modifying and expanding curricula, and developing new courses of study as needed. This function includes short courses to upgrade the skills of incumbent workers. These courses, typically offered through non-credit business and industry divisions within community colleges, should so far as possible be linked to credit in order to encourage existing workers to pursue further education and credentials that increase their value in the workplace. Because clusters need both a pipeline of new workers and additional training for existing workers, Cluster Centers should encompass both credit and non-credit operations. Indeed, such Centers are a good vehicle for bringing the two sides of the college closer together.

2. Concentrations

Many of the jobs in a core cluster company are not specific to the industries but must operate in the particular industry environment. Industrial and facilities maintenance, for example, are needed by all manufacturing clusters but there are special skills associated with different industries. For example, some require working in a sterile or regulated environment and some require certain health precautions. The demand for these skills does not justify special programs but they do require some special knowledge that can be provided by a capstone course or set of courses. These could be recognized as a concentration or minor in a degree program and made available to students outside of the core cluster program.

3. Context

The context in which learning occurs matters. Educators classify their programs by occupation, but workplace skills are defined by the context in which they are applied and vary from industry to industry. IT network administrators working in a division of a large multi-national corporation, a government agency, and a small service company all have different skill requirements and must operate in different business cultures. Further, a worker in a small firm is likely to have to work directly with a more diverse set of customers, work on small office systems, work within budgets, and be much more flexible. By designing curricula around the workplace and business of firms in a local cluster, learners can come to appreciate the value of the cluster, understand more about their regional environment, and perhaps be more inclined to follow career paths in the cluster. At the same time, contextualized education raises school retention rates and educational achievement levels by making the content of the education more relevant to a community's economy and student's life.

4. Management short courses

Management education, especially for small- and mid-sized businesses, is an important function of Cluster Centers. Content taught in the right context is as important to managers as to new entrants. Most colleges offer a variety of management programs, either using contract trainers or their own faculty. The more the courses can be tailored to a particular industry environment, the more valuable they become.

5. Facilities and equipment

High quality and relevant industry specific programs require the most advanced equipment used by the lead firms of the cluster. Educators since John Dewey understood the critical part that

experiential learning plays in education. But it is virtually impossible for educational institutions to equip their labs and classrooms to meet every industry's needs, not to mention the need to upgrade as technologies change. Colleges that are able to provide modern labs and simulated work environments generally have to beg and borrow from local employers and equipment vendors, and this happens where the demand reaches a scale to justify the investments—in clusters. Perhaps the strongest argument for specialization is that state systems can achieve economies of scale and find ways to make costly equipment available to more students from more places. This can be done through:

- Capstone programs or unit operations labs that are available to non-local students
- Developing and transporting mobile facilities.

B. Become a Resource Center for the Cluster

The Cluster Center is a resource for services that affect skill needs and development by increasing or altering skill requirements, employment levels, or the organization of work.

1. Organize and facilitate cluster skills councils

It is vitally important that the Center be well connected to organizations that have been designated by the state or region to represent the clusters. Most of these organizations turn very quickly to education and training and create skills committees. The Northeast Oklahoma Manufacturers Council is an example of a council created by a college that ultimately became a state-wide strategy. Where councils are already formed, the college ought to link itself to the organization and, where they are not, the college should become the catalyst for organizing the committee. The most effective councils are those that officially represent and can speak for their industry, not just for their companies.

2. Manage business incubators

A number of colleges run business incubators as an economic development strategy, as opportunities for graduates or faculty, and as a potential co-op experience for students. Some incubators are generic but many have focused on specific clusters, such as biotechnology at Asheville-Buncombe Community College in North Carolina, metals at Hagerstown Community College in Maryland, and the Arts at LaGuardia Community College in New York.

3. Host technology and business development offices

A community college offers a convenient and easily accessible site for co-locating complementary services for the cluster. Some state Manufacturing Extension Partnerships co-locate specialized engineering staff at various colleges to connect training and modernization needs of small and mid-sized enterprises (SMEs). Some colleges, such as Okaloosa-Walton in Florida and Hagerstown in Maryland, co-locate economic development offices to develop the cluster as well as to promote the regional economy. Co-location makes it very easy to coordinate activities and share information on a day-to-day basis.

4. Train faculty from other colleges

Cluster Centers have a responsibility to help prepare and upgrade the skills of faculty at all colleges in the state, particularly when there are changes in curriculum content or methods, or new information from industry that affects program delivery. The college ought to hold regular faculty workshops and offer to arrange for faculty exchanges and study tours that enhance effectiveness. The training is best done collaboratively in order to take advantage of the expertise and ideas of all college faculty in the state.

5. Provide trained workers to firms within the cluster

A major community college mission is to provide jobs for its students, either by training for incumbent workers or for students who are entering the workforce. One of the principle reasons

that clusters should partner with community colleges is the access these institutions provide to a skilled work force. A major part of the partnership should revolve around questions of present and future workforce development.

C. A Source of Information and Innovation

Cluster Centers ought to be repositories of information relating to the status of the cluster, such as the state of its technology, current and projected employment opportunities, training programs, contacts, and interesting and innovative practices in other locations. Some of this information will reside in the head of experienced faculty, but it ought to also be systematically collected and made available electronically to other institutions and employers.

1. Benchmark programs

Benchmarking, used regularly by businesses, is generally an undervalued and sporadic activity among community colleges. The Center should have resources to track the activity of leading educational institutions for the cluster, organize study tours, attend major industry conferences, stay abreast of changes and innovations (and funding opportunities), and share benchmark practices across the state.

2. Advise on technologies and vendors

By maintaining close connections with equipment and software vendors, a Center advises other colleges on equipment capabilities and applications in colleges and help them make wise decisions. It can also be state's demonstration center, where other colleges and businesses can come to see and learn about the latest technologies.

3. Serve as education and training portal for industry

Companies are bombarded with information about education and training opportunities and with job applicants. With listservs, mass faxes, mailings, television ads, personal telephone calls, and visits, companies have more information than they can possibly sort through and use. Cluster workforce portals are gateways and sorting devices that, if properly designed, can tell firms which trainers understand their business and best fit their needs because they have special equipment, instructors with experience in their industry, or a track record with the cluster. The portal will contain detailed on-line information about the industry-specific capabilities, labs and equipment, instructional expertise, and education and training programs.

4. Collect Industry trends and projections

Plans for programs and new investments ought to be based on the best available information about anticipated cluster growth and state and regional projected employment based on replacements, expansions, and new firms. The more uncertain the future of the cluster, the more important it is that the college system have access to the best knowledge that exists. The Center can play a role in collecting this information, particularly for clusters that are not easily defined by standard industry codes.

5. Develop and distribute marketing materials

Community colleges have scarce, if any, resources for marketing to students or employers. As a result, some of their best programs are not well known by individuals or companies. Cluster Centers are responsible for designing and producing marketing brochures, advertisements, and methods for programs directly relevant to the cluster that may be used by all community colleges in the state.

D. Measurements, Outcomes, and Accountability

It is important for colleges to be able to demonstrate the value of their programs and services and justify extraordinary investments. To do this, they must measure outcomes on individuals, companies, and the economy. We realize that the last two, in particular, are quite difficult because the community college is only one of a large number of factors and circumstances that affect both. Yet a Center should be able to measure impact, even if only rough estimates.

1. Conduct cluster needs assessments

Curricula are nearly always designed on the basis of industry skill needs, whether through a DACUM process or with the help of an advisory committee. Further, colleges plan courses on the basis of employment needs. Assigning responsibility for the design of the instruments, sampling techniques, and analysis or data to a Cluster Center minimizes the demands on companies and ensures comparability across the state.

2. Develop and apply skill standards

The voluntary National Skill Standards that Congress enacted have proven elusive, in part because industry is not well enough organized at the national level to demand them. Yet in selected areas and for selected industries, standards do exist and are being used. Some states (e.g., Washington, Illinois) and some professional associations have developed their own sets of standards. Indeed, one of the problems is that there are too many different sets of standards and too little attempt to resolve them into something that has local cluster support. Standards are much more common in other industrialized nations where industry and labor have more formal roles in technical education. A Center can track existing standards and work with the cluster council towards agreement on a set of standards that will lend more credibility in the skills and knowledge associated with credentials.

3. Measure performance

This is perhaps the most challenging task for the college and will most likely require working with subcontractors or consultants. The college ought to develop the tools and data collection mechanisms that are most appropriate for a particular cluster for capturing as accurately as possible (1) the quality of the programs and services and (2) the added value of the state's programs and services to learners, companies, and local economies. Common means include pre- and post-tests of knowledge and skills acquired, satisfaction surveys, and, the most expensive and difficult, collection of longitudinal data on completers' career paths and income levels. Impacts on companies and economies are even more difficult to assess when the Center's contribution is only one of many and larger impacts on performance. The most commonly used measurement is a survey of employers' estimate of changes in learners' performance and in company productivity and revenues attributed to improved skill levels. In all cases, the Center has the responsibility to work with the cluster associations to make sure the measures reflect the goals and needs of the cluster.

E. Connections

Perhaps the most important functions of Cluster Centers are establishing connections and facilitating collaboration—with companies, among companies, with other levels of education, among colleges, with community-based organizations, and with other regions of the U.S. and world. When Centers are an active hub of information exchange for the cluster and a neutral meeting point for cluster firms, it is almost a given that they are current with the trends and activities within the cluster. Playing this facilitative role gives the Center the "on the street" information and connections they need to keep programs and services relevant. However, staying "above the fray" in any intra-cluster altercations is also important.

1. Organize and broker faculty networks

Typically community college faculty members have very few opportunities such as travel resources or release time to meet with peers from other institutions in their own state, let alone

from other states. Those in the more technical fields may be the only, or one of a very few, teaching in their specialty fields at their particular college. One Center function is to create and facilitate opportunities for professional development and faculty sharing of experiences within their fields.

2. Work closely with secondary school systems to ensure well-prepared students, full knowledge of career options and paths, and improve the transition.

High school counseling systems have far too few resources to develop enough real understanding of various industries to give informed advice to students concerning career paths. Tech Prep programs help in some fields but are aimed at occupations with little context or knowledge of career paths. Particularly in clusters facing skill shortages, Cluster Centers should take the lead in building relationships that can range from industry visits for students to encouraging dual enrollments or developing a specific articulated track between high school and college.

3. Interface with cluster organizations

It is important that the Center represent the region or state in any organization that is designated to, or acts by default, in representing or speaking for the cluster. If non-businesses are permitted membership, the Center ought to be a member or, if not, an associate or affiliate of such organizations. Federal technical and career education and training policies now require states and institutions to work with industry. But industry partners are selected at random, often because of their large size, and members are rarely in a position or empowered to speak on behalf of their industry. Clusters represent a collective voice for the private sector and therefore are more effective in the design and development of educational programs.

4. Establish internships and externships with cluster members

Centers can help pave the way for internship programs for students and externship program for faculty in the cluster by working through the cluster organization to find positions and mentors. Internships give students the hands-on experience companies want, and the externships give faculty a better understanding and appreciation of the newest technologies and of the daily environment in which their students will work. Internships also allow firms to become familiar with the students and the strengths and gaps in their college education. Finally, they build connections to employment opportunities, which is particularly important for non-traditional students. Internships could be strengthened if employer/mentors are well prepared and rewarded, if students can get high school/college credit, and if interns and externs are paid something for their efforts.

5. Work with WIA Boards

Under the WIA legislation, local boards have powers to determine what their foundation and technical local skill needs are and communicate them to the various providers and vendors. In most cases, this means an examination of the central cluster of firms in the community to determine what these skills are and how will firms hire individuals for them. Local WIA boards could and should use skill clusters as a means to meet the needs of their local service area.

6. Participate in learning and innovation alliances

Each state's efforts to build work force programs, skill standards, or curricula can benefit from the ideas and experiences of similar centers or institutions in other states or nations. Innovation and learning are collective and interactive activities, and opportunities for staff and faculty to exchange ideas leads to program improvement. Each innovation alliance will have a specific set of objectives, action items, and measurable outcomes that are agreed upon by all members. Support for such alliances, in terms of acknowledging the value of learning, providing release time, and allowing travel, also creates potential learning and benchmarking opportunities in the cluster. This is a potential use of states' federal Perkins funds targeted to professional development and program improvement.

F. Outreach

Outreach is a vital aspect of any Center's work plan, making its expertise and resources available throughout the state and to all segments of the population. This has to be a strategically planned and proactive set of activities.

1. Any time anywhere delivery

One means for Centers to reach more people is to make greater use of the Internet for delivering courses. Although many skills require hands-on education, some courses do lend themselves to interactive web-based education and in other courses web-based education can be combined with lab work. Experiences with asynchronous learning networks have shown that web-based education that includes team activities and learner-to-learner and learner-to-

instructor interaction are effective tools. The Center maintains the web site, but other colleges participate in course development.

2. Work with community-based organizations

The numerous successful sector-based workforce development intervention strategies, most of which have been supported by private foundations, have assumed responsibility of preparing low income and unemployed people for employment with career advancement possibilities. While sectors and clusters are not exactly the same, they overlap and many have worked successfully with groups of industries in geographic regions that act like clusters.

An in-depth study of six different sector-based programs by the Aspen Institute found that 87 percent completed their training and on average participants increased their earnings by 41 percent in one year. The best sectoral organizations "are more than brokers or bridges between disadvantaged communities and industry. They articulate career paths, develop standardized training for an industry, establish minimum standards on job quality, and assist with market coordination, and with research and development. The best intermediaries also recognize the importance of connections. In any economy, whether skill based or knowledge based, people get ahead based as much on whom they know as what they know. One example of an effective sectoral intermediary is the Jane Addams Resource Corporation (JARC) in Chicago, which works in collaboration with companies to assist low-income people in obtaining decent employment and move up career ladders in metalworking industries. Another is the Garment Industry Development Corporation (GIDC), started in 1984 by government, industry, and labor to help New York City's struggling city garment industry. GIDC introduced systemic changes to modernize, improve wages and career opportunities, and market. At the same time, GIDC helped unskilled, displaced, and immigrant workers prepare for the new workplace including transfer into a community college.

3. Develop local career pathways with the clusters so that new workers understand their future potential development.

Vocational education authorities in some states have organized programs along the lines of career pathways. Central to this concept is the development of clear connections or bridges between basic skills development and entry level work in high wage, high demand careers. While many of these concepts can be articulated on the national level along occupation and/or sector lines, at the local level this makes little sense unless the career/job connections are organized through the actual employers within a cluster of firms. This is because the nature of the occupational work is different within specific clusters of firms—especially in the more highly skilled and specialized work. Information technology specialists in auto plants are different from those who work in public libraries, even though they may both work with computers. Further, it is the behavior of the local cluster that defines the wages, working conditions, benefits, and a host of other issues around actual jobs and careers. It is not only important to recognize this, but build the reality of the local cluster into the career pathway for individuals.

VI. Sources of Funding

The special expertise, connections, and related services necessary to make significant contributions to a cluster's competitiveness have associated costs that exceed conventional community college funding formulas. The colleges that have been most successful at focusing on a cluster have had to cobble together revenues from a variety of sources. One of the biggest problems facing college-based centers is that staff members have had to devote too much time to seeking revenues to cover the costs of activities that enhance and expand programs and services but cannot be recovered from full-time equivalent finding formulas or customer fees. The expectation of self-sufficiency is reasonable for activities that are necessary or have a high probability of positive economic outcomes for individuals or businesses. Self sufficiency is not a reasonable expectation for activities aimed at innovation and improvement of programs or services that address special needs of particular underserved populations, or whose value is to

an entire industry, not a single client company, or that boost a region's competitive advantage to encourage future growth. While there ought to be some industry contribution, the extraordinary costs of excellence require a continuing supplement.

Centers that have been able to sustain their special focus have supplemented their enrollment-generated income with additional funds from:

- State and local economic development agencies
- U.S. and state Departments of Labor
- Special state training funds
- National Science Foundation, FIPSE, Appalachian Regional Commission, U.S. Department of Commerce, and other federal agencies
- Private foundations
- Congressional or legislative earmarks
- Industry and vendor donations (mainly equipment)

One of the challenges for states that embark on cluster strategies is to recognize the value of the community colleges and include in any appropriations sufficient funds to cover those management and innovative, and development driven activities that are not recoverable from fees and existing funding streams. As examples, Centers need:

- Administrative budgets
- Marketing budgets
- Travel and communications related to benchmarking
- Release time for faculty for program development and improvement
- Research and development
- Equipment modernization budgets
- Facility maintenance
- Printing and dissemination budgets

VII. Resources*

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* Many available on www.rtsinc.org.

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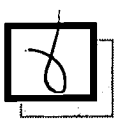

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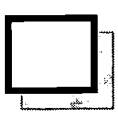

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