Wilder Research

Minnesota State Colleges and Universities Centers of Excellence program evaluation

Year 1 (2005-06) progress report executive summary

The 2005 State Legislature appropriated $10 million for the 2006-07 biennium to create Centers of Excellence within the Minnesota State Colleges and Universities (MnSCU) system to develop flagship programs in Minnesota's critical industries. The Centers would provide best-in-class programs, ensure a highly-qualified and diverse workforce that would strengthen Minnesota's economy, and be recognized regionally and nationally. To achieve these goals, Centers were expected to develop collaborations with businesses and to form partnerships within the MnSCU system and with K-12 schools.

The four Centers selected in October 2005, following a competitive process, were:

- Center for Manufacturing and Applied Engineering
- Minnesota Center for Engineering and Manufacturing Excellence
- Center for Strategic Information Technology and Security
- Center for Integrated Health Science Education and Practice

In 2006, Wilder Research began evaluating Centers on their activities, outcomes and economic impact. Evaluation reports will be submitted in 2007 and 2009 to the governor and chairs of the higher education finance committees in the legislature as required by authorizing legislation. An interim report will also be submitted in 2008. Initial evaluation activities included site visits, document review, data analysis from the statewide record system, and interviews with 100 stakeholders from academic, industry, and K-12 partners.

Key activities and accomplishments in the first year

Center development. A key accomplishment for all Centers was creating a vision, structure, and work plans, as well as new relationships with academic, industry, and K-12 partners. Many faculty, administrators, and industry leaders now know more about each others' programs and resources, and are beginning to share best practices.

New approaches. All stakeholders reported that the Centers have fostered new activity, including new or expanded work with K-12 schools and industry. More and earlier industry input into curriculum development has helped courses better meet industry job-skill standards; programs for high schools students have helped spark enthusiasm for these fields.

Improved articulation (ease of transfer) among programs. Most stakeholders report that Centers are making it easier for students to move through different levels of course work and training, including bridge programs to help diverse students prepare for college; college credit for advanced high school courses; and on-line classes and programs that allow increased flexibility both in schedule and geographic location.

Visibility. All four Centers are developing a "Center identity" and gaining recognition through brochures, websites, campus visits, presentations to statewide and national conferences, and/or articles in academic or industry journals.

Acquisition of outside resources. Besides the $5 million first-year start-up funding, Centers and their associated programs also obtained nearly $6.8 million in grants and donations.

Better labs and equipment. Particularly at the two manufacturing Centers, there has been a significant focus on updating equipment and laboratory facilities in order to provide training in accordance with current industry standards.

Overview of academic partners and programs associated with each Center of Excellence

Consortium for Manufacturing and Applied Engineering (CMAE)

Partners

Bemidji State University, Bemidji
Central Lakes College, Brainerd
Minneapolis Community and Technical College, Minneapolis
Northland Community and Technical College, Thief River Falls
Northwest Technical College, Bemidji
Pine Technical College, Pine City
Saint Paul College, Saint Paul
Saint Cloud Technical College, Saint Cloud

Programs are focused in **Engineering Technologies** (emphasizing Industrial, Electrical, and Mechanical Drafting), several specialties in **Precision Production**, and related programs in mechanics, repair, and technical sales.

Minnesota Center for Engineering and Manufacturing Excellence (MnCEME)

Partners

Minnesota State University, Mankato
Alexandria Technical College, Alexandria
Anoka Technical College, Anoka
Hennepin Technical College, Brooklyn Park, Eden Prairie, and Plymouth
Normandale Community College, Bloomington
Northeast Higher Education District (Hibbing Community College, Itasca Community College, Mesabi Range Community and Technical College, Vermilion Community College)
South Central College, Faribault and North Mankato

Programs are focused in **Engineering Technologies** (emphasizing Hydraulics, Manufacturing, and Computer Assisted Drafting), **Precision Production** (machine tool technology), and related programs in computer science, biotechnology, property and equipment maintenance, and automotive mechanics.

Center for Strategic Information Technology and Security (CSITS)

Partners

Metropolitan State University, Minneapolis and St. Paul
Inver Hills Community College, Inver Grove Heights
Minneapolis Community and Technical College, Minneapolis

Programs include **Computer and Information Science** & Support Services, with related programs in Management Information Systems and Computer Technology/Computer Systems.

Center for Integrated Health Science Education and Practice (CIHSEP)

Partners

Winona State University, Winona
Minneapolis Community and Technical College, Minneapolis
Minnesota State College – Southeast Technical, Winona and Red Wing
Normandale Community College, Bloomington
Pine Technical College, Pine City
Ridgewater College, Willmar and Hutchinson
Riverland Community College, Albert Lea, Austin, and Owatonna
Rochester Community and Technical College, Rochester

Programs include **Health Professional & Related Clinical Sciences** (ranging from Nursing to Dental and Allied Health Diagnostic to Clinical Laboratory Science to Home Health Aide), plus related programs in Bioinformatics and Biomedical Sciences.

Challenges going forward

Showing results within the short funding time-frame. Both academic and industry stakeholders report they are committed to the goals of the Centers. However, many are concerned the Centers might close if they cannot show significant results within the initial four-year time-frame. As one industry representative said, "The innovation and vision are long-term, but the funding is short."

Adequate funding. There is concern about the ability to obtain new ongoing funding within four years. "The [new] funding was going to be coming from fund-raising efforts … but you have to build a water-tight vessel before you sail it." (University administrator)

Sustained partnerships. While development of working relationships with new partners is widely cited as a major accomplishment, the effort and time

required to sustain them – over and above usual responsibilities – is cited as a significant challenge. "It has taken hours from other projects." (College administrator)

Lack of systems to reward or promote inter-institutional partnership. Most personnel essential to the success of the Centers of Excellence are accountable through their institutions rather than to any Center official. Stakeholders generally felt that Center affiliation enhances the work of their own department or program, justifying use of time and resources. However, if their efforts detract from their work within their department or college, their willingness to participate may decrease. Also, some concern was expressed that if the project's future was uncertain, their efforts would have been better spent within their own department or program. "We are already dealing with limited resources. How much do we want to commit to this initiative if it's just going to be a [temporary] innovative project?" (College administrator)

Factors important to success

The following factors were commonly identified as important to achieving success:

- Maintaining a clear and consistent vision and focus
- Collaboration, coalition-building, and shared ownership (*quality* of partnership)
- Communicating with partners and/or relationship-building (*development* of partnership)
- Resource issues, including longer support in the initial grant, as well as the Centers' own work to secure additional external resources for sustainability
- Marketing and promoting the Centers
- Maintaining the energy, support, and/or involvement of Center partners (academic, industry, and K-12), and of state-level "champions" within the MnSCU system and in state government

Tradeoffs associated with variations in Center design

Each Center has unique design elements. It is too soon to speculate on which may prove most successful, but understanding tradeoffs can inform planning for current and future Centers.

Number of academic partners. Having more partners allows a Center to benefit from a wider range of strengths and specialties, but also makes it more challenging to establish new relationships and maintain effective communications.

Industry role in governance. Three of the Centers have separate Industry Advisory Boards. By contrast, CIHSEP includes key industry leaders in every committee and working group, giving them earlier and a more direct voice into Center decisions, but also requiring significantly more time and energy of them.

Decision-making process. Three of the Centers develop work plans that include specific future projects. By contrast, CIHSEP's work plan selects projects by Request For Proposals annually. Work plans that include future projects help identify programs or workplaces most likely to be affected and help to coordinate activities; work plans with annual Request for Proposals provide more flexibility in meeting needs, spread accountability to a wider pool of stakeholders, and may increase the number of new ideas.

Baseline description of Center activities

Last year, Wilder Research collected the following baseline information that will continue to be measured in subsequent years. Since the Centers did not begin to receive funding until January 2006, data reflect only the first six months of Center activity.

- During 2005-06, the 306 programs associated with the four Centers granted a total of 3,091 awards (certificates, diplomas, and degrees).

- 2,970 students received one or more credentials from Center-affiliated programs in 2005-06. Of these graduates:
  - 34 percent were male.
  - 24 percent were members of racial minorities or foreign nationals.
  - Ages ranged from 15 to 75, with an average age of 28.
  - 39 percent were first-generation college students (defined by Minnesota statute as one who does not have any parent who attended college).
- By the best estimates of Center Directors, at least 342 different firms were involved in some way with the Centers during the year. At least 11 percent of those firms were not previously involved with any partner program prior to the organization of the Center.
- Aside from the start-up funding, the estimated total funding received by the Centers (and/or their associated programs) in 2005-06 was $6,792,125. Industries have also made significant in-kind contributions of time, equipment, and space.

Economic impact

It is reasonable to expect that Centers will have an effect on Minnesota's economy; however, the effects are not likely to be fully evident by 2009, and it will be challenging to measure them. The impact is expected to be primarily through helping train more highly-skilled workers and helping companies apply knowledge more quickly and efficiently. The impact is more likely to be seen in selected industrial sectors statewide, rather than particular geographic areas, as implied in the authorizing legislation. However, we cannot know precisely what would have happened to Minnesota's economy in the absence of the Centers of Excellence.

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WILDER FOUNDATION

For more information

This summary presents highlights of the *Minnesota State Colleges and Universities (MnSCU) Centers of Excellence program evaluation Year 1 report* . For more information about this report, contact Ellen Shelton at Wilder Research, 651-637-2470.

Authors: Ellen Shelton, Brian Pittman, and Greg Owen

JANUARY 2007

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Contents

Contents (continued)

Figures

Acknowledgments

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Executive summary

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Introduction

In 2005 the Minnesota State Legislature passed legislation and appropriated funding to create at least three and up to eight different Centers of Excellence as part of the Minnesota State College and University system (MnSCU). As enacted in Chapter 107, Section 31 of state law (see Appendix), each Center was expected to become a regional or national leader within a specific area of education and training, demonstrating strong ties to employers, a continuum of academic offerings providing entry points to students at a variety of career points, and strong partnerships between four-year and two-year institutions.

In addition, the authorizing legislation specified that each Center would be built on strong existing programs, improve performance in related programs, improve employment placement and income expectations of graduates, and integrate the academic and training outcomes with business interests thought to have the best opportunities for growth in the state and regional economies. Finally, to lay the groundwork for growth and sustainability, each Center was expected to develop a separate fund for donations dedicated to the Center's work as well as a development and assessment process that would foster continuous improvement and accountability. The 2005 Minnesota Legislature appropriated $10 million for the 2006-07 biennium to create Centers of Excellence within Minnesota State Colleges and Universities (MnSCU). With this appropriation, the Board of Trustees designated four Centers in October 2005 and committed to funding them at least through Fiscal Year 2009.

Following the legislative session, the Office of the Chancellor sought proposals from state colleges and universities throughout the MnSCU system to create distinctive programs of high quality that would meet a demonstrated and critical industry need, leverage the strengths of other programs and other institutional partners, provide adaptive and innovative approaches to the evolving needs of industry and society, and attract highly qualified students. Four-year universities were expected to serve as the lead institutions supported by one or more two-year state college partners.

The competitive process began with a Request for Proposals that elicited 11 applications, which were reviewed by a group that included industry officials from inside and outside Minnesota, system faculty and administration, higher education officials and representatives of Centers of Excellence in other states, external foundations, other state government agencies, and senior administration officials. Seven proposals were advanced to a second level of review, from whose recommendations the Minnesota State Colleges and Universities Board of Trustees selected four initiatives to be the system's first Centers of Excellence.

The selected programs were:

- Center for Manufacturing and Applied Engineering
- Minnesota Center for Engineering and Manufacturing Excellence
- Center for Strategic Information Technology and Security
- Center for Integrated Health Science Education and Practice

After much discussion, the review committee determined that the two Centers focusing on manufacturing and applied engineering were sufficiently different in focus and approach to each be considered distinctive, in accordance with the intention of the Centers of Excellence initiative. The Minnesota Center for Engineering and Manufacturing Excellence, anchored by Minnesota State University, Mankato, is based around partners with a long record of workforce training, applied research, and relationships with industry in the field, and is the more strongly focused on applied engineering of the two. The Center for Manufacturing and Applied Engineering, anchored by Bemidji State University, is the more strongly focused on manufacturing, with a regional partner (the Ingenuity Frontier) of industry and community leaders working with them to promote manufacturing in northwest Minnesota, as well as innovative approaches in manufacturing education. The two Centers also have a set of academic partners that spread across different diagonal zones of the state.

Each of the four Centers is briefly described beginning on page 9.

One month after the Centers were selected, in November 2005, the Office of the Chancellor issued a Request for Proposals for professional services to develop and implement an evaluation of the four new Centers of Excellence. The goal of this effort was to insure that legislative reporting requirements would be met, that the Board of Trustees would receive appropriate information to evaluate the performance of each Center, and that lessons learned at initial implementation would inform future efforts within the Centers and within the MnSCU system.

In January 2006, Wilder Research was selected as the evaluation consulting firm to carry out the responsibilities identified in the authorizing legislation and by the Board of Trustees. This document constitutes the first evaluation report prepared by Wilder Research as part of the three-year contract with the Minnesota State Colleges and Universities. This report describes the progress at each Center during the first year of operations, key baseline measures for the eventual outcome evaluation, and lessons learned in the first year of implementation that can serve to guide planning by Centers, evaluators, and the Office of the Chancellor in subsequent years.

Overall evaluation design

The evaluation includes two main components:

- An implementation evaluation, to help the Centers (a) document their challenges and successes in setting up the Centers, (b) capture and share the lessons learned, (c) identify and share best practices, and (d) improve operations and strategic decisions, including those that may be made concerning potential future Centers.

- An outcome evaluation, to document short-range, medium-range, and long-range outcomes relating to (a) student admissions, enrollments, graduation rates and outcomes, and employment success, (b) Centers' leverage of external funding, employer participation, and other indicators of successful and sustainable operation, and (c) impacts on the local economy (by the third year of operation).

The evaluation goals specified above are part of the expectations included in the authorizing legislation. The cluster evaluation focuses on the goals that all the Centers share in common, and the learnings from implementation that are applicable to current Centers as well as possible future Centers. While it is not the role of the external evaluator to examine the progress of Centers toward the unique goals they have set for themselves, the Wilder Research contract with the Office of the Chancellor provides for a certain amount of technical assistance to each Center in carrying out evaluation activities, including help in the development of some additional assessment tools that can help meet more individualized Center needs.

During the first year of the evaluation the Wilder Research team:

- Conducted site visits at each of the four lead institutions

- Prepared an overall Center of Excellence logic model, describing Center activities and the short- and longer-term outcomes that those activities are expected to produce, to guide the evaluation work

- Prepared individual logic models to describe the intended development process at each individual Center

- Carried out several meetings with the institutional partners intended to reach agreement on process and baseline measures

- Worked with the Office of the Chancellor to use existing data systems for the establishment of baseline measures

- Prepared an overall evaluation plan

- Collected program, funding, and industry involvement data from each of the four Centers
- Carried out key informant interviews with stakeholders associated with each of the four Centers.

Further information about data sources and methods of analysis can be found in the Appendix.

This report summarizes the result of this work, identifies areas of progress and challenge, and describes expectations for the next year of evaluation work. Wilder Research will continue as the independent evaluator during 2007 and 2008.

Overview of Centers' purposes, partners, and associated programs

The following pages highlight key features of each of the four Centers of Excellence, including its purpose, key strategies, academic partners, director, programs most directly affected by Center activities, and initial funding allocation.

The total Center of Excellence funding (actual allocation) for the biennium is:

FY 05: $4,900,000*
FY 06: $4,900,000*
Total: $9,800,000

* Of the $5 million appropriated by the legislature each year, $100,000 is withheld for the purposes of external program evaluation as conducted by Wilder Research.

Further information on each Center, including distinctive features and selected activities and accomplishments in the first year, is in the Appendix.

Center for Manufacturing and Applied Engineering (CMAE)*

CMAE purpose

The purpose of the Center for Manufacturing and Applied Engineering is:

> To create a comprehensive consortium for manufacturing that brings together education, industry, and economic development. This consortium will create a labor pool of talented and well-skilled students, develop innovative processes and enhance the ability of Minnesota manufacturers to be highly competitive in the global economy.

CMAE seeks to fulfill this purpose through the following goals:

1. Avoid duplication of program and create a seamless process that allows students to progress from credited certificate program through a four-year degree.
2. Support the highest levels of technology in education and industry.
3. Support, encourage, and facilitate engineering technologies in K-12 education.

CMAE academic partners

Bemidji State University, Bemidji
Central Lakes College, Brainerd and Staples
Minneapolis Community and Technical College, Minneapolis
Northland Community and Technical College, Thief River Falls and East Grand Forks
Northwest Technical College, Bemidji
Pine Technical College, Pine City
Saint Paul College, Saint Paul
Saint Cloud Technical College, Saint Cloud

The CMAE Director is Karen White, who was previously the Associate Director for Engineering Operations at North Dakota State University's Center for Nanoscale Science and Engineering.

CMAE core degrees and programs:

- 1 program in the Engineering group (General Engineering).
- 40 programs in the Engineering Technologies/Technicians group (Civil, Drafting/ Design, Electrical, Electromechanical Instrumentation, Industrial Management, Industrial Production, Mechanical, and Quality Control).
- 3 programs in the Mechanic and Repair Technology group (Industrial Mechanics and Maintenance and Engine Machinist).
- 25 programs in the Precision Production group (Precision Metal Working and Cabinetmaking and Millwork).
- 6 programs in the Business Management and Related Support group Logistics and Materials Management, Operations Management and Supervision, and Specialized Sales, Merchandising and Marketing).

Initial funding (actual allocation):

FY06: $1,459,900
FY07: $1,199,219
Total: $2,659,119

* The Center for Manufacturing and Applied Engineering does not use the "CMAE" acronym. This abbreviation is used in this report, together with the common acronyms of the other Centers, for the purpose of clarity and consistency.

Minnesota Center for Engineering and Manufacturing Excellence (MnCEME)

MnCEME purpose

The mission of the Minnesota Center for Engineering and Manufacturing Excellence is:

> The Center for Excellence builds cooperative relationships between higher education and industry to stimulate economic development through education, training and research.

MnCEME intends to fulfill this mission through the completion of the following goals:

1. Increase the pipeline flow with special efforts to recruit women and minorities.
2. Develop the skill sets needed to support the seven National Council for Advanced Manufacturing (NCAM) milestones [technological advances expected to significantly affect manufacturing in the next three to ten years].
3. Develop a national reputation for innovative use of renewable and recyclable resources.
4. Aggressively support Minnesota industries to compete globally.
5. Provide customized training to industry partners to increase the use of advanced engineering processes.
6. Use best practices in engineering and manufacturing education.
7. Foster student-faculty-industry applied research projects to promote advanced technologies.

MnCEME academic partners

Minnesota State University, Mankato
Alexandria Technical College, Alexandria
Anoka Technical College, Anoka
Hennepin Technical College, Brooklyn Park, Eden Prairie, and Plymouth
Normandale Community College, Bloomington
Northeast Higher Education District (Hibbing Community College, Itasca Community College, Mesabi Range Community and Technical College, Vermilion Community College)
South Central College, Faribault and North Mankato

The MnCEME Director is Tsuguhiko Takamura, who previously served as advisor and engineer in the research and development office for the SuSumu Company of Japan, parent company of Thin Film, North Mankato.

MnCEME core degrees and programs include:

- 5 program in the Computer and Information Science & Support Services group (General Computer and Information Sciences and Computer Science).
- 9 programs in the Engineering group (General Engineering).
- 60 programs in the Engineering Technologies/Technicians group (Computer, Drafting/Design, Electrical, Hydraulics, Automotive, and General Engineering Technology, and Industrial Production).
- 5 programs in the Liberal Arts & Science group (concentrations in Physics, Math, Chemistry, and Bioscience).
- 1 program in the Biological & Biomedical Sciences group (Biotechnology).
- 2 programs in the Construction Trades group (Building/Property Maintenance and Management).
- 4 programs in the Mechanic & Repair Technology group (Heavy/Industrial Equipment Maintenance and Automotive Mechanics).
- 20 programs in the Precision Production group (Machine Tool Technology/ Machinist).

Initial funding (actual allocation):

FY06: $1,482,200
FY07: $1,179,141
Total: $2,661,341

Center for Strategic Information Technology and Security (CSITS)

CSITS purpose

The initial mission statement of the Center for Strategic Information Technology and Security is as follows:

> The Center's mission is to help individuals and organizations acquire the knowledge and skills needed to create and maintain competitive information and communication systems that are driven by sound business strategy and employ best practices in total security.

CSITS offers the following key "product lines" representing goal areas for the fulfillment of this mission:

1. Career and professional development opportunities for individuals.
2. Expertise for organizations.
3. Career awareness and readiness.
4. Dissemination of expertise in Minnesota and beyond.

CSITS academic partners

Metropolitan State University, Minneapolis and St. Paul

Inver Hills Community College, Inver Grove Heights

Minneapolis Community and Technical College, Minneapolis

The CSITS Director is Bruce Lindberg, who had been serving as the interim director and previously was with Inver Hills Community College as the Executive Director of Business Partnerships and Outreach.

CSITS core degrees and programs include:

- 33 programs in the Computer and Information Science & Support Services group (Computer Programming, Computer Science, Computer Software and Media Applications, Computer Systems Analysis, Computer Systems Networking and Telecommunications, Computer and Information Systems Security, and Information Science/Studies).
- 2 programs in the Engineering Technologies/Technicians group (Computer Technology/Computer Systems Technology).
- 6 programs in the Business Management and Related Support group (Management Information Systems and Services).

Initial funding (actual allocation):

FY06: $ 860,633
FY07: $1,045,235
Total: $1,905,868

Center for Integrated Health Science Education and Practice (CIHSEP)

CIHSEP purpose

The Center for Integrated Health Science Education and Practice states its mission and vision as follows:

> CIHSEP will integrate the expertise and resources of education, health care providers and community members so that:
>
> The Minnesota healthcare industry will have a well-trained, flexible and diverse workforce.
>
> Health sciences education and healthcare delivery will be transformed.
>
> Minnesota will be a global leader in healthcare education, practice, research, and innovation.

CIHSEP seeks to fulfill this mission through the following objectives:

1. Recruit and retain an expanded and more diverse student population.
2. Increase the number of well-prepared graduates and enhance the current workforce.
3. Develop practitioners who will deliver quality, coordinated, and competent care and define ways to assess the development of these qualities.
4. Engage in research to create continuously adaptive models of education and training shaped by emerging healthcare needs and technological advances.

CIHSEP Academic partners

Winona State University, Winona
Minneapolis Community and Technical College, Minneapolis
Minnesota State College – Southeast Technical, Winona and Red Wing
Normandale Community College, Bloomington
Pine Technical College, Pine City
Ridgewater College, Willmar and Hutchinson
Riverland Community College, Albert Lea, Austin, and Owatonna
Rochester Community and Technical College, Rochester

The CIHSEP Director is Susan Klaseus, who was previously the Vice President of Institutional Advancement and Community Relations at Augsburg College.

CIHSEP core degrees and programs include:

- 5 programs in the Computer and Information Science & Support Services group (Bioinformatics).
- 2 programs in the Biological & Biomedical Sciences group (Biomedical Sciences and Biotechnology).
- 77 programs in the Health Professional & Related Clinical Sciences group (Nursing, Dental Support Services and Allied Professions, Allied Health Diagnostic, Intervention, and Treatment, Community Health Services/Liaison/Counseling, Allied Health and Medical Assisting Services, Clinical Laboratory Science/Medical Technology, Dietetic Technician, and Home Health Aide/Home Attendant).

Initial funding (actual allocation):

FY06: $1,097,267
FY07: $1,476,405
Total: $2,573,672

Implementation progress

This section describes the Centers' challenges and accomplishments in their first year of implementation. It is based on site visits to each Center in the spring of 2006, a review and analysis of a variety of documents produced by the Centers and the Office of the Chancellor, two all-Center meetings, telephone calls and emails with Center Directors and other staff to clarify facts and issues, and in-depth telephone interviews with 100 Center stakeholders (approximately 25 from each Center). This group was made up mainly of college and university faculty and staff and industry and K-12 representatives (see the Evaluation methods section in the Appendix for more details).

Key activities and accomplishments in the first year

Based on all the sources of information collected by the evaluation team, the following have been the most significant accomplishments of the Centers during their first year:

- Establishing the Centers
- Fostering significant cooperation and partnership
- Working collaboratively and with a variety of partners
- Improving pathways for students through different levels of course work and training
- Securing additional resources for their work
- Establishing their visibility
- Modernizing laboratories and equipment

Establishing the Centers has been a significant accomplishment

In the experience of the evaluators, the development of new collaborative entities is a difficult task that requires a significant investment of time at the outset. A significant accomplishment for all the Centers in the first year has been identifying Center vision, structure, and work plans, and building collaborative relationships with new academic, industry, and K-12 partners.

For most of the people who have been involved, this has taken place wholly or mostly in addition to the regular work they are responsible for at the colleges, universities, businesses, and K-12 schools that pay their salaries, as one department chair pointed out:

"The amount of work that I put into the Center is the time that I am away from teaching, so it limits my interactions." For the most part, the stakeholders who were surveyed reported that they found the work productive and well worth the effort.

> [One accomplishment is] That the Center is actually up and functioning and there are established relationships between all the partner institutions. That is a huge development. We have positive working relationships. [Two-year college president]
>
> It is maybe not going to be as fast as was maybe expected. (why not as fast?) I think it is difficult to get something new up and running. The expectations may have been higher. But they have had to hire people, get things organized, and accomplish other things, all at the same time. The goal is to provide the curriculum in both a classroom setting and in applied settings. I think that is the most important goal. I think that can be achieved, but it is going to take some time to achieve all that. [Industry CEO]
>
> There is a much better understanding now. There is a trust factor. When we are at the table and discussion bogs down, we kind of know now when we are posturing and step aside for the interest of what the organization and the Center hopes to accomplish. [Two-year college dean]
>
> Building relationships and collaborating is time consuming and takes commitment of time and energy to keep people connected. [University vice president]

Centers are fostering significant cooperation and partnership

Partners are investing considerable time and energy to build new relationships with each other, and are showing substantial success at finding common ground, establishing a mutually beneficial purpose and goals, and working together.

> It's a real challenge to take the leaderships of technical colleges and community colleges and universities and pull them into an understanding. This requires real collaboration and coming together as a real working unit. I think there has been great effort put into it and I think there has been great progress made so far. [University administrative staff person]
>
> [As presidents,] We are building that level of connection and advocacy. The change is even more significant at the dean's level. They meet monthly and it's people who historically have been very protective of their own turf. They have now been talking about how to work together more effectively to build pipelines, transforming what they do to reach students and to prepare them for industry needs. … What it does is demonstrate a major change in institutional thinking and behavior. That is a real break-down in turf and it wouldn't have happened without [Center's] leadership and staff. [President, two-year college]

Stakeholders report that Centers are nurturing genuinely new ways of collaborating across two-year and four-year institutions and beginning to generate innovate and more efficient programs as a result of greater familiarity with each others' strengths and resources. Both academic and industry partners cite many examples of the qualitatively different way in which the academic institutions are communicating, learning from each other, and collaborating where they used to compete. For most Centers that have participating schools across the state, this has involved much effort to address logistical difficulties in getting people together.

> We have done faculty-faculty conversations that didn't happen before.… It drives "systems thinking" in terms of looking at it as something different from us working as an autonomous college – which has the potential to make innovative changes in how we go about educating students. The downside to this is that the bureaucracy is terrible. It has taken hours away from other projects that we could be doing. [Two-year college dean]

The Center for Strategic Information Technology and Security (CSITS) is distinctive in its compact organization including only three institutions, all in the Twin Cities area. This organizational and geographic simplicity has allowed them to bring faculty into the activities of the Center to a unique degree. There is a Faculty Council involved in decisions about creating and updating courses and programs, and substantial planning for faculty in-service professional development.

Academic and industry partners also report that more industry partners are involved in more ways in providing input to the colleges and (especially) universities, and that the academic institutions are placing a higher priority on meeting industry needs.

> [What is new is] The business committees we have and the variety of people we have who are communicating with business and serving the business communities. [For example, when we were planning a] conference … in the business advisory meeting we asked a business what they wanted the conference to look like, or how it should go. We got their direct input, which gave a completely different perspective and outcome to the original plan of the conference. [As far as the] employability of graduates – we are meeting with business groups and we ask what businesses are looking for from students in order to make them more employable. Some partners are making curriculum adjustments accordingly. [University faculty member]

> We would have never had done most of them [projects started in the first year] without the Center, and now that we are working together, these new projects have now become priorities. The other thing that I think has happened is that those projects that were fast-started created a relationship for future activities and projects. We are really talking more together about common topics of interest. This is really different – for people in industry and people in academics to get together and just talk about these topics. Some of these relationships may not bring about immediate or measurable results, but they are beginning to change the way we think. [Industry representative]

The Center for Integrated Health Sciences Education and Partnership (CIHSEP) is unique in integrating industry into every committee instead of having a separate advisory board for them. This places industry more at the core of key decisions on Center focus, structure, and accountability compared to other Centers' governance models. So far, the partners are very pleased with how it is working, despite its side effect of increasing the time demands on already-busy industry representatives.

The Centers have fostered new ways of working together

The academic, industry, and K-12 stakeholders were unanimous in reporting that the Center has changed how things are done, or how individuals and organizations work with and relate to each other.

Changes in ways of working among the academic partners that were most often mentioned were:

- More or better communication and working together more
- More efficiency, consistency, or cooperation
- Having a common goal or purpose or thinking about the big picture
- Establishing an ongoing structure for communication and working together

Changes in ways of working with industry that were most often mentioned were:

- More communication and interaction between industry and the academic partners
- Establishing an industry advisory board as an institutionalized way to work with and hear from industry
- Acquiring more or new industry partners than the schools previously had
- Placing a higher priority on meeting industry needs

- Representatives of four-year institutions also commonly mentioned an increase in the amount of industry input into the curriculum

Changes in ways of working with K-12 partners that were most often mentioned were:

- Better communication and closer or more collaborative relationships between postsecondary and K-12 organizations
- Project Lead the Way (PLTW), a national model for providing high-tech curriculum in middle schools and high schools, as a specific example of (or vehicle for) partnership
- Establishing the Center as an ongoing structure for identifying and/or meeting common goals
- Representatives of four-year institutions also commonly mentioned helping to prepare, find, or update K-12 curriculum

Centers are making changes to ease the movement of students through different levels of course work and training

Most stakeholders who were interviewed – 77 percent of all stakeholders, and 90 percent of those from the two-year and four-year academic partners – reported that Centers are making changes in curriculum, course offerings, or inter-campus agreements that affect how easily students can move through different levels of course work and training, including from high school to college and from one college to another.

> We have tried to have more involvement as we develop curriculum. We want to be more transparent with our partners – have everything out in the open – that reduces duplication and each school can focus on each area.… The meetings we have are intense. We get a lot done. The schools getting together and discussing curriculum is a new thing [that has] never happened before. [Two-year college faculty member]
>
> The classes are being developed by a third party and the faculty is being trained on how to present those classes in the various institutions. That's new. In the past, each school would be developing their own. There is now more efficiency and consistency across all [partner] institutions. Also, what is being taught – in terms of course content – is much more consistent, in both the classes and the workshops. [Industry CEO]

Given the lengthy process often required to approve such changes, most of the examples mentioned are of changes that are still being discussed or are pending approval. However, a few, especially at CMAE, had already been authorized when the interviews were completed in fall 2006. These include articulation agreements whereby students who have

completed two-year degrees in Engineering Technology and Applied Engineering can complete a four-year degree from Bemidji State University on-line while continuing to live and work in their home locations (approved and ready to begin in fall 2007).

Stakeholders who were interviewed offered many descriptions of the extensive relationship-building and intercampus sharing of information that is required to make such curriculum and transfer changes.

> Since the Center came into being, this has been one of the major topics. To change the levels of training and course offerings would be very difficult. We have had informal and formal discussions. Without the Center, I believe that it would not have come up [changes in curriculum and course offerings]. We have been talking and working to collaborate on a universal system. [University faculty member]

Respondents at two Centers (MnCEME and CSITS) reported that the Center had created a staff position to facilitate such discussions and changes. CIHSEP has developed bridge programs to help diverse high school students better prepare for college entrance and aspire to higher-skilled careers in health care.

The Consortium for Manufacturing and Applied Engineering (CMAE) has focused much of its early work on the development of new and modified programs to promote articulation among the different academic partners, as well as from high school into the two-year colleges. They have developed a new bachelor's completion program offered by Bemidji but available on-line so that students who complete a two-year program at a technical college can work toward further skills and credentials without having to leave their work and their home towns to do so.

Some courses and programs have been revised to make the curriculum better match with current industry standards. Others have been developed or changed to make them more available to incumbent workers and other non-traditional students, such as through more on-line availability.

> They [academic partners] absolutely are [working in new ways with industry]. They are talking about looking at a common problem and together, looking for a common solution. There is significantly more connection and possibilities.… The old way would be to create their programs and syllabus and all on their own, they would create a curriculum. What is really different about this approach is that they are saying, "We are starting with a blank page" and going to people in industry that they know for input. They work it out together. … Making sure the courses work and have an impact in design, delivery, and the end result. [Industry representative]

Centers and their associated programs are securing additional resources for their work

During 2005-06, the Centers and their associated departments and programs secured $6,584,125 in cash grants and donations, above and beyond the Center start-up funding. Because of the challenges in identifying what grants are attributable to the Center (rather than only to the college or department that is associated with the Center), these figures may be revised as more complete information can be collected. However, as a preliminary estimate, the figure is evidence that the programs associated with the Centers have the potential to bring in substantial revenues to help support their operations.

The majority of these funds are for specific customized training or applied research projects. There have also been significant industry donations to some programs for updated equipment. It is not yet clear to what extent the Centers have been able to identify sources of ongoing funding for the more basic Center infrastructure that holds these specific projects together – chiefly Center staff to oversee and coordinate the separate programs, but also the additional time of other college and university staff to be involved in the collaborative processes that are important in maintaining the Centers' coherence. CSITS has taken the largest step in this direction with the launching of their Enterprise Partner program for industry memberships in the Center. One stakeholder who was interviewed reported that through this means "the Center has become a revenue producing center." However, it is too soon to assess the overall success of this model, or whether such a model would be equally suitable for the other Centers.

Centers are establishing their visibility

All four Centers are developing a "Center identity" and key Center messages, and are developing vehicles for promoting these to internal and external audiences. Internal audiences include students, faculty, and administrators within the MnSCU system. External audiences include local, regional, and statewide businesses in the Center's field; high school students, teachers, and counselors; and other professionals and academics involved in the field. Vehicles for promoting the Centers include brochures, web sites, presentations to statewide and national conferences, and articles in academic or industry journals.

> Any time there is a new entity, an awareness has to be created. They have done a good job – continually in process – of bringing an awareness of the Center and what they will have and what they will do in the region, and what they have to offer the region. [Industry/community representative]
>
> [One accomplishment has been] Creating an identity for the Center – a brand – through publications, a web presence, and even apparel conveying the essence of the Center. [University vice president]

The Minnesota Center for Engineering and Manufacturing Excellence (MnCEME) has shown a distinctive degree of accomplishment in its work on marketing and promotion of the Center. They were the first to hire a staff person for this purpose, and also convened all the marketing directors of all the participating colleges to discuss strategies. Many of its stakeholders who were interviewed cited the success achieved by MnCEME in "establishing a presence" and promoting the Center and what it can offer to students and businesses.

Laboratories and equipment have been significantly modernized

Particularly at the two manufacturing Centers (CMAE and MnCEME) there has been a significant focus on updating equipment and laboratory facilities in order to provide training in accordance with current industry standards. In many cases, Center funds were leveraged to acquire matching funds or donations from participating colleges, industry, or both.

> We have been having new equipment coming in, a couple of new robots. Before we could only go to a certain depth with our curriculum, because of the equipment, but now we can go further than before. [Student at a technical college]
>
> The Center has done, from our perspective, an outstanding job of leveraging their resources. They have provided dollars for our electronics programs. We have been able to get some state of the art equipment that we wouldn't have done otherwise. And this has been done without a whole lot of infighting which is remarkable. [Technical college president]
>
> We share equipment, we share curriculum. We didn't work together before. It's more efficient use and it's a win-win for everybody. For this technology, the equipment is very expensive and it changes every 18 months. The curriculum content changes every 18 months, so it's a real challenge for higher education to keep up. What we have got going here now are training labs and we are considered to be one of the top in the nation. The Center has provided a way of sharing resources. [Two-year college dean]
>
> Each school now has either a new area or a new focus that they have been provided because of the new equipment that was purchased through the funds of the Center. They have taken what was already there to a new level. [Center staff person]

Challenges going forward

Academic, industry, and K-12 stakeholders who were interviewed were asked what challenges faced by their Center were most likely to hamper progress. The most frequently mentioned challenges were related to:

- Finding or generating continuing funding or revenue sources.
- Coordinating, or finding common ground, among the schools or other partners.
- Achieving or maintaining a clear and consistent focus.
- Involving or getting commitment from partners (including academic, K-12, and/or industry partners).
- Cuts to the initial budget after the Center had developed a work plan and begun to implement it.

In answers to other questions, and in analysis of information from other sources, two other challenges that were frequently mentioned were difficulties relating to:

- Demonstrating expected levels of results within the short time frame allowed in the initial legislation.
- Trying to innovate while operating within the rules and structures of a large bureaucratic system.

Initial Center funding is perceived as modest and short-term; securing on-going funding for sustainability will be a challenge

Stakeholders expressed some concern about the modest initial size of the start-up grants, especially in conjunction with the short time frame for which they were given. There was more concern about the 18 percent reduction in the Centers' first two years of funding (compared to the proposed budgets for the first biennium) after the proposals were accepted – even though Centers were told, when they were funded, that such a reduction should be expected.

Stakeholders are even more concerned about the challenge of having to develop their own ongoing funding within three years. Research and development tasks are likely to be an important part of developing a regional or national reputation, but they were not specifically funded, leaving Centers on their own to fund and develop the R&D activities to support such recognition.

> [Concerning] the time frame that has been set up for the Centers originally, the thought was that the Centers would reach self-sufficiency in four years. I don't think that is realistic and quite a bit of the funding was going to be coming from fund-raising efforts and partnerships, but you have to build a water-tight vessel before you sail it. [University administrative staff person]
>
> The funding is out there, but it is not a sustainable amount. Is the funding supposed to just be to get things going – start some new projects? Or are we supposed to depend on the amount we have? Everybody has a different idea of that. Sustainability is a talent. The sustainability as it currently exists is a question. [Two-year college representative]

The pattern of responses suggests that the programs in the Centers focusing on applied engineering and manufacturing (CMAE and MnCEME) have higher costs associated with bringing equipment and facilities up-to-date, and that the initial funding may not go as far toward their infrastructure needs as it does for the other two Centers.

There is some concern that without a champion at the state level – in the Governor's Office, in the Legislature, and/or in the Chancellor's Office – the long-term support that the Centers will need may not be there. Specifically, "support" refers not only to continued funding for the expenses Centers incur beyond those of regular departments and colleges, but also – and more importantly – help with visibility and encouragement and assurance that the risk-taking will be rewarded. Currently the commitment and energy are remarkably high, but there is some trepidation that it could be easily discouraged if the incentives are not there to incorporate new practices and relationships into continuing college operations.

It takes constant effort to coordinate multiple partners, maintain their involvement, and stay focused

While the new working relationships with new partners is widely cited as a major accomplishment in the Centers' first year, the effort required to develop and sustain these relationships is widely cited as a significant challenge. Part of the problem is the sheer difficulty of getting busy people to show up for meetings. Other problems arise in the process of trying to find, and stay focused on, common ground. These issues appear to apply nearly equally to relationships among the academic institutions and relationships with industry partners.

> [A challenge is] Political agendas within the member organizations, or trying to sway [the group] for their own purposes. [Industry CEO]
>
> The Center partners are very diverse. So the challenge is being able to find common ground and work towards that and approaching it in different ways. [Community college president]

> We must continue to narrow down our focus – our purpose. Refine it or narrow down. I think at this point we are really broad and I think we need to continue to move in the direction of articulating the vision and making it a manageable one. [Industry representative]
>
> Keeping the partners together and working as a whole and not just in silos. (Two-year college vice president)
>
> We [the partner institutions] have just started feeling as though we are working together – each one is unique in their own selves. ...The presidents of each institution have their own minds. The [people in the] Chancellor's Office have their own minds. Politics or bureaucracy is a challenge to getting results and getting things going. Getting industry [involved] is still a big challenge – they are busy – to get them [advisory board] committed to the quarterly meetings is a big challenge. [Center staff member]

Both academic and industry stakeholders express concern about the time frame within which they are expected to show measurable results

Many of the changes required by the enabling legislation, such as improved graduation outcomes and placement success, require years to achieve just because of the length of time it takes students to complete a degree program. Others, such as higher levels of skills in graduates, depend on time first to develop new or improved academic programs, then to allow students to complete them, and finally to assess whether skills then match industry and workplace expectations. The stakeholders who were interviewed made it very clear that they are seriously committed to making significant changes in the way they structure and deliver the academic programs that are associated with the Centers, as well as other services that they provide to industry and working relationships with secondary schools. However, they want recognition that such a transformation cannot be accomplished in three years. Many expressed a worry that the Centers could be set up for termination, deliberately or through loss of interest, if large results are not measured within a small time frame.

> They won't give the Center enough time to see that it works. Time is a huge thing. Getting to the young people takes time, to get those younger [middle school] students to get their education they need to succeed in the field. Also I am afraid that the Governor's sources will not give sufficient time for the program to succeed. [Technical college staff member]
>
> [One challenge is] The short time frame that they are working on. It is the most unrealistic piece of the whole thing. It makes people try to take short cuts and make bad decisions. [University dean]
>
> Their goal is to achieve something that hasn't been done. They need to be given time to do that. You don't start a Center and have it become what it is to become in a year. The time frames are a challenge. [Industry representative]

> The innovation and vision are long term, but the funding is short. [Industry representative]
>
> There is pressure to achieve too much too soon – a focus on short-term achievement rather than long-term system building. [University president]

The culture, norms, and record systems of the existing MnSCU system do not easily measure or promote inter-institutional partnership

The MnSCU system is set up to require and support accountability of separate universities and colleges and their component departments and programs. The relationships and chains of responsibility among these units are clear, and are well represented in policies and data systems for supporting on-going work and monitoring performance.

The Centers of Excellence, unlike colleges or departments, do not offer any courses, degrees or programs of their own, and the personnel who are responsible for these activities are accountable through their collegiate chains of command rather than to any Center official. The added value of the Centers arises from their efforts to integrate and coordinate the multiple component programs and develop industry relationships at that integrated level. The MnSCU system is not set up to easily facilitate, track, or reward such activities. As a result, the work of the Centers is inherently outside of the culture and norms of the system, and those who are responsible for carrying out this work must in essence swim against the current to accomplish their work.

> Though we both report to the same dean, the Center is not the department and the department is not the Center. Some of the goals and objectives in the proposal are administrative and some are academic. The Center is an administrative [unit] and the department is [an] academic [unit]. Because these goals are interdependent, it creates challenges for defining roles and coordinating activities. [University department chair]
>
> The fiscal arrangements [are an example of doing things in new ways]. We've had to be innovative and creative. The Center gets its money from MnSCU, as do the institutions. Accountability wasn't arranged for a place like the Center. How do we get the money to [the two-year partners] and not [have them] be treated like stepchildren of [the four-year lead partner]. The chief financial officers at the schools got together to create the protocols to keep track of funds, and make sure people are accountable, and how they are accountable, … for the state money. There are a lot of procedures that had to be developed for the first time. The Center doesn't have authority over the institutions. [University dean]

> [Has your working group encountered any barriers or challenges?] The difficulty of bringing in seven schools, [and] the MnSCU system, [and] layering business on top of that. Where is true ownership felt, or is it truly a collaboration? It's the Challenge of the Bureaucracy. … For example, the dean reports to a vice president who reports to a president, who then has to work with the central office. [How have the challenges facing your work group been addressed?] There's a difference between a dilemma and a problem. With a problem, there is a solution. With a dilemma there isn't. I don't think there is a solution to this dilemma. You have to learn how to dance with it. [Industry representative]

The effects on Center stakeholders of constantly going against the grain were evident in a number of ways in the stakeholder interviews:

Time. Stakeholders frequently commented on the amount of time and resources required to participate in the work of the Centers, because such participation was in addition to their regular on-going work, and thus risked detracting from the time and resources needed by their regular departments and colleges.

> Building relationships and collaborating is time consuming and takes commitment of time and energy to keep people connected. [University representative]
>
> It has taken hours away from other projects that we could be doing. We need to get significant results out of this. There is a very major investment for the colleges. Even with the money we received from the legislature, it isn't much when spread among so many and when there is so much we need to do. [Two-year college dean]

Identification with the Center. Stakeholders generally felt that participation in the Center enhances the work of their own department or program, which justifies the use of time and resources. However, if the work to increase enrollments, leverage funds, or promote other successes for the Center risks decreasing them for the department or college, that sense of common purpose and common good with the Center could quickly be diminished.

> We have taken the [customized training representatives from each partner institution] and put them in a room and have them work together. There is still the issue about where the students go in an enrollment-driven institution. Do they go to our school or are we willing to send them somewhere else? The best hope is that the customized training is a self-sustaining business – that arm of the colleges. We are asking parts to share finances and resources and we need to find a way that provides value. [Technical college administrator]

> There is a little bit of a lack of clarity in terms of where this is going to end up. Colleges are being asked to make huge sacrifices and there is the question of what is going to happen in three years after this is done – if it's done. Or if there is going to be more resources. It's hard to get the kind of commitment we need if we are not sure about the future of this initiative. It is a tough place for colleges to be when we are already dealing with limited resources. How much do we want to commit to this initiative if it's just going to be an innovative project? [Two-year college dean]

Tracking and accountability. The Integrated Statewide Record System (ISRS), maintained by state colleges and universities and the Office of the Chancellor, is set up to identify and track students and their outcomes at specific colleges. It has limited capacity at the current time to track students across different colleges. In addition, the enabling legislation charges the Centers with accountability for traditional kinds of measures (such as numbers and characteristics of students), while at the same time requiring them to be innovative and experiment with new ways of addressing evolving issues.

> I believe that part of the issues are going to be around the inability of our data systems to work on curriculum at multiple colleges. We need to make it very much like branch offices. It's the technical problems. Right now, our concept of Centers is not going to come together until we have all the pieces in place. [Two-year college dean]
>
> I would say the legislation or the funders of [the Centers] have looked at [the Centers] from the old model – number of students served, the curriculum being provided – we gave you money so how many students have you put through the mill. [Our Center] is truly about relationship building, partnering, and truly partnering with industry, not just putting their name on the sheet. They are truly involved in how [the Center] could impact them. The roadblock is that we are really doing things differently, having to pull out those numbers that the old model looks for, etc. [University representative]

Some stakeholders – from academic, industry, and K-12 partners – express the hope that the experiences of the Centers can help to change some of the limitations and promote wider inter-institutional collaboration.

Factors important to success

Certain themes were mentioned repeatedly and consistently among the various stakeholders' perceptions of factors that will be important to the Centers in overcoming barriers and achieving success. The most commonly mentioned themes, in the order of frequency, were:

- Maintaining a clear and consistent vision and focus
- Collaboration and coalition-building; shared ownership (quality of partnership)
- Partnering with industry
- Communicating with partners and/or relationship-building (development of partnership)

It is noteworthy that three of these top four themes deal with partnership issues, although a theme relating to vision and purpose shared the top position. Resource issues were also very frequently cited, though sometimes with a stress on the need for longer-term or ongoing support in the initial grant, sometimes a focus on the necessity of securing additional external resources for sustainability. Marketing and promoting the Center, or the field, or both, was also a relatively common theme, as was maintaining the energy, support, and/or involvement of Center partners.

Academic stakeholders were the main source of concerns about resources, and those at four-year institutions were particularly concerned about longer-term support in the initial grant. Industry stakeholders focused mainly on partnership issues (including the importance of partnership with and service to industry) with frequent mentions also of the importance of a clear and consistent vision and the importance of marketing the Center. Stakeholders who are themselves Center staff most often mentioned the importance of communication and relationship-building.

What has been learned in the first year

This section synthesizes information from all the evaluation sources and points out some key lessons that can be drawn to help shape statewide, Center, and evaluation activities in the coming year. It is organized in two parts. In the first we discuss the relative advantages and disadvantages that have been observed as a result of some of the ways in which different Centers have been designed. It should be helpful for Centers to be aware of the alternate strategies that other Centers have tried and to keep these tradeoffs in mind as they refine their focus and work plans in the face of evolving conditions. The second part describes a possible opportunity that the Centers might wish to consider.

Lessons learned and plans for the evaluation in the coming years, including the assessment of economic impact, are discussed in the next sections (Baseline measures and Implications for evaluation).

Tradeoffs associated with variations in Center design

Variations among Centers in their first-year activities, accomplishments, and challenges often appear to be related to differences in design features (such as how compact they are, or how their governance is structured) or in external influences (such as the prior existence of other organizations with similar purposes). The following is a list of selected differences among Centers that appear to have some influence on implementation, at least in the first year:

- Compactness
- Industry role in governance
- Process for making tactical implementation decisions
- Dependence on expensive and/or scarce resources

Below we briefly describe the variations among Centers, and implications for implementation that have been evident in the first year. It is too soon at the present time to speculate on the extent to which any of these is likely to affect the eventual success of the Centers. However, attention to tradeoffs associated with these different approaches can help build on the advantages and mitigate some of the disadvantages for current Centers, and inform thinking about design considerations for possible future Centers.

Compactness

Three of the four Centers comprise seven academic partners, and in two of these three the partners are widely spread out over the state. One Center (CSITS) comprises only three academic partners, all of which are close to each other, and two of which had a prior co-location arrangement.

- Having more academic partners allows a Center to benefit from a wider range of distinctive strengths and specialties from partners among the Minnesota state colleges and universities, thereby gaining efficiencies from sharing of knowledge and specialized equipment.

> We have a better future opportunity because of the structure. We can be better representatives to the state because of it. I think that – the example – we have two states. One is a rural area that is by and large having an aging and declining population and the second one is … the corridor in and surrounding the metro area. [On the] one side…, it's important that we recruit and get the highest number of students from the rural areas. In the metro area, we are more focused on raising the standards because we have more students than we have room for, so it's a matter of being more selective and sometimes limiting who is going to go to school. We have schools that represent both sides. If we have expertise and we have the delivery platform to present to the state, we can make the connections. We can look at it as having shared resources. We can look at things as a state instead of (these problems being simply a) demographic issue.

- Having more partners requires more time and effort to establish new relationships, identify common ground and shared benefits, and maintain effective communications. It makes it more challenging to develop and sustain clarity of vision and consistency of focus.

- Having a larger geographic spread among partners has effects similar to having more partners. It may be easier to achieve a critical mass of partners in the Twin Cities metropolitan area, where students and academic institutions are more densely clustered.

Industry role in governance

Three of the four Centers have Industry Advisory Boards, similar in design and function to those that already exist for technical college programs. At these Centers, industry representatives provide input and feedback on Center plans and priorities, but do not directly participate in the strategic decision-making. Based on the experiences described by the 100 stakeholders who were surveyed, there appear to be opportunities at most Centers for academic staff and industry representatives to interact on advisory board subcommittees and/or special work groups (such as for designing new curriculum or programs), but relatively few faculty are involved on a regular basis in the advisory

boards themselves. CIHSEP has no separate industry group but rather includes industry representatives in every committee and working group of the Center, including those that make key strategic and tactical decisions about Center purpose and activities.

- More integrated involvement of industry representatives in all decision-making groups gives industry earlier and more direct voice into Center priorities and decisions. It creates significantly more opportunities for academic and industry representatives to build relationships and come to understand each others' needs and constraints, and places less burden on Center directors to be the sole liaison between the two groups.

- More integrated involvement of industry requires a significant contribution of time and energy from industry partners' representatives. It is likely that this is more attainable in some industry sectors (such as health care) than in others (such as manufacturing). It also increases the chances that working groups may confront significant differences in work style and expectations based on differences in organizational culture and timelines.

> We have learned a lot about working from different perspectives and trying to find a middle ground between industry and educational perspectives. We were not aware of some of the things in long term care that are going on and have been struggling though some of the consensus building. So, that's probably all I can say at this point in time. We have learned a lot. [Two-year college staff member]

- In both models, industry representatives express some degree of frustration with the pace of change or the extent to which industry needs are being addressed. In both models, however, the large majority of stakeholders interviewed expressed the opinion that Centers have significantly increased the academic partners' responsiveness to industry. The following is a typical comment from an industry stakeholder:

> It [The purpose of the Industry Advisory Board] is to bring industry perspective to the faculty and the Center staff, letting them know the needs of industry, the kinds of ever-changing skill sets in emerging technologies that the students need, so that they can lead, rather than always being behind the industries. … I think some of the recommendations we have made regarding emerging technologies have been well-received. The advice of the advisory board has been well taken. I think they are listening quite closely and carefully to this industry perspective.

Process for making tactical implementation decisions

Three of the four Centers develop work plans, based on the Center's mission and vision, that identify specific implementation tasks to be carried out. By contrast, CIHSEP's work plan does not select specific implementation projects in advance but rather selects them annually based on a Request for Proposals (RFP) soliciting implementation projects that advance the Center's mission and vision and meet current industry needs.

- Prior identification of specific implementation projects makes it easier for a Center to estimate which academic programs or workplaces are most likely to be affected by the Center, and to coordinate the activities that will produce those effects.

- Development of the specific implementation priorities based on competitive proposals may increase the number and variety of new ideas that are generated, respond more flexibly to industry needs, and spread the perception of Center ownership and accountability among a wider pool of stakeholders.

Dependence on expensive and/or scarce resources

Many of the health care programs encompassed by CIHSEP require students to gain experience in a supervised clinical setting, which is a specialized and scarce resource. The two Centers that focus on manufacturing (CMAE and MnCEME) are significantly dependent on laboratories and equipment that are highly specialized, expensive, and require periodic replacement to stay up to date. The computer and networking resources required by CSITS are also specialized and require constant updating, but are somewhat less expensive and more readily available.

- Compared to the other Centers, the manufacturing Centers that rely on expensive large equipment appear to have required more investment in upgraded equipment at the outset in order to fulfill their missions of delivering state-of-the art training and research. The resultant value to the academic programs, and to the Center overall, was testified to by many of the stakeholders who were interviewed:

  > We have been expanding our training in robotics engineering and they provided the equipment. So even though it was our initiative, we couldn't have done it without their help and it shows they are making shoulder-to-shoulder investments that benefit both the students we are bringing into the program [and] the partner institutions as well.

  However, the upgrading consumed a significant fraction of the initial grant, and the two manufacturing Centers appear to have been more negatively affected by the delayed reduction in their proposed budgets than were the other two Centers.

- It is possible that when critical resources have become urgently needed they may be more difficult to acquire than when the need was less acute. For example, when there is a serious shortage of workers in a given health care field, and thus an urgent need to train more, there tends to also be a shortage of clinical settings available for that training, because of the decreased availability of practicing professionals to provide supervision. The same may be true of major manufacturing equipment: as a worker shortage becomes acute, industry competitiveness declines and businesses may become less able to contribute a share of the cost of upgrading colleges' and universities' laboratories for training new (or more highly skilled) workers.

A possible opportunity

The organization of the Centers offers the potential to add significant value to existing training and education programs in many ways. One recurrent theme in the site visits was the value industry finds in what we might call "generalized specialists," or people with good cross-training in more than one sub-specialty. This kind of skill in working across traditional knowledge categories has been identified as important in fostering innovation, which in turn is essential to economic competitiveness. The Centers should be ideally positioned, by their inclusion of multiple closely-related programs, to contribute to this high-demand kind of skill training. This point was not mentioned in the stakeholder interviews, and it is not clear whether this is currently being systematically developed by any of the Centers.

However, stakeholders did frequently mention other kinds of examples of the value added by Centers' work to coordinate existing programs. These include many examples of how academic partners are approaching their work in new ways, such as adapting courses to align better with industry needs, or seeking more diversity among students.

Baseline measures for 2005-06

To supplement the preceding process evaluation, the section that follows outlines the key outcome measures that are currently available for the 2005-06 baseline year:

- The programs associated with each Center
- The awards (degrees and other credentials) granted by these Center-affiliated programs
- The number and characteristics of graduates of Center-affiliated programs
- The involvement of industry with Centers and their associated programs
- Funding received by Centers and their associated programs, other than the start-up funding

This information shows the baseline status of a variety of important outcome measures, documented at a time when Centers were on the verge of implementation and very few students had been affected by changes in recruitment or academic programs. In accordance with the enabling legislation, the complete evaluation will also document a wider range of other outcomes, as described in the evaluation logic model (see Appendix, page 57). For many of these outcomes, more time is required to develop the means of measuring or reporting them. This is discussed in the next section.

Overview of programs included in each Center

During the summer and fall of 2006, Center representatives worked to identify the specific programs within their partner institutions that were most likely to be affected by the Centers of Excellence. It proved challenging to draw a single boundary between programs to be included and those to be excluded, because the work of each Center is likely to have different kinds and amounts of impact on different programs.

Decisions were shaped in part by the individual Centers' logic models that documented planned activities and the short- and long-term outcomes that Centers expect to result from those activities.

Most Centers are structured to develop specific implementation priorities centrally, which made it possible for the key decision-making groups, in consultation with their academic partners, to arrive at an agreed-upon list of programs to be included at each institution. The decision was more difficult for CIHSEP, in which specific implementation projects are selected annually by a competitive review of proposals. All proposals must advance

with the Center's core mission and purpose and respond to current industry needs, with the result that the specific academic programs likely to be most affected cannot easily be known years in advance.

Figures 1 – 4 below summarize, in tabular form, the programs identified by each Center as most likely to be affected by Center activities. The columns in each table list the broad groupings within which identified programs are categorized in the Integrated Statewide Record System. The entries in each cell of the table identify the level of the Center-affiliated programs for each institution. Certificates require 3-30 credit hours, Diplomas 31-72 hours (typically 64), two-year degrees 60-70 hours, and four-year degrees typically 128 hours. Graduate work associated with the Centers of Excellence includes both master's degrees (for which a median requirement is 42 credit hours) and a small number of post-master's certificates (typically 14 hours).

Below the tables are notes identifying the particular specialties within each of the broad program groupings that are associated with the Center.

1. Programs associated with CMAE, by institution, program grouping, and award level

	Engineering	Engineering Technology	Mechanic & Repair Technology	Precision Production	Business Management and Related Support
Bemidji State University		4yr, Grad			
Pine TC		2yr		Cert, Dipl, 2yr	
Saint Paul College		Dipl, 2yr		Cert, Dipl	
Saint Cloud TC		Dipl, 2yr		Dipl, 2yr	
Central Lakes College	2yr	Cert, Dipl, 2yr	Dipl	Dipl, 2yr	
Minneapolis CTC				Cert, Dipl	
Northland CTC		Cert, Dipl, 2yr		Cert, Dipl	Cert, Dipl, 2yr
Northwest TC			Dipl, 2yr		

Engineering *programs include General Engineering.*

Engineering Technologies/Technicians *programs include Civil, Drafting/Design, Electrical, Electromechanical Instrumentation, Industrial Management, Industrial Production, Mechanical, and Quality Control.*

Mechanic and Repair Technology *programs include Industrial Mechanics and Maintenance and Engine Machinist.*

Precision Production *programs include Precision Metal Working and Cabinetmaking and Millwork.*

Business Management and Related Support *programs include Logistics and Materials Management, Operations Management and Supervision, and Specialized Sales, Merchandising and Marketing.*

2. Programs associated with MnCEME, by institution, program grouping, and award level

	Computer & Info Science	Engineering	Engineering Technology	Liberal Arts & Sciences	Biological & Biomedical Sciences	Construction Trades	Mechanic & Repair Technology	Precision Production
Minnesota State University, Mankato	4yr, Grad	Grad	4yr, Grad		4yr			
Itasca CC		2yr						
Vermilion CC	2yr							
Normandale CC	2yr	2yr	2yr	2yr				
Anoka TC			Cert, 2yr					Dipl, 2yr
Alexandria TC			Dipl, 2yr					Dipl
Hennepin TC			Cert, Dipl, 2yr			Cert, Dipl		Cert, Dipl, 2yr
South Central CTC								Dipl, 2yr
Hibbing CC		2yr	2yr				Dipl	
Mesabi Range CTC			Dipl, 2yr				Dipl, 2yr	Dipl

Computer and Information Science & Support Services *programs include General Computer and Information Sciences and Computer Science.*

Engineering *programs include General Engineering.*

Engineering Technologies/Technicians *programs include Computer, Drafting/Design, Electrical, Hydraulics, Automotive, and General Engineering Technology, and Industrial Production.*

Liberal Arts & Science, General Studies, & Humanities *programs include specializations in Physics, Math, Chemistry, and Bioscience.*

Biological & Biomedical Sciences *programs include Biotechnology.*

Construction Trades *programs include Building/Property Maintenance and Management.*

Mechanic & Repair Technology *programs include Heavy/Industrial Equipment Maintenance and Automotive Mechanics.*

Precision Production *programs include Machine Tool Technology/Machinist.*

3. Programs associated with CSITS, by institution, program grouping, and award level

	Computer and Info Science	Engineering Technology	Business Management & Related Support
Metropolitan State University	4yr, Grad		4yr, Grad
Inver Hills CC	Cert, 2yr	Cert, 2yr	
Minneapolis CTC	Cert, Dipl, 2yr		

Computer and Information Science & Support Services *programs include Computer Programming, Computer Science, Computer Software and Media Applications, Computer Systems Analysis, Computer Systems Networking and Telecommunications, Computer and Information Systems Security, and Information Science/Studies.*

Engineering Technologies/Technicians *programs include Computer Technology/Computer Systems Technology.*

Business Management and Related Support *programs include Management Information Systems and Services.*

4. Programs associated with CIHSEP, by institution, program grouping, and award level

	Computer and Info Science	Biological & Biomedical Sciences	Health & Clinical Sciences
Winona State University	4yr		4yr, Grad
Normandale CC			Cert, 2yr
Pine TC			Cert, Dipl
MN State College–SE TC			Cert, Dipl, 2yr
Minneapolis CTC		2yr	Cert, Dipl, 2yr
Rochester CTC	2yr	2yr	Cert, Dipl, 2yr
Ridgewater College			Cert, Dipl, 2yr
Riverland CC			Cert

Computer and Information Science & Support Services *programs include Bioinformatics.*

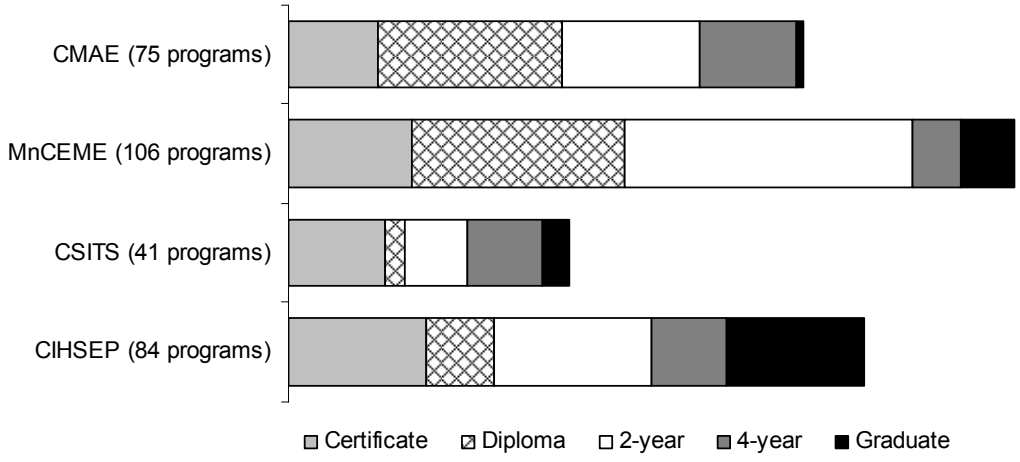
Biological & Biomedical Sciences *programs include Biomedical Sciences and Biotechnology.*

Health Professional & Related Clinical Sciences *programs include Nursing, Dental Support Services and Allied Professions, Allied Health Diagnostic, Intervention, and Treatment, Community Health Services/Liaison/Counseling, Allied Health and Medical Assisting Services, Clinical Laboratory Science/Medical Technology, Dietetic Technician, and Home Health Aide/Home Attendant.*

All four Centers have identified programs that are concentrated in one or two main groupings. These are Health and Clinical Sciences for CIHSEP, Computer and Information Science for CSITS, and Engineering Technology and Precision Production for MnCEME and CMAE. In each case, a smaller number of related programs in other groupings have been included in the Centers. Programs at the Technical Colleges tend to be more narrowly focused in the core fields. The programs offered at Community Colleges tend to be more broadly defined, so that when Community Colleges are included in the Centers, they tend to introduce more breadth to the Center's set of programs.

Figure 5 below illustrates the relative emphases of the different Centers on the different levels of programs. CSITS, with the fewest academic partners and most narrowly-defined program focus, includes the fewest programs, and MnCEME includes the most. CIHSEP and CSITS include the greatest proportion of four-year and graduate programs, while CMAE and MnCEME include the greatest proportion of diploma and two-year programs.

5. Number of Center-affiliated programs, by Center and award level



Source: *Program lists developed by Centers and produced by the Office of the Chancellor; calculations by Wilder Research.*

Degrees granted by Center-affiliated programs (2005-06)

During 2005-06, the 306 programs associated with the four Centers granted a total of 3,091 awards to 2,970 students (some students received more than one credential during the year).

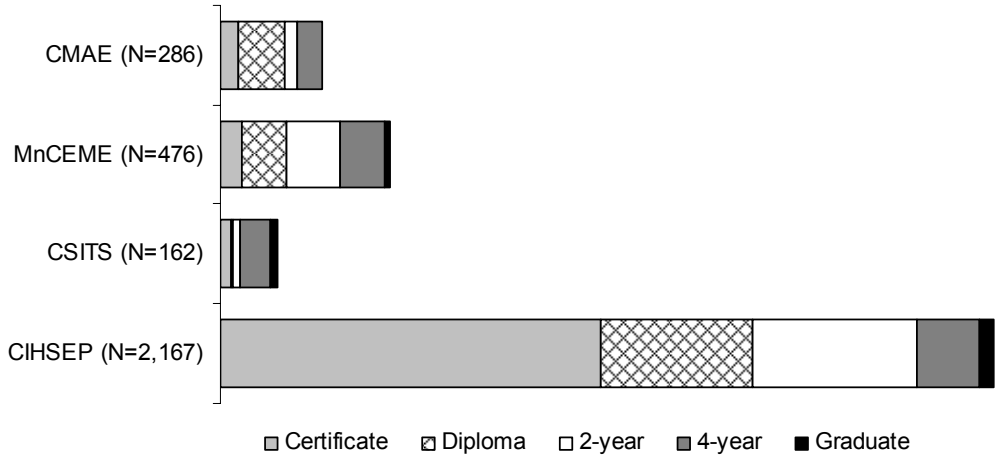
The awards requiring the fewest credit hours (certificates, averaging 17 hours) were the most frequently granted, representing 39 percent of all awards granted during the year. These were followed by diplomas (22%), two-year degrees (21%), then four-year degrees (15%), with graduate awards the least common (3%). Figure 6 below shows the numbers of degrees of each level granted by the programs associated with each Center during 2005-06.

CIHSEP not only accounted for the largest number of certificates, but it was also the Center in which certificates represented the largest percentage of all degrees granted. This reflects its focus in an industry with a relatively high percentage of near-entry-level jobs, as well as its goal of expanding the diversity of health care workers. Thus, although it does not include the largest number of programs, it associated programs granted a significantly larger number of awards per year.

By contrast, the majority of degrees granted in CSITS programs were four-year degrees, and CSITS awarded a higher proportion of its degrees at the graduate level, compared to any other Center. The largest proportion of CMAE degrees were diplomas; CMAE programs granted relatively few two-year degrees but considerably more four-year degrees. In the other manufacturing Center, MnCEME's associated programs granted roughly equal proportions of diplomas, two-year degrees, and four-year degrees.

Detail tables showing complete numbers at each level may be found in the Appendix beginning on page 75.

6. Number of degrees granted by Center-affiliated programs in 2005-06, by Center and level of award



Source: *Data provided by the Office of the Chancellor; calculations by Wilder Research.*

Characteristics of graduates of associated programs (2005-06)

The demographic characteristics of graduates from Center-affiliated programs vary from Center to Center, with the most noteworthy difference being the gender of graduates at CIHSEP. Over four-fifths (85%) of graduates in CIHSEP-identified programs are women. The gender balance of graduates is nearly reversed at the other three Centers, which range from 71 percent male graduates at CSITS to 83 percent at CMAE and 88 percent at MnCEME. These differences, which are consistent with long-standing patterns in the work force in these industries, should be taken into consideration when evaluating Centers' efforts to increase the numbers of students from under-represented populations at the Centers.

The racial makeup of the Centers' graduates should also be noted. One-half (51%) of CSITS graduates are members of racial minorities or foreign nationals. This is considerably higher than the other three Centers, which range from 17 percent at CMAE to 21 percent at MnCEME and 25 percent at CIHSEP. This difference is not surprising considering the difference in geographic location of the Centers. The three CSITS partner schools are all located in Minnesota's most ethnically-diverse population center. In contrast, most of the other Centers' partner schools (with a few exceptions) are located outside of the Minneapolis/Saint Paul metropolitan area – although the demographics of residents in greater Minnesota are now diversifying rapidly. It may also reflect the frequently-seen pattern of higher interest in computer-related fields among foreign nationals.

The age and first-generation college student status of the graduates were also identified through the ISRS database. Students at CSITS were slightly older than students at the other Centers; their average and median age of graduates is over 30 years old, the only Center to be over 30 on either measurement. The average age of graduates at all of the Centers was consistently higher than the median age. This indicates that while most of the students are younger than 30 there are a number of significantly older individuals graduating from the Center programs. Most likely, these individuals are receiving re-training or continuing education to change fields or advance in the field they are in. The proportion of first-generation college student who graduated from CSITS programs was also slightly higher than with the other three Centers. The age difference at CSITS is likely related to the greater proportion of CSITS programs that are four-year or graduate degrees that require more years of study. The difference in first-generation college student status may again be due to geographic differences.

7. Age, gender, race/ethnicity/nationality, and first-generation status of 2005-06 graduates, by Center

Graduates		CMAE	MnCEME	CSITS	CIHSEP	Total
Gender	N *(*)*	281 *(.01)*	448 *(.01)*	105 *(.21)*	2,107 *(<.01)*	**2,941** *(.01)*
	% Male	83%	88%	71%	15%	**34%**
	% Female	17%	12%	29%	85%	**66%**
Race, ethnicity, and nationality	N *(*)*	275 *(.03)*	400 *(.12)*	87 *(.35)*	1,923 *(.09)*	**2,685** *(.10)*
	% Member of racial or ethnic minority or foreign national	17%	21%	51%	25%	**24%**
	% U.S. White	83%	79%	49%	75%	**76%**
Age	N*(*)*	279 *(.01)*	449 *(<.01)*	118 *(.11)*	2,014 *(.05)*	**2,860** *(.04)*
	Range	16-58	17-63	19-60	15-75	**15-75**
	Avg/Med	28/24	27/23	33/31	28/25	**28/25**
1st Generation college students**	N *(*)*	185 *(.35)*	354 *(.21)*	79 *(.41)*	1,678 *(.21)*	**2,296** *(.23)*
	% 1st	31%	30%	46%	41%	**39%**

Source: *Data provided by the Office of the Chancellor; calculations by Wilder Research.*

Note: ** The numbers in italic parentheses after the N indicate the percent (shown as a decimal) of missing data for each domain (e.g., in the Total column in the top row, gender is known for 2,941 graduates, which is 99 percent of all graduates; it is not known for the other 1 percent). The ranges, averages, and medians shown are for those whose age is known. The median age is the age at which half are younger and half are older.*

*** "First-generation college students" are defined in Minnesota statute as students who do not have any parent who attended college.*

Because of the length of time required to earn many of these degrees – especially for part-time students – many of the students currently in Center programs will not graduate during the three-year period of the current evaluation. Thus the Centers' significant efforts to recruit new students into their programs is unlikely to produce large changes in the numbers of graduates by the final (2008-09) report required by the current evaluation contract.

To better capture the changes occurring as a result of Center activities, in future years the evaluation report will also track the number and characteristics of enrolled students, with a particular focus on new students. It is not possible to report these figures at this time, for three reasons: First, not all students identify a program at the time of enrollment; such a declaration is not always required in community colleges or state universities. Second, when students do identify programs, those programs are listed in the records system according to departments or concentrations, and the codes used for these concentrations do not always match closely with the codes for specific degree programs. Thus the lists of degree programs described above, which make it possible to identify a core group of graduates, do not make it possible to identify currently enrolled students in those degree programs. Third, to identify a new Center student it is not enough to know that a student is new to a given institution. With the greatly increased emphasis on articulation agreements to make it easy for students to move among the academic partners within a Center, students will be increasingly mobile in their registrations. The data systems of the overall MnSCU system have rarely needed to track students who move among institutions. It is possible to do this, but the methods for identifying such students require considerably more time and effort than identifying students within a single institution. This work will be undertaken by Office of the Chancellor staff, in cooperation with the evaluation team, during the coming year.

Involvement of industry (2005-06)

Available information points to significant industry involvement in the first year of the Centers. According to 93 percent of industry stakeholders interviewed, and 88 percent of academic stakeholders, this involvement includes an extension, and often a deepening, of relationships that existed already, as well as the development of new relationships with a significant number of firms not previously associated with any of the Centers' associated programs or departments. (In this context, "firms" and "industry" include not only for-profit businesses but also industry associations, nonprofits, or government agencies that are customers for the Center's customized training, research, consultation, graduates, or other products.)

To supplement the interview information, evaluators sought Center Directors' reports of the number of firms involved during the 2005-05 academic year in a variety of ways. Assisted by representatives of the associated programs and colleges, Directors estimated that during 2005-06:

- 34 firms had donated over 600 hours in participation in Centers' industry advisory boards (with more participating after July 1, 2006).
- Around 100 firms had donated over 9,000 hours in participation in other working groups of the Centers.
- Over 40 firms had hosted student interns or provided other field and practicum placements for students in programs associated with the Centers.
- Around 25 firms had made over $400,000 in financial contributions to the Centers.
- At least 45 firms had requested research, consultation, or other expertise or products from the Center or its associated programs.
- About 75 firms and possibly more had donated equipment, use of space, or time or other value in ways not covered above.
- 39 firms had become Enterprise Partners with CSITS.
- Around 15 percent of the participating firms had no previous connection with the Center or its associated programs.

These numbers do not include the very significant amounts of time donated by representatives of the academic partners themselves, K-12 representatives, and staff in the Office of the Chancellor. It also does not show estimates of the value of donated time or equipment, which in some cases is substantial.

The number of new firms (those without a previous connection to the Center or its associated programs) is especially notable in light of the fact that the Centers that were selected were required by the competitive selection process to demonstrate that they already had extensive industry involvement.

Figure 8 below shows information that most Centers were able to provide in ways that evaluators considered reasonably comparable.

8. Industry involvement, 2005-06: Number of firms and type of involvement

		CMAE	MnCEME	CSITS	CIHSEP	TOTAL
Center Advisory Board	Number of firms (Number of hours)	0* (0)	16 (214)	12 (120)	6 (432)	34 (626)
Other Center working group(s)	Number of firms (Number of hours)	22** (4,552)	2 (452)	39 (1,616)	34 (2,643)	97 (9,263)
Financial contribution to the Center	Number of firms Amount of contribution	10 $96,150	2 $208,000	9 $16,500	3 $85,700	24 $406,350
Total firms *** ***(unduplicated)***	***Number of firms***	70	190	45	38	**342**

Source: *Reports prepared by Center Directors with assistance from associated department and college representatives; calculations by Wilder Research.*

Notes: **The CMAE industry advisory board began meeting shortly after the end of the fiscal year.*

*** Includes the Ingenuity Frontier program that involves numerous organizations but is only counted here as one "firm." Also includes representation on the St. Cloud Technical College Project Lead the Way and Discovery Academy Advisory Boards, which existed before the Center was established but whose activities include advising other Center partners in strategies for replicating these programs more widely.*

**** The total number of firms includes some who were involved in other ways that Centers were able to estimate, included contracting for customized training; requesting research, consultation, or other Center expertise or products; and donating equipment, use of space, time, or other value not otherwise covered in this table. The large number for MnCEME reflects a large number of customized training customers.*

State college and university programs have not previously been asked to collect these data on industry involvement, and procedures were not in place at the outset to track this information. The numbers shown here should be seen as preliminary estimates subject to revision as measures improve. During 2007 evaluators will work with Center leaders and the Office of the Chancellor to develop agreement on the measures of industry involvement that can reliably be tracked, and the procedures that would enable each Center to collect comparable information.

Additional funding obtained by Centers (2005-06)

The 2005 Minnesota Legislature appropriated $10 million for the 2006-07 biennium to create Centers of Excellence within Minnesota State Colleges and Universities (MnSCU). With this appropriation, the Board of Trustees designated four Centers in October 2005 and committed to funding them at least through Fiscal Year 2009. No guarantees were made that the Centers would receive on-going support at the end of the initial start-up period; a high priority was placed on Centers to become financially self-supporting as rapidly as possible.

Figure 9 below shows the best available current estimate of funds acquired by Centers during 2005-06, which totals $6,792,125 across the four Centers. This is made up mainly from federal grants, which total over $2,300,000, and state grants, which total nearly $2,000,000. Contributions from partner colleges and universities (for equipment and scholarships) total nearly $860,000, and special projects funding from the Office of the Chancellor (for on-line course development) are another $860,000. In addition to their in-kind contributions, documented in Table 8 above, industry contributed over $500,000.

These figures must be considered preliminary and subject to later revision after more rigorous methods of documenting funding have been established.

In each cell of the table below, the numbers in parentheses indicate the number of different funding sources represented in that cell.

9. Leveraged funding, 2005-06: Dollar amounts and number of sources

	CMAE	MnCEME	CSITS	CIHSEP	TOTAL
MnSCU funds (other than initial CoE funding:					
Office of the Chancellor special projects funds (e.g. on-line courses)	$601,000 (1)	$259,490 (1)	-	-	**$860,490 (1)**
Other MnSCU colleges and universities	-	$523,623 (7)	-	$336,000 (4)	**$859,623 (11)**
Other public sources:					
Local (school, city, county)	$5,000 (1)	-	-	-	**$5,000 (1)**
Other state agencies (e.g., MnDOT, Job Skills Partnership)	$562,871 (1)	$902,550 (4)	$243,310 (1)	$260,000 (1)	**$1,968,731 (5)**
Federal	$91,833 (2)	$2,004,495 (2)	$207,045 (2)	-	**$2,303,373 (5)**
Private corporations, industry associations, and corporate foundations	$93,150 (8)	$330,000 (5)	$9,000 (2)	-	**$515,150 (13)**
Other private sources (e.g., philanthropy, individuals)	$165,986 (2)	$113,772 (?)	-	-	**$279,758 (2 + ?)**
Total amount	**$1,519,840**	**$4,133,930**	**$459,355**	**$596,000**	**$6,792,125**
Total number of sources (unduplicated)	**13 + ?**	**19 + ?**	**5**	**6**	**28**

Source(s)*: Center reports to Wilder Research; calculations and category groupings by Wilder Research.*

Note(s): *This figure shows the funds that each Center received (other than in the original funding to establish the Center) that were "either entirely for the direct benefit or use of the Center, or were leveraged for a department or program because of its association with the Center." This table includes funds that were provided for the purpose of upgrading equipment; it does not include the estimated value of actual equipment that was donated. In-kind donations from industry sources are shown in Figure 8. This report does not document the considerable in-kind support received the Office of the Chancellor, individual MnSCU academic partners, and K-12 partners, which include donated time, space, and equipment.*

These figures may be revised as more complete information can be collected.

Other than the original Center funding, some Centers received special purpose funding from the Office of the Chancellor for development of on-line programs. State grant sources during 2005-06 from other state agencies and entities were training grants from the Minnesota Job Skills Partnership (four grants received by three Centers), and applied research grants from the Minnesota Department of Agriculture, the Local Road Research Board, Minnesota Department of Transportation, and Minnesota Department of Employment and Economic Development (one Center). The sources of federal grants were the National Aeronautics and Space Administration (NASA), Department of Education (Carl Perkins grant for helping students access technical education programs), Department of Energy, National Science Foundation, and the Bureau of Justice.

These amounts include only funds, not values of donated goods or services. For example, the value of donated or discounted equipment is not shown, but funds for the purchase of equipment are included. Scholarship funds (provided they are Center-related) are included. Provided they meet the above criteria, funds for any purpose are included. These include Minnesota Job Skills Partnership grants for customized training; a variety of state, federal, and privately-funded research grants; Carl Perkins grants to help students access technical education programs; corporate and foundation donations for scholarships, PLTW, conferences, and summer camps; and contributions made by participating colleges and universities for equipment, scholarships, etc.

The evaluation will track Centers' success in obtaining funding other than the initial funding from the Centers of Excellence initiative. In the fall of 2006, Wilder Research asked Center Directors to compile reports of funds leveraged during the first academic year (recognizing that the Centers were not in operation for the entire year). Directors were asked to include funds that were received "either entirely for the direct benefit or use of the Center, or leveraged for a department or program because of its association with the Center."

As in the identification of Center students, identification of funds received "by the Center" has proven to be a non-trivial task. The intention was to omit funds (grants, donations, etc.) that would have been received by a program, department, or college in the absence of the Center (such as for research that would have been funded even if the Center had not been created). However, in many cases it was not possible to know whether a grant would have been received in the absence of a Center. Since federal grants often take up to a year to be processed, it is likely that all of the federal grants listed by Centers were at least submitted before the Centers were established.

There are other sources of difficulty in arriving at a consistent basis for identifying the funding that should be attributed specifically to a Center, as distinct from funding acquired by a program, department, or college associated with a Center. A department that receives a grant may have designated some of its programs as being associated with the Center and some not. At this time, the criteria for inclusion used by Centers – or by individual departments associated with Centers – may vary. During 2007 the evaluation team expects to coordinate discussions with the Centers and the Office of the Chancellor about the establishment of a more uniform standard for attributing funding and other kinds of activities to a Center. In all cases, these measures should be regarded simply as indicators of potential future sustainability. If the expectation is that the Centers of Excellence will be self-sufficient absent specific appropriation to them by the State Legislature, then the key measurement of their readiness to be self-sufficient will come when specially designated funding is no longer provided to them.

Implications for evaluation

Implications for the assessment of economic impact

It will take time for significant quantitative results to be evident. It is reasonable to expect that Centers will have an effect on Minnesota's economy; however, the effects are not likely to be fully evident by 2009, and will require a number of different measures to understand.

The Centers of Excellence should help Minnesota companies be more productive and hence more competitive, and also enable more Minnesotans to earn higher incomes

The Centers of Excellence are designed to have an impact on Minnesota's economy (and Minnesota companies) primarily through two channels: providing more highly skilled workers and helping companies to apply new and existing knowledge more quickly and efficiently. Both of these channels should enhance the productivity of Minnesota workers and Minnesota companies, thus helping them to be more competitive. Ultimately, workers will earn higher incomes and companies will make higher profits. Since the first report on economic impact is scheduled for January 2009, there will not have been sufficient time for the full effect of the Centers to have been felt in Minnesota. Accordingly, part of the evaluation will include direct measures of the flow in these two channels of potential impact.

To ascertain whether the Centers are increasing the flow of highly skilled workers, we will examine the numbers of students being trained in different programs offered through the Centers. We will also analyze information on the first jobs of program graduates, recognizing that some of the most highly-trained workers, those who began four-year programs in the first year of the Centers, will not yet have graduated in January 2009. In addition, the data on ongoing customized training of incumbent workers at Minnesota firms will also provide evidence on the impact of the Centers. Finally, the efforts of the Centers to increase the flow of qualified and interested students from high schools will also contribute to an increase in skilled workers and, ultimately, to the success on Minnesota companies.

Testing whether the Centers are enabling Minnesota companies to apply new and existing knowledge more quickly or efficiently will be equally, if not more, challenging. To some extent, the training of incumbent workers may be counted as supporting this objective if the workers are being trained to operate new equipment or apply new technologies. More fundamentally, enhancement of Minnesota firms' productivity will be evidenced by such

measures as increased contact between the Centers and private firms and by increases in research that is supported by private companies. Even though 2009 may be too early for some research to have generated effects that show up on companies' bottom lines, an increase in research that private industry is willing to support will be a strong indication that the Centers are on track to enhance the competitiveness of Minnesota firms.

The impact of the Centers of Excellence is more likely to be seen in selected industrial sectors statewide, rather than in particular geographic areas

Even though the enabling legislation talks about economic impact in geographic areas near the colleges, we envision that the effects will be spread across the state and concentrated in certain industries that can benefit most directly from the Centers' activities.

Statewide economic impact is quite likely for all four Centers. The two Centers dealing with manufacturing and engineering include especially far flung collections of campuses from across the state and should provide especially convenient points of contact for Minnesota workers and companies. Moreover, as opportunities for distance learning continue to expand, all four Centers will be increasingly able to serve the needs of both firms and students throughout Minnesota.

While the reach of the four Centers is likely to extend statewide, their greatest effects will, perhaps not surprisingly, be concentrated in certain industries. Thus CMAE and MnCEME are more likely to impact manufacturing firms which may be located some distance from any of their campuses than they are to affect local businesses that cannot make specific use of their services. Healthcare organization across the state stand to benefit from CIHSEP while many companies located in its campus towns may be unaffected by its activities.

Thus, the search for evidence of the impact of the Centers will concentrate on sectors of the Minnesota economy that are more likely to benefit from their work rather than on geographic areas closely related to the Centers' campuses.

It will be very challenging to measure the economic impact of the Centers directly

We cannot know precisely what would have happened to Minnesota's economy in the absence of the Centers of Excellence. So, it may not be possible to produce clear-cut evidence merely by measuring output or employment. For example, some of the biggest contributions could be to enhance the competitiveness of certain Minnesota companies, enabling them to retain market share against ever-stronger competition. In such cases,

employment and output may not grow, but the company may avoid the business losses that would have taken place without help from the Centers.

As a result, the economic impact assessment in 2009 will be a mixture of several types of information:

- Part of the assessment will show the changes in the flow of students and research that will ultimately benefit Minnesota employers.
- Where appropriate, we will also examine the outcomes for certain industries that may have been started or have grown more rapidly as a result of Center activities. This may include an increasing number of startups in sectors supported by the Centers.
- For certain industries, it may be possible to examine whether the Centers helped Minnesota employers remain competitive in challenging circumstances. Such analysis might take the form of comparisons to peers in other states not receiving support from Centers such as ours or even documented case studies of individual companies' experiences.

The design of the Centers of Excellence makes many standard evaluative measures not applicable

The Centers of Excellence were set up as "virtual Centers" without direct authority over any departments, degree programs, or courses. They operate across institutions that have historically been not only independent but also in direct competition with each other for students and industry support.

In the first year Center Directors and their colleagues have grappled with the challenges of identifying the students who should be counted as "Center students" for the purpose of evaluation. The interdisciplinary nature of the Centers has made this process a challenging one, but in the end each Center identified a precise list of degree programs that they considered most likely to be affected by Center activity. However, the statewide record system does not always make it possible to use this list of degree programs to identify the academic departments and concentrations of current students who are pursuing such degrees. During 2007, the evaluation team will work with the Centers and the Office of the Chancellor to identify an alternate means of identifying current students, possibly through lists of core courses.

Additional challenges in 2006 involved identifying what activity on the part of departments and programs affiliated with the Centers could rightfully be claimed by the Centers as "Center activity." If a department's curriculum and facilities are enhanced by

its association with the Center, and that department secures a research or training grant, is it reasonable to claim that the Center should be given any credit for the funding? What are the implications if a department delivers more than promised in its proposal because of the additional contribution made possible by the resources of the Center (something that might be described as "reverse leverage")? If a group of students are counted as "Center students" are there any ways in which those students home departments are at risk of receiving less credit (such as per-student funding) as a result? To what extent does the important role of the faculty in determining the award of credit affect the ability of a multi-institutional Center to arrive at a common understanding regarding transfer of credits and seamless articulation of courses and programs? During 2007, the evaluation team will help to conduct discussions with Center leaders and the Office of the Chancellor to address such concerns and try to develop an agreed-upon framework for attributing students, funding, or other activities to the Centers without negative results for their associated programs.

Measures of system change and innovation are important leading indicators of Centers' likely longer-term success

In their first year of operation, Centers have organized and motivated large numbers of academic, industry, and K-12 partners to join together to an extent that has been, for many, unique.

Among other work, these partners have developed strategic plans to change how secondary and post-secondary education is delivered and how education, especially higher education, works with industry to help students be well prepared for good careers in critical industries. The enabling legislation for the Centers emphasized many traditional measures of higher education productivity, such as numbers of students and graduates, graduation and job placement rates. It also included some more innovative measures, such as industry involvement and economic impact. These results, however, will only develop over time after new programs have been developed, approved, implemented, and had time to produce significant numbers of graduates.

Center leaders are interested in seeing the evaluation place equal emphasis on helping planners to understand the success of the kinds of change that must occur in the early years if these longer-term results are to be expected. In the logic model, which represents how Centers expect to reach their outcomes, these intermediate steps include such changes as: courses and other products (such as applied research) that better fit with industry needs; fewer gaps and unnecessary overlaps in program offerings; more efficient transfer of students and credits among institutions; and more K-12 students becoming more aware of and more interested in careers in the Center's field. What are the

strategies that best promote these intermediate changes? What can Centers, colleges and universities, and the Chancellor's Office do to support and encourage such work? What kinds of innovations and system changes are the Centers accomplishing?

It is not likely that there will be large changes in the number of graduates from Center-associated programs by December 2008, except for some of the shorter certificate and diploma programs. However, it is more likely that there could be answers to questions about changes in partnership and innovation by 2008, and that these will permit estimation of likely longer-term results. Among the eventual outcomes that can be hoped for, besides graduate and industry success, is greater institutional capacity within the Minnesota State Colleges and Universities system for inter-institutional collaboration and increased flexibility and responsiveness to community needs.

Next steps in the evaluation

Wilder Research will continue to conduct its external evaluation over the next two years. During 2007 the evaluation will focus on four elements critical to the assessment of overall project success. First, researchers and program staff will finalize all baseline and follow-up measures of programs, faculty, students and stakeholder involvement in order to adequately assess growth and change at each site. Second, the study team will enhance the measures of business involvement including the assessment of connections with faculty and students, new joint project activity, funding and other forms of support, as well as business leader feedback on Center development and direction. Third, the evaluation will continue gathering feedback from faculty, students, K-12 educators, regional leaders, task force and work group participants as well as funders and other stakeholders in order to provide useful and timely information to guide Center directors and advisors in their decision making. This feedback will be essential to understanding how intermediate stages of system change and innovation occur, and the factors that can best promote it. Fourth and finally, the evaluation team will begin the examination of potential economic benefits through the identification of industry specific indicators, labor market changes, as well as statewide economic indicators deemed appropriate given the focus of each Center.

Appendix

Evaluation methods

Center profiles

Center for Manufacturing and Applied Engineering (CMAE)

Minnesota Center for Engineering and Manufacturing Excellence (MnCEME)

Center for Strategic Information Technology and Security (CSITS)

Center for Integrated Health Science Education and Practice (CIHSEP)

Detail tables

A1. Programs associated with each Center, awards given in 2005-05, and credits required for those awards

A2. Age of graduates, by Center and award level

A3. Gender of graduates, by Center and award level

A4. Race of graduates, by Center and award level**

A5. First-generation college student status of graduates by Centers and award types**

A6. Graduate, awards, and ages of graduates, by Center and institution

A7. Gender, race, and first-generation student status of graduates, by Center and institution

Centers of Excellence legislation

Evaluation methods

Data sources for this evaluation included:

- Site visits at each of the four lead institutions
- Preparation of an overall Center of Excellence logic model, describing Center activities and the short- and longer-term outcomes that those activities are expected to produce, to guide the evaluation work (see below, page 58)
- Preparation of individual logic models to describe the intended development process at each individual Center
- Several meetings with the institutional partners intended to reach agreement on the logic models and on process and baseline measures
- Work with the Office of the Chancellor to use the existing Integrated Statewide Record System (ISRS) to establish baseline measures
- Preparation of an overall evaluation plan
- Collection of program, funding, and industry involvement data from each of the four Centers
- Analysis of a variety of documents, including original Center proposals, quarterly reports summarized by the Office of the Chancellor, material posted on Center web sites, and documents provided during site visits
- Interviews with key stakeholders associated with each of the four Centers

Stakeholder interviews

The stakeholder interviews were completed between October 9 and November 17, 2006, using lists of respondents provided by each Center. These lists were developed in response to evaluators' request for names of individuals involved in the Center from academic, industry, and K-12 educational partners. Wilder Research requested that Centers name up to 25 stakeholders who were directly involved in some part of the work of the Center, plus up to five more who were in a position to comment on the Center's activities and accomplishments. Some lists included more names, in which case Wilder Research selected randomly but within categories to ensure breadth of points of view.

Interviews were conducted by trained interviewers from Wilder Research who were briefed on the Centers of Excellence in advance. The questions were mainly open-ended and asked respondents to describe, in their own words, the Center's main goals, accomplishments, ways in which it had fostered new activity, efforts to affect the flow of students (both recent high school graduates and adult learners), changes affecting students' ease of transition through different levels of course work and training, and ways in which Centers had changed how things are done or how individuals or organizations work with each other.

Stakeholders were asked a series of questions about working groups or committees in which they were involved. Respondents were asked to describe the group's primary purpose, main activities and accomplishments, any barriers or challenges that it had encountered and how those had been addressed, and factors that they thought would affect the likelihood of achieving each group's primary goal or goals. Each respondent was asked to do this for up to three groups or committees on which they served.

Finally, all respondents were asked what challenges they though were most likely to affect the overall Center's progress, what one or two things would be essential to overcoming barriers and achieving success, any areas in which they felt the Center should change what it is doing, and any lessons learned that they thought would be helpful in the development of future Centers. Respondents were also asked a few questions to identify their professional position, relationship to the Center, and selected demographic characteristics. The average interview lasted 45 minutes.

Calls were made to a total of 113 individuals, of whom 100 (88%) were reached, consented to participate in the survey, and were able to schedule an appointment during the time allotted for the survey. This number included 26 of 30 from CMAE, 28 of 30 from MnCEME, 22 of 27 from CSITS, and 24 of 26 from CIHSEP. Overall, the respondents included 23 representatives of four-year institutions, 37 representatives of two-year institutions, 33 industry representatives, 10 K-12 representatives, and 10 Center or MnSCU staff. These numbers include two individuals twice: these individuals have been closely involved in two Centers, were listed by both Centers, and graciously agreed to completed separate interviews for each.

Research staff reviewed the interview responses, identified the common themes mentioned in each question, and developed and assigned codes based on these themes. Answers were analyzed both as complete individual cases, for an in-depth qualitative understanding of the respondents' perspectives as a whole. After coding, they were also analyzed quantitatively, to identify patterns in the frequency of the common themes, including any differences based on Center, type of work group, or type of organization represented.

Integrated Statewide Record System (ISRS) data

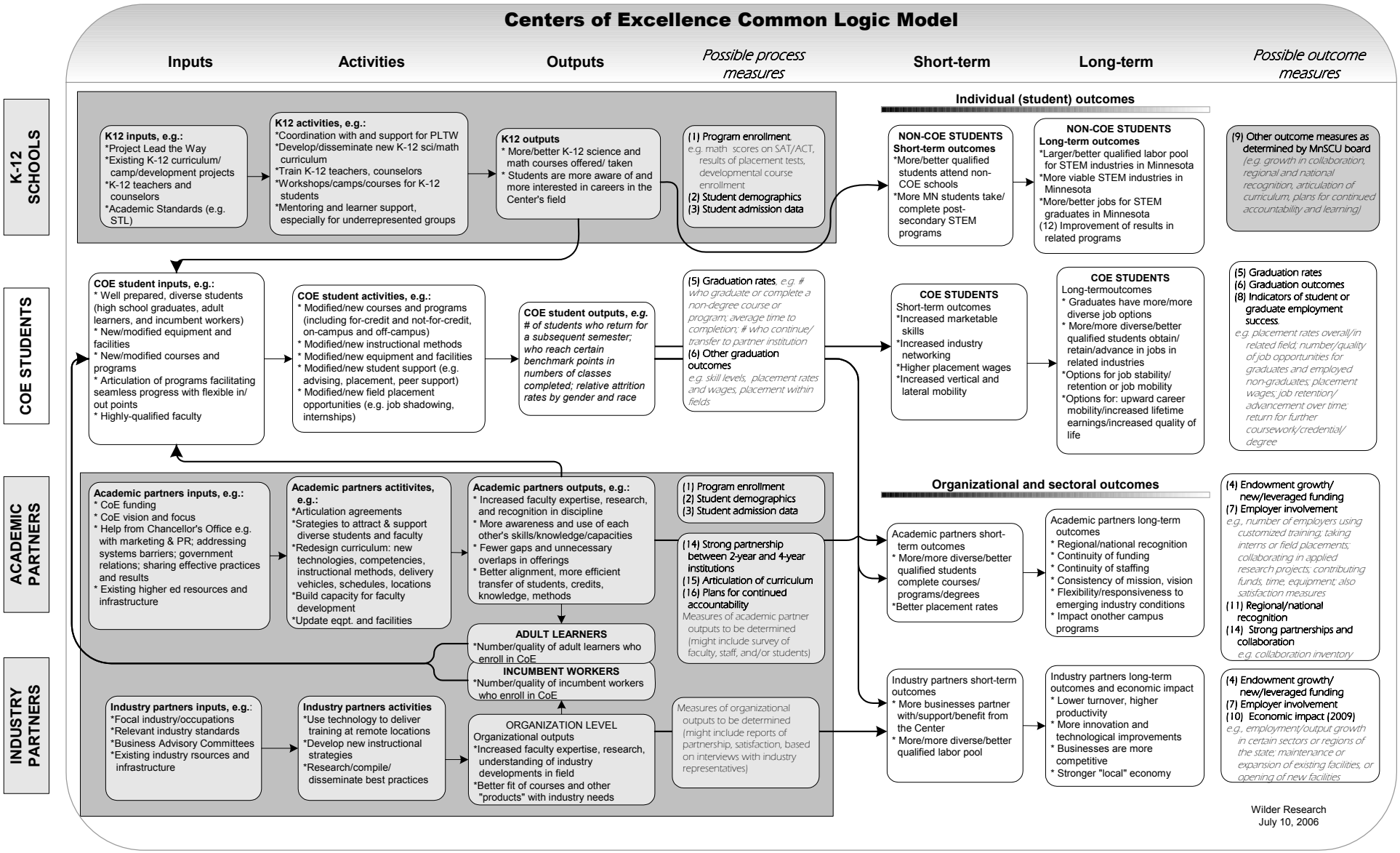
Wilder Research has worked closely with the Office of the Chancellor to identify the data maintained by the state colleges and universities and the Office of the Chancellor in the Integrated Statewide Record System (ISRS) that can be used to measure the effects of the Centers of Excellence. Based on the program lists prepared by Center Directors, the Office of the Chancellor developed three data sets for Wilder analysis. One was a set of records giving details about the programs that were identified by each of the Centers. The second was a set of records about every degree or other credential ("award") given during 2005-06 in Center-affiliated programs. The third was a set of records about every student who graduated (received one or more awards) from one or more of these Center-affiliated programs during 2005-06. The figures and tables in this report reflect Wilder Research's calculations based on these records.

The Office of the Chancellor, in consultation with Wilder Research, has examined possible ways to accurately identify students currently in Center-affiliated programs. Because ISRS codes for degrees do not always correlate well with ISRS codes for departments and concentrations, it was not possible to use the degree program list to identify current students. We have agreed to discuss the issue with Center representatives early in 2007 to develop methods that can be expected to reliably identify students most likely to be affected by Center activities.

The evaluation team

To carry out this evaluation, Wilder Research has assembled an evaluation team made up of experts in the diverse areas encompassed by the work of the Centers. The team is led by Greg Owen, a consulting scientist at Wilder with substantial experience directing multi-site, multi-method evaluations. The team also includes Ellen Shelton, a Wilder research scientist who served as principal author of the McKnight Foundation's study of workforce advancement opportunities (Families Forward) and provides the day to day management of this evaluation. The team also includes Wilder's chief economist, Paul Anton, who recently completed an analysis of the economic impact of the MnSCU system for the Office of the Chancellor; and Luke Weisberg, the former executive director of the Governor's Workforce Development Council. Each team member serves as a liaison to one of the Centers in order to insure continuity and consistency regarding study needs and ongoing reporting.

Logic model


Centers of Excellence Common Logic Model
Inputs
Activities
Outputs
Possible process measures
Short-term
Long-term
Possible outcome measures
K-12 SCHOOLS
COE STUDENTS
ACADEMIC PARTNERS
INDUSTRY PARTNERS
K12 inputs, e.g.:
*Project Lead the Way
*Existing K-12 curriculum/ camp/development projects
*K-12 teachers and counselors
*Academic Standards (e.g. STL)
K12 activities, e.g.:
*Coordination with and support for PLTW
*Develop/disseminate new K-12 sci/math curriculum
*Train K-12 teachers, counselors
*Workshops/camps/courses for K-12 students
*Mentoring and learner support, especially for underrepresented groups
K12 outputs
* More/better K-12 science and math courses offered/ taken
* Students are more aware of and more interested in careers in the Center's field
(1) Program enrollment
e.g. math scores on SAT/ACT, results of placement tests, developmental course enrollment
(2) Student demographics
(3) Student admission data
Individual (student) outcomes
NON-COE STUDENTS
Short-term outcomes
*More/better qualified students attend non-COE schools
*More MN students take/ complete post-secondary STEM programs
NON-COE STUDENTS
Long-term outcomes
*Larger/better qualified labor pool for STEM industries in Minnesota
*More viable STEM industries in Minnesota
*More/better jobs for STEM graduates in Minnesota
(12) Improvement of results in related programs
(9) Other outcome measures as determined by MnSCU board
(e.g. growth in collaboration, regional and national recognition, articulation of curriculum, plans for continued accountability and learning)
COE student inputs, e.g.:
* Well prepared, diverse students (high school graduates, adult learners, and incumbent workers)
* New/modified equipment and facilities
* New/modified courses and programs
* Articulation of programs facilitating seamless progress with flexible in/ out points
* Highly-qualified faculty
COE student activities, e.g.:
* Modified/new courses and programs (including for-credit and not-for-credit, on-campus and off-campus)
* Modified/new instructional methods
* Modified/new equipment and facilities
* Modified/new student support (e.g. advising, placement, peer support)
* Modified/new field placement opportunities (e.g. job shadowing, internships)
COE student outputs, e.g. # of students who return for a subsequent semester; who reach certain benchmark points in numbers of classes completed; relative attrition rates by gender and race
(5) Graduation rates. e.g. # who graduate or complete a non-degree course or program; average time to completion; # who continue/ transfer to partner institution
(6) Other graduation outcomes
e.g. skill levels, placement rates and wages, placement within fields
COE STUDENTS
Short-term outcomes
*Increased marketable skills
*Increased industry networking
*Higher placement wages
*Increased vertical and lateral mobility
COE STUDENTS
Long-termoutcomes
* Graduates have more/more diverse job options
* More/more diverse/better qualified students obtain/ retain/advance in jobs in related industries
*Options for job stability/ retention or job mobility
*Options for: upward career mobility/increased lifetime earnings/increased quality of life
(5) Graduation rates
(6) Graduation outcomes
(8) Indicators of student or graduate employment success.
e.g. placement rates overall/in related field; number/quality of job opportunities for graduates and employed non-graduates; placement wages; job retention/ advancement over time; return for further coursework/credential/ degree
Academic partners inputs, e.g.:
* CoE funding
* CoE vision and focus
* Help from Chancellor's Office e.g. with marketing & PR; addressing systems barriers; government relations; sharing effective practices and results
* Existing higher ed resources and infrastructure
Academic partners actitivites, e.g.:
*Articulation agreements
*Srategies to attract & support diverse students and faculty
*Redesign curriculum: new technologies, competencies, instructional methods, delivery vehicles, schedules, locations
*Build capacity for faculty development
*Update eqpt. and facilities
Academic partners outputs, e.g.:
* Increased faculty expertise, research, and recognition in discipline
* More awareness and use of each other's skills/knowledge/capacities
* Fewer gaps and unnecessary overlaps in offerings
* Better alignment, more efficient transfer of students, credits, knowledge, methods
(1) Program enrollment
(2) Student demographics
(3) Student admission data
(14) Strong partnership between 2-year and 4-year institutions
(15) Articulation of curriculum
(16) Plans for continued accountability
Measures of academic partner outputs to be determined (might include survey of faculty, staff, and/or students)
ADULT LEARNERS
*Number/quality of adult learners who enroll in CoE
INCUMBENT WORKERS
*Number/quality of incumbent workers who enroll in CoE
Organizational and sectoral outcomes
Academic partners short-term outcomes
* More/more diverse/better qualified students complete courses/ programs/degrees
*Better placement rates
Academic partners long-term outcomes
* Regional/national recognition
* Continuity of funding
* Continuity of staffing
* Consistency of mission, vision
* Flexibility/responsiveness to emerging industry conditions
* Impact onother campus programs
(4) Endowment growth/ new/leveraged funding
(7) Employer involvement
e.g., number of employers using customized training; taking interns or field placements; collaborating in applied research projects; contributing funds, time, equipment; also satisfaction measures
(11) Regional/national recognition
(14) Strong partnerships and collaboration
e.g. collaboration inventory
Industry partners inputs, e.g.:
*Focal industry/occupations
*Relevant industry standards
*Business Advisory Committees
*Existing industry rsources and infrastructure
Industry partners activities
*Use technology to deliver training at remote locations
*Develop new instructional strategies
*Research/compile/ disseminate best practices
ORGANIZATION LEVEL
Organizational outputs
*Increased faculty expertise, research, understanding of industry developments in field
*Better fit of courses and other "products" with industry needs
Measures of organizational outputs to be determined (might include reports of partnership, satisfaction, based on interviews with industry representatives)
Industry partners short-term outcomes
* More businesses partner with/support/benefit from the Center
* More/more diverse/better qualified labor pool
Industry partners long-term outcomes and economic impact
* Lower turnover, higher productivity
* More innovation and technological improvements
* Businesses are more competitive
* Stronger "local" economy
(4) Endowment growth/ new/leveraged funding
(7) Employer involvement
(10) Economic impact (2009)
e.g., employment/output growth in certain sectors or regions of the state; maintenance or expansion of existing facilities, or opening of new facilities
Wilder Research
July 10, 2006

Brief profiles of each Center of Excellence

The pages below highlight key features of each of the Centers of Excellence. The information on Center purpose, academic partners, and director is taken from published documents. The information on degrees and programs is from lists developed by each Center, with the help of the Office of the Chancellor, as part of the 2006 evaluation activities.

The information on each Center's distinctive features, plans to strengthen the K-12 pipeline, plans to strengthen industry partnerships, marketing and promotion activities, and examples of first-year accomplishments, are distilled from documents, site visits, meetings, and interviews in fall 2006 with 100 key Center stakeholders.

This information is for illustrative purposes, and is not intended to be a complete description of the Centers. It therefore omits many items that could be considered equally interesting and important. In selecting features to include, we have mainly attempted to draw attention to those that are distinctive about each of the Centers. However, some individual Center features may be obscured by the need to present information in a format that is consistent across all four. The fact that a feature or accomplishment is mentioned in connection with one Center but not with another should not be construed to mean that it is not also applicable to the other Center.

Center for Manufacturing and Applied Engineering (CMAE[1])

CMAE purpose

The Center for Manufacturing and Applied Engineering describes its purpose as follows:

> To create a comprehensive consortium for manufacturing that brings together education, industry, and economic development. This consortium will create a labor pool of talented and well-skilled students, develop innovative processes and enhance the ability of Minnesota manufacturers to be highly competitive in the global economy.

CMAE seeks to fulfill this purpose through the following goals:

1. Avoid duplication of program and create a seamless process that allows students to progress from credited certificate program through a four-year degree
2. Support the highest levels of technology in education and industry
3. Support, encourage, and facilitate engineering technologies in K-12 education

CMAE academic partners

Bemidji State University, Bemidji
Central Lakes College, Brainerd and Staples
Minneapolis Community And Technical College, Minneapolis
Northland Community and Technical College, Thief River Falls and East Grand Forks
Northwest Technical College, Bemidji
Pine Technical College, Pine City
Saint Paul College, Saint Paul
Saint Cloud Technical College, Saint Cloud

CMAE Director

Karen White, who was previously the Associate Director for Engineering Operations at North Dakota State University's Center for Nanoscale Science and Engineering.

[1] The Center for Manufacturing and Applied Engineering does not use the "CMAE" acronym. This abbreviation is used in this report, together with the common acronyms of the other Centers, for the purpose of clarity and consistency.

CMAE degrees and programs include:

	Certificate	Diploma	2-year degree	4-year degree	Graduate study
Engineering			✓		
Engineering Technologies/ Technicians	✓	✓	✓	✓	✓
Mechanic and Repair Technologies/Technicians		✓	✓		
Precision Production	✓	✓	✓		
Business Management, Marketing, and Related Support Services	✓	✓	✓		

CMAE Initial funding (actual allocation)

FY06: $1,459,900
FY07: $1,199,219
Total: $2,659,119

CMAE distinctive features

- CMAE operates in close collaboration with the Ingenuity Frontier, a collaborative project of Bemidji State University, Headwaters Regional Development Commission, The Minnesota Department of Employment and Economic Development, Northland College, and the Northwest Minnesota Foundation, working together in northwest Minnesota to increase the pool of skilled manufacturing workers, promote a culture of manufacturing and applied engineering innovation, and brand the region as a hub of MAE talent and innovation.

- CMAE and its industry partners have made strong efforts to secure scholarship funding to help qualified students attend programs associated with the Center. During 2005-06, almost $30,000 in funding for 14 scholarships had been donated, plus $60,000 in endowment to establish an ongoing scholarship fund.

- Discovery Academy which offers college courses in the high school (see below, K-12 pipeline).

- In common with MnCEME, CMAE offers significant support and encouragement for Project Lead The Way (PLTW) (see below).

Plans to strengthen the K-12 pipeline

- Project Lead the Way: a national middle and high school program intended to give students the knowledge they need to succeed in the high tech fields. PLTW includes the following programs:
    - Gateway to Technology (5-unit middle school program): designed to help all students explore math, science, and technology.
    - Pathway to Engineering (8-unit high school program): designed for students seeking an in-depth and hands-on knowledge of engineering and technology-based careers.
- Discovery Academy, operated by St. Cloud Technical College, provides an opportunity to take college courses in a high school setting. Courses, which include pre-engineering, welding, and automotive disciplines, are taught in cooperating high schools by St. Cloud Technical College instructors or specifically trained high school teachers.

Plans to strengthen industry partnerships

In addition to their industry advisory committee, CMAE is proceeding with the following:

- Ingenuity Frontier: work with business and foundation partners on the education and training needs of businesses and enhance the image of manufacturing in northwest Minnesota.
- Develop internships with and conduct applied research for industry.

Center marketing and promotion activities

- Statewide marketing and recruitment campaign to be executed in spring 2007.
- Website: http://coe.bemidjistate.edu/

Examples of some CMAE first-year accomplishments

- Planning has been completed for the programs of Engineering Technology and Applied Engineering, allowing students with a two-year degree to complete a four-year degree from Bemidji State University on-line while continuing to live and work in their home location. Both programs begin in fall 2007.
- Development of the 3D Holographic Projection "program of distinction" at Bemidji State University, placing BSU and the Center at the cutting edge of technology.

- Development of articulation agreements to facilitate the transfer of students from high school to college and from one college to another.
- Work to expand the availability of PLTW at many more high schools.
- Modernization of equipment and laboratories, including significant upgrades in automation, machining, and metal forming, plastics, electronics, and computer technology equipment in the Technological Studies Department at Bemidji State University.

Minnesota Center for Engineering and Manufacturing Excellence (MnCEME)

MnCEME purpose

The Minnesota Center for Engineering and Manufacturing Excellence states its mission as follows:

> The Center for Excellence builds cooperative relationships between higher education and industry to stimulate economic development through education, training and research.

MnCEME intends to fulfill this mission statement through the completion of the following seven goals:

1. Increase the pipeline flow with special efforts to recruit women and minorities.
2. Develop the skill sets needed to support the seven National Council for Advanced Manufacturing (NCAM) milestones.[2]
3. Develop a national reputation for innovative use of renewable and recyclable resources.
4. Aggressively support Minnesota industries to compete globally.
5. Provide customized training to industry partners to increase the use of advanced engineering processes.
6. Use best practices in engineering and manufacturing education.
7. Foster student-faculty-industry applied research projects to promote advanced technologies.

[2] The NCAM milestones, advanced technologies expected to significantly affect manufacturing in the next three to ten years, are: sensors; micro/nanofabrication; modeling and simulation; reconfigurable tools and systems; smart systems; solid free-form fabrication; and visualization, planning, and knowledge management.

MnCEME academic partners

Minnesota State University, Mankato
Alexandria Technical College, Alexandria
Anoka Technical College, Anoka
Hennepin Technical College, Brooklyn Park, Eden Prairie, and Plymouth
Normandale Community College, Bloomington
Hibbing Community College, Hibbing
Itasca Community College, Grand Rapids
Mesabi Range Community and Technical College, Virginia and Eveleth
Vermilion Community College, Ely
South Central College, Faribault and North Mankato

MnCEME Director

Tsuguhiko Takamura, who previously served as advisor and engineer in the research and development office for the SuSumu Company of Japan, parent company of Thin Film, North Mankato.

MnCEME core degrees and programs include:

	Certificate	Diploma	2-year degree	4-year degree	Graduate study
Engineering Technologies/ Technicians	✓	✓	✓	✓	✓
Computer and Information Science and Support Services			✓	✓	✓
Engineering			✓		✓
Precision Production	✓	✓	✓		
Mechanic and Repair Technologies/ Technicians		✓	✓		
Construction Trades	✓	✓			
Biological and Biomedical Sciences				✓	
Liberal Arts and Science, General Studies and Humanities			✓		

MnCEME Initial funding (actual allocation)

FY06: $1,482,200
FY07: $1,179,141
Total: $2,661,341

MnCEME distinctive features

- The Anoka STEP program, a technical high school on the college campus (see below, K-12 pipeline).
- Hiring a PLTW Coordinator to promote and support Project Lead the Way in more high schools, and training college faculty to train K-12 teachers to teach the curriculum.
- Hiring a MnCEME Curriculum Coordinator to work with academic partners on more seamless transitions among programs.
- Work under way to publish a *Journal of Applied Engineering and Manufacturing* for sharing research and best practices nationally and internationally.
- Hired a marketing director to help brand the Center and develop promotional and recruitment materials; organized and hosted a regional STEM Forum at Minnesota State University, Mankato for several hundred students (see below, K-12 pipeline).

Plans to strengthen the K-12 pipeline

- Organization and support for Project Lead the Way (PLTW): a national middle and high school program intended to give students the knowledge they need to succeed in the high tech fields. PLTW includes the following programs:
    - Gateway to Technology (5-unit middle school program): designed to help all students explore math, science, and technology.
    - Pathway to Engineering (8-unit high school program): designed for students seeking an in-depth and hands-on knowledge of engineering and technology-based careers.
- Anoka Technical College's STEP program: The Secondary Technical Education Program (STEP) is a high school in a college setting where students explore hands-on careers, fulfill district academic requirements, and have opportunities to earn both high school and college credit.

- Hosted a regional Science, Technology, Engineering, and Mathematics (STEM) Forum at Minnesota State University, Mankato to provide about 280 high school students with career awareness and tours of college facilities.

- Convened multiple meetings with academic and K-12 partners to discuss ways to facilitate granting of college credit for advanced technical work taken in high school.

Plans to strengthen industry partnerships

Along with their industry advisory committee, MnCEME is proceeding with the following:

- Formation of three sub-committees of the industry advisory committee: Pipeline, Customized Training, and Research and Development.

- Recruiting women engineers and establishing a support system for them.

- Industry participation in the development of a new Automation Program at Minnesota State University, Mankato.

- Working with industry to connect faculty in all the partner campuses with applied research projects.

Center marketing and promotion activities

- Convened a discussion of public relations staff at each of the academic partners; placement of an article about the Center in an industry trade journal.

- Work under way to publish a *Journal of Applied Engineering and Manufacturing*, a peer-reviewed professional trade journal for sharing research and best practices, including articles from leaders in manufacturing and engineering from around the world as well as faculty of the colleges associated with the Center.

- Website: http://mnceme.org/

Examples of some MnCEME first-year accomplishments

- Certification in advanced automation education received by Alexandria Technical College, one of only four colleges in the world.

- Marketing and public relations, including development by Hennepin Technical College of a traveling "road show" to introduce high school students to manufacturing and engineering technology.

- Increased enrollments at some partner schools, including Itasca Community College, which has seen a 100 percent increase in applications for engineering and is sharing its strategies with other academic partners.
- Modernization of equipment and laboratories, including purchase of a new "robotic arm" at Hennepin Technical College for students in automation and machine technology programs.
- Substantial emphasis on applied research activities. Grants for this have been received by faculty in transportation and renewable resources, among others.

Center for Strategic Information Technology and Security (CSITS)

CSITS purpose

The initial mission statement of the Center for Strategic Information Technology and Security is as follows:

> The Center's mission is to help individuals and organizations acquire the knowledge and skills needed to create and maintain competitive information and communication systems that are driven by sound business strategy and employ best practices in total security.

CSITS offers the following key "product lines" for the fulfillment of this mission:

1. Career and professional development opportunities for individuals
2. Expertise for organizations
3. Career awareness and readiness
4. Dissemination of expertise in Minnesota and beyond

CSITS academic partners

Metropolitan State University, Minneapolis and St. Paul
Inver Hills Community College, Inver Grove Heights
Minneapolis Community and Technical College, Minneapolis

CSITS Director

Bruce Lindberg had been serving as the interim director and previously was with Inver Hills Community College as the Executive Director of Business Partnerships and Outreach.

CSITS core degrees and programs include:

	Certificate	Diploma	2-year degree	4-year degree	Graduate study
Computer and Information Science and Support Services	✓	✓	✓	✓	✓
Engineering Technologies/ Technicians	✓		✓		

Initial funding (actual allocation):

FY06:	$ 860,633
FY07:	$1,045,235
Total:	$1,905,868

CSITS distinctive features

- Inclusion of a Faculty Council among the key decision-making groups for the Center. This group has engaged in enhancing course content and organizing a two-day academic planning session to coordinate course and program offerings among the academic partners.
- Development of the "Student Member" program. Student membership is intended to enhance student opportunity through improved access to Center-related programs, applied learning opportunities, and new academic programs and courses. Expected benefits to students include enhanced career development including personal career assessments; job, research, and internship opportunities, and opportunities to influence program development and refinement.
- Development of industry "membership" in the Center through "Enterprise Partner" program. (See below for description)

Plans to strengthen the K-12 pipeline

- Organized a summer math academy at Metropolitan State University for middle school girls from communities of color; Saint Paul Career Connections programs for Saint Paul secondary students; "Computer Geek U," a one-week workshop in which students take a computer apart and put it back together again, for which college credit is possible.
- Offer career awareness and readiness for K-12 and two-year college students through Cisco Networking and Information Technology Academies.
- CSITS is also working with industry to promote ongoing professional training among incumbent workers.

Plans to strengthen industry partnerships

- "Enterprise Partners": Minnesota businesses, government agencies, and nonprofit organizations join and take part in Center activities.
- Help business update their technology through faculty-student applied research projects and consultations.

- Sponsoring and conducting an inter-institutional feasibility study of open source (public domain) software commercialization, which is expected to help the Center establish its image in the community as a leader in supporting the new information technologies that are needed.

Center marketing and promotion activities

- Production of a brochure for industry audiences.
- Participation, as a sponsor or exhibitor, in industry conferences.
- Creation of a Center web site: http://www.StrategicIT.org

Examples of some CSITS first-year accomplishments

- Development of new cooperative, articulated programs and courses: including one new two-year degree program and one new bachelor's program (and seven new courses) to support the fast-growing need for Internet Protocol (IP) Telephony technicians and managers. Courses and programs began in September 2006 and a year-round schedule for 2007 is already established. The development of this program was significantly supported by a grant from the Minnesota Job Skills Partnership.
- Significant faculty involvement in Center activities and plans, including a formal Faculty Council, and sponsorship of faculty attendance at a number of conferences and symposia where they can benefit from professional development opportunities and make the Center more widely known.
- A two-year degree program in Computer Forensics, developed with support from the U.S. Bureau of Justice, was approved in September 2006 at MCTC and will articulate with the four-year Computer Forensics program at Metropolitan State University.
- Implementation of an Enterprise Partner program that offers businesses and other industry partners access to new employees (students in Center programs), customized training opportunities and other opportunities for continuing professional education, conferences on leading-edge topics, and student interns and faculty externs for special projects. By the end of June 2006, 39 partners had signed up.
- CSITS also has placed a significant focus on increasing opportunities for students. A career portal will be launched in February 2007 to manage job postings, internships, and other career development opportunities focused on the information technology (IT) industry.

Center for Integrated Health Science Education and Practice (CIHSEP)

CIHSEP purpose

The Center for Integrated Health Science Education and Practice states its mission and vision as follows:

> CIHSEP will integrate the expertise and resources of education, health care providers and community members so that:
>
> The Minnesota healthcare industry will have a well-trained, flexible and diverse workforce.
>
> Health sciences education and healthcare delivery will be transformed.
>
> Minnesota will be a global leader in healthcare education, practice, research, and innovation.

CIHSEP seeks to fulfill this mission through the following objectives:

1. Recruit and retain an expanded and more diverse student population.
2. Increase the number of well-prepared graduates and enhance the current workforce.
3. Develop practitioners who will deliver quality, coordinated, and competent care and define ways to assess the development of these qualities.
4. Engage in research to create continuously adaptive models of education and training shaped by emerging healthcare needs and technological advances.

CIHSEP academic partners

Winona State University, Winona
Minneapolis Community and Technical College, Minneapolis
Minnesota State College – Southeast Technical
Normandale Community College, Bloomington
Pine Technical College, Pine City
Ridgewater College, Willmar and Hutchinson
Riverland Community College, Albert Lea, Austin, and Owatonna
Rochester Community and Technical College, Rochester

CIHSEP Director

Susan Klaseus, previously the Vice President of Institutional Advancement and Community Relations at Augsburg College.

CIHSEP core degrees and programs include:

	Certificate	Diploma	2-year degree	4-year degree	Graduate study
Health Professional and Related Clinical Sciences	✓	✓	✓	✓	✓
Computer and Information Science: BioInformatics			✓	✓	
Biological and Biomedical Sciences			✓		

Initial funding (actual allocation):

FY06: $1,097,267
FY07: $1,476,405
Total: $2,573,672

CIHSEP distinctive features

- A competitive process for selecting Center investments in system change efforts, consistent with mission and vision, by calling for and funding proposals for specific research and implementation projects.
- An organizational structure that incorporates industry representatives into key governance groups as well as all working groups of the Center, including three study groups to help determine the Center's most useful role in meeting specific needs, and 15 Actualization Teams carrying out the implementation of funded projects.
- Extensive use of distance communication technology to facilitate communication and relationship-building. This includes meeting via videoconferencing, and developing an Internet portal for the purpose of sharing learnings and best practices among the many Center working groups, including Study Groups and Actualization Teams.
- An active Assessment Team developing a Center-level evaluation framework to include each of the funded projects.

Plans to strengthen the K-12 pipeline

Center efforts to recruit future practitioners include outreach to K-12 students and the organizations serving them, as well as outreach to low-wage incumbent workers to help them acquire skills to enter and move up in health care careers. Examples of activities sponsored to date include projects to:

- Provide a health careers awareness program to diverse young students in the Rochester Boys and Girls Club.
- Recruit diverse high school students enrolled in the Post Secondary Enrollment Option (PSEO) to participate in an accelerated pilot post-secondary nursing program.
- Offer community-based training to help unemployed and underemployed people from disadvantaged backgrounds to enter higher-skilled health care careers through a Pre-Certified Nursing Assistant program.
- Sponsor a K-12 Study Group to examine existing efforts to increase interest and preparation for health care careers, to help the Center prioritize its own efforts to add the most value.

Plans to strengthen industry partnerships

Industry partnership is incorporated into all aspects of the Center's operations, from the key governance groups to each of the implementation projects. Key activities in which industry is participating include:

- Development of an accredited Clinical Laboratory Science program.
- A study of best practices for integrating simulation into professional education.
- Development of a program to apply "lean" practices (often used in manufacturing) to increase the efficiency of health care delivery.
- Discussions of potential changes in health care policy.

Center marketing and promotion activities

- Creation of a Communications Team to develop a communications plan and key messages
- Creation of a Center web site: http://www.winona.edu/21stcentury/CIHSEP.html

Examples of some CIHSEP early accomplishments

- Winona State University is expanding clinical education sites through industry partnerships for its newly accredited clinical laboratory science program.

- Many strategies have been implemented to increase interest in health care and health science fields, including outreach to a Rochester Boys and Girls Club, a Postsecondary Education Options recruitment project, and making training available and accessible to low-wage incumbent workers to help them enter higher-skilled health careers.

- Industry participation in all governance bodies instead of separate business advisory committee.

- Development of a "white paper" detailing the most promising and strategic ways in which the Center can begin developing programs using simulation and gaming to deliver in-service professional development in the workplace.

- Development of a program to provide training through distance learning to diverse high school students and adults seeking to obtain certification as Emergency Medical Technicians (EMT) or Certified Nursing Assistants (CNA).

Detail tables

A1. Programs associated with each Center, and awards given in 2005-06 in those programs

	Programs		Awards	
	N	%	N	%
Overall				
Certificate	65	21%	1,181	39%
Diploma	71	23%	683	22%
2-year degree	94	31%	671	22%
4-year degree	43	14%	458	15%
Graduate work	33	11%	77	3%
Total	306	-	3,070	-
CMAE				
Certificate	14	17%	54	19%
Diploma	27	36%	126	44%
2-year degree	19	27%	33	12%
4-year degree	14	19%	71	25%
Graduate work	1	1%	1	<1%
Total	75	-	285	-
MnCEME				
Certificate	18	17%	49	10%
Diploma	31	29%	125	27%
2-year degree	42	40%	156	31%
4-year degree	7	7%	125	27%
Graduate work	8	8%	16	3%
Total	106	-	471	-
CSITS				
Certificate	14	34%	15	10%
Diploma	3	7%	5	3%
2-year degree	9	22%	20	14%
4-year degree	11	27%	83	57%
Graduate work	4	10%	24	16%
Total	41	-	147	-
CIHSEP				
Certificate	20	24%	1,065	49%
Diploma	10	12%	427	20%
2-year degree	23	27%	460	21%
4-year degree	11	13%	179	8%
Graduate work	20	24%	36	2%
Total	84	-	2,167	-

Source: *Programs identified by the Centers, data from the Office of the Chancellor; calculations by Wilder Research.*

The first four tables below present demographic characteristics of 2005-06 graduates (age, gender, race, and first-generation college student status), by associated Center and award type. The subsequent tables present the same demographic characteristic in greater detail for each of the four Centers, separately for each the partner academic institutions associated with the Center.

A2. Age of graduates, by associated Center and award level

		CMAE	MnCEME	CSITS	CIHSEP	Total
Total Graduates**	N*(*)*	279 *(.01)*	449 *(<.01)*	118 *(.11)*	2,014 *(.05)*	**2,860** *(.04)*
	Range	16-58	17-63	19-60	15-75	**15-75**
	Avg/Med	28/24	27/23	33/31	28/25	**28/25**
Certificates Awarded	N*(*)*	53 *(.02)*	48 *(.02)*	13 *(.13)*	978 *(.08)*	**1,092** *(.08)*
	Range	17-57	19-53	19-52	15-75	**15-75**
	Avg/Med	38/39	35/35	32/29	27/23	**28/25**
Diplomas Awarded	N*(*)*	124 *(.02)*	125 *(0)*	5 *(0)*	426 *(<.01)*	**680** *(<.01)*
	Range	16-58	18-56	19-36	19-62	**16-62**
	Avg/Med	24/21	26/21	26/27	30/26	**28/25**
2-year Degrees Awarded	N*(*)*	33 *(0)*	156 *(0)*	19 *(.05)*	457 *(.01)*	**665** *(.01)*
	Range	18-38	17-63	19-52	19-63	**17-63**
	Avg/Med	24/23	28/23	33/29	31/29	**30/27**
4-year Degrees Awarded	N*(*)*	70 *(.01)*	124 *(.01)*	74 *(.11)*	175 *(.02)*	**443** *(.03)*
	Range	21-58	21-50	20-60	20-63	**20-63**
	Avg/Med	30/28	25/23	33/32	25/22	**27/23**
Graduate Degrees Awarded	N*(*)*	1 *(0)*	16 *(0)*	20 *(.17)*	31 *(.14)*	**68** *(.12)*
	Range	-	22-57	27-47	25-59	**22-59**
	Avg/Med	-	28/25	35/32	38/34	**35/30**

Source: *Programs identified by the Centers, data from the Office of the Chancellor; calculations by Wilder Research.*

Notes: ** The numbers in italic parentheses after the N indicate the percent (shown as a decimal) of missing data for each domain (e.g., in the Total column in the top row, age is known for 2,860 graduates, which is 96 percent of the total graduates; it is not known for the other 4 percent). The ranges, averages, and medians shown are for those whose age is known. The median is the age at which half are younger and half are older.*

*** The total number of awards may exceed the number of graduates because one graduate may receive more than one award.*

A3. Gender of graduates, by associated Center and award level

		CMAE	MnCEME	CSITS	CIHSEP	Total
Total Graduates**	N *(*)*	281 *(.01)*	448 *(.01)*	105 *(.21)*	2,107 *(<.01)*	**2,941** *(.01)*
	% Male	83%	88%	71%	15%	**34%**
	% Female	17%	12%	29%	85%	**66%**
Certificates Awarded	N *(*)*	54 *(0)*	49 *(0)*	13 *(.13)*	1,062 *(.04)*	**1,178** *(<.01)*
	% Male	37%	92%	77%	15%	**20%**
	% Female	63%	8%	23%	85%	**80%**
Diplomas Awarded	N *(*)*	126 *(0)*	124 *(.01)*	5 *(0)*	427 *(0)*	**682** *(<.01)*
	% Male	97%	91%	60%	10%	**41%**
	% Female	3%	9%	40%	90%	**59%**
2-year Degrees Awarded	N *(*)*	33 *(0)*	154 *(.01)*	19 *(.05)*	458 *(<.01)*	**664** *(.01)*
	% Male	91%	82%	74%	15%	**36%**
	% Female	9%	18%	26%	85%	**64%**
4-year Degrees Awarded	N *(*)*	69 *(.03)*	125 *(0)*	63 *(.24)*	177 *(.01)*	**434** *(.05)*
	% Male	87%	91%	70%	29%	**62%**
	% Female	13%	9%	30%	71%	**38%**
Graduate Degrees Awarded	N *(*)*	- *(1)*	16 *(0)*	18 *(.25)*	36 *(0)*	**70** *(.09)*
	% Male	-	88%	72%	6%	**42%**
	% Female	-	13%	28%	94%	**57%**

Source: *Programs identified by the Centers, data from the Office of the Chancellor; calculations by Wilder Research.*

Note: ** The numbers in italic parentheses after the N indicate the percent (shown as a decimal) of missing data for each domain (e.g., in the Total column in the top row, gender is known for 2,941 graduates, which is 99 percent of the total graduates; it is not known for the other 1 percent).*

*** The total number of awards may exceed the number of graduates because one graduate may receive more than one award.*

A4. Race, ethnicity, and nationality of graduates, by associated Center and award level

		CMAE	MnCEME	CSITS	CIHSEP	Total
Total Graduates**	N *(*)*	275 *(.03)*	400 *(.11)*	87 *(.35)*	1,923 *(.09)*	**2,685** *(.10)*
	% Member of racial or ethnic minority or foreign national	17%	21%	51%	25%	**24%**
	% U.S. White	83%	79%	49%	75%	**76%**
Certificates Awarded	N *(*)*	54 *(0)*	46 *(.06)*	11 *(.27)*	948 *(.11)*	**1,059** *(.10)*
	% Member of racial or ethnic minority or foreign national	7%	26%	55%	34%	**32%**
	% U.S. White	93%	74%	45%	66%	**68%**
Diplomas Awarded	N *(*)*	123 *(.02)*	121 *(.03)*	4 *(.20)*	411 *(.04)*	**659** *(.04)*
	% Member of racial or ethnic minority or foreign national	5%	8%	100%	14%	**12%**
	% U.S. White	95%	92%	0%	86%	**88%**
2-year Degrees Awarded	N *(*)*	33 *(0)*	151 *(.03)*	17 *(.15)*	438 *(.05)*	**639** *(.04)*
	% Member of racial or ethnic minority or foreign national	21%	14%	47%	19%	**19%**
	% U.S. White	79%	86%	53%	81%	**81%**
4-year Degrees Awarded	N *(*)*	66 *(.07)*	87 *(.30)*	51 *(.39)*	145 *(.19)*	**349** *(.24)*
	% Member of racial or ethnic minority or foreign national	46%	39%	45%	10%	**29%**
	% U.S. White	55%	61%	55%	90%	**71%**
Graduate Degrees Awarded	N *(*)*	*(1)*	14 *(.13)*	14 *(.42)*	34 *(.06)*	**62** *(.19)*
	% Member of racial or ethnic minority or foreign national	-	71%	71%	6%	**100%**
	% U.S. White	-	29%	29%	94%	**65%**

Source: *Programs identified by the Centers, data from the Office of the Chancellor; calculations by Wilder Research.*

Notes: ** The numbers in italic parentheses after the N indicate the percent (shown as a decimal) of missing data for each domain (e.g., in the Total column in the top row, race is known for 2,685 graduates, which is 90 percent of the total graduates; it is not known for the other 10 percent).*

*** The total number of awards may exceed the number of graduates because one graduate may receive more than one award.*

A5. First-generation college student status** of graduates, by associated Center and award level

		CMAE	MnCEME	CSITS	CIHSEP	Total
Total Graduates* **	N *(*)*	185 *(.35)*	354 *(.22)*	79 *(.41)*	1,678 *(.21)*	**2,296** *(.23)*
	% 1st gen**	31%	30%	46%	41%	**39%**
Certificates Awarded	N *(*)*	119 *(.65)*	37 *(.24)*	11 *(.27)*	799 *(.25)*	**866** *(.27)*
	% 1st gen**	42%	46%	27%	39%	**40%**
Diplomas Awarded	N *(*)*	111 *(.13)*	107 *(.14)*	5 *(0)*	412 *(.04)*	**635** *(.07)*
	% 1st gen**	33%	31%	40%	47%	**42%**
2-year Degrees	N *(*)*	31 *(.06)*	125 *(.20)*	17 *(.15)*	380 *(.17)*	**553** *(.17)*
	% 1st gen**	36%	30%	35%	45%	**41%**
4-year Degrees	N *(*)*	24 *(.66)*	91 *(.27)*	45 *(.46)*	130 *(.27)*	**290** *(.37)*
	% 1st gen**	13%	29%	47%	28%	**30%**
Graduate Degrees	N *(*)*	*(1)*	11 *(.31)*	12 *(.50)*	9 *(.75)*	**32** *(.58)*
	% 1st gen**	-	9%	58%	33%	**33%**

Source: *Programs identified by the Centers, data from the Office of the Chancellor; calculations by Wilder Research.*

Notes: ** The numbers in italic parentheses after the N indicate the percent (shown as a decimal) of missing data for each domain (e.g., in the Total column in the top row, first-generation college student status is known for 2,296 graduates, which is 77 percent of the total graduates; it is not known for the other 23 percent).*

** *"First-generation college students" are defined in Minnesota statute as students who do not have any parent who attended college.*

*** *The total number of awards may exceed the number of graduates because one graduate may receive more than one award.*

A6. Graduates, awards, and ages of graduates, by associated Center and institution

	Grads	Awards	Age of Graduates N (*)	Range	Mean	Median
CMAE	283	285	279 *(.01)*	16-58	28	24
Bemidji State University	25%	25%	71 *(.01)*	21-58	30	28
Pine Tech. College	**					
Saint Paul College	15%	15%	41 *(.02)*	17-53	26	23
Saint Cloud Tech. College	20%	20%	57 *(0)*	16-58	25	22
Central Lakes College	14%	14%	40 *(0)*	18-48	23	21
Minneapolis Com./Tech.	**					
Northland Com./Tech.	23%	23%	64 *(.02)*	18-57	34	35
MnCEME	451	471	449 *(<.01)*	17-63	27	23
MSU, Mankato	31%	30%	140 *(.01)*	21-57	25	23
Itasca Com. College	8%	7%	35 *(0)*	18-38	20	20
Normandale Com. College	5%	5%	23 *(0)*	17-48	25	23
Anoka Tech. College	5%	5%	21 *(0)*	19-60	32	30
Alexandria Tech. College	12%	12%	56 *(0)*	17-47	21	20
Hennepin Tech. College	24%	27%	109 *(.01)*	19-63	35	34
South Central College	4%	3%	16 *(0)*	18-44	25	22
Hibbing Com. College	3%	3%	13 *(0)*	19-25	21	20
Mesabi Range Com./Tech	8%	8%	36 *(0)*	18-42	25	24
CSITS	133	147	118 *(.11)*	20-60	33	31
Metro State University	80%	73%	93 *(.12)*	23-43	34	32
Inver Hills Com. College	3%	3%	4 *(0)*	19-52	34	35
Minneapolis Com./Tech.	17%	25%	21 *(.09)*	19-60	30	27
CIHSEP	2,114	2,167	2,014 *(.05)*	15-75	28	25
Winona State University	10%	10%	206 *(.04)*	20-63	27	23
Normandale Com. College	14%	13%	283 *(.03)*	16-63	28	26
Pine Tech. College	4%	5%	73 *(0)*	19-53	32	32
MN State College–SE Tech.	8%	8%	175 *(0)*	19-62	30	27
Minneapolis Com./Tech.	34%	34%	681 *(.06)*	16-75	30	26
Rochester Com./Tech.	8%	8%	177 *(.01)*	19-55	28	25
Ridgewater College	22%	21%	419 *(.08)*	15-59	25	21

Source: *Programs identified by the Centers, data from the Office of the Chancellor; calculations by Wilder Research.*

Note: ** The numbers in italic parentheses after the N indicate the percent (shown as a decimal) of missing data for each domain.*

*** Data suppressed to maintain confidentiality.*

A7. Gender, race, and first-generation student status of graduates, by associated Center and institution

	Gender		Member of racial or ethnic minority or foreign national		First-generation college student status**	
	N *(*)*	% Female	N *(*)*	%	N *(*)*	% 1st Generation
CMAE	281 *(.01)*	17%	275 *(.03)*	17%	185 *(.35)*	31%
Bemidji State University	70 *(.03)*	13%	67 *(.07)*	45%	25 *(.65)*	12%
Pine Tech. College	***					
Saint Paul College	42 *(0)*	5%	41 *(.02)*	29%	35 *(.17)*	29%
Saint Cloud Tech. College	57 *(0)*	2%	55 *(.04)*	2%	48 *(.16)*	40%
Central Lakes College	40 *(0)*	8%	40 *(0)*	5%	39 *(.03)*	36%
Minneapolis Com./Tech.	***					
Northland Com./Tech.	65 *(0)*	52%	65 *(0)*	2%	32 *(.51)*	28%
MnCEME	448 *(.01)*	12%	400 *(.11)*	21%	354 *(.22)*	30%
MSU Mankato	141 *(0)*	9%	101 *(.28)*	44%	102 *(.28)*	27%
Itasca Com. College	33 *(.06)*	30%	33 *(.06)*	0%	34 *(.03)*	12%
Normandale Com. College	23 *(0)*	35%	22 *(.04)*	36%	14 *(.39)*	25%
Anoka Tech. College	21 *(0)*	10%	21 *(0)*	5%	19 *(.10)*	32%
Alexandria Tech. College	56 *(0)*	0%	53 *(.05)*	2%	49 *(.13)*	22%
Hennepin Tech. College	110 *(0)*	10%	107 *(.03)*	26%	79 *(.28)*	47%
South Central College	16 *(0)*	6%	15 *(.06)*	0%	15 *(.06)*	20%
Hibbing Com. College	13 *(0)*	0%	12 *(.08)*	0%	11 *(.15)*	36%
Mesabi Range Com./Tech	35 *(.03)*	29%	36 *(0)*	6%	31 *(.14)*	32%
CSITS	105 *(.21)*	29%	87 *(.35)*	51%	79 *(.41)*	46%
Metro State University	80 *(.25)*	30%	64 *(.40)*	50%	57 *(.46)*	49%
Inver Hills Com. College	4 *(0)*	25%	4 *(0)*	0%	4 *(0)*	50%
Minneapolis Com./Tech.	21 *(.09)*	24%	19 *(.17)*	63%	18 *(.22)*	33%
CIHSEP	2,107 *(<.01)*	85%	1,923 *(.09)*	25	1,678 *(.21)*	41%
Winona State University	213 *(.01)*	75%	179 *(.17)*	9%	139 *(.35)*	28%
Normandale Com. College	291 *(0)*	88%	266 *(.09)*	19%	194 *(.33)*	40%
Pine Tech. College	73 *(0)*	93%	72 *(.01)*	4%	67 *(.08)*	45%
MN State College – SE Tech.	175 *(0)*	91%	175 *(0)*	7%	169 *(.03)*	46%
Minneapolis Com./Tech.	721 *(.01)*	79%	688 *(.05)*	50%	684 *(.06)*	45%
Rochester Com./Tech.	178 *(0)*	85%	164 *(.08)*	11%	150 *(.16)*	37%
Ridgewater College	456 *(0)*	93%	379 *(.17)*	8%	275 *(.40)*	38%

Source: *Programs identified by the Centers, data from the Office of the Chancellor; calculations by Wilder Research.*

Notes: ** The numbers in italic parentheses after the N indicate the percent (shown as a decimal) of missing data for each domain.*

***" First-generation college students" are defined in Minnesota statute as students who do not have any parent who attended college.*

**** Data suppressed to maintain confidentiality.*

Centers of Excellence legislation

[136F.31] [CENTERS OF EXCELLENCE.]
Subdivision 1. [BOARD DESIGNATION.] The board must designate at least three and up to eight different program Centers of Excellence. The board must determine the form and required information contained in applications from member institutions.

Subd. 2. [CENTER SELECTION CRITERIA.] The board must select programs based on institutional proposals demonstrating:
(1) the capacity to build multistate regional or national recognition of the program within five years;
(2) a commitment to expanding the influence of the center to improve results in related programs in participating institutions;
(3) the capacity to improve employment placement and income expectations of graduates from the program;
(4) a strong partnership between a four-year and at least one two-year institution that maximizes the leverage of academic and training capacities in each institution;
(5) a comprehensive academic plan that includes a seamless continuum of academic offerings in the program area that supports career development at multiple levels in related employment fields;
(6) a specific development plan that includes a description of how the institution will pursue continuous improvement and accountability;
(7) identified commitments from employers that include measurable financial and programmatic commitment to the Center of Excellence on the part of employers who will benefit from the development of the center. A center for teacher education must demonstrate support from local school districts;
(8) a commitment from the institution that the new designated funding will not supplant current budgets from related programs;
(9) a strong existing program upon which the proposed center will build; and
(10) a separate fund for donations dedicated for the program within current institutional foundations.
The board may adopt additional criteria that promote general goals of the centers. The board shall give priority to programs that integrate the academic and training outcomes of the center with business clusters that have a significant multiplier effect on the state's economy based on projections of job, income, or general economic growth. The board shall consult with the Department of Employment and Economic Development to identify these clusters and the potential economic impact of developing a center for excellence.

Subd. 3. [ADVISORY COMMITTEE AND REPORTS REQUIRED.] A Center of Excellence must create an advisory committee representing local, statewide, and national leaders in the field. By January 15 of each odd-numbered year, each designated center must provide a report to the governor and the chairs of committees of the legislature with jurisdiction over higher education finance, that includes annual and integrated data on program enrollment, student demographics, student admission data, endowment growth, graduation rates, graduation outcomes, employer involvement, indicators of student or graduate employment success, and other outcomes as determined by the board. After a center has been in existence for three years, the report must include measures of the program's impact on the local economy.