Growing Your Own

Engaging Academia, Industry and Business in Curriculum and Program Development as a Pathway to Developing a Skilled Technology Workforce.

A White Paper on the Planning and Developing of an Innovative *Design Technology Program* For the Community College Student

Iowa Western
caring   commitment   challenge

Growing Your Own:
Engaging Academia, Industry and Business in Curriculum and Program Development as a Pathway to Developing a Skilled Technology Workforce.

Cover Page Left Photo: Grand Opening
Iowa Governor, Terry Branstad at the Grand Opening

Cover Page Middle Photo: Ribbon Cutting Event
Bill Boswell (Siemens PLM Software, Senior Director, Global Partner Marketing), Joseph Vanstrom (IWCC, Design Technology Instructor and Program Chair), Ann Pross (IWCC Cass County Center Director), Dr. Dan Kinney (Iowa Western Community College President), Randy Pash (IWCC Trustee Board President), Dale Wolf (Rockwell Collins), Kathy Somers (Atlantic City Council)

Cover Page Right Photo: Grant Opening
Jay Miller (Project innovator/Advisory Board member), Dr. Dan Kinney (Iowa Western Community College President), Bill Boswell (Senior Director, Global Partner Marketing, Siemens PLM Software)

Image 2 - Page 8 Photo
Tony Pross (student) and Bill Boswell (Siemens) in discussion at the Design Technology Program Grand Opening

Abstract/Executive Summary

Science, Technology, Engineering, and Mathematics (STEM) fields have become increasingly central to U.S. economic competitiveness and growth. Producing enough qualified technology professionals is critical to America's ability to remain a leader in innovation, and retain the intellectual capital that will enable industry to meet forecasted local, regional and global workforce needs.

Manufacturing, architectural, and civil/infrastructure industries require employees who have been trained in the latest techniques and technologies. The emerging need for technicians who are knowledgeable in Product Lifecycle Management (PLM) and skilled in design technology is due to the exponential global expansion of technology throughout various industries – from design and production, to inventory management and delivery.
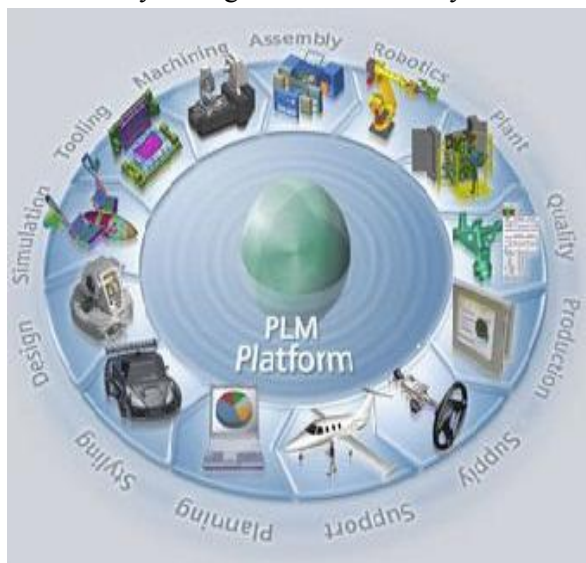
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New collaborations among industry, business and post-secondary institutions are essential to developing programs that will prepare a highly skilled workforce that is responsive to technological change and ever-increasing global competition. These partnerships have the potential to creatively leverage technical knowledge, workforce skills, pedagogy, business acumen, labor markets, students and employers to meet current and growing needs. Involving industry and community partners in the development and implementation of community college education programs offers a new and better way to prepare traditional and nontraditional students for high-wage, high skill employment.

Developing curriculum that incorporates skill training and job-related theory which is linked to industry and company standards offers an opportunity to engage industry with academia, and provides an avenue for industry to "grow your own" workforce. This approach to cultivating highly trained employees creates better skilled workers for industry.

This white paper details one such venture, involving Iowa Western Community College (IWCC), Siemens PLM Software, and multiple community partners. The goal of this endeavor has been to develop an advanced level, ground-breaking software and technology program that will fill immediate and emerging identified gaps for employees who are skilled in PLM. Outlined within are the crucial roles of education, industry and community-based partnerships and processes that resulted in development of this unique *Design Technology Program* associate degree.

This first-of-its-kind program brings together industry and academia to define program requirements that meet marketplace needs. This white paper communicates strategies that:

- *Respond to forecasted needs for a proficient advanced technology workforce;*
- *Incorporate cutting-edge 21st century skills to prepare a skilled workforce;*
- *"Grows your own" technology graduates to enter the workforce or transfer to universities for continued higher education and advanced degrees;*
- *Engages industry, business and academia in developing state-of-the-art evidence-based training and interactive student learning experiences;*
- *Facilitates valuable industry and academia collaborations to define program requirements and curriculum design that meets marketplace needs;*
- *Provides critically valuable education which will result in solid, well-paying, high demand technology jobs;*
- *Leverages collaborative resources into valuable training linked to jobs.*

Introduction: The Impetus for this Report

STEM jobs are forecasted to grow at twice the rate of the economy as a whole between now and 2018 (*STEM Jobs, Education, and the Economy Through 2018*, Georgetown University Center on Education and Workforce, 2010). The seminal National Academy of Sciences study, *Rising Above the Gathering Storm* (2006), argues that, absent a serious and rapid response, the U.S. will lose quality jobs to other nations, lowering our standard of living, reducing tax revenues, and weakening the domestic market for goods and services.

Today's high-tech jobs require highly trained technical personnel, including those with advanced knowledge and PLM skills. International Data Corporation expects the PLM market to grow steadily as the demand for PLM applications increases in emerging markets (*Worldwide Product Life-Cycle Management 2009-2013 Forecast*, 2009). Driven primarily by increased corporate focus on collaborative product development/innovation, quick and short manufacturing cycles to attain high productivity, cost reduction, improvements in time to market, and robust demand from Asia-Pacific, a forecast of $44.2 billion is anticipated by 2017 *(ibid)*.

According to Global Industry Analysts (2010), North America is the largest regional market for PLM. The *2011 IT Skills and Salary Report, A Comprehensive Survey* further states that almost one-third (32 percent) of international survey respondents indicated that virtualization was on the radar to be added to their place of business for 2011 - up from 2010's 25 percent (Global Knowledge and TechRepublic, 2011)

Against this backdrop, Product Lifecycle Management, which helps the entire supply network to optimally manage product lifecycle with reduced time, ease, and cost effectiveness, is expected to continue to grow.

Yet numerous companies report that within 10 years, half of their workforce will be retirement eligible (*Aerospace Industry Response to the Workforce Challenge*, 2010). The retirement of skilled baby boomers within 5 to 15 years will create a workforce shortage of an estimated 10 million new workers by 2020 (*America's Most Wanted: Skilled Workers*, G. Shankel, Fabricators & Manufacturers Association, International, 2010). These statistics are supported by The Manufacturing Institute, Deloitte and Oracle, which cites that among companies involved in skilled production, 51 percent report shortages and anticipate increased shortages ahead (October 2009). Additional reports indicate that retirements are starting to sap companies of their most experienced workers, and confirm the need to mitigate this baby boomer exodus:

Retirement Related Shortages
• An estimated 2.7 million U.S. manufacturing employees, nearly a fourth of the total, are 55 or older. [1]
• 40% of Boeing workers, and nearly half of Rockwell Collins' workers will be eligible for retirement by 2016. [2]
• 45% of companies are encouraging older workers to delay their retirements as they face the prospect of losing skilled staff. [2]
• 53% of manufacturing companies indicate that 10% of their total positions remain unfilled due to a lack of qualified candidates. [3]
• The U.S. education system isn't turning out enough people with the math and science skills needed to operate and repair sophisticated computer-controlled factory equipment. [4]
1. Allbusiness.com http://www.allbusiness.com/economy-economic-indicators/economic-indicators/10527695-1.html#.ToR_fqPUFn0.email
2. H. Wietzman, February 2010, *US Manufacturers Face Skills Shortages*, The Financial Times.
3. 2005 Skills Gap Report, by Deloitte Consulting for the National Association of Manufacturers – the Manufacturing Institute.
4. Online Wallstreet Journal, 5/2011. http://online.wsj.com/article/SB10001424052748703643104576291360540691764.html

The STEM workforce pipeline challenge is not just about the supply and quality of baccalaureate and advanced degree earners. A large percentage of the workforce in industries and occupations that rely on STEM knowledge and skills are technicians and others who enter and advance in their field through sub-baccalaureate degrees and certificates or through workplace training (*The STEM Workforce Challenge*, Department of Labor, 2007). To prepare more Americans to be sufficiently skilled for STEM-related jobs will require attention to segments of the workforce that are often overlooked: incumbent workers who need skill upgrading, dislocated workers looking for new jobs in industries with a future, and traditionally

underrepresented groups like women, minorities and veterans.

A Success Roadmap – New Approaches for Developing Innovative Academic Programs

The IWCC *Design Technology Program* addresses industry needs to increase the supply and quality of "knowledge workers" whose specialized skills enable them to work productively within the STEM industries and occupations. Responding to this STEM challenge required a concerted and multi-faceted approach. Much greater collaboration was called for from key business, industry and government institutions whose policies and practices shaped the development of the curriculum and program.
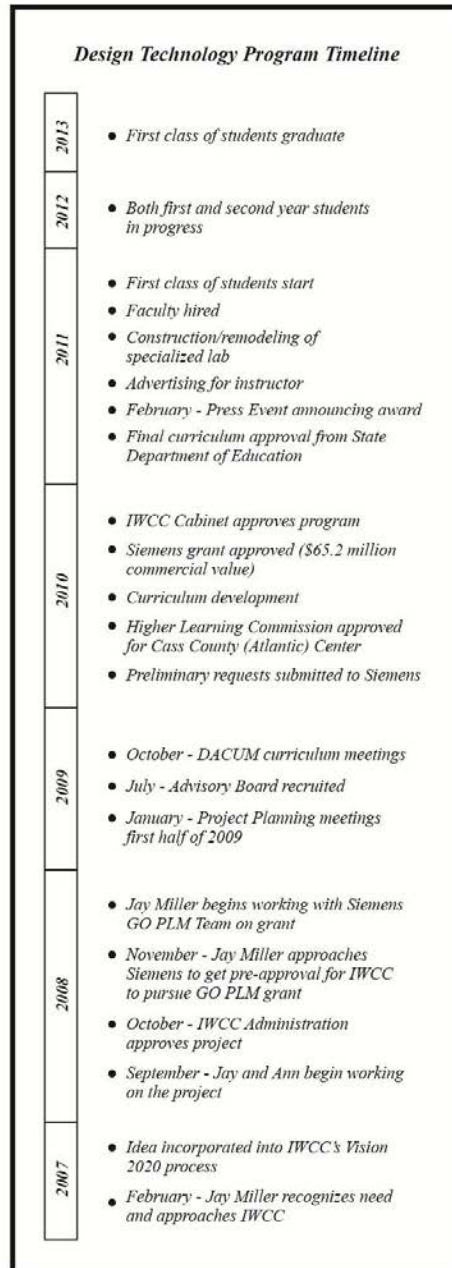
To dispel the assumption that Iowa's best and brightest must leave their roots in order to benefit from cutting edge education and well-paying, high demand employment, a visionary plan was created that would offer students an advanced level, ground-breaking software and technology associate degree. Spearheaded by Jay Miller, a local business leader and private contractor, and in partnership with Siemens and other industry, business and academic partners, IWCC lead the curriculum development and implementation of an innovative *Design Technology Program.*

IWCC, one of the fastest growing community colleges in the nation, is a multi-campus entity serving a predominantly rural population of 169,063 within its 4,309 square-mile, seven-county service area in southwest Iowa. The current economic situation is stretching the college's capacity to provide key class and lab experiences as more students enroll in its two-year degree and transfer programs. Like most community colleges, IWCC is experiencing financial shortfalls in the dedicated education dollars from state and federal sources.

With 80 percent of IWCC's student population eligible for financial aid in 2010-2011, it is critical that updates and enhancements are addressed in ways that ensure a high quality education is financially accessible. To maintain an affordable education, current tuition is held to a modest $126 per credit hour. To provide students with necessary educational opportunities that are directly linked to well-paying jobs, it is vital that IWCC locate financial and in-kind support from community partners.

Academic, community and industry partnerships were galvanized, including IWCC and Siemens Corporation. Industry workforce needs encompassing Southwest Iowa and the Omaha, Nebraska/Council Bluffs, Iowa metropolitan region, as well as national demands, were researched. An Advisory Board that engaged local, regional and national leaders from academic and industry fields was formed to lead this development of a new model of workforce training. Key activities that occurred during this project's four-year collaborative process are highlighted below:

Design Technology Program Timeline

2013
- First class of students graduate

2012
- Both first and second year students in progress

2011
- First class of students start
- Faculty hired
- Construction/remodeling of specialized lab
- Advertising for instructor
- February - Press Event announcing award
- Final curriculum approval from State Department of Education

2010
- IWCC Cabinet approves program
- Siemens grant approved ($65.2 million commercial value)
- Curriculum development
- Higher Learning Commission approved for Cass County (Atlantic) Center
- Preliminary requests submitted to Siemens

2009
- October - DACUM curriculum meetings
- July - Advisory Board recruited
- January - Project Planning meetings first half of 2009

2008
- Jay Miller begins working with Siemens GO PLM Team on grant
- November - Jay Miller approaches Siemens to get pre-approval for IWCC to pursue GO PLM grant
- October - IWCC Administration approves project
- September - Jay and Ann begin working on the project

2007
- Idea incorporated into IWCC's Vision 2020 process
- February - Jay Miller recognizes need and approaches IWCC

Community college partnerships with the private sector have grown in significance due to state budget shortfalls, evolving labor requirements, the need to provide cutting-edge curriculum, and a desire to respond to local educational needs. Evolving labor requirements, particularly in high tech and rural areas, have influenced the creation of community college relationships with local business and industry (Information Technology Association of America, 2002). Private sector partnerships enabled IWCC to create academic and technical training that is responsive to high tech labor needs.

To complement higher education strategies, the primary components of this *Design Technology Program* educational model offers:

- A curriculum that prepares students with high demand skills and competencies;
- A pipeline for technology-related academic and career ladders;
- Innovative training partnerships responsive to community, business, academic and labor needs;
- A seamless academic delivery system with an uninterrupted route through college;
- Skill training and preparation designed to meet workforce needs;
- A basic and adaptable technology core of courses to build job specific knowledge, skills and training;
- A facility featuring a task specific technology lab and classroom;
- A curriculum that prepares students with high demand skills and competencies;
- University articulation agreements that ensure effective 2 + 2 transfers for baccalaureate degrees and beyond;
- Sustainable collaborations that identify and meet community and industry needs;
- Accessibility to rural communities as a response to "Rural Brain Drain";
- Increased enrollment diversity for universities and businesses recruiting from community colleges;
- Accessibility for under-represented populations (i.e. women, minorities and non-traditional students);
- Strong community college leadership to maintain project focus, bring partners together, broaden relationships, sustain commitment, and garner support of industry, business and government;
- Data collection and facilitation of communication regarding progress;
- Marketing strategies and activities;
- Relationships that support allocating resources – money, people and facilities;
- Involvement, ownership and project momentum assured by the community college president and administration.

Capitalizing on the power of these partnerships helped IWCC and its partners create a demand-driven approach to workforce development which focuses academic system on giving next generation workers useable skills, knowledge, and information that are most needed by employers, particularly in high-growth occupations with career potential. Collaboration has enabled IWCC to bring together resources devoted to employment, education, and economic development, and use them strategically to create opportunities for students.

Siemens PLM Software, Inc. (Siemens), a business unit of the Siemens Industry Automation Division and a leading global provider of product lifecycle management (PLM) software and services, has been a critical industry partner in the development of the Design Technology curriculum and program. A global powerhouse in electronics and electrical engineering operating in the industry, energy and healthcare sectors, Siemens is a pioneer in energy efficiency, industrial productivity, affordable and personalized healthcare systems, and intelligent infrastructure solutions.

A leading integrated technology company, Siemens has a presence in some 190 countries, approximately 405,000 employees and 1,640 locations around the globe. The partnership with Siemens PLM Software enables IWCC to have access to NX, Solid Edge and Teamcenter cutting-edge PLM software. This unprecedented in-kind grant, with a commercial value of $65.2 million, provided IWCC students access to a transformational, industry-lead program which meets workforce needs and results in real jobs.

Advisory Board

From its inception this Design Technology Program initiative has been community and industry driven, with Jay Miller at the forefront of the volunteer endeavor and IWCC identified as the education provider. An essential component

> **Iowa Western Community College**
> **Design Technology Program**
> **Advisory Board Members**
>
> **Academic Partners**
>
> *Iowa Western Community College:*
> *Dan Kinney, Ph.D., President;*
> *John Magill –Professor of Computer Information Technology;*
> *Carol Huffman – Dean of Math, Engineering & Industrial Technologies;*
> *Ann Pross, Cass County Center Director*
>
> *Iowa Regent Universities:*
> **University Of Iowa**
> *Megan Allen, College of Engineering,;*
> **Iowa State University**
> *Melody Carroll, Agricultural & Biosystems Engineering;*
> **University of Northern Iowa**
> *Ella Huff, Student Recruitment & Academic Services Coordinator,*
>
> **Industry Partners:**
>
> *Bill Boswell, Siemens PLM Software;*
> *Bob Bloomingdale, Winnebago Industries;*
> *Nigel Chivers, Mahle Engine Components, USA Inc.;*
> *Scott Hevelone, LBT, Inc.;*
> *Jack Marshall, Kiewit*
> *Dale Wulf, Rockwell Collins;*
>
> **Community Partners:**
>
> *Jay Miller, Independent Consultant*

to the success of this project was the formation of an Advisory Board, a core group of community members, industry representatives and faculty who were carefully selected for their knowledge, expertise, and ability to advise the college on the future direction of academic programming.

Carefully selected from an initial list of 75 potential candidates, prospective Advisory Board members were contacted to gauge their interest and ability to support the goals and outcomes of the project.

In addition to their expertise, members were chosen based on their passion for the project, compatibility with the college's mission, representation across various industries, and ability to be fully engaged and provide dynamic leadership. The resulting Advisory Board encompassed members who committed to participate with consistency toward developing, implementing, assessing and enhancing the Design Technology Program.

In its advisory capacity to the faculty and administration, the advisory board ensures that the program meets the needs of the community and industry by providing graduates who have the necessary skills and knowledge for success in the workplace. The items delineated below outline the Advisory Board functions:

1. Systematic assessment and identification of business and industry needs;
2. Provision of region-wide interpretation of industry and program needs;
3. Establishing sustainable partnerships and regional supportive relations and resource development;
4. Ongoing expertise and advice on curricular development, changes and enhancements;
5. Communicate industry trends and technology that should be addressed within the curriculum;
6. Suggestions and support for additional opportunities (field trips, guest speakers, scholarships, competitions, etc.);
7. Assistance in placing students in internships, and graduates in jobs;
8. Promoting the *Design Technology Program* community and industry wide;
9. Promoting university linkages and articulation agreements for graduates;
10. Ongoing assessment of outcomes and continued program improvement;

The advice and cooperation of board members in working toward common goals provided optimum results in meeting the objectives of the program. Members assisted in researching and planning, engaged in reviewing curriculum,

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shared information about the ever-changing needs in the workplace, promoted this effective and viable career-oriented technical program, and maintained a continuous dialogue with faculty. The knowledge and expertise shared by the board helped develop a specialized program that is current and meets the workforce needs of the communities we serve.

Advisory Board members had the opportunity to provide input early in the planning process, from designing the vision, setting goals, developing the curriculum, aligning assessments and entry standards and establishing performance benchmarks. For the various partners to become and remain engaged, each saw see clear benefits arising from their involvement. Being asked to join an advisory board is a sign of respect and accomplishment, and offers benefits to individuals as well as their companies, such as:

Benefits to Advisory Board Membership
- *Connections, networking* opportunities;
- *Credibility* as a public endorsement and an affiliation that can be promoted;
- *Recognition* – attention, marketing, and publicity for individuals and companies;
- *Exposure* – to new knowledge;
- *Context* – appreciation for different types of groups and people;
- *Impact* – ability to make a difference in a company, a community, an industry, and in a lot of individual lives.

Program Curriculum

To meet a broad range of industry needs within manufacturing, civil/infrastructure, and construction fields, each of which reflect growing demand for these highly skilled technicians, the Advisory Board developed an innovative and purposeful *Design Technology Program* curriculum. Based on identified regional, state, and national needs, the associate degree program will emphasize skills for *architectural technicians, civil technicians*, and *manufacturing technicians.*

The established curriculum will introduce students to cutting-edge synchronous technology that combines speed and flexibility with the precise control of dimension-driven design,

providing a fast, flexible design experience and easy modification and editing, significantly reducing drawing and documentation time, saving time, effort and costs.

The technology centric skill sets that students acquire will encompass effective use of tools for the purpose of streamlining design processes. Among the skills sets learned will be the use of computers to draw blueprints, create virtual models, animate models, assembly layout and analysis, program writing, as well as the application of problem-solving skills. Students will gain an understanding of PLM, an emerging industrial management industry focus related to the digital definition, manufacture, and delivery to market of products through the digital development, analysis, validation, build, optimization, service, and disposal of the product prior to any capital outlay occurring.

The body of knowledge needed by skilled employees must meld technical excellence with "soft skills" that are critical to success in professional fields. Such skill sets include communication, problem solving skills, leadership development, continuous learning, creative thinking, teamwork, self-assessment and career exploration (i.e. job shadowing and internships), as well as resume development and interview skills. The *Design Technology Program* curriculum will respond to a need for graduates who are able to listen, problem solve and apply their skills to creative solutions.

Graduates will have the skills to use interactive design paradigms to effectively translate ideas from inventors, engineers, planners and designers into visual graphic form. Roles that graduates may be responsible for may include researching technical data, modifying existing designs, performing analysis using computers and software, supplying manufacturing/construction personnel with technical specifications, and providing marketing personnel and customers with "virtual" pictures of the finished product. Graduates will be able to successfully enter the workforce with such skills immediately after completing their associate degree, or continue on to complete a baccalaureate degree at a four-year institution.

This unique program will offer an advantage to the region by growing its own workforce with valuable training in this growing career field. In

addition to retaining local talent, the program will help recruit others to the community, based on the originality and value of the program.

Competencies which graduates gain include:

- Applying principles of manufacturing and engineering graphics to prepare detailed drawings using CAD and PLM software;
- Demonstrating computer literacy in the use of state-of-the-art CAD systems;
- Utilizing 3D solid modeling CAD systems to create virtual/visual design;
- Applying Geometric Dimension and Tolerancing (GD&T) techniques to engineering design;
- Using American National Standards Institute (ANSI) protocol for sizing and tolerancing;
- Demonstrating understanding of soft skills identified as pertinent by industry;
- Preparing for further advancement in multi-dimensional modeling.
- Utilizing specialized PLM software;

This project has been identified as a flagship program by industry partners who are excited to collaborate on a dynamic approach to meeting skilled workforce needs. The curriculum incorporates competencies required for jobs, is tied to industry skill standards and is linked to articulation agreements at state regent universities for further education. The *Design Technology Program* and its corresponding curriculum have been reviewed and approved by the IWCC Instructional Council, the Iowa Department of Education and the Higher Learning Commission. A complete outline of the curriculum and course sequencing are located on IWCC's web site at http://iwcc.edu/programs/program.asp?id=designtechaas

Facilities and Equipment:

A primary impetus in the timing of the *Design Technology Program* project was Siemens' commitment of an in-kind grant entailing breakthrough software for academic use with a commercial value of 65.2 million dollars. This significant grant provided extraordinary access to information vital to implementing the approved curriculum, generated an emergent need to pursue funding sources to bring the project to fruition.

To provide a center of excellence in which to house this program, space was needed to accommodate enrollment numbers (30 new students a year, maximized at 60 students when combining 1st and 2nd year students). The space designated for renovation, positioned at the IWCC Cass County Center and located in rural Atlantic Iowa, resulted in a 3,700 square foot build-out of formerly vacant, unfinished space.

Upon completion, this center of excellence for Design Technology encompassed a computer lab with student workstations, a media classroom and a conference room. In addition to IWCC students, corporations and businesses will have access to the facility for on-going and continuing education and conferences for maximum training utilization.

Image 2

Funding:

To date, in addition to the $65.2 million in-kind grant, IWCC has confirmed multiple private grants and donations totaling over $1 million. In addition to private donors, businesses and foundations, successful requests were made to the local Cass County Board of Supervisors and the City of Atlantic. Official fundraising efforts were directed to local and regional businesses and foundations.

Within three years, the *Design Technology Program* will be fully self-sustaining. Until that time, financial assistance from multiple public and private parties ensures the immediate and ongoing success of the project. The full start-up costs for the *Design Technology Program* project included 1) construction/remodeling, architect

fees and furnishing; 2) faculty salary and benefits; 3) program marketing; 4) software upgrades/renewal fees; and 5) educational equipment.

Further financial support is being provided through student aid scholarships which has been made available through IWCC's student services. Students also have access to an extensive support mechanism which encompasses tutoring, mentoring and counseling, as needed to promote retention and successful program completion and graduation.

Administration:

At IWCC, commitment to this project ran deep, from the involvement of the President and support of the Board of Trustees, to administration playing an active role in supporting faculty and staff who participated on the project. Institutional commitment was further demonstrated through highlighting the *Design Technology Program* initiative in special announcements, press events and informational sessions offered to inform and engage community partners about the initiative.

The following IWCC faculty are key to the *Design Technology Program* implementation: Kim Carter, *Dean of Math, Engineering and Industrial Arts,* provides general oversight and faculty supervision of the overall *Design Technology Program*. Ann Pross, *Director of Cass County Center* is responsible for day-to-day project operations and budget management.

Joseph Vanstrom, who holds a Masters in Industrial Technology from Iowa State University was brought on board as the full-time *Design Technology Instructor* to implement the curriculum as well as motivate, inspire and guide students along this new academic and career path. He coordinates the program in his role as Program Chair which includes networking, expanding community connections, overseeing data collection among program participants and project partners. Advisory Board participation enables him to monitor progress, identify emerging trends, address concerns and modify services.

Following the planning process, and upon securing the initial in-kind grant, start-up activities included fundraising and grant development, securing construction bids and selection of a contractor, bids on equipment, computers, and classroom furniture, equipment and supplies, developing enrollment procedures, designing applications and forms, and orientation of all involved faculty and staff.

Outreach and recruitment efforts involved developing an IWCC *Design Technology Program* website; developing and distributing marketing materials; disseminating media/press releases statewide; presentations at community meetings statewide (legislative groups, industry providers, veterans organizations, Chamber entities, high schools, Workforce Development offices, etc.) as well as at state level meetings, organizations and events (STEM conferences, Iowa Workforce Development annual meetings, business/industry conferences). Siemens PLM Software collaborated with IWCC to create a PR/Marketing plan utilizing webinars, a white paper and additional PR/marketing materials.

Ongoing employment and education strategies for students and graduates will involve linkages to job shadowing and internship placements, presentations from potential employers, and/or campus visits to applicable four-year programs. Recruitment events and job fairs will provide opportunities for industry providers to disseminate information about employment opportunities across Iowa. Efforts will be made to expand industry participation in job fairs.

Implications for Community Colleges:

After being the centerpiece of the education platform of a winning presidential campaign, community colleges have remained at the forefront of higher education discussions. Part of the genius of higher education is its ability to strengthen the social and economic fabric of the country by meeting the dreams of its citizens.

Increasingly seen as a great place to start and then transfer to a four-year institution; community colleges are seen as a wise choice for the financially savvy - as opposed to a last choice institution. Community colleges are now recognized as more flexible, responsive partners for business and industry who are prepared to customize training to meet changing needs. Establishing a new promising program at a community college provides opportunity for

institutional transformation, garners wide-spread community support, leverages partnerships, and promotes building pilot projects to scale.

Forging relationships can support much-needed reallocation of resources – information, money, people and facilities. The partnership with Siemens has afforded IWCC access to *Best in Class Software* (the highest current performance level) – a resource that would have been well outside of the college's reach without such a successful collaboration.

IWCC works dynamically with local and regional industry partners to improve workforce skills and practices that are essential for keeping the U.S. competitive in today's global economy. To achieve its goals, IWCC works closely with key stakeholders: college administrators, faculty members, high school educators, and industry partners. Industry-driven skill sets and credentials are incorporated into curriculum in order to prepare graduates for success in the workplace. The college utilizes its industry partnerships to inform educators about cutting-edge technologies and practices in order to enable them to effectively teach the nation's next generation of top-performing technicians.

A major component to the success of this project has been a strengthened communication network between college and industry. Remaining current on industry-related developments and workforce needs occurred by talking with businesses and involving the advisory board to gather information. Such proactive efforts enables the college to stay one step ahead of identified needs, potentially reducing expense and risk by knowing which technologies are on the horizon, identifying workforce needs and responding by providing a ready, well-trained workforce.

Partnering with industry and universities to anticipate and develop new academic and training curricula has the potential for community colleges to provide opportunities for new workforce career ladders. Leadership in aligning programs of study with local and regional economic needs has the potential to generate new and expanded community support. Support and direction from the college president was essential, as was the full engagement of the program dean, department head and faculty. A unified voice is

seen as invaluable to industry partners preparing to commit resources to a project.

Costs associated with starting and maintaining new programs at community colleges can be shared with interested partners. Once the program is well established and enrollment is consistent, revenue from the new program remains as an ongoing benefit to the college, which can then fund future program enhancements, upgrades or other new programs.

IWCC's *Design Technology Design Program* offers directed choice (established course curriculum) and structured (pre-set) scheduling, both of which are recognized as successful research-based strategies for retention and completion. Program outcomes on student engagement, retention and graduation rates will enable to college to gauge the benefits of these approaches. Additionally, outcomes regarding student transfer rates for continued education and employment rates for graduates are expected to be high. Assessment and evaluation are built into the project design to ensure success of the program goals and objectives, of student outcomes, and of the impact the project has on its partners – particularly with regards to industry partner Siemens.

Implications for Industry Partners:

The goal for industry partners is to build a pipeline for a new technology workforce that leads highly trained and skilled graduates to high-demand jobs. Collaboration on this project has enabled industry to broaden and strengthen partnerships, promote curriculum and programs that are responsive to industry need and demand, and ensure that skilled employees are prepared to enter the technology workforce.

Collaborating with educators and community leaders on education and workforce development through a cutting-edge program that uses real-world problems to teach technical skills and 21st Century professional skills such as teamwork and time management is crucial for business and industry to remain competitive in a global market.

The data suggests that community partners validate institutional commitment to engagement by monitoring three important

domains: the extent to which campus executives are visible and active in their support of partnerships, the degree to which faculty and staff are "ready" to work with partners, and the extent to which organizational outreach and engagement are welcoming and accessible to partners. (Weerts, D., (2005). *Validating Institutional Commitment to Outreach at Land-Grant Universities: Listening to the Voices of Community Partners¸ Journal of Extension*, vol. 43., http://www.joe.org/joe/2004april/a1.shtml).

Evidence of commitment was often seen through the convening of events or public announcements. The ability of key faculty and staff to relate to partners from different business and industry cultures sent a strong signal that IWCC was serious and ready to take on this endeavor.

Ongoing communication was required to ensure a clear understanding of each partner's role and responsibilities. In this instance, Siemens has IWCC's permission to replicate and reference the college's intellectual property (curriculum and syllabus) designed for the *Design Technology Program.*

Siemens and IWCC have developed agreements and contracts to establish guidelines and criteria that address issues related to intellectual property and distribution of information in order to ensure the project is successful and that both parties benefit.

Implications for Community Partners:

A core value of community colleges is to use their intellectual, economic and human resources to empower the people of their communities. While community colleges prepare students for employment or higher education, they also partner with business and industry to impart important skills, and opening their doors for myriad cultural, athletic and educational events and opportunities for community residents. As a result, all communities reap benefits from involvement from community colleges.

Local and regional businesses can utilize their community college to provide affordable quality education and training, curriculum development,

and training materials. Contributions from community partnerships include:

- Opportunities to collaborate on developing specialized curricula;
- Opportunities to prepare students for employment through site visits, job shadowing and internships;
- Access to affordable help through engaging internship placements;
- Access to a well prepared workforce through participation in campus job fairs;
- Access to the latest teaching approaches;
- Shared resources and expertise.
- Responsiveness to immediate and emerging needs;
- Opportunities to enhance or begin programs and courses that ensure relevancy to business and industry;
- Partnerships that offer students experience and training that is valuable and relevant to future employers;
- Programs of advanced instruction to insure that the area economies have sufficient numbers of trained professionals;
- Collaborative community development initiatives that improve the community;
- Partnerships involving education and employment programs that support economic stability;
- Opportunities to advocate for program and curriculum direction and initiatives;
- Strengthened educational preparedness of youth and underrepresented groups such as minorities and rural and non-traditional and returning students;
- Broadened ethnic, cultural and socio-economic representation of students, graduates and the workforce;
- Access to an affordable start to numerous academic and career pipelines;

Summary and Conclusions:

In the 21st century, scientific and technological innovations have become increasingly important as we face the benefits and challenges of both globalization and a knowledge-based economy. This white paper reviews strategies utilized in one example of innovation and leadership that resulted in an education model and approach for a technology-based curriculum associate degree program that can be replicated nationwide. This paper shows the benefit of fostering broad-based, community-wide collaborations in order to align education and training with identified workforce needs in technology fields.

This project has been, and will continue to be, a great opportunity for IWCC students. An innovative program, the *Design Technology Program* will offer an advantage to the region by growing its own workforce with valuable training in this growing career field. This approach to "growing your own" workforce by cultivating highly trained employees has broad ramifications to academia, industry and other private and public entities.

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