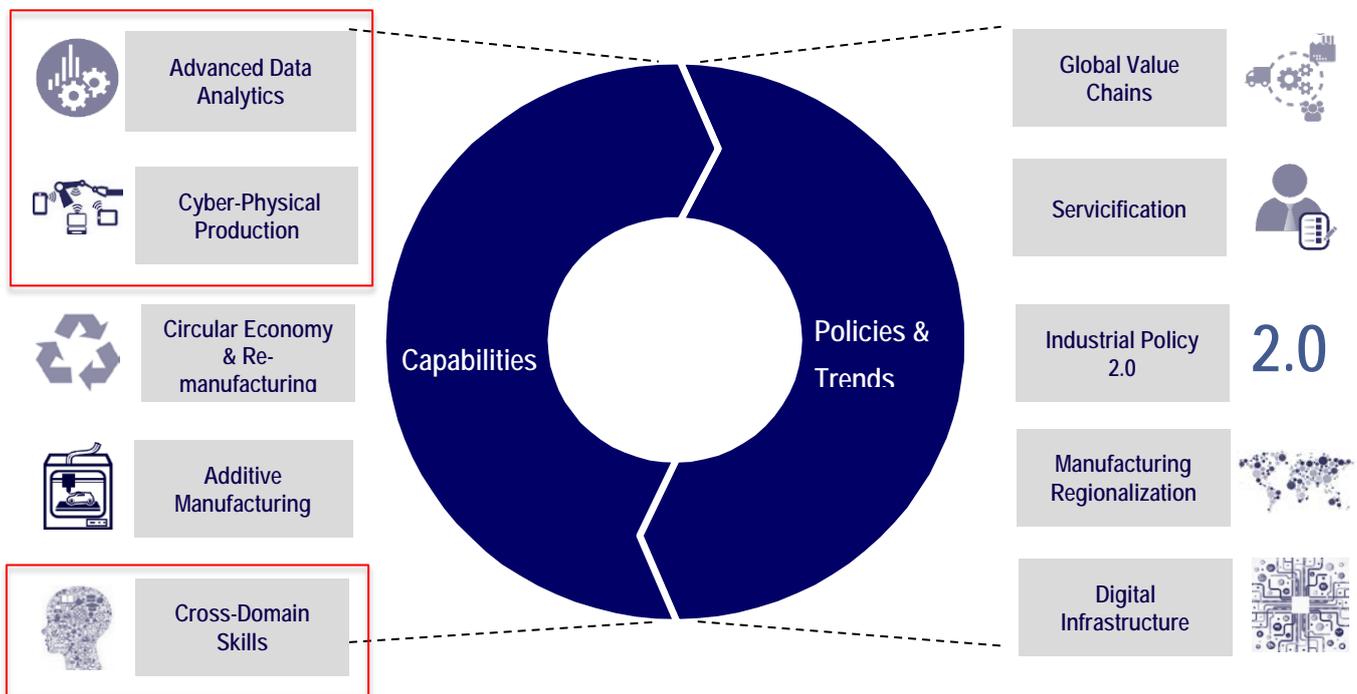


Case 16

Central Piedmont Community College

Drivers of the Future of Manufacturing



Source: World Economic Forum Global Agenda Council on the Future of Manufacturing, Whiteshield Partners framing



1. Challenge Confronted

Central Piedmont Community College (CPCC) and its partners in education, industry, government and non-profits create and sustain a talent pipeline of middle-skilled workers for technical, STEM and related jobs in the US state of North Carolina. Manufacturing is North Carolina's largest industry sector, with over \$88 billion, or 20%, of the state's gross domestic product. Home to more than 10,000 manufacturing businesses, the state ranks 10th overall in US manufacturing employment. Continuing the transition to advanced manufacturing is a top economic development strategy, with primary target clusters of aerospace/defense, automotive, biomedical, energy and logistics.

This case focuses on the challenges and tremendous opportunities presented by the significant expansion of the Siemens Charlotte Energy Hub – a power equipment production and service operation that expanded to include gas turbines to its steam turbine and generator portfolio in 2011. The company's investment of more than \$400 million since 2010 required over a 1,000 new hires, primarily for welders, CNC operators and engineers.

The complexity of the new equipment and processes called for fundamental changes in required skills, including use of industrial software and computer control systems for robotics. The primary demand was for a workforce with mid-level skills, meaning a composition of those with more than a high school diploma but less than a four-year degree. The highest demand was in production jobs for highly trained machinists, mechanics and welders and those in engineering occupations with STEM skills.

2. Solution Used

Finding a concentration of job candidates and workers with the above skills **required key partnerships among education, government and the private sector**. While the Charlotte area stakeholder network is much larger in support of workforce development, the Siemens case engaged three primary partners: Central Piedmont Community College (CPCC), the local workforce development organization, Charlotte Works, and the Siemens Charlotte Energy Hub.

The company, the college and the local workforce development board **jointly set five objectives**:

1. Effectively engage training and education stakeholders and institutions
2. Identify skill sets required and appropriate assessment methods
3. Identify and select qualified candidates from which to hire and train
4. Train expert instructors and develop curriculum in global learning exchange
5. Deliver targeted training

These objectives were met through eight programme elements, which blend existing and new components into a comprehensive strategy for manufacturing talent pipeline development, which are outlined below in the "work performed" section.

Charlotte Energy Hub

Dates: 2010 – present

Keywords: skills, partnership, energy

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Key Facts:

- The Charlotte area has lost about 34,000 mostly traditional manufacturing jobs since 2005, but the sector is recovering with a shift toward modernized equipment and the re-engineered production of advanced manufacturing.
- The Siemens Charlotte Energy Hub – a power equipment production and service operation – expanded to include gas turbines to its steam turbine and generator portfolio in 2011. The company's investment of more than \$400 million since 2010 builds on the growing energy sector here.
- Central Piedmont Community College, Charlotte Works and Siemens Charlotte Energy Hub partnered to craft a comprehensive programme that combined existing, effective training with new, tailored components that utilized industry best practice.

3. Lessons Learned



1. **Engagement and Collaboration:** Effectively engage training and education stakeholders and institutions, including funding and resources.



2. **Alignment for Sector and Job Training:** Identify skill sets required and appropriate assessment methods.



3. **Selection and Pre-employment:** Identify and select qualified candidates from which to hire and train.



4. **Expert Instruction and Global Knowledge Sharing:** Train expert and custom instructors and develop curriculum in global learning exchange.



5. **Coordination and Delivery of Training:** Deliver targeted training

Description of the Work Performed

As noted above, CPCC, Charlotte Works and Siemens Charlotte Energy Hub put together eight programme elements to meet the group's objectives.

1. **“Mechatronics Re-Envisioned” Grant Project:** A \$2.5 million US Department of Labor grant to modernize the mechatronics curriculum will blend online instruction and in-person labs with automated equipment, plus offer credit for prior learning to accelerate completion.
2. **Siemens PLM CAD/CAM Software:** A \$32 million grant from Siemens will integrate world-class PLM software into CPCC's curriculum.
3. **NSF Bridge to the Baccalaureate - NC STEM Alliance:** A \$1.5 million grant from the National Science Foundation (NSF) is supporting work to advance STEM education by increasing underrepresented minority degree completion.
4. **Advanced Welding Technology Center:** CPCC trains at the entry level and more highly skilled craft workers for industry-based knowledge and certifications in welding technology, including American Welding Society (AWS) and non-destructive examination (NDE).
5. **Festo Learning Center of Excellence for Modern Manufacturing:** Brought to the United States through the German Embassy's Skills Initiative, the Festo training facility will feature mechatronics and other disciplines for student and instructor training, plus dual education models for high school students.
6. **Corporate Learning Center:** CPCC's Corporate Learning Center (CLC) serves employers for custom learning needs and services with the focus on competencies, applied knowledge and skills, and industry-based credentials.
7. **Fab Lab and Associate of Engineering Degree:** CPCC partners with MIT's Center for Bits and Atoms (CBA) to teach innovation and design for the engineering curriculum. FabLab Carolinas lab is a digital fabrication facility that allows for the creation of nearly anything with 3D printers, laser cutters, CNC routers and more.

8. **Apprenticeship Programmes:** Apprenticeship 2000 is a formal workplace learning partnership, which Siemens Charlotte Energy Hub joined to advance the Energy Hub hiring pipeline.

Key Outcomes

The programme generated significant results across four general categories:

1. **State Funded Non-Credit Customized Training:** Highlights from phases one and two at a cost of nearly \$3 million over 2010-2015 are:
 - 1,200 classes for a total number of 13,586 hours of training from 2010 to 2014.
 - 10,622 individuals started the application process with 8,650 actually completing the application through the Charlotte Works job portal.
 - About 6,000 moved on to testing in math and reading, with about one-third meeting the minimum qualifications set for Siemens Charlotte Energy Hub.
 - Average number of participants per month is 236 (some counted more than once if taking multiple classes).
2. **Apprenticeships:** Enrolled 22 students, three of whom graduated with two-year degrees from CPCC in June 2015. The three graduates, now full-time machinists with the company, completed the Siemens Charlotte Energy Hub programme in summer 2015 with associate degrees in mechatronics and their Journeymen Certificates.
3. **Curriculum and Programming:** In 2013, CPCC graduated 76 students in manufacturing-focused degree programmes, plus another 59 in certificate programmes.
4. **Workforce Development Infrastructure:** This partnership features and strengthens a Charlotte region workforce development infrastructure. From an economic development strategy to job recruitment and assessment, to custom design and training delivery, the partners represent key dynamic elements in the infrastructure.

Drivers & Enablers



Industry expansion and partnership engagement



Flexible, tailored programs



Sector development and employment gains

Barriers

- **Resources and Capabilities:** As higher level job skills are needed, the cost to retool and to do required training increases. Meanwhile, in North Carolina, the allocation of state funding as a percentage for community colleges overall has decreased.
- **Culture of Shared Responsibility:** Encouraging other employers to invest in workplace learning and upgrading of existing employees for talent-driven innovation is critical, but challenging.
- **“Interest Gap”:** There is an outdated perception of manufacturing and a lack of understanding of today’s advanced equipment and technologies. Addressing that means confronting public misperceptions.