REGIONAL TALENT PIPELINE STUDY

REPORT TO THE GREATER CAPITAL REGION WORKFORCE INVESTMENT BOARDS

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June 30, 2009

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Prepared for

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This Talent Pipeline Report was made possible through a regional grant from the New York State Department of Labor to the Fulton, Montgomery, and Schoharie Workforce Development Board on behalf of the Greater Capital Region WIBs.

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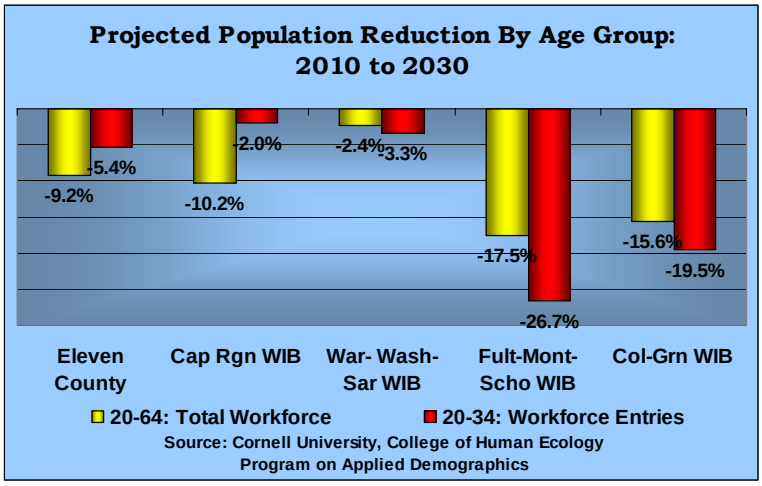
Table of Contents

◈ Executive Summary

The jobs are coming.
But we won't have the people with the skills to fill them.
That's the disconnect!

The world economy is undergoing a significant transformation and the Capital Region is not immune. Our economic mix is changing in ways similar to the rest of the nation – moving away from heavy industry to more of a service and "knowledge" economy. But we in northeastern New York face special challenges -- trends and features that are not found in many other regions. The coming of the GlobalFoundries chip fabrication plant in Malta is the most visible part of this change, but there are also a growing number of small high-tech manufacturers, emerging biotech, nanotech, and green energy companies, and the development of an advanced construction industry related to clean room construction and renewable energy.



The demand for skilled workers is increasing, but there is data to show that the supply is not. Population projections indicate that the number of workers in the region, with or without the necessary skills, will decline over the next twenty years. The challenge will be not to find jobs for people but instead, **to find people for the jobs.**

The Greater Capital Region Workforce Investment Boards (WIBs) recognized the need to identify the skill sets that are required to staff these industries (with a special focus on mid-level technician positions), and how the region can best respond to the coming shortage. As part of this response, the WIBs have contracted with Krieger Solutions, LLC to conduct a "Regional Talent Pipeline Study."

❖ Methodology:

The study process was largely qualitative – through a series of formal focus groups and individual in-depth interviews, the consultants conducted more than 400 hours of discussions, mostly in-person, and the remainder via telephone. Approximately half of the respondents were business leaders, with the rest made up of workforce development professionals, educators, government officials, and community leaders. In addition, greater than fifty reports on subjects including employment projections, workforce pipeline methodologies, and economic development efforts were reviewed. While some of the opinions cited in the report may be challenged as to their accuracy and interpretations, nonetheless, these views and statements are real beliefs and judgments held by multiple analysts and professionals, rendering them valid as data. The findings and action items presented here are supported by this research.

❖ The Scope:

The Regional Pipeline Study is part of a comprehensive project related to the Greater Capital Region's workforce needs. In this phase, Krieger Solutions, LLC was asked to determine:

- The skill sets needed by workers in mid-level technical positions in the emerging high-tech industry (mid-level was loosely defined as requiring a two-year college degree or less).
- How the region can best support the strengthening of its workforce through the development of a "talent pipeline" to meet these emerging needs.

Five sectors were selected for study; all are deemed to be significant and growing in the region, and all present considerable opportunities for mid-level technical employment:

- **Advanced Construction –** defined as building facilities with clean rooms, installing "green energy" systems, and constructing green buildings.
- **Advanced Manufacturing –** defined, at a minimum, as those using CNC (Computer Numerical Control) operated systems.
- **Biotech / Biomedical Companies –** expanded to include health care technicians.
- **Energy Companies –** especially renewable.
- **Nanotechnology Companies –** including those affiliated with universities.

❖ Findings:

1. **Shortage of workers for emerging jobs.**
   The evidence indicates that there will be a large demand for highly skilled technicians that the current workforce cannot fill. The gap will be expressed in sheer population figures, as well as finding workers with the necessary skills. And over time, the gap will widen.

   Demographic data shows that the regional workforce will not be large enough to fill all the jobs that are forecast, which leads to three possible outcomes:

GE Wind Energy Learning Center employee, 250 feet in the air servicing a GE 1.5 MW Wind Turbine.
Photo courtesy of GE Wind Learning Center, Schenectady, NY.

   1. A net inflow of labor.
   2. A reduction in the forecasted need, as businesses go elsewhere.
   3. A major effort to develop the necessary skills among the local population is undertaken.

2. **Desired Skill Sets for Mid-Level Technicians.**
   A major focus of our study was to identify the skills employers want for mid-level technicians, and then, to determine which of these skills were difficult to find in the current labor force.

Desired Skills and Abilities for Mid-Level Technicians (Employer-Identified)		
Soft Skills	Critical Thinking / Interpersonal Skills	Hard Skills
Attendance	Trainable – Willing and Able to Learn	Computer Skills
Basic Communication Skills	Detail-Oriented / Process Oriented	Math and Measurement
Appropriate Dress	Teamwork / Advanced Communication	Reading
Dignity and Respect	Problem Solving and Critical Thinking	Writing
Proper Use of Company Time	Dealing with Conflict and Stress	Science
	Ownership	Technical Background Mechanical Aptitude
	Perseverance and Motivation	Documentation
	Maturity and Integrity	Health and Safety
	Flexible – Able to Handle Change	
	Initiative	

   In addition, prior work experience is regarded as beneficial.

3. **Insufficient capacity in the training system to meet anticipated demands.**
   Employers suggest that those possessing technical skills are fully employed in the region, with little slack. Each year, local colleges and training entities prepare and graduate many individuals with technical skills, and they are typically hired immediately. With the projected addition of 1,200 technicians needed by GlobalFoundries and GE in two years, the shortage will become severe.

4. **Employers see little value in the current workforce development system.**
   Most businesses see the focus as primarily on job seekers and not the needs of employers. Many feel that WIB meetings provide no value. "They don't speak our language." And yet, businesses want a stronger two-way relationship, if they can be convinced that useful actions and outcomes would result.

5. **Four-year college preparation is the education system's primary mission.**
   Due to the pressure from parents, teachers, and society in general, students miss out on the exposure and education that two-year college degrees can offer. They may also miss out on the emerging opportunities in the region.

6. **High schools do not do enough to prepare students for the world of work or college.**
   Too many high school graduates need remedial work in math and language skills at college or on the job. Employers expressed frustration with the number of job-seekers lacking these skills.

Employers are also consistently surprised about the lack of "soft skills" – the ability to communicate, work well with others, have commitment to the job and to the employer, and take initiative. By focusing on rigid structures of lecture, testing, and individual grading, high schools fail to teach these other key competencies As one respondent stated, "They have a name for teamwork in school – it's called "'cheating.'" These skills are teachable, but are rarely part of the curriculum beyond the middle grades.

7. **High schools do not connect with business, nor offer helpful career guidance.**
   Employers have limited ties to local high schools, and believe that guidance counselors are overworked and have other priorities. BOCES is an exception, with excellent models of how schools and businesses connect, but the stigma technical programs face ("that's where the bad students go") is difficult to overcome.

8. **The relationship between businesses and community colleges is of uncertain value to employers.**
   Employers have mixed views on how to best use community college resources in their businesses, due to the cost, varying levels of responsiveness, and ease of access. Some colleges lean toward preparing transfers to four-year colleges, while others concentrate on "terminal" two-year degree programs. While recent changes have sped up the State's program approval process, making it easier for colleges to respond to employer requests in a quicker manner, the credit and non-credit sides often do not communicate or coordinate their efforts. There is also little communication between colleges, according to college administrators.

Something you might see on Sci-Fi: Optical Tweezers, from RPI Biotech lab.
Photo Courtesy of Rennselaer Polytechnic Institute, Center for Biotechnology and Interdisciplinary Studies, Troy, NY.

9. **Successful pipelines already exist in the region.**
   We found many examples of local initiatives, operated by a variety of entities, which are succeeding in preparing and bringing qualified workers to high-tech businesses. They can benefit from greater collaboration, technical assistance, and sharing of ideas. There are gaps in the network, and the addition of other local initiatives is needed to fill them.

10. **Many segments are not sufficiently engaged in technical careers.**
    At a time when there is a shortage of skilled workers, there are numerous populations that are underrepresented among mid-level technicians, including women and minorities. Many of our employer-respondents expressed interest in expanding this labor pool via early career education, training, and recruitment. Several also volunteered to change job descriptions to better accommodate workers with disabilities.

❖ Action Items

Based on our research, we have developed a set of recommendations designed to:

- Strengthen the regional workforce system.
- Better prepare community residents for the modern work world.
- Provide a skilled and productive workforce to employers in the emerging high-tech industries.

1. Move to implementation -- stop further general studies.

A number of studies on the Capital Region workforce development system have come to similar findings and conclusions, as have studies we examined from other regions. The action items that follow, like the findings, were for the most part derived from a broad consensus of area respondents.

2. Develop a regional talent pipeline system that enhances and does not duplicate local efforts.

Our recommendation is to support local pipeline efforts by providing assistance and coordination to enhance working relationships between business, educators, and workforce developers.

- Develop a directory of existing talent pipelines via a web portal, benchmark successful practices, share this information, and use it to guide resource allocations and expand the network of local pipelines.
- Structure all pipeline and workforce development efforts by economic market needs, industry sectors, or training resources, not by political subdivisions. Create task forces with defined, action-oriented agendas that focus on specific growth sectors, such as technology, health care, manufacturing, and energy.

Technician making adjustments at Regeneron Pharmaceuticals, Inc.
Photo courtesy of Regeneron Pharmaceuticals, Inc., Rensselaer, NY, (property of), photography by Ted Horowitz Photography

- Continue to identify workforce development needs of local employers and feed this information to educators across the region. Provide educators increased access to employers and current career information in the emerging sectors.
- Develop training/awareness programs to help educators and workforce development professionals interact more productively with employers.
- Establish a Regional Workforce Training Coordinating Council, organized and headed by senior representatives of the business community to implement and evaluate these recommendations. The Council will include agency, education, economic, and workforce leaders and will require a small professional staff.

3. **Accelerate the way technicians and operators are trained for emerging high-tech industries.**

   In light of the coming labor shortfall, we need to expedite the way we prepare technicians, both high-tech and low-tech.

   - Design and establish an accelerated one-year technology-based certificate program, focusing on key skills and knowledge, to meet the needs of employers. The courses can count as credit toward a two-year degree at an accredited college.
   - Establish a regional technology based learning community that links community colleges and BOCES across the region to help adult learners take advantage of the new training programs.
   - Expand BOCES offerings in programs that can meet industry needs, and provide college credit and articulation agreements to facilitate associate's degrees with one year of community college. Increase the adult education component, and consider expanding technical education services to lower grades.
   - Design accelerated, customized retraining programs for dislocated workers with substantial experience in related industries.
   - Develop apprenticeship programs proportional to forecasted needs in emerging high growth industries.
   - Support internships and on-the-job training programs.

4. **Improve societal perceptions of two-year technical degrees.**

   Many talented people prepare for, and start out at, four-year colleges where nearly half do not graduate within six years, and many who do, end up in jobs unrelated to their degree. The broad promotion of bachelor's level education over an associate's degree deprives many students of the skills and opportunities that can be derived from a community college education.

   - Implement a regional education program on career opportunities and training options for the emerging high-tech industries -- targeting parents, students, and displaced workers.
   - Set standards for local school districts to increase career education resources in high school and middle school.
   - Implement a Regents level technical diploma that includes a rigorous and more applied education program with additional math, science, and technology requirements.
   - Expand the teacher extern training program that exposes teachers to corporate and industrial careers and environments to all eleven counties.

5. **Expand the high-tech labor force by exploring ways to connect individuals who are currently outside the labor force to training and jobs.**

Given the need to bring more people into the workforce, it seems logical that efforts should be made to encourage participation by the unemployed, the underemployed, the displaced, and the discouraged.

Using a micrometer for precision - Zak, Inc.
Photo courtesy of Zak, Inc., Green Island, NY

- Partner with service agencies to increase outreach to older workers. Evidence suggests a fifty-year-old will stay with one company longer than a twenty-five year old will.
- Provide support for businesses, secondary schools, and community colleges willing to be training sites for older learners and other populations.
- Work with business associations, and state and local agencies to engage populations who can increase the available technology workforce.
- Increase outreach and career education at an early age to groups not fully represented in the high-tech workforce, especially minorities and women.
- Make use of existing facilities for special technology training programs serving populations not traditionally targeted, including the disenfranchised and those with special needs.
- Increase career tracks for low income workers through incumbent worker assessment and individualized training.

6. **Expedite the component of the new State Education Department (SED) / SUNY P-16 data tracking system that tracks employment outcomes for graduates.**

The SED has always tracked where high school students intend to go after graduation, but now, a system is being developed to determine what actually happens to students from pre-school through a four-year college degree. There are plans to extend the system to track results after college completion. This should be implemented as soon as possible.

- Use the data to educate students and parents about career paths and to support programs that coordinate with the needs of business, industry, and professional development.
- Establish assessments of technology/workforce skills that tie to industry needs, compare them to actual education outcomes, and use the data to allocate educational and workforce development resources more effectively.

7. **Implement critical structural changes in K-12 education.**

   The Board of Regents, the Partnership for 21st Century Skills, and most of the educators with whom we spoke indicated a need to change from the old industrial model of education to one that focuses on building competencies in a contextual way. Tech Valley High School is one positive example.

   - Extend the Tech Valley High School teaching methodology to other schools.
   - Create three new Tech Valley High Schools in the region, one exclusively for girls.
   - Provide more off-campus career training options, such as the "New Visions" program.
   - Establish a career/work readiness certification for all high school diplomas and GEDs.
   - Add an enhanced GED program that includes a work readiness and technology certification component.
   - Require all K-16 teachers to train in the use of technology in the classroom, including virtual and immersive educational techniques.
   - Develop a virtual high school pilot model, following the lead of several other states.
   - Establish a fast track teaching certification process for qualified retired or mid-career changers with technology backgrounds.

8. **Increase the effectiveness of community colleges in preparing our region's workforce.** The five community colleges in the region represent the front line in training mid-level technicians for the jobs that will soon be available. Some structural changes will improve their performance.

   - Assign a staff person with expertise on both the credit and non-credit sides of the institution to be a single point of contact for business people. Work to improve collaboration and communication among all college departments.
   - Establish collaborative training models, in which students at any community college in the region can develop programs, find courses, and receive specialized training at other community colleges.
   - Offer credit, degrees, and certification opportunities through the establishment of a technology-based "any campus," with a real time course of study, using conferencing and streaming media technology.

Orbital welding stainless steel tubing for a high purity gas delivery system by a TFS technician
Photo courtesy of Total Facilities Solutions, Inc., Watervliet, NY

- Increase flexibility in scheduling courses outside the traditional multi-course semester-based model.

9. Examine the existing WIB structure and conduct a cost and feasibility analysis.

Workforce investment boards have been operating for a sufficient period to warrant a comprehensive assessment, especially at a time when they will be called upon to be exceptionally productive, effective, and efficient.

- Assess WIBs in terms of effectiveness as a workforce training and service delivery agency. Also, consider the appropriate regional boundaries and whether WIBs are more effective as a regionally based model or as a sector model.
- Develop a regional workforce development training plan that maximizes limited resources and examines the elimination of duplicative administrative structures.
- Champion new programs that promote lifelong learning, in areas such as computer education, technology updates, and methods to adapt to changes in career opportunities.

10. Support training programs to further develop the high-tech workforce.

One of the key questions we were asked to address is where the workforce investment boards can best use their training resources to help prepare the workforce for mid-level technician positions. Some companies prefer to handle the training on their own so they can tailor it to their specific situations and also use it as an assessment tool. Others, however, preferred to have employees as job-ready as possible before hiring.

Employer-recommended training programs in each of the following areas:

a) High level technician
b) Lower level technician
c) Work readiness – critical thinking/interpersonal skills
d) Training in the green/renewable energy field
e) Advanced construction and weatherization training
f) Certification in laboratory science
g) General workplace safety
h) For the future – life long learning

Section 1 - Introduction

The Regional Talent Pipeline is a project of the Greater Capital Region Workforce Investment Boards, born as a result of the desire to create a system designed to build strong linkages between regional employers and educational and workforce development organizations. The goal is to produce a workforce that meets employers' changing needs.

Krieger Solutions, LLC was asked to conduct research to determine:

1. The skill sets needed by a worker in a mid-level technical position in the emerging high-tech industry (mid-level was defined as requiring a two-year college degree or less).
2. How the region can best support the strengthening of its workforce through the development of a "talent pipeline" to meet these emerging needs.

The five sectors we were asked to investigate were:

- Advanced Construction – defined as clean room and green buildings
- Advanced Manufacturing - defined as using CNC (Computer Numerical Control) operated systems at a minimum.
- Biotech/Biomedical Companies – expanded to include health care technicians.
- Energy Companies -- especially renewable.
- Nanotechnology Companies – including those affiliated with universities.

The Greater Capital Region encompasses four workforce investment boards covering eleven counties: Warren, Washington, Saratoga, Fulton, Montgomery, Schoharie, Albany, Schenectady, Rensselaer, Columbia, and Greene.

We began on January 26, 2009 and over the ensuing four months conducted eight focus groups and additional individual interviews with approximately 75 employers and trade group representative. We also spoke with approximately 80 other respondents representing educational, workforce development/economic development, and government organizations. More than 400 hours of formal discussion took place, generating nearly 3,000 quotes, many of which are presented in this report as representative of a consensus within sectors. This data serves as a foundation for our recommendations.

Using qualitative research techniques, employers were interviewed individually and in formal focus group settings. Topics investigated included:

- The skill sets they seek when hiring technicians.
- Which skills were most difficult to find.
- Additional training that employers chose to provide.
- How employers currently connect and would like to connect with the workforce development and educational systems.

Following the employer focus groups and interviews, we conducted additional interviews with representatives of the education and workforce development sectors, and with community leaders. These interviews explored further how to best connect schools, workforce organizations and employers to ensure the development of a highly skilled local workforce.

Based on these discussions, we have developed a set of recommendations designed to:

- Strengthen the regional workforce development system.
- Better prepare community residents for the modern work world.
- Provide a skilled and productive workforce to employers in the emerging high-tech industries.

The recommendations include a discussion of the structure of the regional talent pipeline, suggested changes to the educational system and how it interfaces with business, and recommendations for specific areas upon which to focus workforce development resources.

This project was conducted under a very tight timeframe and as one respondent said, studying workforce development is "like peeling an onion. As you peel back one layer, there's another underneath." We did not interview everyone who might have contributed to this study, but we did engage approximately three times as many people as we planned.

Our study uses a qualitative methodology. We gathered a wide range of opinions and have reported them as such. Where time and data permitted, we have added quantitative data to add further perspective. Our sample was not randomly selected and does not fully represent the regional population. However, most of the community with whom we spoke reflects in a comprehensive manner the industries on the cutting edge of new technology or have leadership roles in agencies working to move the workforce and education systems to the next level. Due to the short timeframe, we were not able to fact check every statement and may have misinterpreted some of our respondents' comments. Overall, we believe this report accurately exhibits the sentiment of the various sectors we spoke with, but we regret any factual errors.

We would like to thank all those who participated in the focus groups and interviews. They are listed in the Appendix. We would especially like to thank the four workforce investment board leaders, the Regional Committee that worked with us and the organizations that helped coordinate and host the focus groups: the Center for Economic Growth; the Albany-Colonie Regional Chamber of Commerce; Iroquois Healthcare Alliance; Warren County Economic Development Corporation; Fulton, Montgomery, and Schoharie Counties Workforce Development Board, Inc.; Workforce Development Institute; Mohawk Valley Applied Technology Corporation(MVATC); and the Saratoga County Economic Development Corporation.

◈ Section 2 - Talent Pipeline

❖ Definition

A talent pipeline is a system that provides workforce training to a diverse population and facilitates the delivery to area employers of a well-prepared workforce.

The talent pipeline can be viewed as an apprenticeship program designed to meet a wide array of workforce development needs: academic training for specific skills, hands-on experience, exposure to industry sectors, development of soft skills, job placement, and continuous skill improvement.

It must also meet the needs of employers and workers. The talent pipeline is, ultimately, a system that recruits and prepares qualified job seekers and connects them to employers needing employees with specific skills.

The talent pipeline includes:

- Employers: businesses, non-profits, government agencies, and recruiters.
- Educators: K-12 and college teachers and counselors, training providers and workforce development staff.
- Current and future job seekers: students, parents, people who are unemployed and those considering changing jobs.

The primary challenge of a talent pipeline is how to best bring employers, educators, and job seekers together to create an effective workforce, consolidating them into a skill-match economy.

The role of employers is to keep educators informed about evolving needs; recruit, screen and train employees; and support educators in the development of job seekers' skills and abilities. Employers can provide:

- Regular updates in terms of new workforce demands and changing skill sets.
- Feedback on the quality of the workforce that is "piped" to their hiring process.
- Career education and hands-on opportunities for educators and job seekers to better understand the workplace, career pathways, and the skills, knowledge and abilities needed for specific jobs.

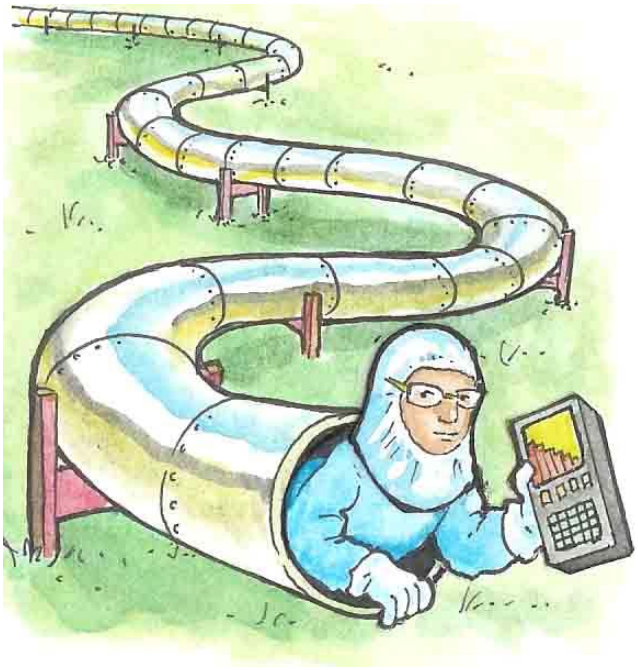
The role of educators is to recruit, encourage, and prepare job seekers for high quality employment. Educators need to:

- Understand evolving workforce demands in terms of skill sets, the interests of the job seeker groups, and the supply/demand balance.
- Provide this information to job seekers in an easily accessible and up-to-date manner.
- Provide opportunities for job seekers to develop the skills, knowledge and abilities needed to qualify for jobs in which they have an interest, and for which there is a demand for workers.

The role of job seekers is to make the best use of the resources provided by educators and employers to enable them to qualify for jobs of interest. Job seekers should:

- Research career opportunities through classes, written materials, and hands-on experiences (such as internships and job shadowing).
- Build the skills, knowledge, and abilities needed to qualify for jobs in which they have an interest and there is a demand for workers.
- Give feedback to educators and employers on the quality and accessibility of the information and experiences they provide.

One image of a pipeline is as a one-way flow, under some kind of pressure, often from a lower or less desirable location to a higher, more desirable one. Many Talent Pipeline models are presented as just that -- a one-way system in which educators prepare the current and future job seekers and ship them to employers, with the hope that the skills taught are appropriate and that employers have need of them. But this design will not accommodate rapidly changing conditions.



Drawing by Phil Singer, philsinger67@yahoo.com

We envision the Talent Pipeline as an interactive network, more than a single flow pipeline. The system needs feedback and review to effectively respond to a continually evolving context. Employers will be receiving well-prepared workers and will also be providing educators and agencies with feedback and information about changing needs and requirements.

Job seekers will enter the pipeline, but some, such as parents, will use the career planning section to help orient their children and will not go any further. Others will go through the pipeline and not like or feel prepared for what they find and will go back a step or two. Still others, interested in moving up will reenter the pipeline while they are working and use it to help them get to the next level.

All along the way, a network of educators and agencies will provide needed educational, informational, and counseling services, and will help pipeline dropouts get back on track.

Steps in the Talent Pipeline

	Employers	Educators	Job Seekers
Career Exploration and Planning	Provide information about emerging needs, offer job shadowing, internship experiences, speak at career information programs.	Provide assessment, information, field trips, counseling.	Participate in career exploration activities and develop a career plan.
Job / Career Preparation	Offer job shadowing, internships, and part time jobs.	Teach hard and soft skills and knowledge, provide project-based experiences.	Register for and attend relevant classes.
Hiring	Screen and give feedback to job seekers and educators about degree of preparation.	Provide referrals, references, subsidized or supported placements.	Prepare résumé, apply for jobs, go to interviews.
After hiring	Continue to assess and provide feedback on employees' readiness and skill sets.	Provide follow up support and monitoring.	Continue education for next step on the career path.
Pipeline drop-outs	Provide job shadowing, internship and part time job opportunities.	Provide additional support services -- counseling, remedial education, transportation assistance.	Participate in additional training and education; access needed services.

Employers and educators will be in regular communication to ensure educators receive feedback -- about what they have done well in preparing job seekers, and what more needs to be done. The feedback will be based both on the initial screening, and again, after the job seekers have been assessed on the job. Employees and interns will also receive feedback from employers about their performance, to help them assess their need for additional training and to look at next steps in their career path.

While some employers still train and promote from within, this strategy is no longer as effective in many sectors. The technical skills are too rigorous to learn from an entry level position, or advanced education is specifically required. A "re-circulating" pipeline is needed in order to create new pathways to promotion.

People will change jobs many times in their career, and the old straight line career pathway is no longer relevant. "There is no real pathway in the real world – it's not a staircase or straight line approach. What people need are the skills to negotiate the system and they'll rise up in their career."

❖ Findings

- Employers and educators welcome efforts to increase access, communication, and collaboration locally and across the region.
- The pipeline should be "demand side" oriented – driven by employers' needs.
- Larger employers are cautious about being overwhelmed by too many career related inquiries from educators or job seekers.

- The power of collaboration is strongest at the local, community level.
- There are many local pipelines that could benefit from technical assistance and sharing of ideas.

Our research turned up many examples of talent pipelines in this region and across the country. They range from formal coordinated statewide efforts to informal relationships between a school and a local employer. They have in common the goal of facilitating the development of a well-prepared and well-aligned workforce.

❖ Proposed Regional Pipeline Model

During the course of our investigation, we have come to believe that local connections between educators, employers, and job seekers are where the real value can be found. Creation of a formal regional talent pipeline with a complex website (as we originally considered) would duplicate and conflict with local efforts, and lose the personal connection.

Therefore, we propose a "virtual" approach to a regional talent pipeline. It will exist on the internet as a "portal" or collection of links, but job seekers will not pass directly through it. Instead, the regional pipeline will be a system that promotes and strengthens existing local pipelines, where the actual connections are made. The regional effort will:

- Document best practices in the operations and relationships in small local pipelines, and post these in an on-line library.
- Develop a linked network of these local pipelines and other interested people and share the best practices with them via email, webinars, and conferences.
- Maintain a list of links and encourage each small pipeline to post these links to enable people to connect with others in the broader regional network as appropriate.

This pipeline concept will help the area to think regionally and break down artificial geographic boundaries. A regional coordinating group, organized by business leaders, will oversee the pipeline. It will include of representatives from employers, economic developers, chambers, BOCES, community colleges, other schools, and state and local workforce development staff. The advisory group will recommend appropriate changes, help ensure that new links are added to the portal and disseminated to the network, and that best practices will be recognized and documented.

TFS technician preparing high-tech pipe
Photo courtesy of Total Facilities Solutions, Inc., Watervliet, NY

Most of the portal links will be directed to local collaborations hosted by coordinating agencies such as chambers of commerce, schools, economic development agencies, workforce investment boards, etc. These organizations

are knowledgeable about workforce issues and resources in their area. Many have websites that include resource listings, which can direct individuals to the most appropriate contacts. Career information resources or employer websites are other links by which job information can be posted.

This "virtual" model will better match the messy reality of the non-linear career paths most people take. The region will still have links to all the information on a single portal home page for those who want to see the whole system at a glance, or desire information outside their local area. However, the expense of building and maintaining yet another complex website and data base will be avoided. We also emphasize the importance of the "best practices" component, which will identify and benchmark what works best at the local level. In this way, we can convey the successful aspects and techniques that can increase the effectiveness and capacity of each local network.

- Focus on Business:

  "The thrust should come out of the business community, since we as customers should be driving the effort."

  Most of the websites we found and many of the local pipelines are "supply side" based, starting from the perspective of the educators and the current and future job seekers, not from the needs of employers. It is critical that the voice of employers be as strongly amplified (especially about the emerging high-tech workforce) as that of parents, students, and teachers.

  That employers are not actively engaged in many of the local pipelines is amply illustrated by the low level of employer participation on workforce investment boards (WIBs). Two explanations were offered (both are broad generalities, but ring true):

  1. Employers and educators work from a different mind-set. Educators like to explore, discuss, and consider problems; employers like to consider briefly and then take action and revise as they go.
  2. Employers are focused on the bottom line – how will this help the success of my business. Educators are focused on the broad development of individuals, intellectually, socially, and professionally.

  There are many organizations that attempt to bring employers and educators together, including WIBs and chambers, but they are often unsuccessful. One dissatisfied employer commented, "We had different expectations (at a WIB) than the educators and government officials, and to some extent, (even) some of the chamber of commerce members were more into the bureaucratic stuff."

  Junior Achievement (JA) provides an example of a two-way pipeline that seems to have payoffs for all parties. JA offers business representatives a chance to make short presentations in school classrooms. "It provides an opportunity for industries to get the word out about hard-to-fill jobs … It's a chance for employers to go out and tell your story," while at the same time helping to meet an educational need. BOCES and Tech Valley High School also bring business people in as partners to expose young people to technology.

Most of the employer-respondents expressed interest in participating in the pipeline. Some see its value for recruiting new staff and training their existing staff:

- "We are not always looking for those folks ... It's hard to keep having that contact when it's rarely used. It would be nice that there would be one place for you to look when these jobs do come up."
- "We have been able to develop the people we have already hired ... But if they express an interest, where can we send them to get the technical pieces they need? That is what is missing."

Employers are interested in being active partners, but they desire to put boundaries on their involvement. A chamber executive commented, "(The) concept sounds good. As a business, will they want to complete this profile? Will they end up getting calls that will suck up their time?" He emphasized the need to show the benefit, "assisting the workforce development effort so they have a better talent pool to hire and retain." A business executive put it even more strongly. "We have to help our companies, so they can grow and thrive. We haven't got time to waste doing nonsensical stuff."

To make the process more manageable, several suggestions were offered, including one to report only the activities a company was willing to undertake. A business can offer, for example, to talk to high schools with engineering clubs. This way, the calls from schools would be limited and on target. With the proper links, educators and job seekers can "go to getcareers.com and search on their own for info about jobs, duties, skill sets, etc." Having these links prominently displayed (with suggestions for successful navigation) will provide accurate career information to parents and students without overburdening employers.

- Focus on Job Seekers:

  To be effective, a pipeline must operate on a number of levels – pre-placement help to get people ready to access the training they need, counseling and support for those with multiple needs and challenges, and a more direct route for those who have a solid preparation in the foundation skills. But we have to keep in mind that most individuals are simply looking for work; they do not necessarily want to be part of a formal "employability pipeline."

  Promoting high quality, hard-to-fill careers is an important service for pipelines. One avenue, as a health care representative pointed out, is to "get the parents involved. There are so many jobs in health care that nobody has ever heard of. Histology, who has ever heard of that? There is only one program in New York State (SUNY Cobleskill), and that program almost went bust because there were no students."

  Many employers and educators echoed this finding – the importance of reaching young people:

  - "You have to engage the students, parents, and the guidance counselors about what opportunities there are in our region."

- "I think the focus has to be less on getting people with good qualifications than on getting people interested in manufacturing at all ... If they're not coming at all, this part (having the right skills) doesn't matter."
- "Research has shown that it's in the fifth grade when kids start eliminating careers ... when they're sitting with their counselor to decide what track they'll follow in high school … it stays in their mind that this might be a viable career."

Some employers were also looking for people with lower skill sets: "To get to the top of the chain, they would probably need a two-year degree … But there are other jobs that low tech employers will be dying to fill (through a six month) certificate program." A successful pipeline therefore needs to provide a wide range of services.

There is a concern about job seekers who stop looking and preparing for employment. "How do we get people who've leaked out get back into the pipeline?" Resources must be offered to service these people, as well.

➢ Focus on Schools:

Schools also realize the advantage of a well-thought-out pipeline. A community college educator told us, "I'm really excited about this venture (pipeline). I hope this isn't one of those reports that just sits on a shelf. It's one of the most terrific ideas I've heard."

Most school administrators also saw value in the expanded dialogue with employers, citing the feedback component and additional information offered by the pipeline. "We're always looking for more resources on the employer side … To be able to consolidate it and make it available to gate keepers in schools – guidance counselors and teachers – would be great."

Another educator added, "The pipeline would be wonderful – list job types and skill sets and what the pay would be. It would help students understand - what would I be *doing* at work? … The website will bring this alive."

Some educators commented that existing programs fell short of their stated objectives. "Career Zone and O*NET are too dense, too hard to navigate ... Have it all in one place, but easy to manipulate." Others were concerned that "having it all in one place" makes it too difficult to navigate. "It would need to have a very robust data base."

❖ Regional vs. Local Pipeline:

As expressed above, an all-encompassing pipeline would be overwhelming for an eleven county region, so we recommend that the pipeline focus solely on mid-level technical positions. Respondents from all sectors were in accord – a focused pipeline addressing a large geographic scale, with local connections, is the appropriate route. A business leader concurred. "Keep the pipeline focused and narrow; it will have more impact that way." The main benefit of a regional approach is the awareness of

opportunities outside the immediate area that can be created, we were told. College students have little interest in the political/geographic boundaries that may constrict their job search – they are ready to move to where industry is. And despite the presumed turf-protecting, "County leaders are interested in a regional approach," a workforce development leader reported.

While there was strong support for a regional pipeline that had all the information in one place, there were also many cautions:

- Keep it simple: "You have to be careful not to make it too cumbersome." Most of us view hiring as a transaction – "need somebody, hire somebody."
- It is too expensive to maintain such a large database.

  "TechValleyCareers.org had lots of great data. It's off line for now," due to lack of funding, and the risk of obsolescence is real. Updating links on existing local websites is much easier.

An electro-slag melting crucible for high temperature alloys from Zak Inc
Photo courtesy of Zak, Inc., Green Island, NY

- It can be overwhelming for an employer to figure out the public workforce system from a website. "Do you need training, employment subsidies? They don't know what the options or regulations are or who to call."

We recommend supporting and not duplicating or competing with existing local efforts at talent pipelines including the NYS Department of Labor employer services teams, the Fulton-Montgomery Business Education Alliance, and the Adirondack Business & School Partnership. Many chambers, WIBs, BOCES, and colleges are also engaged in business and school alliances, workgroups, etc. There are a number of websites with extensive career information, including NYS Department of Labor's Career Zone, US Departments of Labor and Education Career Voyages, Tech Valley Technology Road Map, Tech Valley Careers.com; Tech Valley Internships.org, O*NET; and NYS Department of Labor's employer locator system.

- "(You) don't need to replicate our site, it's already out there, just link to it."
- "We need good communication between stakeholders, not another web site."
- There is no need to develop a new site that we would "have to drive traffic to. Why not just link the existing sites in a network?"

There was added value to keeping it local.

- "For me, it's important to deal with the local aspect of it. If it were small enough so that it would make a difference to us personally, then we'd participate."
- Relationships are important and they work best on the local level. "It's the relationship the teacher at the school builds with businesses that allows placements to happen."

- One employer, already actively involved with local efforts, suggested, "Create a database of models that shows -- here's how it works. Have each school/company contact their local counterparts and find partners that are a good fit and stick with them. Don't list everyone on a big web site/data base."

Some networks are organized by sector and will not want to replicate themselves on a regional pipeline. "Hospitals already have a pipeline to new employees through contacts with high school guidance counselors and two-year schools ... With their existing linkages, they may not need a pipeline."

❖ Who should host this "virtual regional pipeline"?

Suggestions include the NYS Department of Labor with their Career Zone and Tech Valley intern websites, labor market data, employer service teams and one-stop networks; the Capital Region Human Resource Association with their links to over 800 regional human services professionals; and the Center for Economic Growth with their network of manufacturing companies and training providers. Other business and trade associations, such as the various chambers of commerce and Associated General Contractors have expressed interest in participating.

As noted elsewhere in this report, educators and employers have different frames of reference and different languages. Whoever hosts the regional pipeline should be seen as "an honest broker" who can speak the language of both worlds and see and represent both perspectives.

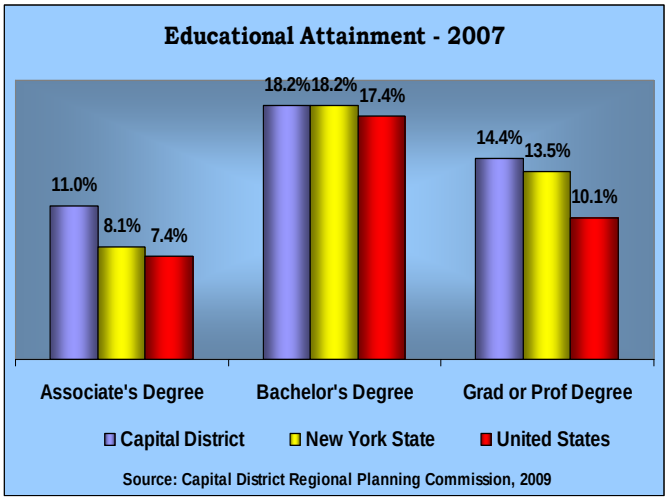
❖ Cost

One economic developer pointed out that by increasing employer success and profitability through improved workforce development, the regional pipeline could help create jobs. Current job creation efforts value new jobs at "$20,000 each, so if a plan that cost $1 million was devised and it resulted in the creation of 50 new jobs, that's the standard number the state looks for."

◈ Section 3 - Perceived Regional Demographics and the Effect of GlobalFoundries

New York is commonly known as a high-tax state, not especially business-friendly, with older demographics, high electricity rates, and possessing an aging infrastructure. Several economic development professionals, as well as a representative from GlobalFoundries, the new company formed by AMD and other investors that will build and operate its semi-conductor fabrication plant, explained why the Capital Region was selected by listing many factors in its favor. Among them were a local and state political structure that was very much in favor, backing the project with political capital and significant financial incentives. Another reason was the high quality of the school system and the workforce.

As part of its search, AMD/GlobalFoundries researched the region's education system -- high school, two-year community colleges, four-year colleges, and research universities -- and determined them to be generally of high quality. Standardized test scores of fourth and fifth graders and the K-12 math curriculum were especially strong, perhaps projecting to future academic success. Also, college attainment per adult was higher in the region than in the rest of the state and nation.[1] Of special interest is the greater proportion of those who have attained associate's degrees (largely from community college graduates), the workforce that can potentially fill many of the coming mid-level technical positions.



Occasionally, we hear about a "brain drain" in the area, but there is some anecdotal evidence that refutes this notion. Many of our universities draw from wide areas – our college capacity far exceeds our local college-bound students. Much of the loss of college graduates are the out-of-towners returning home.

In the case of GlobalFoundries, the positive factors turned out to have a greater influence than did New York State's business-unfriendly reputation. An area economic development professional analyzed the process and concluded, "Our comparative advantage must be on workforce quality."

Other new-to-the-area companies have found a skilled and available workforce (even before the recent upturn in unemployment). Vistec Lithography came to the Watervliet Arsenal from England, held a job fair, and 250 people came. We were told that Vistec executives were overwhelmed with quality applicants. They wanted employees with generic technical skills and they easily found sufficient numbers.

[1] Chart reflects CDRPC Region - Albany, Saratoga, Rensselaer, and Schenectady Counties (approximately 80% of the workforce for the eleven-county Greater Capital Region).

Maintaining this advantage may be difficult. Currently, we have a shortfall in the sheer number of technically trained people. As evidence, a consultant's report relating to siting a large semiconductor plant in upstate New York reported that 80% of the engineers would have to be imported into the area, as well as 30% of the fabrication operators.[2] A workforce expert noted these mid-level production workers are hard to import. The conclusion -- to sustain the anticipated growth, more effort has to be made to develop them locally.

GlobalFoundries will need hundreds of skilled employees to manage and repair highly-complex equipment – operators and technicians who can monitor performance, keep the machines operating within specifications, and make adjustments in programming, all on round-the-clock shifts. The majority of jobs will call for two-year college degrees, mostly exhibiting expertise in semi-conductor manufacturing and applied science.

Opportunities for those with associate's degrees are definitely increasing, and not just from GlobalFoundries. On a statewide basis, between 2004 and 2014, occupations requiring at least an associate's degree are projected to grow more than any other level except those requiring doctoral degrees.[3]

Hudson Valley Community College will play a large role in training employees for the Luther Forest Complex, by establishing a "TEC-SMART" center at the Saratoga Technology and Energy Park (STEP) campus near the GlobalFoundries plant in Malta. The campus is a joint venture with the NYS Energy Research and Development Authority. In addition to nanotechnology technician training, there will be a major renewable energy curriculum offered. The first class will graduate in 2011.

GlobalFoundries personnel are also considering the same strategy used by General Electric for training large numbers of employees, in which workers spend four days at GE, and one day in training at HVCC.

Fulton-Montgomery, Schenectady County, Berkshire, and Adirondack Community Colleges are also being considered by the company as training sites, as are others that are more distant. Several officials from other community colleges expressed hope that they would become more involved with GlobalFoundries and its related industries. "I hope they'll look at us. They can't get them all from HVCC." Feeder businesses will have similar needs. We note several comments from businesses relating to the overly-territorial nature of some area public community colleges, which detracts from their ability to coordinate programs with other institutions for the benefit of their overall region.

In the construction industry, there are not enough qualified workers in the region to build the multi-billion dollar structure. Specialized workers are being trained through programs set up by unions, contractors, and others, but many workers will be imported, especially

[2] "Upstate New York: Assessing the Economic Impact of Attracting Semiconductor Industry," SEMICO Research Corporation, March 2008.
[3] "Analysis of Occupational Projections and Wages by Education and Training Requirements, New York State," prepared by Division of Research and Statistics, New York State Department of Labor, July 2007

those who have worked on similar plants. For example, the majority of process piping tradesmen may be "travelers."

Most of the construction workforce will be unionized, acquired through a contract with the trade unions. The company receives qualified workers, and the union workers are employed at prevailing wage, with benefits. A union official explained that construction skills are similar for most applications, but "protocol is a big thing with clean rooms – doing it exactly as it's laid out." Certain subcontractors may not be unionized but this is expected to account for a small part of the workforce.

Overall, the arrival of GlobalFoundries is viewed by most people in the region as a strongly positive event. Certainly, the construction industry is optimistic. "It's a two-year project, but hopefully, more companies will come to the area because of GlobalFoundries, which will increase our workload." Economic developers are hoping that some subcontractors and spin-offs will also arrive in the region.

But the consensus view is that there are simply not enough qualified workers in the region to staff the new plant. The need for another source for workers received much discussion in our focus groups and interviews, not always positively. "GlobalFoundries will need three times the available technicians in the area -- logically, there will be raiding." One manufacturer expressed concern that "they will have to poach from other companies. (But) eventually, it will balance out. And they're not going to hire 1,000 people all at once."

Still, "Anybody in the semiconductor business … should perceive themselves as a target." Another company official said, "Where we lose is our skilled trades ... if they start hiring machinists and drafts people and pay them potentially more than we would pay them, that's where we think we would lose."

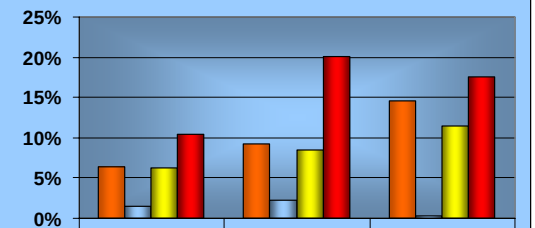
With SUNY NanoTech and Semetech operating, there are qualified employees in the region in fields that did not exist until recently. One manufacturer noted the increasing ease for newly established companies to find people experienced with clean rooms and semiconductor technology. Furthermore, GlobalFoundries' need for trained workers has provided the impetus for Hudson Valley Community College to establish new programs, which will eventually help other companies as well.

Right now, the Albany region is flooded with people who have technical aptitude, but not the expertise necessary for some of the emerging businesses, we were told. Because some of the companies are in cutting-edge fields, there are very few individuals who have the specific knowledge for that line of work. "No one does exactly what we do until they do it with us." One biotech manager explained, "If you are a high-tech company, you come here for the aptitude of the workforce, not the skill set."

Although the proportions are favorable, the technical pool in the Capital Region as a whole is small. "This is like an oasis in the middle of the desert. There really is nothing when you leave the Capital District for three hours. I've worked in Boston and in northern New Jersey, and there is a company at every traffic light."

No one is surprised that government expenditures are a significant component of the regional economy, but the manufacturing sector also represents a considerably larger portion of the Gross Metropolitan Product here than in the rest of the state.

Gross Metropolitan Product-2006



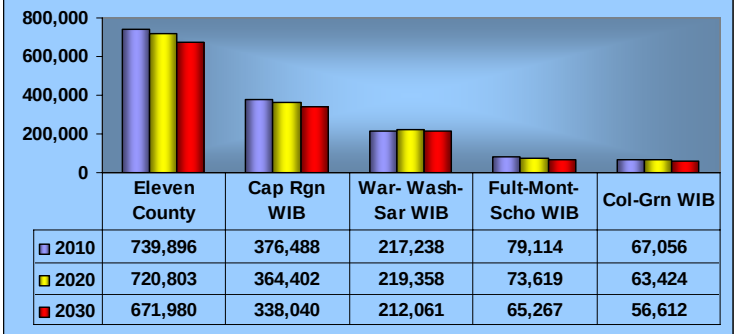
	New York State	Alb-Schen-Troy	Glens Falls
Manufacturing	6.4%	9.2%	14.6%
Education	1.5%	2.2%	0.3%
Health	6.2%	8.5%	11.5%
Government	10.4%	20.1%	17.6%

Alb-Schen-Troy MSA (Albany, Schenctady, Rensselaer Counties)
Glens Falls MSA (Warren, Washington Counties)
Source: US Dept of Commerce, Bureau of Economic Analysis

Some manufacturers are world leaders, although not in "glamorous" fields. The Glens Falls metro area enjoys the highest concentration of employment in medical devices and equipment manufacturing of any metro area in the U.S.[4] It is also the location of several large paper product plants. Companies find it hard to fill positions because so few students choose to enter relevant college programs. "They have some sort of engineering program (at the local community college) and have usually been hired by the places they interned ... They can name their price."

Some cities and towns with empty and under-used factory buildings are promoting their proximity and inexpensive cost to attract spin-offs. "They talk about Amsterdam being 20 minutes from the site. The industries necessary to support GlobalFoundries are on the list for Amsterdam to attract, as part of its rebuilding."

Workforce Population Projections 20-64 Age Group



	Eleven County	Cap Rgn WIB	War- Wash-Sar WIB	Fult-Mont-Scho WIB	Col-Grn WIB
2010	739,896	376,488	217,238	79,114	67,056
2020	720,803	364,402	219,358	73,619	63,424
2030	671,980	338,040	212,061	65,267	56,612

Source: Cornell University, College of Human Ecology
Program on Applied Demographics

Not all business executives are convinced that the arrival of GlobalFoundries will change business conditions for them. From a small manufacturer, 40 miles away: "It will affect some people in the semi-conductor world, but it probably won't affect a lot of others."

By the numbers, a review of data collected from the US Census Bureau, the Capital District Regional Planning Commission (CDRPC), the NYS Department of Labor, and Cornell University tend to agree that the population has been relatively static over recent decades, but there are definite shifts within the region, away from urban areas to counties that are more suburban and rural in character. Saratoga County continues to grow, but population growth in other parts of the US is much greater.

[4] "Biosciences in the Capital Region," Jim Ross, Labor Market Analyst – Capital Region, Employment in New York, NYS Department of Labor, November 2007
http://www.labor.state.ny.us/workforceindustrydata/PDFs/enys1107.pdf, May 30, 2009

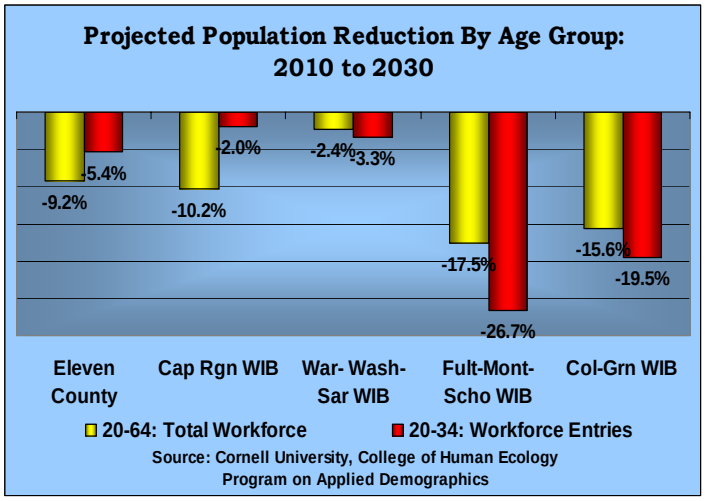
By age, the CDRPC reports confirm what we have heard from many employers, as exemplified by the comment, "our average employee age is 45 – they're either 60 or 25." An employer with a unionized construction workforce commented, "There is a gap in the middle of the age groups in the current workforce, 35-50, due to reduced hiring in the 1990s. Journeyman level staff are at a premium nationally." Demographically, he is describing the gap between Baby Boomers and Millenials.

Many businesses are facing the aging of their labor force. While some employees are extending their working lives, shortages are expected. "What if I need to find 20 more skilled machinists and I've got guys that are retiring? I won't know what to do at that point."

The overall workforce increase over the past 50 years has leveled off and the projections are not encouraging, for any age group. The region's total workforce is expected to diminish over the next 20+ years.

Among the 20-34 cohort, the population entering the workforce, a slightly lesser decline is projected in the eleven county region. But running a comparison by WIB, we see that younger workers will decline at a faster rate in the more rural WIB territories.

The drop in workers in the Fulton-Montgomery-Schoharie region is particularly pronounced, showing a loss of one out of four entry-aged workers.



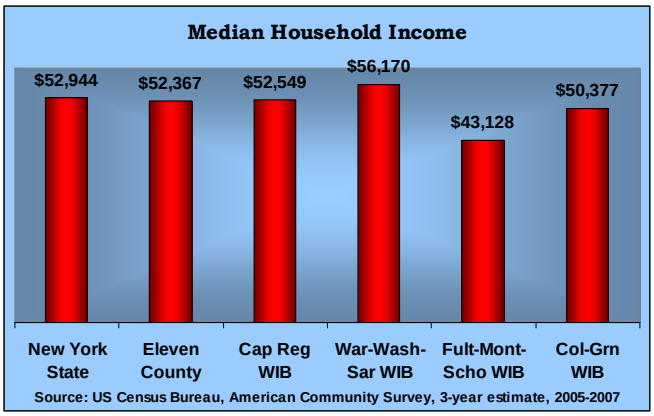
The predominant sector locally continues to be government employment, which remains stable, even with planned state reductions. Education is similarly steady, according to area demographers. On the other hand, healthcare employment is increasing, and there are shortages in many technical areas.

Large employers are no longer as dominant in the region. Their portion of total employees has dropped significantly over the last few decades, with staff reductions and large business divestment by General Electric as the most obvious examples. CDRPC has noted that smaller businesses have been filling the gap.

Capital District Businesses:

	1980	2006
1,000 or more Employees	20	21
1-4 Employees	6,820	10,413

The four county region has just about the same number of large employers as it did twenty-five years ago, albeit smaller than they were, but businesses of 1-4 employees has nearly doubled during that period. While the number of jobs has remained the same, employees often receive lower salaries and benefits.



In terms of income, the region matches up with the rest of the state, but the outlying areas have somewhat lower median household incomes.

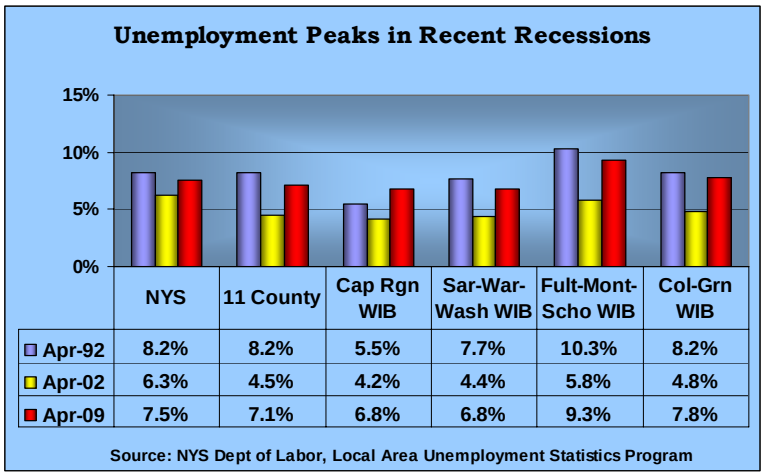
On the negative side, business executives made reference to the lack of diversity among the workforce. Minorities can be difficult to recruit. "We haven't tapped that labor pool here (northern part of the region). I wonder if there's a way to get folks from south of us, Albany. I keep hearing there is large amount of people available looking for work and might have the skill sets."

Still, optimism is rampant. As the high-tech sector enlarges through the efforts of GlobalFoundries, its suppliers, and related industries, companies will be attracted to the region for the same reasons expressed by the original AMD investigators. The evidence shows that area is starting to develop some high-tech presence and stability. As the businesses grow, so too will the opportunities for career pathways.

◈ Section 4 - Trends in Employment

❖ Effect of current economic conditions

Although economists continue to remind us that the future is always uncertain, we are not in midst of anything comparable to the great depression. Unemployment is at one-third of that of the 1930's, production is down by a few percentage points as opposed to a significant portion of our gross domestic product, and we have a social safety net in place that did not exist then. A prominent economist recently presented evidence that, indeed, we may have hit bottom, noting, based on his work with credit managers, that lenders are lending again – one of the first sign of confidence.[5] The unemployment rate is a lagging indicator – when the rate peaks, the recovery is usually already under way.



	NYS	11 County	Cap Rgn WIB	Sar-War-Wash WIB	Fult-Mont-Scho WIB	Col-Grn WIB
Apr-92	8.2%	8.2%	5.5%	7.7%	10.3%	8.2%
Apr-02	6.3%	4.5%	4.2%	4.4%	5.8%	4.8%
Apr-09	7.5%	7.1%	6.8%	6.8%	9.3%	7.8%

Source: NYS Dept of Labor, Local Area Unemployment Statistics Program

With that in mind, we compared the current period with the last two recessions – early 1990s and early 2000s. Since the most recent unemployment figures available are for April 2009 and they are not seasonably adjusted, we compared the month of April in the year when unemployment was highest for each recession.

If the worst is over and employers begin to hire again, then the coming need for mid-level technical workers will put increased pressure on the pipeline to develop them.

In the eleven county regional WIB (Work Investment Board) area, the unemployment rate is actually lower than that of the 1991-92 recession, although it varies by county, with those to the west maintaining a slightly higher rate (as they usually do). It is considerably higher than that of the recession following the "dot com bubble" and "9/11," though.

To put the various WIB figures in context, as of April 2009, the Capital Region WIB continues to contain the largest workforce among the four WIBs by far, at 51%, followed by the Saratoga-Warren-Washington WIB at 30%, the Fulton-Montgomery-Schoharie WIB with 11%, and the Columbia-Greene WIB at 9%.

❖ Opportunities

The economic conditions represent opportunity for some employers. "Right now, we have more people to choose from, so we can be more selective." Most industries hope to position themselves for a speedy recovery. "If you're going to make it to the other

[5] Dr. Chris Kuehl, Managing Director, Armada Corporate Intelligence, presentation before the Marketing Research Association Annual Conference, Chicago, June 3, 2009.

side of this recession, at least for us (energy), the demand is not going to go away. Just like after 9/11, the floodgates will be released and we'll need more people at that point."

There are also opportunities for job seekers. One focus group finding was the mention of a "hot jobs" (hard to fill) context in healthcare. "It is hard to say in this economy, but healthcare is one of the best industries to get into, right now. We are still hiring," according to associations representing hospitals. Furthermore, "there are so many hot jobs in hospitals. They all require specialty training. They don't have enough schools to train them but boy, they are critical. You can shut down a whole unit if you don't have enough of them." The retirement issue looms large in hospitals. "For a lot of technical people, the average age is in the 50s. There is a coming shortage of workers in the healthcare industry."

SuperPower, Inc. - working the IBAD system
Photo courtesy of SuperPower, Inc., Schenectady, NY

Despite the slowdown, opportunities for women are increasing due to pending retirements, changing technologies, new skill requirements, and changing societal norms. "If I could hire a woman electrician, I would be overjoyed. She could write her own ticket, not for the quotas, but to set a precedent … if that becomes an accepted thing, then it wouldn't be such a rarity to see a woman pipe fitter or a woman carpenter." " To become a decent mechanic, it's all computerized. It's not rough and tough anymore. We're trying to entice more women to come to our industry to operate heavy equipment."

There is near-universal praise for employees with military experience. "Love them. They come to work. No problem taking direction." Other descriptions include hard-working, conscientious, on time, disciplined. "Ex-military, who have gone to HVCC and other places and qualify themselves, are usually more disciplined, mature, and process oriented. The training process weeds out those who won't show initiative." They also occasionally help to fill in the age gaps mentioned in this report. "We hire them because when they retire after 20 years, they are not so old."

The construction industry has created a special program to recruit veterans, "helmets to hard hats." The G.I. Bill benefits enable veterans to receive money as apprentices. Some military academy graduates who have civil engineering degrees have proven to be valuable employees.

- **Screening Employees**

  Employers, in discussing the screening process, emphasized the expense of making a bad hire. "You've got to make really sure you have the right person."

Some companies prefer initial training by outside entities before hiring as a means of screening. People who find a job unsuitable will be "weeded out early." For example, there are various HVCC two-year programs in technical skills. An employer reports that those doing the hiring, "look at teacher comments and grades of students ... they know if they have initiative and other soft skills from how they perform in school ... it doesn't guarantee employment, but most get hired."

The use of aptitude tests came up in several of our discussions, and aside from basic math, English, and computer competence exams (testing skills rather than aptitude), we found that very few companies use formal generalized testing, although a number of them had considered and tried them. "We were doing seven aptitude tests, for three hours. They were very long, unnecessary, and painful."

Some enterprises screen for specific characteristics – initiative, for example. "We try to pull out those traits in our interviewing process. Based on their answers, if we find that they are somewhat inflexible, we probably wouldn't hire them. We use behavioral-based interviewing where we ask people how they handled previous situations. It gives you a gauge of how they're going to perform now."

- **Drug Testing**

Almost all area companies who are engaged in technology conduct drug testing of their employees, usually before they are hired. "It's a post-offer, pre-employment test that has to be taken." For construction projects, owners sometimes have their own drug screening rules, and in the biomed and biotech industries, which are government-regulated, there are prescribed requirements, often including random drug tests and those conducted upon suspicion. One biotech company reported, "Everybody gets drug tested, and in some positions, they have their blood levels checked all the time." Most companies require that testing be done after accidents.

Alcoholism is another concern, and in some industries, it is the greater issue. "We don't test for alcohol, but if there is suspicion, if you smell alcohol, then we will take action." Many employers offer rehabilitation, up to a point.

- **Hiring challenges**

There is a widespread assumption that many of the industry sectors under analysis here are not regarded as prestigious. By definition, they involve blue collar work, even if the skills are acquired through higher education. "That's the stereotype - dirty work." With a large public university system and parents who encourage their children to try for prestigious professions, "we are not finding anyone (to apply). Anybody who wants to go to college can go to college."

Applicants also lack exposure to many of these jobs and tasks. We heard from manufacturing executives in a focus group, "As children, no one dreamed that they would be doing this. There are no firemen or ballerinas around this table."

Distance and weather are other obstacles. Some prospective workers refuse to travel any significant distance to an appropriate job. For example, "When you look at where our people come from, they come from southern Washington County (where the company is located). They won't cross that river (the Hudson River from Saratoga County)."

Generational challenges were also mentioned. In the "free to be me" and "everybody is special" era, employers complain that students coming out of college are not ready for the corporate life. They expect that the notion of academic freedom will carry over to work. An example they shared is that new hires question the need for lab coats and safety shoes in the summer.

- **Retention**

First, it must be stated that retaining employees is easier during a recession. "Our turnover rate is going down."

Almost all companies have some sort of probation policy, ranging from 90 days to six months. "There is a lot of pushing and testing that goes on during that time." Most people qualify, but during the interview, "They give the perception by their demeanor that they can do the job well, but when you hire them and get them on the floor, there is a problem. It usually shows up in the first 90 days."

For some, the nature of the job is misunderstood, despite the tests and tours presented by the employer. In healthcare, "We would actually show them the yucky part of the job. They come in and say, you are paying (a high hourly rate), and that's perfect for me. But once they get on the floor, dealing with bedpans, the unpleasantries of that position, they are gone ... We can get them in, but we can't keep them."

◈ Section 5 - Interactions between Employers and the Workforce Development Community

❖ **Findings:**

- Employers see little value in the current workforce development system, including the workforce investment boards, the NYS Department of Labor, and One-Stop Centers.
- Employers believe the system is too focused on getting people into jobs and not focused enough on developing a workforce that meets employer needs.
- Employers are interested in collaborating with the workforce development system if they could be convinced that actions and outcomes of value would result.

In most of our interviews, individually and in focus groups, we asked respondents to describe the interactions between employers and the workforce development community. Most businesses had few interactions to report.

❖ **First Issue** -- Too many meetings, too much study, not enough action.

Among those who did have contact with the workforce development community, the comment epitomizing this was "the WIBs consist of people who go to meetings to meet. We go to meetings to get things accomplished."

Some business executives criticized the overall goals. "The WIBs came about to bring the educators, the Department of Labor, and the trainers together (leaving out the employers). I've been to the boards to set up the WIB in our area, and it was such a complete and total waste of time that I wouldn't go back." Another business person commented. "We had different expectations than the educators and government officials that were sitting there."

Consultants were taken to task as well. "No offense, but the WIBs have been studying this stuff for years without ever offering a tangible program. The employers with whom I speak will not wait for a study. When they have a training need, they simply find a provider and get it done."

When asked why any employers choose to come to meetings, a business association official replied, "Most business people who participate in WIBs do it as part of their civic duty, not because they see any benefit."

❖ **Second Issue** -- An outdated, supply-side culture and structure.

A broader analysis came from a workforce investment official who compared the WIB model to a 20-year-old bicycle. "We keep putting new bells and whistles on, but it is not going anywhere, because it was designed to serve an older manufacturing, blue collar population, that was used to a public assistance context. Now we are serving a higher educated white-collar population that isn't used to public assistance and a WIB model doesn't work."

A business leader suggested that WIBs should look systematically at their own organizations, to determine how to promote real change. "WIBs are almost constructed to fail -- they have boards of 50 members representing so many different sectors." In another community, a reduction to 15 members proved much more effective.

Workforce investment boards are a creation of the Workforce Investment Act and to some extent, the New York State Department of Labor. The DOL also operates One-Stop centers which, we are told, "feel like an employment office. White-collar professionals feel out of place."

If so, the mid-level technical employees upon whom we are focused may also feel out of place, especially since "one-stop counselors don't know what's out there and don't know who's hiring. They don't have good assessment tools that companies believe in," according to a workforce development executive.

Employers say they are looking for experienced workers with the right skill sets, especially attitude and soft skills, but according to some of our respondents, the Department of Labor sets as its priority to get the least-skilled persons employed. Their training grant requirements are too restrictive to businesses, and many do not go after the funding for that reason.

- **Possible solutions**

  Our key finding is that the business community does want to be involved. Even though they feel "meetinged to death," employers' objectives are to align the systems to work better together.

  - Most important, businesses and some government officials believe that DOL activities should shift from focusing on workers to the needs of businesses.
  - Each one-stop center has access to a regional labor market analyst who keeps the counselors apprised of local trends and needs. Employers need to see results; how the data is effectively used to improve the quality of referrals.
  - More needs to be done to improve the public image of one-stop centers. Communication with employers would be a good start. Each county or WIB region has an employer services team assigned to reach out to the employers and inform them about the services available to them. Of special value is the help offered in navigating the complex public workforce development system. Assessments can be conducted for employers, resulting in recommendations for appropriate services and support. Some of these teams are fairly active and have developed good relationships with area employers, while others are not as active.

  We interviewed a number of business association executives who note that their ability to communicate with thousands of employers at the touch of a button can be of great value, and their desire is to be helpful. The major question asked of the WIBs is to identify the value to employers of the programs they promote. "They've never answered that question, nor provided us with something we thought had value for the bulk of our members."

◈ Section 6 - Required Skills and Skill Gaps

❖ **Findings:**

- With the exception of advanced construction, there was much similarity across sectors in terms of desired skill sets. The variations were based more on the complexity of the processes involved, rather than the specific sector.
- Mid-level technician jobs require lower levels of computer and math skills than had been assumed by educators and workforce officials.
- A college degree is used as a symbol that someone is trainable and intelligent, which can be as important as the specific skills learned on the job.
- "Soft skills" are still a critical under-met skill set for most employers at all levels in the industry. While this is not a new finding, it is discouraging that so little progress has been made, so many years after it was first promoted by the US Departments of Labor and Education.

This is the core of our research. Our charge was to identify the skills employers require for mid-level technicians and then, to determine which of these skills were the most difficult to find in the current labor force. We defined mid-level technician as a position that required a two-year college degree or less to be hired. Our focus was the high end of the high-tech industry, in the five following areas:

- Advanced Construction
- Advanced Manufacturing
- Biotech/Biomedical Companies
- Energy Companies (especially renewable)
- Nanotechnology Companies

We also included technicians from the healthcare industry that we deemed to be part of the biotech/biomedical field, and that fit the "mid-level good paying jobs" criteria.

Few advanced manufacturing companies actually operate in a production mode in this region, so we expanded our lists to include manufacturers that use Computer Numerical Controlled (CNC) machine tools or robotics. We refer to these as "lower tech." The data that follows is generalized for all five industry sectors. Specific issues related to a single sector are noted in the narrative.

- **Variations across sectors**

  We found that the primary variance among different levels of industry was that the most high-tech companies -- semi-conductor, nanotech and biotech -- which operate in a clean room environment, and the wind energy system maintenance industry, which uses very complex controls, tend to require a two-year degree for mid-level technicians. Companies doing business within the other sectors are open to workers with a certificate, some college courses, a BOCES technical program, or even a high school degree.

Skills sets and credentials for the health care industry are heavily regulated and most technician jobs are licensed, requiring very specific college programs that lead to degrees and certifications. This industry is the most difficult in which to build an internal career ladder. To advance in the technical areas, staffers usually need to go back to school.

Axle lathe and cover from Simmons Machine Tool Corporation
Photo courtesy of Simmons Machine Tool Corp., Albany, NY

Otherwise, the skill requirements were fairly similar, again with the more demanding companies requiring higher levels of these skills. As one respondent said, "The five sectors are not so distinct. They share common, core, threshold skills – accuracy, being detailed and focused, having people skills, and able to work with machines." Another pointed out, "we are past the era where people work with either their hands or their minds; they have to work with both together."

A number of respondents noted that educators and employers often emphasize different messages. "Educators need to learn about this (the structure of) the physical model of schools, bells, culture, etc." and how they conflict with the different culture and norms of the work world. In discussing the non-profit training sector, one noted that educational programs "operate in silos, yet collaboration / coordination will be a key strategy to engage employers."

Furthermore, "Students need more than a high school diploma for successful employment … This is the driver behind No Child Left Behind … Now with global competition and high-tech work, we need more skills. College participation shows an ability to learn. It's a marker for being trainable."

- **College education as a symbol for something else**

The "marker for being trainable" comment is one of the most interesting findings of our project. Repeatedly, we were told that workers in many of the companies were required to have two-year college degrees. When we pried deeper to try to find out what specific skills or knowledge these programs brought to the job, we found that college education in many instances was a symbol for something else. Even in the most high-tech companies, most technicians did not need math skills beyond a solid understanding of high school algebra. (In some areas they needed a little trigonometry, geometry, and/or statistics.) Yet most, if not all, of the two-year degree programs targeted for the high-tech industry require pre-calculus or even calculus.

Employers and college staff were equally unapologetic. We learned from them that they believe high level math "sharpens your mind," "improves your critical and analytical thinking skills," and "if you can pass college level pre-calculus, then I

know that you have a solid understanding of high school algebra." Also, "9th grade math was a long time ago, they need to keep taking math so the gap isn't too long and their skills fade."

We agree that taking math all through high school is a good idea, but pre-calc might be going too far. One college educator said, "Pre-calc is taught because that's the way it's always been…Times change and programs sometimes lag behind." Requiring these courses is "intellectually arrogant" according to another educator. This is one blockage in the talent pipeline that can be eliminated.

Another reason given for requiring two-year degrees is that it indicates that the applicant has solid learning skills, and is motivated and intelligent. College completion provides a short cut for employers to sort through résumés. Again, this seems to add an unreasonable obstacle to the pipeline.

- **The critical importance of soft skills**

When we began this study we were told, "Don't come back and tell us employers want workers with good soft skills and they'll train them for everything else. We want to know what the 'everything' else is." Yet, we have acquired thousands of comments from employers and the main message is "we need workers with good soft skills and we'll train them for everything else!" We did not stop at that answer and we pushed for more, but since employers were so adamant, we decided to cover it in our report as well.

"Faculty are always disappointed," a college official told us, "to hear the focus is on soft skills, since they focus on the academic and technical skills."

"Soft skills" is a term that is used very loosely and means many things. We have divided this into two areas: Basic soft skills, which we will refer to as "soft skills," includes such things as proper attire, attendance, respectful communication, and proper use of company time. These skills are based on understanding the rules. Once you understand the rules, you are able to demonstrate these skills with little training.

More advanced soft skills, which we now refer to as "critical thinking/interpersonal skills," are generic/transferable skills that apply to any work place and focus on human interaction, and need to be developed over time and with coaching. These include being process oriented and accurate, working in a team environment, able to solve problems and think critically, deal effectively with conflict, communicate with accuracy and precision, demonstrating a sense of ownership or responsibility for the work, being flexible, etc. The challenge with critical thinking/interpersonal skills is "how do you teach them?" Many employers reported that you either "had them or you didn't. They can't be taught." We disagree.

Many educators spoke of "21st Century Skills" as a short-hand for the critical thinking/interpersonal and hard skills we are discussing. 21st Century Skills are being promoted by the Partnership for 21st Century Skills, and have become broadly endorsed in the education community. It responds well to employer

statements of needed skill sets, although employers refer to them in other language -- as work ethics, job readiness, or soft skills.

Many of these 21st Century skills are also reflected in the SCANS skills from the 1990s promoted by the US Department of Labor, and the Career Development and Occupational Studies (CDOS) skills from the NYS Education Department (from whom we have borrowed the "critical thinking/interpersonal" label). After years of effort, many young workers are still lacking in these critical skills.

Finally there are the "hard" skills; skills based on an academic discipline such as chemistry or math; skills based on specific technology such as using computers or reading blueprints, and other skills that can be taught in a fairly straightforward manner. These skills generally relate to technical aspects of the job and not to interactions with others.

Each of these is addressed in the discussion that follows. The table below summarizes the list, aligning our findings to the 21st Century Skills and CDOS skill list.

Desired Skills and Abilities for Mid-Level Technicians (Employer-Identified)	21st Century Skills	NYS Education Department CDOS Skills
Work Experience		Career Development
Soft Skills		Integrated Learning (applied or project based learning)
Attendance		
Basic Communications Skills	Communication and Collaboration	Read, write, listen, and speak
Appropriate Dress		
Dignity and Respect	Social and Cross-Cultural Skills	
Proper Use of Company Time		Using resources … and the elements of time and materials to successfully carry out a planned activity.
Critical Thinking/ Interpersonal Skills		
Trainable – Willing and Able to Learn	Learning and Innovation Skills	
Detail-Oriented / Process Oriented		Systems skills - ability to work within natural and constructed systems.
Teamwork / Advanced Communication	Communication and Collaboration	Positive interpersonal qualities lead to teamwork and cooperation
Problem Solving and Critical Thinking	Critical Thinking and Problem Solving	Thinking skills lead to problem solving, experimenting, and focused observation
Dealing with Conflict and Stress		

Desired Skills and Abilities for Mid-Level Technicians (Employer-Identified)	21st Century Skills	NYS Education Department CDOS Skills
Ownership	Productivity and Accountability	
Perseverance and Motivation		
Maturity and Integrity		
Flexible – Able to Handle Change	Flexibility and Adaptability	
Initiative	Initiative and Self-Direction, Leadership and Responsibility	Personal qualities - competence in self-management and the ability to plan, organize, and take independent action
Hard Skills		
Computer Skills	ICT (Information, Communications and Technology) Literacy	Information management … the ability to access and use information obtained from … computer networks.
Math and Measurement	Mathematics	Perform arithmetical and mathematical functions
Reading	Reading	Ability to read
Writing	Language Arts	Ability to write
Science	Science	*addressed in academic standards*
Technical Background, Mechanical Aptitude		Skill and ingenuity in designing and creating things from available resources to satisfy personal and societal needs and wants
Documentation	Information Literacy	
Health and Safety	Health Literacy	
not matched:	World languages, arts, economics, geography, history, government and civics, global awareness, financial, business and entrepreneurial literacy, media literacy, and creativity and innovation	

❖ Talent Pipeline Employer Identified Skills/Abilities

➢ Work Experience

Before discussing specific skills, many employers highlighted the need for a strong work record. In the more high-tech areas, they prefer demonstrated personal responsibility and commitment, given the complexity of the processes, the fine tolerances for quality, and the cost of the tools, material, and equipment. A proven track record as a technician is highly desired. A number of respondents also discussed maturity -- work experience was a good way to both develop and demonstrate this.

One example can be seen in the health sector, in which new regulations require technicians to have more experience (clinical hours) than before. "Years ago, before the law was passed, we would hire people with biology degrees, or associate degrees, and we could train them on the job." Now candidates "have a good handle, because they've done a basic internship, on the job training."

A high-tech employer said they would consider someone with a high school degree if they had "lots of experience" in the field. (Although, "those with a high school degree would be on a slower learning curve and couldn't do as much.")

For younger workers with a college degree and not much work experience, employers consider summer activities. If they worked at a more exacting job in a science setting, that would show "that they're accustomed to a certain kind of work, while at the same time, they have a science mind ..."

- **Soft Skills**

  "We teach the values of the company, but we hope that someone comes with a solid work ethic, a willingness and aptitude to learn, and they show up to work on time."

  - **Attendance**

    Among the most basic attributes of a successful employee, as we were told repeatedly, is the act of "showing up." One employer emphasized the importance for younger workers especially, to understand employer expectations – "how it differs from school standards," and the impact of absences – "how someone's absence impacts on others," which does not have a parallel in school.

    Another employer remarked on how difficult this was to find. "For the work we do, you are expected to be there all five days. This eliminates a lot of people."

  - **Basic Communication Skills**

    "If you're looking for a mid-level person, you want them to communicate and understand." We want people who are able to interact with people. "Feedback we've gotten from supervisors of interns is that communication skills are critical, and are often lacking."

    One respondent noted, "They lack that communication piece of it. They don't know to ask." " If there's nobody there to hold their hand, then they fail. They stand there and do nothing."

  - **Appropriate Dress**

    A manufacturer reported, "We struggle with appropriate clothing, even at professional mid-levels." Another said: "We offer $100 a year for people to dress according to the task book, and I have to push them to spend the $100." "We issue uniforms," which solves the problem for a third manufacturer.

Others are not as concerned. "It's a safety issue. Other than that, we don't care. You can have offensive T-shirts if they don't bother others, because we don't have customers going through."

Hospitals have it somewhat easier. "We have dress codes … The top has to meet the bottom. It's in the policy book ... When we're in the lab, we have to wear a lab coat, but it's over your street clothes. A lot wear scrubs."

- **Dignity and Respect**

  Successful companies place a high value on basic personal characteristics, notably the "golden rule – do unto others as you would have them do unto you."

  "Part of the orientation is going over … the values of the organization -- dignity, respect, how we treat one another. If you truly live and die by your core values, you can probably have some good success in your organization."

  Choice of language is attributed to age. "It's a generational thing…There's more and more emotion coming out that you wouldn't have seen in the past. In front of patients, each other, superiors."

- **Proper Use of Company Time**

  Several employers reported occasions when employees have become so engrossed in personal web surfing or texting that their duties have been neglected. Perhaps distractions are more pervasive than in the past, but the need for responsibility and commitment to the task have not diminished.

➢ **Critical Thinking / Interpersonal Skills:**

- **Trainable – Willing and Able to Learn**

  The majority of our respondents reported that they find it harder to hire people who can be taught to learn, as compared to finding those with specific technical skills. Nearly all respondents felt that workers who are trainable are the more valued, since each company inevitably has to train its employees to operate within its specific systems.

  One employer was blunt. "If they are not coachable, not willing to learn, not able to adapt to change, we don't want them." This theme is echoed by a number of employers. "There's a certain level of hard skills that people bring and that's enough to get you started. But to understand some of the nuances of each company … we need someone who is trainable." The key is someone who "responds well to training and is willing to learn." "Employers will train people with a strong desire to learn."

- **Detail Oriented and Process Oriented**

  We heard many comments, especially from the biotech companies, about the need for technicians to be able to follow explicit directions, with careful

attention to detail. Tolerances are very fine and quality control is a major concern.

"Someone who understands processes and is process oriented rather than just random. But that doesn't mean they can't step outside the process to make a change for the good, just as long as they are following the proper procedures to do so."

"We want people with an interest in learning what's required to get things done. They need to understand the larger process flow. Nanoelectronics are capital intensive. It costs $4-$15 million for each tool. Procedures have to be absolutely uniform. There are very defined instructions, and in some cases, 500 process steps to build a chip and all needs to go right."

- **Teamwork / Advanced Communication**

  This was one of the topics that generated the most discussion. More companies in all sectors are moving to a team-based environment and are finding that employees of all ages often lack the skills to operate successfully on teams. One employer summed it up with "teamwork is the key."

  Another described it as follows: "Teamwork is important. I see people pulling in different directions, and for me to get them to communicate effectively is hard. When we talk about lean manufacturing in German, there is no word for it because it's a given."

  What is teamwork? "Working for a common goal with a number of other employees with a selfless attitude." Or, "Working collaboratively. Knowing how to work in a group and what that actually means. How you let others speak and listen."

  Advanced communication skills are required for collaborative processes, and precision in communication is also needed in industries where quality control is very precise.

  "Collaboration, teamwork, there's lots of this in elementary and middle schools." Educators note that teamwork and collaboration are left out in traditional high school settings. A shift toward project based learning is another way for schools to build teamwork skills.

- **Problem Solving and Critical Thinking**

  Problem solving takes many aspects. Here is one: "Somebody will get stuck on 10% of the job, and be able to work on the other 90%. But because they can't do that 10%, they shut down. They don't understand that there is still a lot that can be done even though the 10% can't be resolved right now."

  Critical thinking also involves observing and assessing situations. The ability to first see the problem and then understand the best next step is an important skill. "Be able to diagnose and resolve problems by understanding the science

and math behind the systems." (Practical/applied science.) Employers want technicians to be able to "recognize when something is outside the norm and needs attention, and be able to carry it to the next level for resolution." This can mean taking direct action or bringing it to a supervisor's attention.

One concern about problem solving and critical thinking is the difficulty in assessing them during the hiring process; another is how to teach them on the job. An educator noted that there are some promising changes taking place in schools in terms of the design of student assessments -- a "part 2," focusing on problem-solving applications. Project Lead the Way, a practical engineering course has many problem solving activities and the shift towards project based learning also expands on the subject.

But there remains a fundamental challenge in the education model. In the old industrial model, there was one right way for workers to do their job. But in the modern work world, for problem solving, a single correct answer is rare. In school, the old ways tend to continue and there is often only one right answer. "Educators need to learn about this change."

- **Dealing with Conflict and Stress**

  Training in communication and conflict resolution "should be mandatory in high school and college."

  Workers need to maintain their composure. "We have a lot of value on the line on a daily basis, both in equipment and in the process." They have to be able to handle daily stress … "we struggle with that a lot, people who are unable to handle stressful situations and keep their emotions in check."

  Another employer explained, "We tell them they need to learn from mistakes. They either flare up or they hide it, which is even worse. It's ok to make a mistake. Let's learn from it. Our boss says, 'Nobody has lost their job here for making an honest mistake. Never.'"

  Younger workers in particular are singled out. "Some of these guys come out hot-headed … you're going to be working with certain journeymen who don't have the proper communications skills. And they're going to ask you to do things and it may not be nicely. Don't take it personal and ask them to step out to the parking lot."

- **Ownership**

  Another crucial skill offered by respondents was the notion of ownership – recognizing the needs and goals of the employer, and taking actions that would advance them. Employers hope that their hires will "understand and value the big picture, what the company expects from them."

  The point is further emphasized in the details: "We expect an awful lot out of our folks on a daily basis. How they are spending their time and what they are

doing with company property, whether it's running a machine, how they tend that machine, their relationship to efficiencies, to scrap, to its yearly usage."

Regulation puts on added pressure to do things right. "Following our procedures, filling out paperwork, and relating to the importance of that. It's not pencil whipping the document."

- **Perseverance and Motivation**

  For many companies, the stakes are high – imperfections or lax performance can be life-threatening. "Our company makes aerospace parts and to have a failure at 35,000 feet is unacceptable. People sometimes cannot comprehend that the work they are putting forward can affect someone's life." Similarly, "We make components for Mercedes-Benz. When you're steering a car, failure is not option."

  Given these pressures, it is not surprising that companies value employees who can operate in this kind of environment. "It's not just checking data and writing it down casually. It is implementing quality into what you do every day because of the liability that comes along with it."

  The question employers ask when hiring is "does the employee (assuming they have the required technical skills) have the personal attributes for the job?" "I see a lot of people struggle when they come in and have to deal with this (high quality focus) … It intensifies as you become more and more involved, because your responsibilities grow."

  This comment from a high-tech employer summarizes the importance of critical thinking/interpersonal skills. "The people we've let go, it's almost always due to a lack of motivation, poor attitude, or poor team work skills. If they had all that, but couldn't do a complex job, we'd find some other place for them."

- **Maturity and Integrity**

  In many of these businesses, integrity is not just a generic issue. For example, in the pharmaceutical industry, employees fill out legal forms "on a daily basis," and integrity is key. Other employers used the term "have business ethics" along the same lines.

  No one disputes the need for such attributes – "We seek workers with a strong sense of ethics, and good behaviors." But there is a dispute about whether they are trainable - "We can teach our trade pretty well, but we can't teach the ethics part."

  One justification for increasing education requirements for new hires is the presumption that recent high school graduates lack the maturity to function effectively in the world of advanced technology. "Everybody needs some kind of education beyond high school, just to get their maturity level up."

- **Flexible – Able to Handle Change**

  In addition to the team skills noted earlier, employers highlighted flexibility as a key concern. "Especially today, people who were doing one job are now doing three jobs. If you're not willing to pick up the ball and fill in, I just don't need you" In addition to the willingness to do what is needed is the ability to handle change. "That should be number one."

  Cross training was seen as a way to create a more flexible work environment, "so they all understand how their job impacts the next person." "Everyone does everything now. We each have specific skill sets and we have an expert area, but we have a broader scope … we've been trying to develop that as a culture."

  Employees are rotated at some firms, so that procedures are constantly reviewed and improved with each newcomer. "As processes change in the workplace, these people need to adapt. So there are a lot of skills and techniques that they need to learn or relearn." " The company is handcuffed when certain people are the owners of a certain operation. We want the procedures and the systems (not recalcitrant individuals) to drive the success of the division."

  It is a challenge, however, to impart the need for flexibility when it contradicts tradition. "Maybe it has to do with the business that we are in. You have been working a job with consistency and if you throw something at them and it messes with them … that's difficult, especially when you've been doing something over and over again for a certain amount of time."

  When employees move from one company to another, the transition may be hard. "People who come in at mid-level may have some preconceived ideas of how things should be done. It's difficult to redirect them."

  Several employers discussed the hardening of ways among older workers. "The longer tenured employees, if you present some opportunities, tend to be more narrow-minded, making it a little more difficult to get that flexibility." "The entry-level person is going through training and is a bit more open-minded."

- **Initiative**

  An important skill set was a willingness and ability to take initiative, part of which includes effective performance without direct supervision. Initiative "separates the A players from the C players."

  One employer noted, "With the mid-level person, you would hope that they would be able to do their job without asking a lot of questions, but if they come across something, sometimes they feel that they either can't or shouldn't ask questions. They will proceed maybe without the guidance that they need." The employer went on to say that sometimes it is the supervisor who discourages this kind of initiative. "When someone stops to ask a question, the supervisor doesn't always react in the best way."

Employers also want employees to share their observations and feedback. "We have a lot of systems that they have to work within, but we definitely want their feedback." As part of the trend toward lean manufacturing, Six Sigma, and ISO standards, "Continuous improvement is key in this industry."

Employees who understand the larger process flow and can act to improve it are especially valuable, even in industries which seemingly discourage individual thinking, due to regulations. "I think that point is very important - the one about discipline and initiative. This industry is a very highly disciplined industry, but the initiative is even more important. More often you cannot get them both at the same time."

- **Hard Skills**

  - **Computer skills**

    Virtually all industries require mid-level technical employees to have computer skills, but rarely are highly advanced skills required. "Everybody's got to learn to use computers today. We're trying to push as far down the level as we can, because you need that instant communication to move the paperwork that much faster."

    Solid, basic computer aptitude is essential, so they can learn the company's software system once hired. For many companies, a computer "is the control panel on equipment."

    Most of the employers expect new hires to be familiar with Microsoft Office products … "Open a document. Open a spreadsheet. Not necessarily write a document in Word. Be able to open an attachment that might be in an e-mail." Some lamented the need to train employees in the most basic computer skills, such as turning the computer on, using a mouse, navigating in a Windows environment, etc.

    These skills are not as common as one might expect. One employer from a rural area explained: "Thirty to forty percent of my employees do not have a computer at home. This is true of even our younger people coming through the door."

  - **Math and measurement**

    In terms of math, the requirements were remarkably consistent -- technicians needed "basic algebra, fractions, decimals, and percentages."

    "We struggle with that even at the mid-level positions. We find that folks typically have not touched math for many years and struggle. We offer remedial math courses on occasion." We were surprised to hear in the discussion of math skills that some of this was as simple as using a ruler. "Measurement. I mean rulers, centimeters, millimeters."

The machines can be complex, but the math level needed to operate them may not be. "Just to be able to do fractions, basic math, some metric exposure is good. We'd like the ability to read simple schematics, to understand tight tolerances … I would desire that (a ninth or tenth grade level), but I often find people who aren't functioning at a simple algebra level."

A few added basic geometry (right angles) and one or two went as high as trigonometry. "Geometry. That would be very important in my business but we don't often get that." In the solar industry geometry also comes into play: "They need to know how to measure. For site assessment they need basic geometry – right triangles – for calculating the angles of the sun and the roof. Also some basic algebra - cross multiplying and subtraction, able to calculate roof slope, area, etc."

One combined technical reading with math … "The ability to read and interpret technical manuals, good arithmetic, and measurement skills."

Testing ceramics for thermal shock at Blasch Precision Ceramics
Photo courtesy of Blasch Precision Ceramics, Albany, NY

- **Reading**

Matching the minimum math requirements by grade level, most employers felt that a 9th grade reading level would be sufficient for mid-level employees This is slightly above "the industry standard (for entry level people, which) is typically targeted at an eighth grade reading level." For reading mechanical design, "9th grade reading level is ok."

Of particular interest is the skill to comprehend blueprints and schematics. "How to read them, understand them. There's a whole note section they need (in the construction field) to know how to read, but instead they just look at the drawings."

Some needed a higher level of reading. "We have a reading comprehension test. A lot of the documents that we work with are written by engineers for technical individuals. We asked the technicians on the shop floor to work with those documents."

A college staffer pointed out that college textbooks were written at a twelfth grade level or higher, so anyone who attained a two-year college degree would presumably have stronger reading skills.

- **Writing**

Poor writing skills were a common complaint. Employees can't write properly – "even kids with degrees." "The writing ability is atrocious at all levels."

"When we look at applications, sometimes it is very difficult to understand what you're reading. When I see one (poorly written), I put it aside because now I'm worried about (their ability to do adequate) documentation."

Others noted that writing skills were key to future promotions. "To advance, they need writing skills."

- **Science**

In the more high-tech industries, a common feeling was that most people working in a technical environment should have a firm grounding in science. "It's not intuitive. Understanding cryogenics, vacuum systems, chemical vapor, disposition, sputtering."

To work in certain fields as a mid-level technician, employees may "need an understanding of nanoelectronics, modules, and processes at simple fundamental levels." For many aspects of the electronic industry, "the two-year Electrical Engineering (EE) degree is best. They test in at tech 2 and tech 3 to start…minimum (understanding) includes a strong foundation in electrical theory and hands-on experience."

Scientists engage in cutting-edge research and development at CNSE's Albany NanoTech Complex, the most advanced research enterprise at any university in the world.
Caption and photo furnished by UAlbany College of Nanoscale Science and Engineering, Albany, NY

Yet, one of these high-tech employers also said that they would hire someone without a degree who had "three years of closely related work experience in electrical / electronic industry, or experience in trouble shooting automation equipment in manufacturing."

We heard indirectly that new technicians at a biotech company wished that they had had a stronger science background so they could better grasp what was going on at work. And having a two-year degree makes it easier for them to go on for a bachelor's degree, if they want to advance.

- **Technical background and mechanical aptitude**

Most employers report a preference for someone who has a technical background, coupled with mechanical aptitude for many jobs -- someone who is comfortable working with tools and machines. "We would like mechanical aptitude. We test that before we fill the position. It's a pen and paper test. And they have to pass with a certain score."

One educator said: "technicians don't have to be engineers, but they have to be able to talk to them. If you can't interpret, then the message gets corrupted." This aptitude was affirmed by a chamber leader, who noted that employers specifically look for "techies" – gamers, computer jocks, etc. A contrary opinion was offered by another respondent, who remarked that the military found that expertise in computer games did not translate to skills in the military using complex equipment.

One employer offers their own test. "You can see very quickly if they have it or they don't have it."

- **Documentation**

Several industry sectors have required scientific compliance and documentation practices ("we make as much paper as we do medicine"). The challenge is to get employees to do it right. "Even if they know what they're doing, we want them to do it our way. Your documentation systems are based on your practices. You have to insist that they're done a certain way."

"Being able to keep a good lab notebook is essential." It needs to be complete, well organized, and accurate." " If they've come out of HVCC and taken a course in basic science, they should know how to keep a lab notebook ... It should be included in the basic education environment."

The goal for all – "We try to find smart people, who can take direction, get tasks completed from start to finish, and document what they have done and the results. They need to be well organized…"

- **Health and Safety**

A number of employers talked about the importance of health and safety, which includes the need to follow protocols, be alert to dangers, use protective gear such as goggles all the time they are required, etc. Some employers said that new employees are not consistent with their use of safety equipment and when they speak to them, the employees say they did not have to follow the rules so strictly in school.

Catheter Assembly
Photo courtesy of AngioDynamics, Inc.

This was one area in which a number of employers felt schools could provide some basic orientation to students taking technical programs. The employers would still have to do their own training on specific hazards and procedures in their workplace, but if new employees had a stronger background in this area, it would be helpful.

◈ Section 7 - High School Preparation

❖ **Findings (Common themes among business people and shared by most high school[6] and college educators and administrators)**

- High schools push too many students to four-year colleges. Many young people who would be better off at a community college miss out on positive opportunities offered by two-year technical programs.
- High school staff has neither the background, the knowledge, nor the time to do high quality career education.
- High schools do not do enough to prepare students for the world of work or for college. Too many students need remedial education after high school, and too many are ill prepared for the expectations of employers.
- High school educators and business people do not work well enough together. BOCES have successful models for school-business collaborations.
- Schools need to better respond to changes in technology and how students learn.
- BOCES graduates, without any further schooling, are sought after by "lower" tech advanced manufacturers.
- A high percentage of BOCES graduates go to college and many, using college credits earned in high school, can complete community college degree requirements in one year (including a summer).

❖ **Overemphasis on four-year schools**

"College is not for everyone," and its variations are themes heard repeatedly in our interviews. The context was the overemphasis by area high schools on academic preparation for four-year colleges. Employers in the region report numerous high paying technical positions that are difficult to fill, in part because the hiring pool is reduced by all the students attending four-year colleges.

Many graduates of four-year colleges find that the college experience did not effectively prepare them for a career. "Four years after receiving a bachelor's degree, 40 percent of those not enrolled in graduate education say they are employed in a job where a college degree 'is not required.'" [7] One employer told us of an employee who graduated with a degree in international relations from Mt Holyoke College. She ended up as a waitress, but then took a year-long certification course in solar technology at HVCC and was hired as a sales person in a photovoltaic company.

No one said, nor are the authors of this report implying, that the only or primary purpose of going to college is job preparation. However, many of our respondents

[6] The term "high school" as used here refers to comprehensive high schools and "BOCES" refers to technical schools generally covering the last two years of high school.

[7] Laura J. Horn, Lisa Zahn, and Dennis Carroll. From Bachelor's Degree to Work. National Center for Education Statistics, NCES 2001-165, February 2001, as cited in High School Reform and Work: Facing Labor Market Realities. Paul E. Barton. Educational Testing Service, 2006

believe, and we do as well, that one major motivation for many parents and students when seeking a college is determining the type of institution that would best help with subsequent job searches. Indeed, the first line in the cover letter in a GAO report from 2003[8] reads: "A college degree is a key ingredient for success in the job market."

Our qualitative data indicates that students who complete two-year degrees or who achieve some other technical expertise or credential can readily move into jobs that provide a career path and substantial compensation. Comments from respondents support this finding:

- A teacher with a masters' degree may start at $40,000, while a welder can earn more than twice that much, with overtime.
- An electrician often out-earns a college professor.

A number of respondents noted that many students do not finish their four-year college program, and this is confirmed by the same GAO report. Nationally, 51% of students who begin at a four-year college graduate from that college within six years, and only 8% of the remainder graduate with a bachelor's degree at any school within the same period. Twenty-eight percent were no longer enrolled in a four-year school and 14% were still enrolled after six years. The same report shows substantially lower completion rates for African-American, Latino, and lower income students.

- **Why do schools so strongly promote the path to a four-year school?**

  When asked why high schools continue to steer students to four-year colleges, several factors were cited:

  - Parents are operating with outdated information and think their children will benefit more by going to four-year colleges. "One of the reasons the federal school-to-work initiative failed nationally," according to one educator, "is that parents were fearful it was a tracking system that would track their kids out of the four-year college path."
  - Guidance counselors and teachers promote the path because it is one of the key factors on which their performance is assessed. Also, most went directly from high school to college and then to work in a school; they do not know the wide range of options available in the work world.
  - Schools are rated publicly by the number of graduates that plan to go to two-year and four-year colleges. The school district "report card" (prepared by the New York State Education Department) reports these figures annually, and local school boards, parents, and newspapers compare across districts the number of students going to two-year vs. four-year colleges. Real estate agents tout the positive numbers in their businesses.

[8] "College Completion, Additional Efforts Could Help Education with Its Completion Goals." US General Accounting Office, Report to Congressional Requesters. May 2003, http://www.gao.gov/new.items/d03568.pdf

Guidance counselors are key, we were told. "Change the mindset of the guidance counselors who are rated by the number of kids they can send to Ivy League colleges." Also important to the issue are superintendents, since they lead the districts. "I would skip the guidance counselors and go straight to the superintendents…because they're at the top of the food chain."

Some members of the business community will be surprised to learn that *all* superintendents with whom we spoke were strongly supportive of this change in emphasis. One superintendent said, "I fight this fight every day. Parent/community perception is the main barrier to students going to two-year colleges." " Schools that focus on technical and career education get criticized for 'dumbing down' the curriculum," said another. Another school official added, "We undervalue technical degrees in this society."

Aiming promotional efforts for technical training at guidance counselors and school administrators is not enough. Efforts should also focus directly on parents and students. "Parents and students need direct exposure to these kinds of jobs."

- **Other factors -- industry, regional biases**

  Educators recognize industry's role in encouraging the push for a four-year education. Said one, "We have been saying for years that we're shifting from a manufacturing to an information economy and people are finally believing it and encouraging their kids to not work in manufacturing." Even before the recent economic turndown "all you hear from industry is layoffs and closures. It doesn't motivate students to go into manufacturing," reported another.

  The issue was also discussed in a context of suburban vs. rural/inner city differences, with suburban districts focused far more on placements to four-year degree programs. One educator from a rural area said: "It's more well-rounded here. Schools support BOCES and technology tracks. The primary focus is to meet graduation requirements, but not push to four-year colleges."

- **We need a shift in focus**

  Respondents are quick to point out that they were not devaluing a four-year degree. Rather, they wanted to promote the positive value of both tracks. There is a need to "shift off the focus on going to four-year colleges as the way to rate high schools," although another cautioned that the "pendulum shouldn't shift too far to technical education. We need to stay broad-based."

  All agreed that career education should start at a very young age, to counter the societal pressure. One employer said: "It starts with guidance counselors and parents, early on. The school teachers don't understand what the industries are in our area and the amount of money you could make." If they did, they could tell students: "maybe college is not your cup of tea, but if you go for a two-year apprentice program, you can come out making $25 or $30 dollars an hour."

The State Education Department is moving to a P-16 data base (pre-school through four-year college, instead of K-12). The intent is to monitor progress through college. They are hoping to add a follow up measure of jobs secured after college completion, which would create data for children, parents, and educators with respect to the value of a two-year vs. four-year college education in relation to future employment.

❖ Career Education

A number of educators and business people talked about the importance of giving students more opportunities to explore careers, an activity that would offer a focus when they get to post-secondary education. Career expos, job shadowing, and internships were all cited as ways to accomplish this. "We need to narrow the chasm between business and education." "If we give students good career information, they'll make good choices."

Several chambers sponsor programs that work with middle school students, offering explorations of many of careers, including technical ones. One suggested there might be limited effectiveness though, noting, "Most students at that age are already oriented to professional careers and four-year colleges."

- **More hands-on, "applied," and rigorous education; State Education Department (SED) mandates are out of date**

  Several employers suggested presenting a teaching method geared to students who are more hands-on than abstract learners -- more applied and practical science and math courses. All the superintendents with whom we spoke supported the idea, but several felt constrained by SED mandates. One commented: "Applied science and math are problems at the state level – we'd love to teach it, the state restricts it." (A school leader clarified this - SED does not restrict what schools can teach, but the required mandates leave little room for other subjects.) Furthermore, among educational policy makers, according to several respondents, the word "applied" has the connotation of being less rigorous, which is not how it is being used here. Respondents who know about Tech Valley High School and BOCES have heard the same criticism, and proclaim that their academic courses are "applied" and very rigorous.

  A number of school leaders agreed with employers, advocating a move away from "talk and chalk" teaching and shift toward project-based, team-based learning. Students learn in different ways, and many learn best when the learning is put into a practical context they can connect with. "Contextual education is where we bridge things."

  One school leader observed, "In the modern work world, for problem solving, there is not one right answer. In the old industrial model there was one right answer, one right way for workers to do their job. In school, our approach is there is usually only one right answer."

Employers said: "One of the changes in high school education has to be to teach teamwork. The product in nanotech is so complex and valuable that it can only succeed if people work together." Critical thinking and problem solving skills are needed. "Schools apply theory to a situation; businesses provide experience to a situation."

The need for strengthening soft skills was cited in virtually all the interviews with employers. Most educators agreed that schools should teach this and cited the 21st Century Skill model, which focuses on a number of what we call "critical thinking/interpersonal" skills (higher level soft skills). Educators commented that the State Education Department (SED) can help facilitate this change by incorporating 21st Century Skills into the learning standards and find ways to measure that. "If it's not measured, it won't get done."

The Board of Regents is reacting to these new realities. In their "Standards Review Working Principles," principle #5, they state their intention to "infuse real life application skills throughout all the content areas….to address the need for students to have the necessary skills to enter the workforce and/or pursue post secondary education."

This is also addressed in the Career Development and Occupational Studies (CDOS) standards under career education, but attention to these standards is less than that given to the more academic standards. One educator stated that due to budgetary constraints, many schools have cut back on technical education programs.

- **Strengthening hard skills is also a concern**

  In addition to academics and soft and critical thinking/interpersonal skills, schools also recognize the importance of providing "hard skills." While most technical programs are taught at BOCES, some high schools are adding technical courses of their own in biomedical, nanoscience, computer technology, etc.

  Other "hard" skills include math, science, literacy, etc. as noted in the skills section of this report. One school is offering a more advanced applied, project-based math/science course as an option for seniors to keep their math skills fresh and deepen their understanding. It will be integrated with literacy skills and technology and can be an excellent bridge to a technical education.

- **Change the focus of schools from college prep to broader "life prep"**

  The role of schools in preparing all students for successful post-secondary life – academic or work -- was raised by a number of educators. "School districts are supposed to prepare kids for any end game, but we're hit with so much it's hard to manage." Another noted, "We're not building robots; we're developing minds … We need to prepare kids to tap into a range of opportunities after high school."

  Employers and educators both referred to the additional pressure brought on by standardized testing, as required by the State Education Department/Board of

Regents, No Child Left Behind, and the public. They agreed that, as a result, freeing up time for critical career exploration is more difficult.

But changes in education occur slowly. "Don't overwhelm people by focusing on a massive change. We just need to do this (education) differently." Another educator pointed out the independent role of teachers and the resulting difficulty of mandating anything in terms of teaching methodology.

Yet, it is important to note that school leaders were excited about working with business people. "I can learn from the business world. We consult with them on curriculum design."

One suggestion would bring high schools into a new model – with college prep as one mission, and "apprentice prep" as another. This additional track can help prepare those youth who do not want to go to four-year college or perhaps, any college, for entrance into technical/skill based careers. By making the apprentice prep rigorous, but more practical, it would provide a solid foundation for students who at a later point decided they wanted to pursue additional education.

- **How well do secondary schools prepare students for their future?**

"The high school diploma should demonstrate readiness for post-secondary life," says one superintendent. "Now all it says is you're proficient in the content we taught. But many colleges have to provide remediation to high school graduates, so the degree doesn't even mean that much." Quoting an educator, "There is little guidance for students to help them make the transition from academics to a career."

According to the National Center for Education Statistics in their report, *Remedial Education at Degree Granting Post Secondary Institutions in fall 2000*[9], 28 percent of entering freshmen enrolled in one or more remedial reading, writing, or mathematics courses.

According to the 2006 Measuring Up Report on New York State, published by The National Center for Public Policy and Higher Education[10], academically, New York is near the top of the nation in preparing its strong students, who do well in Advanced Placement and college entrance exams and enter post secondary education. For lower performing students, the story is different. Over the past decade, the chance of a ninth grader enrolling in college by age 19 has declined sharply, to 37% —one of the steepest declines in the nation on this measure.

An employer concurred: "What schools do doesn't work – doesn't prepare students for the work world."

[9] http://nces.ed.gov/surveys/peqis/publications/2004010/, June 5, 2009

[10] http://measuringup.highereducation.org/reports/stateprofilenet.cfm?myyear=2006&stateName=New+York, June 5, 2009

Furthermore, minority youth are too often left out of the discussion. The high-tech world must be introduced to all youth, but especially minority youth, an educator continued, emphasizing that we need to also focus on alternative education students in 9th and 10th grades.

Paul Harrington, Professor of Economics and Deputy Director of the Center for Labor Market Studies at Northeastern University, highlighted the need for schools to teach more than academics. He identified three key elements to workforce success for youth today besides higher educational attainment: workplace experience (with a job chronology beginning in the late teens), occupational skills proficiency, and solid development of basic skills.

❖ How Businesses Connect with High Schools and BOCES Programs

A school leader, in considering the link between education and the business community, observes, "We need to move from criticism to collaboration. We have different vocabulary, but we have common interests." The differences in vocabulary can be significant. "21st century skills" is the latest buzz word and on the tip of nearly every educator's tongue … and "21st century skills" does not mean much at all to most business people. "P-16" is another example.

Another business person analyzes the relationship: "Educators (in high schools) are generally not receptive to businesses telling them how to do their job ... We need a blended approach – academic and work preparation. Education shouldn't be all about work, but the world of work needs to be a big piece of it. Education should be designed by a combination of business, educators, and government."

Many employers indicated an interest in beginning, continuing, or increasing their involvement with career education in schools, noting that when students are exposed to various professions, some will add these new possibilities to their list of future options.

Others (generally the more high-tech / high profile companies) felt they were sufficiently engaged. They value the current level of interactions with schools, but do not want to expand their involvement due to time constraints.

Many smaller employers were unsure as to the points of contact at educational institutions, and some were discouraged, after attempting to partner with schools. "We sent letters to all the guidance counselors in Schoharie County offering a full scholarship to Hudson Valley Community College for two years. Work with us and at the same time, they would go evenings at Hudson Valley to get a degree. We got one response from one guidance counselor. Very disheartening."

Most high schools have Work Experience Coordinators who can serve as a good initial point of contact for private sector employers.

A school administrator, commenting about the gap between schools and business, concluded that the goals are not mutually exclusive but the route is substantially different. Employers focus on the end game, but schools need to break it down into steps as part of a curriculum that leads to the desired end. For example, businesses

want workers who will take ownership of a task and beyond, while schools need to consider, "How can that be taught?" Educators aim to generate well-rounded citizens, but businesses want effective workers.

A number of schools, both BOCES and academic high schools discussed ways they are working with industry to bring to their schools high-tech equipment and courses related to the high-tech workplace. BOCES also actively involve business people on curriculum advisory boards, developing hands on projects, and providing work experiences.

In developing technical/vocational programs, most BOCES go through the following process:

1. Consult with and receive approval from the New York State Education Department to be sure the program meets specific criteria and the state learning standards.
2. Ensure the program meets industry credentials; an industry recognized set of skills with knowledge and performance indicators.
3. Establish and work with an advisory committee (craft committee), usually consisting of technicians, the people who do the work or provide the training.
4. Integrate academics; tie in English, math, etc.
5. Develop college articulation agreements (where appropriate).

Of particular interest to businesses is the increasing practice on the part of BOCES to include hands-on experience in the workplace. One employer commented: "I understand that BOCES is requiring internships now for some of the students going through their program. If they are, that's great. If they're not, they should. Kids need to get out of the classroom, even if it's just two or four hours per week, and see what the real world is like."

BOCES leaders emphasize their strong orientation toward understanding and responding to the needs of businesses. "Our program advisory committees meet two or more times per year. I (a BOCES administrator) have meetings quarterly with an overall advisory committee to do strategic planning. This includes representatives from economic development agencies and chambers of commerce."

Many employers in the region clearly endorse the value of a BOCES education, and compare it favorably to other institutions: "Send them to the BOCES programs for two years, or send them to HVCC for two years and they'll come out great." Responding to market needs, another said, "we are finding that BOCES is producing some wonderful graduates, but there just aren't enough to choose from … There just aren't enough kids available to be trained." There were some comments that in some schools, students were discouraged from enrolling in BOCES programs, due to the added cost to the school district.

Within the region, a new secondary school -- Tech Valley High School -- recently opened. As part of the design, there was an intensive consultation with major

businesses in the region, and the needs of business continue to be an integral part of the program. The school's Business Alliance (60-80 businesses), is involved in the development and assessment of projects, "making business a part of the learning community, not an outside partner. We asked businesses to move from 'advisor' to 'participant.'"

Also prominent in this region, Junior Achievement provides a number of programs that bring business people into the classroom. An example is a 12th grade economics course that ties into the NYS curriculum. The regular school teacher conducts the class four days a week and a JA volunteer teaches on the fifth day. The JA volunteer provides the practical application or context for what the learning has been up to that point. They bring tangible, concrete examples of how to apply the lessons.

- **Adult Education in Technology**

  Adult training programs are also available through most BOCES, offering certification programs. Some are national skills credentials certification programs, which are in demand by employers.

  Employers can also contract directly with BOCES to conduct specific training. For example, one BOCES taught machining skills to engineers, "So they invent things that are possible to make." BOCES also provides basic education and English skills for local union members.

  Most adult education is usually done in the evening and on school vacations, when the classrooms are empty and teachers are available.

❖ Trends in Education

- **Tech Valley High School**

  Tech Valley High is a four-year, full time regional high school program, established as a joint venture between Questar III (Rensselaer, Columbia, and Greene counties) and Capital Region (Albany, Schenectady, Schoharie and Saratoga counties) BOCES. It is designed to prepare students for the emerging needs of high-technology employers.

  The goal is to expose students to the technology work world, provide a solid applied math/science education, and teach students critical thinking/interpersonal skills: the ability to work in teams, be self directed, communicate, think across disciplines, and think critically. Students at Tech Valley High School are required to investigate career options via an independent project, job shadowing, and an internship.

  Tech Valley High School also serves as a demonstration and training model for local school districts. Tech Valley teachers are taught how to use technology and project based learning. Once proficient, they become certified trainers of this model, and many work with BOCES professional development services to help disseminate this methodology to other schools. According to a Tech Valley administrator: "we will

be an R&D center for this type of teaching." The State University of New York at Albany School of Education will also be using Tech Valley High School as a "laboratory," training teachers to teach 21st century skills.

- **Impact of Technology**

  Technology will revolutionize what we are doing in education over the next 20 years, according to an educational leader in the region, with new opportunities for more effective, collaborative approaches. Noting that several states have introduced K-12 virtual learning, "This will snowball. Just like outsourcing jobs, this will open opportunities for learning that are beyond anything we have now."

  Michigan and Florida have done extensive work with virtual classrooms at the high school level. In 2008, the Center for Digital Education conducted a review of state policy and programs to determine the status of online learning policy and practice across the United States. New York State ranked 47th[11].

  Empire State College is at the forefront of using Second Life as a teaching tool at the college level to create virtual spaces where students can "experience" other cultures, experiment in ways they otherwise could not, or explore situational challenges they would not normally face. They piloted it and found students were more highly engaged than with other on-line learning methods. "We can build a mock clean room for avatars to work in. We're having lots of success, but also have issues to deal with: Security, privacy, hacking, intellectual property."

  An educator said, "How we learn today is not the same as we learned years ago. Everything is driven by technology." Technology also provides tools for "virtual" field trips, "virtual" groups, or teams where students interact with others on-line, opportunities for complex surveys and other research projects, etc.

[11] Online Learning Policy and Practice Survey: A Survey of the States, page 2.

◈ Section 8 - Community Colleges

❖ Findings

- The five community colleges in this region vary greatly in terms of:
  - How they balance programs oriented to help students transfer to four-year schools and those oriented towards job training.
  - How much they focus on technical education.
  - How aggressively they reach out to businesses, WIBs, BOCES and other high schools.
- The business community's perception of each college does not always match the college's own perception of itself.
- The credit and non-credit sides of each college are often disconnected from each other, causing confusion for businesses.
- Colleges have flexibility to offer alternative schedules and customized courses, and they now have an expedited program approval process, but many employers and workforce developers are not aware of this change in policy.

❖ Overview of Community Colleges

There are five public community colleges in the eleven county region: Adirondack, Columbia-Greene, Fulton-Montgomery, Hudson Valley, and Schenectady County. Cobleskill, a four-year technical college also offers two-year degrees. There are several other two-year colleges and proprietary schools. We spoke with staff from the five community colleges, SUNY Cobleskill, and one proprietary school, and heard comments about some other schools within and outside the region.

Each college is known for certain specializations and while all provide technical programs, Hudson Valley Community College is the most developed in this field. Some focus primarily on preparing students to transfer to four-year colleges, but most of the college administrators with whom we spoke are interested in increasing their technical offerings in light of the changing economy of this region. Each community college has its own board of trustees and is funded in part by the count(ies) in which they are located. Each college is encouraged to meet the unique needs of their region and local communities.

Most colleges have staff assigned to develop relationships with local employers and to offer training, both credit and non-credit, that will meet employer needs and help students secure employment locally. These staff also help employees find grant money to support training and provide feedback to the academic departments about changing demands.

Community colleges, in general, offer:

- Several types of two-year degree programs; some designed to lead to jobs, and others to help students transfer to four-year colleges.
- Career Centers, which focus on getting students to become employees.

- Special programs, to enable those with extra challenges to successfully enter the workforce.
- Continuing education and certificate programs that are more flexible, non-credit, and job focused.

SUNY Cobleskill is a four-year technical school whose focus is less on the manufacturing or the other high-tech sectors we studied, and more on agriculture and health care.

We also spoke with Modern Welding, a proprietary school, to see what their involvement was in the high-tech construction sector. At this point, they offer training in a wide range of welding techniques, but not in orbital welding, which is the method required for clean room construction.

- **Relations with Business**

  - Internships

    Many of the colleges require internships and employers often agree to serve as sites for them, hoping for an advantage in recruiting the best employees. Businesses place substantial value on internships, as do college faculty. "Internships are huge." One employer was blunt and specific. "Ours is strictly for recruiting."

    Within the college, faculty and deans both recognized the value of internships, where students can apply on the job what they have learned in the class. "Our students were turned away at first by the more high-tech companies. They wanted them to have lab experience in the outside world before they'd hire them. Now we have more internships and more extensive labs set up. This helps our students get jobs."

    One business person wished that their local community college "would develop a coop or internship program" specifically for that business. FMCC has a non-degree program called Collaborative Career Learning (COCAL) that works almost exclusively through a coop experience. It does not require completing a degree program. "We find a skill or knowledge need and help people fill it so they can get a job. They spend 360 hours on site, usually without any salary. They receive college credit and take some related courses to improve their skills. It's a short term, in and out, program."

  - Other Ways Colleges Work with Business

    Colleges recognize that an important part of their mission is to work together with businesses.

    - "We provide advice to employers on how to sharpen specific skills of technicians … and what courses would be best."

- "We collaborate closely with businesses. We're part of the employer services team. We go to employers and help them figure out what services are available that might be of help to them. We also have a Human Resources roundtable where we meet regularly with HR staff from local companies."

Colleges and businesses work together on both short term and long term projects. In the short term ... "We act as a broker, bringing in outside trainers and simulating a lab setting as needed." Colleges also help secure grants for short term training. One business person said, "We have applied with them for training grants through the state and they help us set up the training."

For the longer term, "We're trying to start a new program ... The faculty and Dean are talking to local companies to build the program, look at connections to jobs for graduates, what specs are needed, and how to build in internships." Some colleges help get grants to build specific relationships between a school and industry. HVCC's TEC-SMART center and SCCC's program with SuperPower are two examples.

One college noted, "We have had an advisory committee in the past. Now, our adjuncts come from industry, so we don't have a set advisory committee to provide input. We understand what industry needs."

♦ Outreach

In terms of initiating contact, college staff spends time networking with businesses, developing relationships, and showing them "what we do."

- "We do a major job fair each year…. and usually have 70 employers."
- "We use the tech club to bring in speakers… and invest in professional associations to bring awareness to students."
- "We use faculty to network with employers to upgrade and target our programs."
- Alumni are another way through which businesses learn about colleges, building upon "the reputation of our students who've done so well."

Another college administrator described a curriculum development process which is similar to BOCES. "Phase 1 -- we invite HR staff and managers from the field to discuss this program. Then the HR people identify expert workers who flesh out the concrete skills needed for the job. In the third phase, HR, expert workers and educators meet and identify what classes we have that already teach these skills and what new classes are needed. Now we know what we should be teaching and we send that up for approval."

Some college staff lament though, that while businesses are clear on what they want, they do not always act as partners. "They don't step up and invest time in the educational arena…Industry should be a regular in classroom as a club

advisor, guest speaker, adjunct faculty, program advisor. Students and faculty love this and it helps faculty keep skills up."

- Employers' Views of Community Colleges

  Colleges are challenged to satisfy competing demands, but most businesses to whom we spoke expressed satisfaction with the connections they have to their local college.

  - "The community colleges are going to the companies or the associations and saying 'Hey, we'd like to sit down with these companies to learn what they need from us to teach our kids.' That's what is needed."
  - "If you give them a few ideas they'll take it and make a course out of it."
  - "They're working in the right direction."
  - Local colleges are adapting existing programs to better train technicians.

  When asked whether two-year graduates are ready for mid-level jobs, one employer said, "Absolutely," mirroring the comments of most employers with whom we spoke.

  One large employer, when considering his relationship with community colleges, looks at a number of factors including: "What kind of programs do they offer now? How can they tweak the program?" For colleges that line up best with their needs, they develop a partnership and "serve on their advisory board, give them advice, provide them spare parts, and develop internships."

  Businesses work with community colleges to help their employees move along in degree-bearing programs. The colleges grant credit for apprenticeship programs. "I get 51 credits for my program. When they complete the apprenticeship, they're 12 credits away from a two-year degree."

  Many large employers are seeking a more diverse workforce and, according to one employer, some of the colleges present better opportunities for recruiting minority candidates.

  Community college systems can be puzzling to business people. There are the for-credit and the non-credit sides, and they often do not work together effectively, "It's almost a firewall between them….gets confusing when they have to deal with different people."

  Some larger employers want to expand their relationships, with a "method to communicate with all the community colleges, which does not exist now." Another employer stated that they prefer to work with a single community college. "We have close relations with our local school and they have a program that is directly applicable to our workplace. Students get experience while they learn."

Advisory committees receive mixed reviews. Some recognized the value they bring and others felt that the value was lost over time, since the "advisory committee hasn't met in over a year," or "the same people are on them for 15 or 20 years."

But business representatives can feel like outsiders: "We don't have the connections (with community colleges) to get on the list to be able to hire somebody … at least that's the myth that I know about. The kids go into the program, often sponsored by somebody … and they agree to work for that company. There is really nobody coming out of the program with this résumé, and asking to interview with my company. I may be way off-base with this."

Students who drop out of community colleges can be good targets for certain employers. One employer reported, "Some drop out because they go to jail, but others are just not cut out for school." While some of the educators with whom we spoke agreed with this statement that drop-outs were readily employable, several disagreed. "There's a myth out there that there is a group of motivated students who just don't fit in the classroom. Community college is open admission. Some students are not motivated and not prepared mathematically. Drop-outs would not make good employees."

- **Liberal Arts vs. Technical School**

Views of college missions, attitudes, and programs vary greatly. When discussing the same college, respondents said:

- "It has a huge business focus. They try to tailor courses to your needs."
- "They are setting up a tech program which will benefit us."
- "They don't want to retool their programs to address evolving needs."
- "The college is basically a liberal arts college."

When we spoke to a college administrator at that particular institution, we received a list of technical programs they offer: "Electrical technology, mechanical technology, design and drafting, and Cisco IT systems." One educator (not with the school) offered us the perspective that under a previous administration, the school had focused on liberal arts, but had recently moved to increase their technical offerings. Another college staffer acknowledged, "We could do a better job educating businesses and industry" about their course offerings.

Another school reported, "We are not a tech school. The physical set up is very expensive. We've made a conscious choice to focus primarily on liberal arts given the resources we have. We do training for employers all the time, but not in hard technology skills."

- **Community College Constraints**

Community colleges face a variety of constraints in terms of program offerings and in the ability to serve business community requirements.

- Budget

  When businesses ask colleges to offer a specific course, colleges ask in return, "How many graduates are you going to hire? How many students can we get to fill a class?" Educational institutions do not have the resources to take major risks. "We can't respond to requests from a single small employer."

  A number of employers mentioned successful programs that meet their needs, but that have too few students enrolled to continue. "You have to look at it from their (the college's) perspective. They are a business as well, and they have to offer courses that people want to take. Are you going to go after the colleges and say 'you're not offering the courses or producing the graduates that we're looking for?'"

  Another constraint is the sheer cost of many technical programs that require expensive equipment and facilities. "The fight that you will have is with colleges that looked at the cost of providing the technical programs. They've gotten away from that because their budgets cannot sustain them." One path taken is to look at cooperative measures, where employers provide use of their facilities and loan equipment and expertise.

  One community college has developed a new program that will prepare students for high-tech technician jobs. In the first two years, they only attracted a handful of students, but they expect the numbers to improve, once early graduates report back on their success after graduation.

- Current Economy

  In the current economy, some colleges have noticed that training requests for employees has dropped. They "don't want to pay a lot for it and can't free up staff."

- SUNY and SED Regulations

  There is a process through which colleges receive program approvals from both SUNY and SED. This used to be time consuming, taking many months. Businesses believe "Once they've already established the course … it's unchangeable at this point." "The take on community colleges is that they are not getting qualified individuals to your door when you need them, due to their institutional requirements." Without the same constraints, the for-profit proprietary schools were said to be more nimble.

  Recently, both SUNY and SED have expedited the system in response to a policy recommendation from the NYS Commission on Higher Education's Final Report, from June 2008: "The Board of Regents should coordinate with SUNY and CUNY to streamline the academic program review process." They have

substantially reduced the time needed for program approvals and college staff has noticed. However, the business community is not yet aware.

- Academic Traditions

  Businesses have criticized colleges for offering classes on a rigid, semester calendar with summers off. We were told that colleges are willing to try to accommodate alternative scheduling, especially through the non-credit divisions. One college noted that they already offer programs on varied schedules, including a five year part time program towards a two-year degree for students working full time.

  We also learned that most colleges would be willing to start programs off cycle or on a compressed schedule through the summer and through the January break (if they were guaranteed a sufficient number of students). For example, a hybrid training course that had some on-line components and other hands-on classes (such as for specific lab work), is being considered.

  When we asked at one institution whether the faculty is receptive to incorporating work contexts in their classrooms, we were told that some see the value while others do not. The attitude among some educators, an administrator informed us, is that they "want freedom of pedagogy; my classroom is my classroom and the chamber or business people aren't going to tell me how to run my classroom." Yet, others choose to work closely with businesses.

  Some faculty members apply work place standards to their classroom -- lock the door at start time, make students take hats off and correct their poor interpersonal skills. Others run a more open environment --leave the classroom door propped open and wear shorts and flip flops.

- Academic Skills of Students

  Another constraint community colleges face is the academic skills of their incoming students. Public community colleges are "open admission" – anyone with a GED or high school degree can enroll (and less is needed to just take a class). "Many students come here barely getting through 9th grade algebra, and they need stronger skills than that." Some students also have other serious challenges in their lives which impede their college progress.

- **Relations with high schools**

  Community colleges state that they have favorable relations with the local high schools from whom they recruit students, although we did not probe further.

  Most colleges have "articulation" agreements with the local BOCES for programs offered by the college that align with a specific BOCES program. BOCES students

receive college-level credit, which allows them to accelerate their college program, sometimes finishing in as fast as two semesters plus a summer.

FMCC has a pilot program with HFM BOCES, in which they are both located on the same site and share some services, faculty, and facilities. For example, they use the same facilities at different times for a building analyst program and a program in photovoltaics, which is under development.

From the BOCES perspective, a staffer reported on differences as to how closely community colleges work with BOCES. Some are very open to talking with BOCES staff; others are less open.

- **Community College relationships with each other**

One staff person told us that for the most part, "community colleges have slightly different directions. We're not competing … There is no antagonism, but not much contact either. We just don't work together." Others went further and indicated there was more competition than collaboration among the colleges.

Some college staffers do collaborate and share information and resources. One respondent brought up the Capital Region Career Consortium, a group of college career centers. "We focus on increased interaction between Tech Valley Groups and we use CEG's roadmap listing of technology companies. We try to connect students and alumni to employers."

Others view each other warily, in terms of sharing students and curricula. One issue raised is intellectual property – "who owns the course?" The other is compensation – how is the college that designed the program compensated when other colleges pick it up? There also is a concern that by allowing neighboring schools to offer the same course, enrollment will go down at the originating school.

Colleges are hoping to participate in HVCC's new TEC-SMART facility, which is being designed on the premise that the labs will be shared with other area schools. The facility is not yet finished, and there is currently a degree of confusion about how much access the other schools will have.

Geographic restrictions are also an issue. Colleges can not operate on another school's turf without the permission of that school. Some schools collaborate well in this, but it is another step for a business to negotiate. "The big thing for me is that FMCC will allow Schoharie County businesses to go through FMCC to apply for the grants that are not available at SUNY Cobleskill because they do not participate (in this specific program), as long as I've got a waiver from SUNY Cobleskill."

- **Community College Relationships with WIBs**

All of the colleges have representatives on their local workforce investment boards. The strength of these relationships varies. The Columbia-Greene WIB has a special advantage with its physical location on the college campus, as is the One Stop Career Center, which enhances interaction.

Two colleges located in our region that are not community colleges but do grant associate's degrees and have some impact on the area workforce are Excelsior College and Empire State College. Both are distance learning institutions that evaluate courses for college credit and offer many degree-related classes and non-credit courses on their own. Both colleges are currently working with area WIBs on workforce development issues.

Empire State College offers credit for significant work and life experiences -- this can be a model to investigate for serving displaced workers. They are also investigating offering certificate courses, but not in technology at this time.

Excelsior College applies college credits achieved by student elsewhere, from courses they offer, and from the results of nationally-recognized examinations, to degree programs. In addition, they collaborate with companies to train employees in a variety of areas, with both degree and certificate programs in business and technical fields. They have articulation agreements with four of the five area community colleges. Excelsior, partnering with HVCC, currently has a proposal pending with the National Science Foundation for advanced technology courses.

◈ Section 9 - Training After Hiring

❖ Findings:

- Most businesses preferred to do their own training after hiring, using internal staff or outside trainers. Financial assistance from the WIBs for certain outside training would be welcome, but they did not think there was much direct training the WIBs could offer in place of their own.
- The most common training conducted by employers is customized on-the-job and that is often not eligible for grant funding.

❖ In-House Training

Most, but not all, business executives to whom we spoke use their own staff as instructors for new hires. Some acknowledge that their classroom training programs are "very rudimentary. Most of the training has to take place on the job." Others have more formal methods. For example, one firm reports a thirteen week initial training program for staff, conducted one-on-one since they do not have sufficient numbers to form classes.

Larger companies sometimes have internal training groups to conduct most of their training, although they do use some outside trainers for specific skills.

Some manufacturers are trying to increase their in-house training by expanding it to include more employees. Typical of this thinking: "We are designing a new training program for people on the floor. In the past, it was focused on management."

Several companies reported on why they choose to handle the training in-house. "We prefer to do our own training because we know our culture best. We know specifically what to target." Furthermore, said another, "conducting this training directly provides feedback for us; who's asking questions and paying attention. We want to continue working with them, to move up the sharp ones and do some extra work with the others."

A manufacturer lamented that his employees needed more soft skills training but it was costly to offer. "You're losing time. You're pulling them off the floor."

In healthcare, hospitals used to train staff, but because many job titles now require degrees and hospitals cannot grant degrees, they are dependent on schools for this training. Many hospitals will provide tuition assistance to help staff get the credentials. The New York State Department of Health requires hospitals to provide orientation and some training to all new staff, but not training sufficient for credentialing. In previous years, the hospital associations and unions received workforce development retraining funds, but the money has "mostly dried up."

- **Paired with experienced person**
  The most common in-house training method typically involves the assignment of an experienced person to a newcomer. This meets with mixed results, according to a number of respondents. "We pair them up with old guys... but it's not a consistent program. Nobody ever learns the same stuff." One manufacturer discussed similar issues. "You would be amazed at how two people saw the job entirely differently. From their knowledge of how to handle that, you would have sworn that there were two entirely different companies that they work for."

  A method that results in greater consistency was described by another manufacturer. "For new hires, we do training on machines, paired with a person who has been there -- the buddy system... we started a part-time pool over a year ago, and we have a coordinator, who goes in to check to see they're getting the training they need, learning the process the right way."

  Trade unions mention that journeymen are supposed to teach, but are sometimes unable or unwilling. They report that pressure from contractors to quicken the results can affect the time set aside for training. For example, "getting apprenticed on a pipe crew is going to be unheard of (on the GlobalFoundries project), because of the time constraints and the fines that are going to be involved."

- **School-to-work**
  Employers in the health field are offering a combination school and work training program, similar to the program that GlobalFoundries is investigating with Hudson Valley Community College. "We have a school-to-work program where we take entry-level employees that we have, and we're putting them through a curriculum. While they are at work, they go to classes to get computer training, some math skills, medical terminology (hospital work), to better prepare them to slide into better health care positions. It's to create a career path for them, so that they are not in entry-level positions always."

- **Internal apprentice program**
  A few of the larger manufacturers have their own apprentice programs. One described theirs, successful but limited. "There may be two apprentices every five or seven years. It's a four-year program and those people stay in the company for thirty years, so there aren't a lot of openings."

- **Online**
  Some companies do most of their training through online or distance learning programs. A biotech firm informed us that all training is Internet and Windows based. A construction contractor reported, "Most of our training is online at the higher levels."

- **College reimbursement**
  Many firms offer tuition reimbursement programs, but several report that they are seldom used.

- **Soft skills**
  A manufacturer who provides in-house training puts a special emphasis on handling conflict, "giving and receiving feedback, recognizing your defense mechanisms and how that impacts the way you respond to other people -- all the touchy-feely stuff. Our training sessions are very popular. I wish we could do more of it. I wish schools would do it, because they really need that, coming in the door."

- **Hard skills**
  Manufacturers also train employees on specific equipment. "We have trainers for new operators on the floor, people who are experienced with the broad range of skills and processes within the department ... that will range from four to twelve weeks. In six to eight weeks, we will probably have a person trained enough so we can hand them off from any formal training to one of the seasoned operators … they are learning not only how to assemble a device but also the SOPs and the documentation – we're a heavily regulated industry."

  Large construction contractors, especially those involved in advanced projects such as GlobalFoundries, find they have to train workers by the hundreds in new techniques. Not all trainees make it to the job site for various reasons -- not skilled, not interested enough, take other jobs, etc.

  Surprisingly, in addition to training on their procedures and equipment, some employers have found that measurement skills may require additional in-house training. "They have to be able to use a ruler. They have to understand weighing scales. Comparing readings to what's acceptable and what is not acceptable." On the construction side, contractors mention the need to train workers in the LEED construction rules. "We expect all our managers to become LEED certified. There are continuous classes, and software."

  - **One suggestion – a simple matching funds program**
    Some firms lament that they are unable to conduct enough training, due to economic reasons. To help meet this need, a business association representative put forward a suggestion. "If you want to focus on manufacturing operations, I'd suggest a matching funds program, one that could be used by firms of all sizes to hire the training providers they need when they buy new equipment"

    "If the state wants to encourage businesses to upgrade their equipment… provide a simple online opportunity to obtain matching funds, up to a certain amount for such training." We were told that a similar program had been in place in Massachusetts.

Outside Trainers

In addition to employee training via community colleges, in-house methods, and the Internet, some employers choose to hire outside providers. For distance-learning, some companies, often in the health field but increasingly in manufacturing, turn to Excelsior and Empire State Colleges, which offer noncredit certificates and credit bearing courses,

leading ultimately to college degrees. Some of this training can be funded by WIBs, although there are limitations.

Another source of training is the industry and business associations. For example, most chambers of commerce offer business leadership courses, as does Associated General Contractors, who also train in LEED construction and other trade-specific areas. The Center for Economic Growth, sometimes through the Chief Executives Network, provides training in several areas mentioned in this report, such as lean manufacturing, continuous improvement, and ISO standards. "We've done a lot with the Center for Economic Growth ... We did our whole shop for lean manufacturing training from a grant they set up. We've had more success with CEG than any other training organization."

On the soft skills side, a local WIB runs an employee enhancement class for people making less than $15 per hour. Other companies hire outside trainers to educate their workforce in teamwork and leadership. Some employ locally based companies, and one mentioned that they use a firm from Washington State in a hybrid manner. "We send people to get trained -- train the trainer -- and we purchased the rights to do training in-house."

For hard skills, companies focus on areas of study such as blueprint reading, safety, manuals and procedures, specific software and computer systems. Several mentioned using New Horizons as a local resource providing training in Microsoft products.

Leadership is another area in which companies seek to enhance expertise and proficiency. For one biotech firm, a consultant placed on-site provides a management leadership series for the entire leadership team. In other companies, human resource people go through training, and then conduct in-house sessions on leadership skills.

◈ Section 10 - Certification and Licensing

❖ **Findings:**

- Employee certification is rare in this region.
- There was some interest among employers in exploring certification further, especially where it would help assess skills and skill gaps.
- There is skepticism on the part of some employers about certificates issued by schools as opposed to those issued by industry.
- Many technician positions in health care require licensing and very specific training.

One topic gaining traction in this region is that of certification and licensing. The discussion is being driven mostly by those in the workforce development field and by proponents of specific programs. In our focus groups among business executives, we found virtually no recognition of current general manufacturing certification methods geared toward mid-level production technicians. There is also some confusion about general employability certifications, as well as specific certificates offered by trade associations. "Is it like somebody who has taken certified quality auditing or something of that nature?"

In each group, we asked respondents to consider the value of certifications after we described the products of several vendors. We also added comments from workforce development officials and others.

One industry association executive reported that certifications are granted by colleges in other states, and that the employer community really likes that. "The *certificate* means you sat in a chair and listened. *Certification* means you sat for an exam and demonstrated a level of knowledge or skill." A manufacturing executive commented, "If two people showed up, one with certification and one without it, certainly the one who had it would be given preference, (because) this person is above entry-level."

- **Must meet specific employer contexts**

  One manufacturer was quite vehement. "Why would I care about a certification that doesn't translate to my needs?" Another echoed, "I wouldn't care if somebody else accepted it. They would have to squarely meet my needs."

  On the subject of recognition, there were comments related to the need for a critical mass of acceptance. From a human resources perspective, there would have to be a common certification accepted by all, region-wide. Without it, it's "still a crapshoot."

  "Still, it sounds interesting ... I would run it up to various managers to take a look at it."

  Another manufacturer said, "Certification would be great, if it proved that employees understood the basic things that you deal with every day as an employee

in manufacturing." A construction contractor highlighted its value: "In my mind, it would show that the person at least had the initiative to go through this additional bit of training."

After considering descriptions of several general manufacturing certification programs, one executive observed, "but that's a lot of what a two-year or four-year degree does, it shows initiative."

- **Would your company sponsor it?**

  There was some interest among employers toward assessing the skills of their employees through these programs, and perhaps sponsoring courses where they were deficient. This would then lead to certification. However, all wanted more information about costs, in terms of time and cash outlay.

❖ Employability certificates

The Chamber of Schenectady County has developed a certificate of employability, which is offered via a 30 hour, 10 week credit course in area high schools. In the end, applicants must pass rigorous tests which demonstrate competencies, in order to receive the award. Proponents believe that certificate-bearing employees are recognized as more valuable, and would "move them to the head of the hiring line." The skills taught and tested include many of the key soft skills with a focus on work attitude.

Employers commented that employability certificates indicate that the bearer has "some of the intangibles, like ethics, that would be helpful for incoming employees." "If you see one of these people and they present you with their certification, you as an employer can be relatively assured that you have a pretty good hire in terms of work ethic."

One employer questioned the teaching source. "Not if it came from a school. Their expectation of reliability is not the same as ours. If it came from an industry association or from the union, I say, 'now we're getting somewhere.'"

❖ General manufacturing and technical certifications

During the course of this study, three general certifications were discussed: Work Keys, Prove It!, and MSSC. The notion of general manufacturing certification has its advocates and critics.

WorkKeys, a product of ACT (provider of college entrance exams) is a certification program that includes tests used to assess skills of applicants and current employees. Electricity, mechanics, fluid dynamics, and thermodynamics are among the subjects offered in applied technology. Targeted training is provided in those skills found to be deficient from the assessment exams. They also offer job profiling by using information gathered from employers and collected from thousands of examinations. An employee's scores are compared with those of others who are successful in those jobs, which enable employers to make decisions about hiring, training, and development

needs. The Manufacturers Association of Central New York uses WorkKeys and Syracuse University serves as one center for the program. Training in WorkKeys programs are offered by outside publishers.

Locally, a worldwide company with a large facility in the Capital Region is looking at pre-employment evaluation via WorkKeys. One advocate especially likes the job profiling feature; breaking down jobs to skill areas and then providing this data to those entities that can match an applicant's skills to job needs, such as one-stop centers. WorkKeys includes a system that can automatically provide computer-driven matches.

Prove It! is another certification program receiving interest from the Department of Labor, offering thousands of tests in a variety of fields. Most of the tests are related to office and computer skills, but there are a number of "industrial titles." It will be used to prequalify candidates by certifying they have the specific skills that employers require. The Department of Labor has purchased the system and is rolling it out through One-Stop Centers.

One manufacturer refers to Prove It! as an opportunity for Adirondack Community College. They "could offer Prove It! with programs and training. It would be perfect for them."

Prove It! has its detractors, who charge that the program is too generic – "aimed at pink collar (jobs traditionally held by females) and white collar skills," without sufficient emphasis for proficiencies required by successful practitioners in mid-level manufacturing. Furthermore, one observer believes that DOL decided on Prove-It! solely on cost, rather than on function.

MSSC, an industry-led training, assessment and certification system offered by the Manufacturing Skills Standards Council, is not common in New York State, although it is used in many other parts of the country. None of the employers had heard of it. The program awards a "CPT" (Certified Production Technician) to those successfully completing a four-module course, consisting of 1) safety, 2) quality practices and measurement, 3) manufacturing processes and production, and 4) maintenance awareness. According to the Council, this is "a strategy for providing industry with a future pipeline of skilled workers." They hope to embed their certification training into schools, and establish their credential as the one most recognized and accepted by industry.

The Washington-Warren-Saratoga-Hamilton-Essex BOCES, with funding from the WIB for eligible participants, is offering a certificate in advanced technology, using the MSSC system. The program starts in June in the evenings and takes 140 hours, ending in August. Within two days of advertising including online, more than 40 people responded. This program was targeted toward unemployed people and displaced homemakers. Those who finish the modules will be awarded a CPT (certified production technician).

❖ Trade association certifications

These certifications are much more specific in nature, and are sometimes required to work in certain fields. Among the certificates mentioned in our interviews and offered in this region, sometimes by community colleges, is a certification in renewable energy from the National Association of Board-Certified Energy Practitioners (NABCEP), which includes site assessments and understanding of how photovoltaic systems work. The New York State Department of Labor is advancing certifications by the National Building Performance Institute, among others.

One high-tech manufacturer mentioned that there are jobs to be filled by low-tech employees, such as in mechanical technology and basic electronics, which could be filled more easily if employers knew the applicants were certified in some way. Courses might be offered by trade associations, he suggested.

❖ Government licensing and approvals

Many jobs require specific government licenses, including some of the construction trade apprentice programs. In the healthcare field, licenses abound. "Most of the technical positions require a special curriculum, whether it's a two-year degree or special certifications … They have to meet very special criteria."

With respect to state authorized apprentice programs, "the New York State labor secretary is revamping the system," says a manufacturer who has been in contact with the department. "They review your job so that they can give you a state seal when they're done. You get a certificate that says 'approved state-sponsored apprenticeship program,' that qualified your business for the work-related experience aspect in the classroom portion."

In renewable energy, we were told that the certified photovoltaic installer certification requires three years of experience and an exam.

◈ Section 11 - Special Focus Talent

❖ Findings:

- With the coming shortage of skilled workers for mid-level technical jobs, all sources of labor must be considered.
- Older workers (dislocated workers) are valued for their strong soft skills, but may be lacking in certain technical skills. They may also have acculturation difficulties.
- Employers want to take extra steps to create opportunities for people with disabilities, but physical job requirements may be hard to overcome for people with certain disabilities.
- Ex-offenders are potential additions to the workforce, depending on the nature of their convictions.
- Recent immigrants and those with limited English are a very small portion of the population, but with the right skills, they are welcome in many area manufacturing facilities.

In an economy churning with business failures, new technology, rising and falling sectors, anticipated workforce shortages in certain areas, and demographic shifts in terms of age and ethnicity, the practice of assisting certain groups of workers so that they can be more productive is good business, as well as a societal obligation.

❖ Re-Career-Older Workers

- **Scope and value**

  Sometimes called dislocated workers, this group is rapidly enlarging, given the economic climate. They include longtime employees of downsized industries, as well as individuals who had hoped to retire, but now find that their plans have been derailed. We heard from a workforce development professional who believes that One-Stop Centers will be key players in helping to retrain and redirect these workers.

  Older employees usually have good "work ethics" and strong experience, but may need technical retraining, according to several respondents. Based on their soft skills, they should be attractive to employers, although they may have to overcome possible limitations in math, science, and computer skills. "Most older workers are smarter and know how to do things, instead of just lifting something, like the younger guys," said a trade union official.

  One of these groups consists of government employees who are now moving to the private sector. Given the demographic increase in sheer numbers of those of retirement age, state cut backs, and financial market declines, it is reasonable to assume that more retirees will try to find work than in the past.

  Some employers report that they are beginning to see more older workers from all fields applying for jobs. "For certain plants that folded, we've been able to place

them." Others are doing some outreach. "We sent letters to some older workers that we were interested in talking to them."

An economic developer reports that displaced workers from the paper industry "have many of the skills that will be needed for new opportunities, including GlobalFoundries. Maintenance in a paper mill is similar to that needed in nanotech."

Perhaps, but not in biomed, according to a manufacturer in that field. "My concern with people who are coming out of the paper industry, here anyway, is that they're coming from a union environment, so they are not necessarily a cultural fit."

And yet, not all employers are seeing applicants from other industries. "There are a lot of plants that have closed ... I haven't seen a one of them. There is a break somewhere. Those WIBs and whoever else is out there are not directing them to us." Some employers charge them with "being too set in their ways ... We're just not seeing them." He continued, "There are too many new skills to learn, too much old technology to get beyond. "

- **Training opportunities**
  One chamber executive hopes that workforce development efforts will include an emphasis on retraining displaced workers, especially older workers who are not "techies. We have to get them comfortable playing with computers and other electronics." A community college official described his institution's efforts. "We want to be proactive about reaching out to adult learners. We're moving towards a web-based degree, with online learning. We also find that displaced workers often have very focused interests. For example, medical coding is a new program that has been student-driven."

  In some professions, older workers might be expected to succeed, but the barriers to entry in terms of degrees and credentials can be rigorous. They generally receive no college credit for prior non-credit training and existing skills. Excelsior College provides one avenue -- attaining an associate's degree by applying previous courses and other training as credit. Excelsior is now the largest nursing school, in terms of associate's degrees, in the United States. Empire State College can also assist with credit for work/life experience.

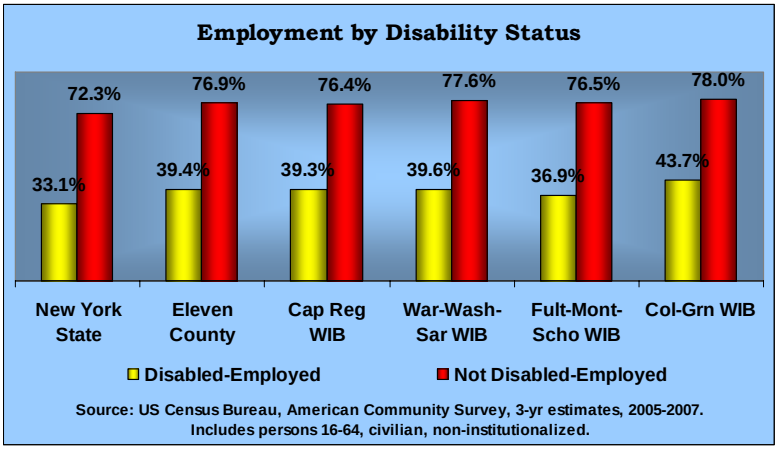
- **Expect too much money**
  One community college official, in discussing older returning workers, said, "Working with people in transition, it's helping them to see the need to shift from $75,000 to $45,000 to start, and then moving up later, or up and out. It's a tough adjustment, but in this economy, that is what they are facing." A manufacturer agreed. "It is going to be a huge leap for them from a monetary point of view, depending upon what their tenure is."

- **Physical limitations**
  According to one community college staffer, employers are less willing to give older workers a fair shot, because some believe that these workers do not have high energy levels and commitment. Others, especially those involved in certain kinds of

manufacturing point out that "given the physically demanding nature of the job, there are few older workers who are hired."

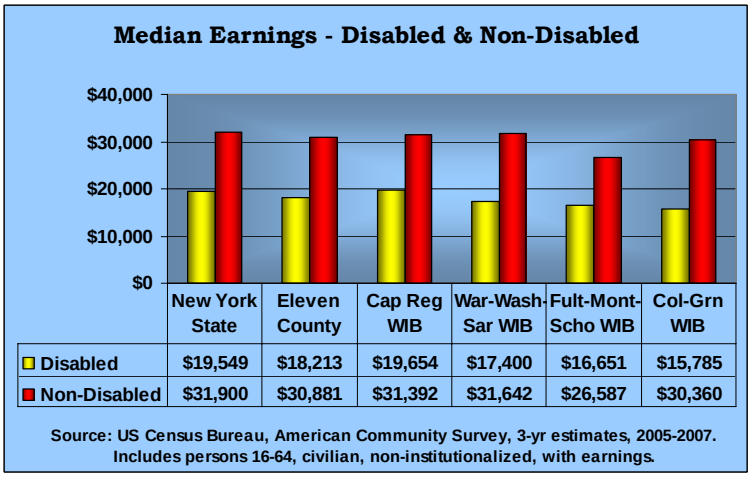
New York State has established a mature worker task force, whose purpose is to encourage employers to use best practices in retaining older workers. "To improve economic development and economic security of older adults through opportunities that recognize the value of mature workers and also seek to retain, retrain, and offer second careers that will fill anticipated areas where there will be a labor deficit."[12] The full task force is still not appointed, and appropriations have been minimal.

❖ Persons With Disabilities



Within the eleven county region, we find that 76.9% of non-disabled people between the ages of 16 and 64 are employed, as compared to 39.4% of disabled currently employed. Definitions of "disabled" are unclear, but this may indicate an untapped workforce.

By income on a per capita basis, the employed disabled are earning significantly less.



	New York State	Eleven County	Cap Reg WIB	War-Wash-Sar WIB	Fult-Mont-Scho WIB	Col-Grn WIB
Disabled	$19,549	$18,213	$19,654	$17,400	$16,651	$15,785
Non-Disabled	$31,900	$30,881	$31,392	$31,642	$26,587	$30,360

When asked if there are roles for disabled workers to play in their businesses, several manufacturers discussed possibilities within their facilities. "It depends on the disability, but generally speaking, it's all open." "Any handicap is some kind of challenge, but if that person has some capability," employers report, "there may be something." "There may not be a lot on the manufacturing floor (for people with disabilities that limit range of motion or strength), but among support positions, there may be some possibilities."

Most respondents thought specifically of physical disabilities when considering this question. CAD designs, bench work, circuit board assembly, applications engineering,

[12] Mature Worker Task Force, First Annual Report, July 2008

and inside sales were all positions that were mentioned as suitable for some disabled workers. Quality control was another. "Most of the equipment we use is just not conducive to them (people with disabilities), but you can tailor the equipment to the individual, sometimes."

Even in biotech, the jobs are mostly physical, and workers have to be able to move a certain amount of weight. "Off the production floor, there may be jobs. Not in the sterile areas though." Several employers suggested that the requirement to "gown up" might be an issue for those with certain disabilities.

In some industries, notably construction, contractors, and union agents were less likely to describe jobs that would be available to the disabled. "The opportunities are limited, because the job is physically demanding. It would be tough for a project manager who can't move around on a job site."

In the manufacturing plants, we heard, "you have to consider plant logistics. We are one story, but others are not." And the physical jobs are not limited to those in the entry levels. "Mid-level tech jobs (also) tend to have physical requirements."

Within the New York State Education Department, VESID (Vocational and Education Services for Individuals with Disabilities) provides services to people with a wide range of disabilities. A VESID official noted that many of the people they work with have no physical limitations at all (e.g. learning disabilities).

VESID is offering a model transition program. A partnership has been created among high schools, VESID, local vocational rehabilitation providers, independent living centers, colleges and universities, and the business community. The concept is to work with high school students to improve the services available through the vocational rehabilitation system which would help students move into postsecondary education and other job training opportunities, eventually leading to employment. Services include after-school employment internships and "shadowing" work experiences. Several area school districts and one not-for-profit agency in the region are contract recipients.[13]

❖ Ex-Offenders

Those released from correctional facilities are also part of the workforce, and area employers will hire them, "as long as it (the offense) is not directly related to the nature of what we do." "You don't have to hire an embezzler to be your controller, but for a machine operator, you're pretty wide open as to what they might have done." "We stay away from the violent crimes, and theft, given the fact that they are mostly unsupervised."

There some specific restrictions. "Drug offenders wouldn't get jobs at places with controlled substances. There are federal laws about pharmaceutical companies and employees." From a construction industry perspective, "a violent crime will keep them out of most federal buildings." "There are some job sites they cannot work on, and we

[13] http://www.vesid.nysed.gov/mtp/home.html 5/17/09.

try to make it known to them." In the healthcare field, hospital officials report that ex-offenders are not often hired for many positions because background checks are very restrictive.

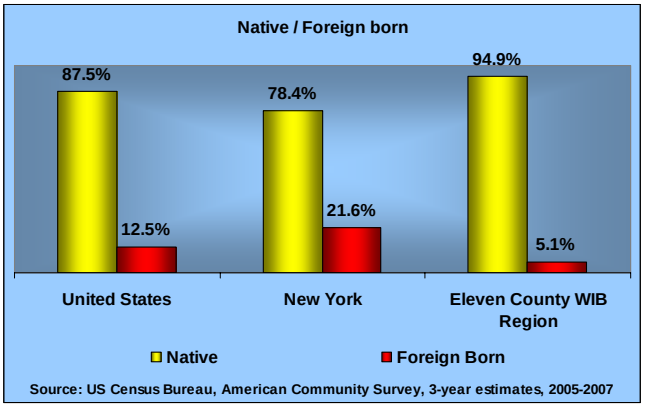
Another perspective was offered by a manufacturer. "I like them. Their parole officers keep them drug-free and under control." Another manufacturer reports that he hires ex-offenders for short-term positions. "We have work, but it is absolutely brutal bull work ... but they get practice writing a résumé, going through an interview. They work and then they get a letter of recommendation."

❖ Immigrant/ESL Population

The following figures are available from the United States Census Bureau's American Community Survey, of Albany County:

Language spoken at home, ability to speak English/population over five years old:	
English only	89.0%
Speak other language at home but speak English "very well"	7.6%
Speak other language at home, but speak English less than "very well"	3.4%

As to hiring immigrants, the issue mentioned repeatedly was the ability to communicate in English. "I have a part on my application that says ability to communicate. Since I speak English, so must you." Spanish instructors are in place in other regions but most employers and observers have told us that it is seldom necessary in northeastern New York.



"They have to be able to comprehend the specs. If they can't read and write in the English language, that's a problem." Other employers expressed a willingness to hire skilled workers with limited English speaking ability, and tutors are occasionally provided. Fluency in English is important, but there are other important attributes. "Most of the time, our hardest working people are immigrants."

Some employers hire large numbers of immigrants. "We have Polish, we have all sorts ... They're good workers." Manufacturers have informed us that they have hired from refugee centers, which may include people from Bosnia and Sudan.

There is also a seasonal aspect. "They come every year at the same time in the summer. They work for a program from their school."

One reason that lack of English language skills seldom came up is the high proportion of native-born Americans in the region.

◈ Section 12 - Recommendations

After talking with more than 150 regional stakeholders -- employers, chamber and business association representatives, economic developers, educators, public officials and workforce developers -- hundreds of suggestions, concerns, and recommendations were offered with respect to a workforce talent pipeline.

Most of the recommendations below represent a strong convergence of opinion. Those which do not are so noted. As we gathered input from employers, we formulated hypotheses, and further tested and explored them with educators. Some of these held true all the way through the study. Others continually evolved as we received more input and this is noted in the recommendations as well. It would have been helpful to return to our respondents for feedback on these recommendations, but time did not permit that.

The following recommendations will:

- Strengthen the regional workforce development system.
- Better prepare community residents for the modern work world.
- Provide a skilled and productive workforce to employers in the emerging high-tech industries.

One major recommendation focuses on the design and structure of a regional talent pipeline that will facilitate the on-going development of a skilled and productive regional workforce. All of the other recommendations also contribute to this goal.

Recommendations range from specific types of training that can be supported, to advocating for more students to study technical subjects, to encouraging schools to change the way they educate their students. A key overriding recommendation is for the workforce development system to focus on the needs of employers, as much as it does on job seekers. This study and these recommendations are designed to bring the voice of employers to the discussion.

Recommendations:

1. Move to implementation - stop further general studies.
2. Develop a regional talent pipeline that enhances and does not duplicate local efforts.
3. Accelerate the way technicians and operators are trained for emerging high-tech industries.
4. Improve societal perceptions of two-year technical degrees.
5. Expand the high-tech labor force by exploring ways to connect individuals who are currently outside the labor force to training and jobs.
6. Expedite the component of the new State Education Department / SUNY P-16 data tracking system that tracks employment outcomes for graduates.
7. Implement critical structural changes in K-12 education.
8. Increase the effectiveness of community colleges in preparing our region's workforce.
9. Examine the existing WIB structure and conduct a cost and feasibility analysis.
10. Support training programs to further develop the high-tech workforce:

a) High level technician
b) Lower level technician
c) Work readiness – critical thinking/interpersonal skills
d) Training in the green/renewable energy field
e) Advanced construction and weatherization training
f) Certification in laboratory science
g) General workplace safety
h) For the future – life long learning

1. Move to implementation - stop further general studies.

This report has much in common with a number of recent local and national studies, which have made similar recommendations. Our most important recommendation, therefore, is to begin implementation of the recommendations having a general consensus, without further study. The agreement of most of our respondents – employers, workforce developers, and educators – along with the findings of most of the other reports (many are listed in the attached Appendix), supports the conclusion that we are all on the right track.

The proposed regional pipeline model, the expedited training process, some of the education technology recommendations, and the community college collaborative strategies were developed over the course of our study, and therefore, were not fully tested. As part of the implementation process, we recommend that the WIBs hold a short series of roundtable discussions where these can be presented for reaction and comment, and some may be initially implemented as pilot projects.

We recognize the need to continue to gather and study data as part of implementation. The activities must be monitored to identify any barriers or obstacles that arise, and to refine strategies as needed. As a wise person shared at a recent conference, "If it's not measured, it won't get done, and if the wrong things are measured, the wrong things get done." But the key words here are "get things done!"

Of special note is the clear finding that business, educators, and the workforce community have different agendas and means of communication. Business executives want immediate action, workforce developers want to place people in jobs, and educators want to improve academic skills. Coaching would be helpful to facilitate dialogue and collaboration.

2. Develop a regional talent pipeline that enhances and does not duplicate local efforts.

Students, job seekers, and current employees need a "pipeline" that can take them from their current career path level and boost them to the next level. This pipeline can include career information and planning, skill training, and placement assistance. Employers similarly need an effective pipeline to help assure that they have the skilled workforce they need -- in the numbers they need.

Efforts to connect businesses, workforce agencies, and schools are best done locally through individuals who can work closely together. There are currently many such local talent pipelines in our region.

The regional role is to strengthen these local efforts and provide information region-wide, in order to promote successful workforce development in the "Tech Valley" region. The regional talent pipeline should be a support to, and communication network for, the existing and future local pipelines that make up the workforce development system.

We propose a regional talent pipeline, to be funded for the following:

- Develop a directory of existing local talent pipelines via a web portal.
- Benchmark successful practices, share this information via an on-line library, and use it to guide resource allocations and expansions to the network of local pipelines.
- Structure all pipeline and workforce development efforts by economic market needs, industry sectors, or training resources, not by political subdivisions. Create task forces with defined, action-oriented agendas that focus on specific growth sectors, such as technology, health care, manufacturing, and energy.
- Continue to identify workforce development needs of local employers and feed this information to educators across the region. Provide educators increased access to employers and current career information in the emerging sectors.
- Develop training/awareness programs to help educators and workforce development professionals interact more productively with employers.
- Establish a Regional Workforce Training Coordinating Council, organized and headed by senior representatives of the business community, and including agency, education, economic, and workforce leaders, to implement and evaluate these recommendations. This Council will require a small professional staff to provide technical assistance to local talent pipelines, and to host an annual regional event to build, evaluate, and maintain momentum for this initiative.

3. Accelerate the way technicians and operators are trained for emerging high-tech industries.

We identified two levels of advanced manufacturing:

- Older style manufacturers who have upgraded to CNC systems (Computer Numerical Controls), where required skill sets for technicians and operators are more basic, and,
- New very high-tech manufacturers, who use clean rooms, require extremely complex and very specific tolerances in their quality controls, and whose technology is continually evolving. The skill sets for technicians and operators in these companies are much more complex.

The capacity for training high-tech technicians is the most significant gap in the local workforce development system. While several local colleges are moving to address this shortfall, they will not provide enough graduates to meet the projected needs for 2011 and 2012. No one with whom we spoke had a strategy to address this on a large

enough scale. The following recommendation represents our thinking in response to the data we received.

The WIBs should explore with local employers the possibility of developing a shortened, accelerated program to:

- Train new workers for these higher-tech jobs.
- Retrain people with some experience in CNC manufacturing for these higher tech jobs.
- Prepare people to replace the lower level technicians who may be recruited away by the more advanced companies.

To accelerate job training, students should be required to take courses that directly relate to what they will do on the job. Several educators and employers state that they require pre-calculus to help students "sharpen their critical thinking skills" or to ensure that "students have a strong command of algebra," even though they will not need pre-calc skills on the job. Schools should use more direct means to achieve necessary competencies. According to a local college educator, there are many intelligent and very capable young people who can be taught to be good critical thinkers with solid algebra skills, but who can not pass or will not register for programs requiring pre-calculus. The rest of the technician curriculum should be reviewed for relevance as well.

During our discussions with educators, we have come to appreciate the complexity of this recommendation, and that it will meet with resistance. Extensive discussions will have to occur between high-tech employers; college faculty in math, science, engineering, and technology; deans at local colleges; and experts in project-based learning and those teaching "critical thinking/interpersonal skills" or "21st Century Skills." It will not be a quick resolution.

The question to be asked, is what other alternatives are there? Short of tapping the labor force outside this region, we did not hear of any other workable suggestions. Within the immediate time frame, if we want to promote local residents for these positions, recall that the military service academies accelerated their programs during World War II.

Specific action items:

- Design and establish an accelerated one-year technology-based certificate program, focusing on key skills and knowledge, to meet the needs of employers. Identify what workers really need to know and only teach that. The courses can count as credit toward a two-year degree at an accredited college.
- Establish a regional technology based learning community that links community colleges and BOCES across the region to help adult learners take advantage of the new training programs.
- Expand BOCES offerings in programs that can meet industry needs, and provide college credit and articulation agreements to facilitate associate's degrees with one

year of community college. Increase the adult education component, and consider expanding technical education services to lower grades.

- Design accelerated, customized retraining programs for dislocated workers who possess substantial experience in related industries.
- Develop apprenticeship programs proportional to forecasted needs in emerging high growth industries.
- Support internships and on-the-job training programs. Consider subsidized internships to get job seekers "in the door" and provide previews for employers. Job seekers get to test the job and consider it as a career.

4. **Improve societal perceptions of two-year technical degrees.**

The workforce development community, including schools and agencies, must work together with employers to educate school staff as well as parents and students as to the value of a two-year technical education. This is not to supplant or undermine a four-year education, but it is to recognize that contrary to current conventional wisdom, a four-year degree is often not the best option for many young people. For some, it can result in their earning a lower lifetime wage. To the surprise of many, including the authors of this report, we have learned that a substantial number of jobs requiring four-year or masters degrees (teaching and social work, for example) offer lower salary scales than those that can be obtained with a two-year technical degree.

Specific action items:

- Implement a regional education program on career opportunities and training options (including the value of a two-year degree) for the emerging high-tech industries -- targeting parents, students, and displaced workers. This could serve as a pilot for a statewide effort. One educator suggested mounting a media campaign to educate the public about community college technical educations, as the race to the moon in the 1960's was used to promote "best and brightest" to go into teaching and science fields.
- Set standards for local school districts to increase career education resources in high school and middle school. Suggestions include linkages to information about high-tech employers in the region.
- Implement a Regents level technical diploma that includes a rigorous and more applied education program with additional math, science, and technology requirements. This is not a recommendation to "dumb down" a high school degree, but to recognize that there are multiple intelligences and that for some students, practical and applied thinking might be superior preparation than that of the more abstract disciplines. The technical program can include just as much math and science (or even more) than the traditional college prep program, but these courses would be more practical, contextual, hands-on and project-based. Bill Gates has coined a new set of the 3 R's that reflects this recommendation: "rigor, relevance, and relationship."

  SED currently offers a "Technical Endorsement" on the Regents diploma for students completing a BOCES or other technical program. Our recommendation is

that the comprehensive (non-BOCES) high schools create a second academic track along these lines for those students who choose not to, or are unable to, enter a BOCES program.

The alternative is the current situation, in which students do not continue in math and science in high school, many do not graduate, and more than a few students who do graduate need remedial services in college. These students form a large number of "leaks" in the pipeline.

- Short of a separate diploma, offer more applied math and science courses in high school, as electives once the Regents requirements are met. Reversing the order was suggested by one educator, who noted that taking one of these applied math or science courses prior to the comparable Regents-oriented course would help many students master the Regents course and would keep them engaged in math and science for a longer time.
- Expand the teacher extern training program that exposes teachers to corporate and industrial careers and environments to include all eleven counties. This will enable them to more accurately and more positively present the opportunities and skill sets needed for high-tech positions.

5. Expand the high-tech labor force by exploring ways to connect individuals who are currently outside the labor force to training and jobs.

Given the need to bring more people into the workforce, it seems logical that efforts should be made to encourage participation by the unemployed, the underemployed, the displaced, and the discouraged.

- Partner with service agencies to increase outreach to older workers. Evidence suggests a fifty-year-old will stay with one company longer than a twenty-five year old will.
- Provide support for businesses, secondary schools, and community colleges willing to be training sites for older learners and other populations.
- Work with business associations and state and local agencies to promote the engagement of populations who can increase the available technology workforce.
- Increase outreach and career education at an early age to groups not fully represented in the high-tech workforce, especially minorities and women. Add this component to adult and alternative education programs as well.
- Make use of existing facilities for special technology training programs serving populations not traditionally targeted, including the disenfranchised and those with special needs.
- Increase career tracks for low income workers through incumbent worker assessment and individualized training.

6. Expedite the component of the new State Education Department / SUNY P-16 data tracking system that tracks employment outcomes for graduates

The new P-16 data tracking system from the State Education Department and SUNY will answer one critical question that no one seems to know with any certainty - how

many of the students, who in their senior year report their plan to start two or four-year colleges, actually start and then graduate within a reasonable period of time? The conventional wisdom is that the figure is about 50-60% for a four-year school.

However, another equally important question is how college graduates fare in the first few years after graduation. Of those who do graduate, how many end up in good paying jobs and/or jobs related to their field of study? The P-16 tracking system has, as one of its long term goals, to include more long term data on follow-up after graduation.

We recommend that this expansion be made part of the initial planning of the system and set as a priority for implementation. This would answer another critical question for students, parents, and educators - how many four-year graduates secure jobs that provide satisfaction and compensate them as well or better than jobs secured by two-year college graduates in technical areas? This data, we believe, will help change the argument with respect to the over-reliance on a four-year college degree.

7. Implement critical structural changes in K-12 education.

The Board of Regents, the Partnership for 21st Century Skills, and most of the educators with whom we spoke indicated a need to change from the old industrial model of education to one that focuses on building competencies in a more contextual way.

A word of caution came from a business leader who warned about shifting from one static paradigm to another. Instead, schools must be able to shift to a dynamic model that recognizes change to be constant. To be successful, schools, just like businesses, must continually innovate and adapt. Tech Valley High School is held as an example of the new way of education.

- Extend the Tech Valley High School teaching methodology to other schools. Schools need to infuse critical thinking/interpersonal skills into the way they deliver education. Rather than using the old industrial model of education, a change of focus to real world contexts and project-based learning, as Tech Valley High School is doing, will appeal to many students who do not learn well in the current educational delivery system.
- Create three new Tech Valley High Schools in the region, one exclusively for girls. These new schools will provide opportunities to participate in a similar program for those outside the current catchment area. Also, the benefit of single-sex education for girls, especially in the achievement of math and science learning, is well-documented. A school devoted to technology will help promote careers in these areas.
- Provide more off-campus career training options, such as the "New Visions" program. Off-campus, hands-on education can be an excellent experience for many students and should be made more broadly available.
- Establish a career/work readiness certification for all high school diplomas and GEDs. Students in high school, college, and work force development programs should be certified through rigorous skill-based testing to show they are work ready

and have mastered (not merely completed a course in) the soft and critical thinking/interpersonal skills employers have set as a priority.

Employers are nearly unanimous in:

- The importance they place on these skills.
- Their very strong desire that these are in place prior to hiring.
- Their assessment that these skills are lacking in many job applicants.

Most employers believe that these are difficult, if not impossible, to teach. To the contrary, the Schenectady County Chamber of Commerce has developed a system to teach and certify employability. It has been well received so far. Employers will be convinced of the value of certificate programs only by the strong work characteristics the graduates demonstrate. Another program model that teaches these skills is the Junior Achievement "company" program in which students establish and run a small company as a learning experience.

- Add an enhanced GED program that includes a work readiness and technology certification component.
- Require all K-16 teachers to train in the use of technology in the classroom, including virtual and immersive educational techniques. Current technology, from the internet to electronic networking tools to graphic and presentation software, offer many opportunities for better connecting with students, infusing critical thinking/interpersonal skills into the curriculum, and expanding the range of choices available to students. New York State ranks near the bottom nationally in capacity for virtual education. Given the current high technological engagement of young people, this teaching methodology should be further investigated. Several colleges, including Empire State College in this region, have begun to make use of this technology.
- Develop a virtual high school pilot model, following the lead of several other states.
- Establish a fast track teaching certification process for qualified retired or mid-career changers with technology backgrounds. The benefits are a larger pool of math, science, and technology teachers, and an enhanced business perspective among the faculty.

8. Increase the effectiveness of community colleges in preparing our region's workforce.

The five community colleges in the region represent the front line in training mid-level technicians for the jobs that will soon be available. Some structural changes will improve their performance.

- Improve coordination and communication between the credit and non-credit sides of the institution and among departments, so employers seeking to benefit from a college relationship do not feel as if they are working with two or three different institutions. It will take the authority of a high-level administrator to bridge these gaps. In addition, assign a staff person with expertise on both the credit and non-credit sides of the institution to be a single point of contact for business people.

- Schools need help from businesses to promote courses that offer opportunities in emerging industries. Several schools noted efforts in which they designed a program to meet business needs, but had difficulty enrolling students.
- Establish collaborative training models, in which students at any community college in the region can put together programs, find courses, and receive specialized training at other community colleges. Colleges should invite other schools to offer programs on their campus, having students travel to the other campus for specific lab work.
- Offer credit, degrees, and certification opportunities through the establishment of a technology based "any campus," with a real time course of study, using conferencing and streaming media technology.

To make best use of limited resources and to accommodate student and business needs for scheduling:

- Consider running programs in the summer, in the evening or during school vacations to make the best use of community college and BOCES facilities. (Note: we were told that many younger students object to going to classes in the summer.)
- Increase flexibility in scheduling courses outside the traditional multi-course semester-based model. Under the semester structure, some programs requiring specific sequences can only be started in August each year, a time which may not align with the needs of someone who loses their job in September. Some colleges indicated a willingness to run programs "off cycle," if there were a large enough group to make it cost-effective. One way to increase the flexibility in scheduling would be to create "hybrid" programs that combine on-line courses with some scheduled hands-on classes (for specific lab work and soft/critical thinking/interpersonal skill development). On-line classes can start at any time. Classes can also be scheduled as compressed modules, instead of semester long courses.

9. Examine the existing WIB structure and conduct a cost and feasibility analysis.

Workforce investment boards have been operating for a sufficient period to warrant a comprehensive assessment, especially at a time when they will be called upon to be exceptionally productive, effective, and efficient.

- Assess WIBs in terms of effectiveness as a workforce training and service delivery agency. Also, consider the appropriate regional boundaries and whether WIBS are more effective as a regionally based model or a sector model.
- Develop a regional workforce development training plan that maximizes limited resources and examines the elimination of duplicative administrative structures.
- Champion new programs that promote lifelong learning, in areas such as computer education, technology updates, and methods to adapt to changes in career opportunities.

10. Support training programs to further develop the high-tech workforce.

One of the key questions we were asked to address is where the workforce investment boards can best use their training resources to help prepare workers for mid-level technician positions. Some companies preferred that most of the training be done by schools before the employees are hired. "I wish schools would do it, because they (workers) really need that coming in the door." A manufacturer lamented that his employees needed to demonstrate more soft/critical thinking/interpersonal skills on the job, but for economic reasons, his company could not provide the training.

Employer recommended training programs for each of the following areas:

a) High level technician
b) Lower level technician
c) Work readiness – critical thinking/interpersonal skills
d) Training in the green/renewable energy field
e) Advanced construction and weatherization training
f) Certification in laboratory science
g) General workplace safety
h) For the future – life long learning

a) High level technician

High level positions ($15-$25 per hour) require a two-year degree or, alternatively in some cases, many years of experience working in the field.

An applicant who successfully completes the appropriate two-year degree is very likely to be hired. Most, but not all of the community colleges offer these types of programs, and they have connections with local employers to arrange student internships and job placements. Industries requiring this two-year degree include semi-conductor and other nanoscale/advanced manufacturing, biotech, wind energy, and line workers in utility companies.

Those with significant experience in the field who desire to advance to a high level technician job without pursuing a degree can also benefit from selected coursework to:

- Sharpen or update their math skills (pre-calculus or calculus would be most impressive, although solid college algebra is usually sufficient for the job).
- Add greater background in the appropriate science (e.g. nanoscale and materials science for working in the semi-conductor industry, biology and lab methodology for biotech).
- For displaced workers from other industries who possess some of the skills needed, courses in understanding the different corporate culture of high-tech industries vs. old tech industries. In this sector, the technology is emerging; workers need to be able to critically view a process and suggest or make

changes to the "recipe" as needed. Also, the tolerances for quality are much tighter. Clean room technology training can also be offered.

Applicants lacking a two-year degree will be less competitive, but most employers said they would consider someone who brings the right mix of skills, knowledge, and successful experience. A few employers make the two-year degree an absolute minimum (but we suspect employers will re-think this requirement as demand for these workers increases).

Returning to college to meet a two-year degree requirement may be the best route to ensure employment, but the expedited, one-year retraining programs discussed earlier can also be appropriate to meet the expected ramp-up in demand.

b) Lower level technician

For the lower level technician positions (paying $9.50 - $14 per hour), a mechanical or electrical technician certificate is deemed sufficient by many employers, especially if the job seeker had completed a BOCES or strong math/science high school program. Technical aptitude is obviously a desired skill set. Courses to sharpen math skills (college algebra) and computer skills (basic computer use – mouse, touch screen, windows, internet, and email) would also be helpful. Ninth grade reading and math skills (if actually mastered at the 9th grade level and not just "completed") would be sufficient for these positions.

One employer suggested targeting college drop-outs, especially those who drop out for financial reasons, or because, while they do have sound basic academic skills, they are simply not school-oriented. There was some extensive debate among college staff as to whether drop-outs can really be "high quality," but we heard enough validation to support this recommendation. WIBs can work with colleges to help identify and recruit these job seekers, and provide limited training to sharpen skills.

There is a concern that GlobalFoundries or General Electric as part of a fast start up, will raid some of these "lower tech" industries for their skilled technicians. Preparing people to back-fill these positions is probably a good short term work force development strategy.

c) Work readiness – critical thinking/interpersonal skills

In addition to including this training at a greater level in the high school and college curricula, WIBs may want to support it for older job seekers as well. They can be taught directly through a program similar to the one developed by the Schenectady Chamber of Commerce, or infused into the curriculum of GED programs and other classes using a project-based learning approach.

d) Training in the green/renewable energy field

In the emerging solar photovoltaic (PV) field, there is a growing demand for installers and sales people with a technical background. One-year, night-and-weekend, certificate programs are offered at Hudson Valley Community College to

qualify people for these positions, which require some familiarity with the materials, equipment, and technology of the PV industry. The program provides basic electrical and solar principles, leading to jobs paying $15-$20 per hour. The National Association of Board Certified Energy Practitioners (NABCEP.org) provides a certification exam for installers. There is also a much shorter PV program that takes 40 hours to complete, preparing applicants to work on PV crews. After that, they can take the one year course to move up, or receive training on the job.

For wind energy operators and technicians, electrical or mechanical two-year technical degree holders (or experienced electricians) are hired. GE currently provides a three week training program to people with these backgrounds who will be working on GE equipment. Other sites use equipment from other manufacturers, so additional training may be needed. Wind turbines are generally at remote sites, and none of the larger "wind farms" are currently in the eleven county Greater Capital Region. If training were done here, graduates would have to relocate.

FMCC is starting a green technologies program. It will be an on-line program, running for as long as six months, and students will pass national certification exams upon completion. This is something that can be offered in other parts of the region as well.

e) Advanced construction and weatherization training

Skilled workers will be needed in advanced construction, most notably in the construction of clean rooms. Pipe fitters and welders need specialized training, but the remainder of the trades can benefit from short programs focusing on special procedures and slight differences in materials. Some of this training is already being conducted locally through grant funded programs, and the need will increase as the construction phase ramps up (both for GlobalFoundries and for the companies that will follow).

We were also asked to consider programs for high-needs populations such as high school drop-outs, ex-offenders, or people with low literacy or numeracy skills. In most high-tech endeavors, employers state that candidates should have strong skills, and many required a full two-year college program. Some of these high-needs candidates will require extensive supplemental education to prepare them for the next level.

While they are improving their basic skills, the building trades represents an area in which apprentices can earn while they learn, making training possible for those who need steady income. Furthermore, all would benefit from developing a résumé with solid work experience.

Weatherization programs were recommended as areas on which to focus, since they were given priority in the stimulus funding. Initial training typically takes only one or two days for basic skills in each area. Weatherization contractors are focused on narrow sectors and simple tasks -- replace a window, redo insulation, etc.

Community Action agencies have funding for the training, but the WIBs can help with recruitment and referrals.

These programs can serve as a career ladder, since success will require construction skills, understanding of procedures and process, understanding the scientific basis behind their work, etc. – all transferable skills. The weatherization industry offers a program called Career Pathways, a 64 hour course of study that addresses the basics in building trades and weatherization. Once hired, there is additional training, leading to advancement into a crew leader position.

Certification offered through the Building Performance Institute programs provides a valuable credential. (One course involves four days in the classroom, with a two day field test and written exam.) The training and experience can qualify individuals for the construction industry apprentice programs. It also serves as preparation for additional training in related fields, such as photovoltaic or wind energy, or training as linemen with electrical utilities (involves working on roofs, at heights, using construction tools, etc.). Some of these jobs would require completing a two-year degree after demonstrating the basic skills.

f) Certification in laboratory science

Courses leading to a certification in laboratory science would be valuable to job-seekers in the biotech industry. There are both on-line and classroom programs available from a national certification organization. Columbia-Greene Community College is exploring a two-year laboratory technician degree program which would be a much stronger preparation for biotech lab work.

g) A general workplace safety program

A general workplace safety program, while already offered by most companies to their employees, would be beneficial as a skill building, pre-employment program. Several employers volunteered the importance of this attribute in terms of attitude and experience.

h) For the future – life long learning

For the high-tech industry of the future, the idea of life long learning should be instilled in all. Technology is continually changing; therefore, people will need to upgrade their skills on a constant basis to maintain their jobs and to move ahead. For example, in advanced construction, the materials used in construction of the 150 mm fabrication plants in the 1980's, are not the same as those for the new 300 mm fabs being built now. Even for those with prior experience, retraining is mandated. Also, a certificate or two-year degree may be sufficient for their current job, but in the future, advanced education might be required for advancement.

◈ Appendices

❖ Appendix 1 - Questions for Respondents in Focus Groups and In-Depth Interviews

(A moderator's guide was written, tested, and used in focus groups for business executives. As the project branched out to other stakeholders, questions were added, eliminated, and modified for different respondents as appropriate. In addition, as differing perspectives and information were offered, there were continual adjustments in the questions and subject matter.)

❖ Questions for Businesses

❖ **Warm-Up / general questions:**

- Tell us about your business. What is your niche? Are you locally owned? What is your size, compare to your competitors?
- Give use your analysis of the current and future business climate in the region, especially with respect to workforce needs.
- Given the current economic climate, describe the attitudes of your current employees? (Are employees looking inward and saying, what can I do for this company?)

❖ **Hiring:**

- How do you currently find qualified, production line mid-level employees? Are they available locally?
- Are there regional factors that make it hard to find workers?
- There are agencies that can help you with finding and/or training workers. In what areas could you use some help? Do you have any experience with them?
- Are there strategies to increase minority and women participation in technical programs? How are they working out?
- What positions are the hardest to fill? Have the highest turnover? Any solutions?
- How do you know when you find someone?
- How long is the recruitment process from initial contact to first day on the job?
- Are there probation periods? What percentage makes the grade?
- Tell us about washouts, those who leave shortly after they are hired? Do you know what happens to them?

❖ **Skills:**

- Let's consider an "ideal" employee for a production line mid-level position. What kind of job titles would you put in this classification?
- What are the required skills? What skills would you like to see, in addition?
- Which is more important - an employee who has specific skills to fit a particular position, or one that has the technical ability to rapidly learn new skills? (Or an employee who has the specific skills for the specific job you're filling, or one that has generic skills but can be taught this and other jobs)?
- How have skill sets changed in recent years?
- In the future, 3 to 5 years, what new or additional skills or knowledge will your employees need to be successful?

- What skills are especially hard to find in this region?
- Is initiative sometimes restricted by safety rules and protocols?

- **Training:**
  - When you hire someone for these positions, do they come ready to work, or is training needed?
  - Besides the specific task, what else to you typically have to teach them?
  - If training is needed, who does it in your company?
  - Let's talk about how outside trainers fit your needs. Can they successfully teach skills that are relevant in terms of current technologies? (Discuss community colleges, proprietary trade schools, etc.)
  - Is cross-training, the ability of an employee to do multiple tasks, an important part of your training efforts?

- **Career Ladder:**
  - Do you hire based on the expectation that they have promotion potential?
  - If you had someone who was working out well in a low skill position, what would they need to do or learn to move from entry level to mid level skilled production jobs in your firm?
  - Is the career ladder pretty much on the inside or do you recruit from the outside? Do you recruit for mid-level technical positions outside the region?

- **Effect of GlobalFoundries:**
  - What effect will the arrival of AMD/Global Foundries have on the region? Now specifically, on your workforce?
  - A consultant's report indicates there are not enough workers in the region to meet AMD/GlobalFoundries' needs. Will that have an effect on you?

- **Relationship and Communication with Secondary and Post-Secondary Schools:**
  - What would you want to include in the school curricula to prepare students for the world of work, besides basic reading and math. What kind of work skills should be taught (showing up on time, appropriately dressed, respectful, responsible)?
  - Do you have any relationship with area schools? What is your method of communication with schools, if any? How do you get the schools to know your business needs?
  - Have you talked with educators and can they speak business? Are they being responsive?
  - Do you have any contact with high schools or middle schools for career awareness/promotion/recruiting?
  - Do you recruit from high schools?
  - Do you offer "extern" programs for teachers?
  - How ready are high school graduates to work at your business? Are BOCES Mech Tech Grads ready for mid-level positions?
  - If the college came you and asked "What do you need us to teach?" - what would be at the top of your list?
  - Have you used an intern program? Would you be open to it? What about job shadowing (where a student spends a day observing someone at work)?

- **Certification and Licensing:**
  - Do you have positions that require licensing? Certification? Competency Models? Tell us about the procedures?
  - Employability certificate – what are your impressions? Would it indicate a stronger applicant or employee?
  - Workkeys, MSSC, or Prove It! – Are you familiar with any of these? What are your impressions. Would it indicate a stronger applicant or employee?
  - If the curriculum for Workkeys, MSSC, or ProveIt! was appropriate for your needs, would your company sponsor it? What would the criteria be?

- **Health Care Specifically:**
  - In other industries, you can enter, do well, and move up. Can you do that in health care?
  - Are there other opportunities for people who have earned licenses besides relatively restrictive jobs?
  - Can employees find education and training, or are they limited by the availability of training venues and faculty shortages?

- **Roles of other entities:**
  - Tell us about your contacts and relationships with the following, specifically related to finding and training qualified mid-level technical employees:
    - New York State Department of Labor
    - Workforce investment boards (WIBs)
    - New York State Economic Development
    - Business associations – chambers of commerce, partnerships, Center for Economic Growth?
    - Regional government entities – county economic development, etc.

- **Special Focus Talent Capital**
  - From your experience, describe the strengths and weaknesses of each of the following for your business:
    - Older employees (40+), (newly back in the workforce, laid off from other businesses, ex-government retirees, etc.)
    - Disabled workers
    - Ex-Offenders
    - Limited English speakers
    - Veterans
  - What positions might suitable for workers with disabilities?
  - What role could work readiness organizations have in preparing employees?

- **Talent Pipeline:**
  - What do you think of when you hear the term "talent pipeline?
  - There are efforts to develop a cooperative partnership, leading to a talent pipeline between businesses and counselors, trainers, and other workforce professionals. Would a talent pipeline be of value to you?
  - What are the key ingredients, from the business perspective, in making this collaboration work?

- Can a mechanism be created to bridge the gap between business and education? If not, why not?
- Most training entities and businesses acknowledge an information gap – the trainers are not sure about the skills businesses may need, and the businesses are unaware of what the trainers offer, as well as what they are capable of. How can this information get to the right people on both sides?
- Suppose there was a web site that listed all the schools and training facilities in the region. What kind of information should be on this web site?
- Which entities should be listed?
- What skills should be offered?
- Describe past successes.
- Should businesses be on the website, listing skills needed and perhaps, job openings?
- Should it include a listing of business task/skill certifications?
- As a business, if a formal pipeline, how would you use it?
- Should the training entities agree to seek feedback from the businesses, and should the businesses agree to provide the feedback?
- If the business cannot find a specific skill on the website, should there be a "central authority" to call who would seek out entities that can provide the training, or perhaps facilitate between the businesses and appropriate schools or training entities?
- About the "central authority," who or what could it be? Could it be some sort of existing organization? Which one?
- Would a pipeline for entry-level employees be more valuable to you than a pipeline for mid-level employees?

❖ **Additional Questions for Educators:**

- What is a successful completion for a student in your district? How do you measure it and to whom do you report it?
- Do schools bear the responsibility for teaching basic skills (appropriate work behavior, attendance, not texting, appropriate dress) or higher level soft skills (job readiness skills, including problem solving, team work and critical thinking skills)? Is this being done in the schools?
- Tell us about the ways in which you currently collaborate with businesses?
- Are there other areas in which you would like to collaborate?
- Who would be the best point of contact in your district for a business interested in working with you on career awareness or internships?
- We're hearing that schools promote the message that nearly all students should go to four-year colleges. Is that true? What are your thoughts on the subject?
- Is more project-based learning going on in your school?
- Is there anything about the math and science curricula in secondary schools that you would want to change?
- One proposal we're hearing is having applied math or science programs taught in school. These courses would not prepare a student for advanced science and math education, but would prepare them for practical applications on a job. What are your thoughts?
- Workforce studies in this region are showing that the major area of job growth will be among mid-level technical employees – in jobs that require some training and education, but not necessarily a four-year degree. Students are not always exposed

to messages promoting two-year degrees. Would you be interested in promoting that message in your district?

- How would you feel about a program in which employers come to the school to talk to elementary and middle school students about technical careers with the express message that you don't have to go to a 4 year college to get these high paying jobs?
- How would you feel about having 9th and 10th graders do job shadowing in these careers?
- Tell us some of your thoughts about Tech Valley High School.
- Are there constraints being placed upon you by sponsors and parent organizations (State Education Department, SUNY, County governments) that are preventing you from serving students and businesses as you might like? What are they, and what would you like to do differently?
- (For colleges) – tell us about your relationships and collaborations with the other colleges in the region?
- (For colleges) – Do you see as your primary mission to prepare students for four-year colleges, or something else?

❖ **Additional Questions for Workforce Development Professionals:**

- Describe a successful pipeline. Do you see it as a one-way applicants-to-jobs program, or should it be more interactive?
- Should the government have a role in the pipeline? Which parts of the government, and what role?
- We've heard a criticism that the Department of Labor is too "supply-side" oriented – they concentrate on the workers, without considering what businesses really need. Please respond.
- What elements of a pipeline already exist?
- Please talk about your relationship with WIBs.
- What role do unions play, in terms of planning for future workforce needs?
- Tell us about One Stop Career Centers. What is their relationship with businesses? What is their connection to colleges? To BOCES?
- What kind of training resources do One Stop Career Centers offer? What kind of training do counselors get in terms of career/labor market info? How much time do they have to spend with dislocated workers who need to change careers?
- How well suited are one stop centers to be a pipeline to high-tech industry?
- Are you familiar with 21st Century Workforce Skills?

❖ **Additional Questions for Economic Development Professionals:**

- What are the strengths and weaknesses of the region in terms of the workforce? What are the trends? What do you tell/show businesses from out of the region?
- Are there business sectors on which we should concentrate – because they show growth and play to our strengths?
- What relationship do the schools in your region – secondary, two-year and four-year colleges, and proprietary trade schools – have with you? Do they have a single point of contact? Do you make matches between schools and area businesses?
- Tell us about your role with respect to employability certificates and other work readiness and specific skill certification programs.
- Are the skills of workers the old manufacturing plants similar enough so that, with a little bit of training, they can move to the new high-tech companies?
- Please talk about your relationship with WIBs.

◈ Appendices

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◈ Appendices

❖ Appendix 3- List of Respondents and Affiliations

Adirondack Community College

Patricia Carte
Program Coordinator

Diane Dalto
Technology Division Chairperson

Tim Lahey
Director of Career Services

Adirondack Regional Chamber of Commerce

Todd Shimkus
President / CEO

Albany Community Action Partnership

Kathy Cloutier
Executive Director

Albany Medical Center

John Adams
Human Resources

Kathy Ervolina
Lab Supervisor

Albany-Colonie Regional Chamber of Commerce

Kevin Catalano
Loan Officer

Mark Eagan
President

Karen Fox
Project Manager

Alteris Renewables, Inc.

Michael Stangl, P.E.
Vice President of Sales

Altfeld, Inc.

Jim Altfeld
Consultant

AMRI

Michelle Pilato
Manager, Science & Technology

AMT Castings, Inc.

Angelika Verderber
Production Manager

AngioDynamics

Paul Kudlacik
Director, Manufacturing

Mike Perez
Corporate Recruiting

Associated General Contractors of NYS

Brendan Manning
Education and Evironmental Director

Karen Morrison, PE
VP - Transportation & Technical Services

Ballston Spa Central School District

Joseph P. Dragone, PhD
Superintendent of Schools

Blasch Precision Ceramics

Les Lak
VP of Operations & Systems; also President, CEN; and Board Member, Manufacturing Alliance of New York (MANY)

Bricklayers & Allied Craftsmen Local #2

Pat Tirino
Apprentice & Training Director

Business Council of New York State

Margaret Moree
Director of Federal Affairs

C.R. Bard, Inc.

Shaune M. Toomey, SPHR
Employee Relations Manager

Cambridge Valley Machining, Inc.

Don Schneider, Jr.
Vice President

Capital District Regional Planning Commission

Rocco Ferraro
Executive Director

Capital Region BOCES

Dr. Hank Stopinski
Director of Career and Technical Education

Capital Region Workforce Investment Board

Dan Gentile
Executive Director

Robert C. Wildermuth III
Director, Workforce Development

Carpenters Local 370

David Moak
Training Coordinator

Cascades Tissue

Veronick Hill
HR Manager

Center for Economic Growth

Jeff Lawrence
Executive Vice President

Chamber of Schenectady County

Leesa Pagan
Director of Workforce Development and Public Affairs

Chamber of Southern Saratoga

Peter Aust
Executive Director

College of Nanoscale Science & Engineering at UAlbany

Christopher Borst, PhD
AVP for Engineering & Integration

Robert Geer, PhD
VP of Academic Affairs and Chief Academic Officer

Columbia-Greene Community College

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Director, Office of Community Services

Columbia-Greene Community College Workforce Investment Office

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Director

Ellis Hospital

Randy Stark
Human Resources Director

Empire State Development - Capital Region Office

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Economic Development Specialist II

Environment One

Kelley McCart
Director of Human Resources

Euphrates, Inc.

Kristine Elmore
Human Resources

Kevin Korzenski
Human Resources Manager

Excelsior College

Patti Croop
Director of Grants and Research

Cathy Kushner
VP for Institutional Advancement

Fort Miller Group

Mary Ann Spiezio
Vice President, Human Resources

Fulton County Economic Development

Lisa McCoy
Marketing Director / Zone Coordinator

Fulton, Montgomery, and Schoharie Counties Workforce Development Board, Inc.

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Executive Director

Nancy Reccio
Business Services Representative

Brittney Skill
Business Services Representative

Fulton-Montgomery Community College

Debra Bartman
Trio Student Support Services Transfer Advisor

Christie Crawford
Outreach & Support Rep

Mary-Jo Ferrauilo-Davis
Director of Counseling, Advisement, & Testing

Laura LaPorte
Associate Dean for Enrollment Management

Sharon Poling
Director, COCAL Collaborative Career Learning

Richard Prestopnik
Professor, Electrical and Computer Technology

Diana Putnam
Dean of Business Technology & Health Professions

Reid Smalley
Director of Continuing Education and Workforce Development

General Electric Renewable Energy

Jessica Budris
Technical Staffing Leader, Human Resources

Daniel Lance
Global Training Leader, Wind Field Operations

GlobalFoundries

John Blowers
former Senior Manager of Human Resources

Greene County Economic Development, Tourism, & Planning

Frank Alguire
Economic Developer

Hamilton, Fulton, Montgomery BOCES

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Director of Career and Technical Education

Healthcare Assocation of NYS

Sherry Chorost
Director of Workforce

Cindy Levernois
Senior Director, Workforce & Behavioral Health

Fred Heigel
VP, Health System Redesign and Regulatory Affairs

Hero / Beech Nut Nutrition, Corp.

Amy McGrath
Human Resources Director

Hudson Mohawk Area Health Education Center

Lottie Jameson
Executive Director

Hudson Valley Community College

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Project Manager, Community-Based Job Training Grant

Joseph Sarubbi
Executive Director, TEC-SMART

Michael Stangl, P.E.
Adjunct Instructor, Electrical Construction and Maintenance Program

Insulators Local #40

Jeff Guynup
Business Manager

Iroquois Healthcare Alliance

Stacy Connors
Associate VP Member Relations & Advocacy

Greg DeWitt
Workforce Project Director

Junior Achievement of Northeastern NY

Edward Murray
President

Keymark Corporation

Robert Rivenburgh
Human Resources Manager

Kintz Plastics

Wynn Kintz
President

Manufacturing Skill Standards Council

Ryan R. Beal
Marketing Coordinator

Mesa Technical Associates

Chuck Finin
President

Modern Welding School, Inc.

Patricia Aucompaugh
Former Administrator

Mohawk Valley Applied Technology Corporation

Cory Albrecht
Business Development Manager

Jack Dillard
Vice President

National Grid

Keith McAfee
Vice President, Operations Eastern Division

Navilyst Medical

Michael Butkowski
Senior Production Supervisor

Larry Gaska
Manufacturing Supervisor

Amy Wolfe
Human Resources Supervisor

NTI Global

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Human Resources Manager

NY Association of Training & Employment Professionals

Russ Simon
Assistant Director

NY Wired for Education (Metrix Learning)

Brian Lee
CEO

NYS Association of Counties

Isabelle Andrews
Workforce Intelligence Project Director

NYS Board of Regents / School of Education, SUNY Albany

Dr. Joseph Bowman
Regent

NYS Department of Labor

Anthony Joseph
Director of Workforce Policy, Innovation and Improvement

Jim Ross
Capital Region Labor Market Analyst, Division of Research and Statistics

NYS Education Department

Jean Stevens
Associate Commissioner of Education

NYS Education Department, VESID

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District Office Manager

NYS Energy Research and Development Authority

Adele Ferranti
Program Manager

NYS Work Experience Coordinators Association (WECA)

Rich Heim
President, WECA; President, Capital District Business and Marketing Education Association; and Business Teacher, North Colonie School District

Operating Engineers Local 106

Ed Millington
Training Director

Painters & Allied Trades District Council #9

Roy Casey
Apprentice & Training Coordinator

Plumbers Local #7

Russ Lincoln
Apprentice & Training Coordinator

Pond and Lucier, LLC

David Lucier
Founding Member

Public/Private Ventures

Carol Clymer
Director of Labor Market Initiatives

Quad Graphics, Inc.

Sheila Zirlin
Employees Services Lead

Questar III BOCES

James N. Baldwin, JD, Ed D
District Superintendent and Chair of the New York State District Superintendents

Regeneron Pharmaceuticals, Inc.

Daniel Corbett
Associate Manager, Cell Culture

James Wolfe
Senior Manager, Protein Purification

Rensselaer Polytechnic Institute, Center for Biotechnology and Interdisciplinary Studies

Glenn Monastersky
Director of Operations and Associate Center Director

Rensselaer Polytechnic Institute, Severino Center for Technical Entrepreneurship

Shreefal Mehta
Executive in Residence

Saratoga Economic Development Corporation

Dennis Brobston
President

Shelby Schneider
Economic Development Specialist

Saratoga Springs School District

Janice White
Superintendent of Schools

Saratoga/Warren/Washington Workforce Investment Board

Bob Hummel
Executive Director

SCA Tissue

Tracey Riley
Regional HR Manager

Schenectady County Community College

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Interim President

Denise Brucker
Coordinator of Workforce Development, Business & Industry Training

Tania Cabrera
Assistant Professor, Math, Science & Technology

Robert Frederick
Coordinator, Career and Employment Services

Ruth McEvoy, PhD
Chair, Departments of Mathematics, Science & Technology

Seton Health

Kathleen Occhiogrosso
Vice President, Human Resources / CHRO

Sheet Metal Workers Local #83

Larry Hebbard
Business Agent

Shenendehowa School District

Dr. L. Oliver Robinson
Superintendent of Schools, Shenendehowa

Simmons Machine Tool Corp.

Lisa Lamanna
Human Resources Generalist

Solid Sealing Technology

Denise Balfour
Human Resources Manager

SUNY Cobleskill

Holly Cargill-Cramer
Director of Communications & Public Affairs

SUNY Empire State College

Lisa Sax
Director of Corporate and Community Partnerships

SUNY System Administration

Barbara Drago
Assistant Vice Chancellor for Business, Industry and Workforce Development

SUNY, University Center for Academic & Workforce Development

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Statewide Coordinator for the ATTAIN Project

SuperPower, Inc

John Dackow
Director of Operations

Truate Lehner
Director of Marketing and Government Relations

Taconic Farms

Laurie Phoenix
Administrator Training/Career Development

Tech Valley Communications

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Tech Valley High School

Raona Roy
Director of Institutional Advancement

Tech Valley Internship Program

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Co-Coordinator

Sandra McGarraugh
Co-Coordinator

Total Facilities Solutions, Inc. (MW Zander)

Chris Walton
Mechanical Regional Manager and Vice President

Joseph Miner
Electrical Regional Manager and Vice President

Tri City JATC / IBEW Local 236

Richard Cataldo
Training Director

WAMC Northeast Public Radio

Alan Chartok
President

Warren County Economic Development Corporation

Jeff Farley
Director, Programs and Services

Washington County LDC

Tori J.E. Riley
Executive Director

Washington-Saratoga-Warren-Hamilton-Essex BOCES

Doug Leavans
Director of Career & Technical Education

Denise Pallozzi
Adult Education Program Coordinator for Business & Workplace Development

Dr. John Stoothoff
District Superintendent of Schools

Workforce Consortium for Emerging Technologies

Elizabeth Herkenham
Director Executive

Workforce Development Institute

Penny Hill
Regional Director for the Capital District

WorkKeys Center at Syracuse University

Tom Hadlick
Director

Zak, Inc.

Scott Mitchell
Sales Representative, Lean Manufacturing Engineer

◈ Appendices

❖ Appendix 4 – Employer Questionnaire: For mid-level technical employees, please rate the following characteristics by "Easy to Find / Hard to Find":

1. Flexibility – adapts to changes in process and changing priorities									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0	**2%**	**5%**	**12%**	**11%**	**46%**	**15%**	**7%**	**4%**	**0%**
Mean = 5.4									
2. Respect for perspectives, customs, and individual differences									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0%	**0%**	**11%**	**17%**	**23%**	**25%**	**16%**	**4%**	**4%**	**0%**
Mean = 5.0									
3. Open-minded - Listens to other people's opinions and alters own opinion when appropriate									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0%	**1%**	**2%**	**8%**	**14%**	**44%**	**22%**	**3%**	**7%**	**0%**
Mean = 5.8									
4. Able to read and understand written information									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2%	**3%**	**9%**	**12%**	**17%**	**21%**	**30%**	**7%**	**0%**	**0%**
Mean = 4.8									
5. Able to speak so others understand									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2%	**3%**	**9%**	**16%**	**20%**	**21%**	**25%**	**4%**	**0%**	**0%**
Mean = 4.5									

6. Able to communicate ideas in writing									
Easy To Find									**Hard To Find**
		6	24	55	48	63	40		
0%	**0%**	**3%**	**10%**	**23%**	**20%**	**27%**	**17%**	**0%**	**0%**
Mean = 5.8									
7. Able to do basic math computations									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1%	**3%**	**4%**	**10%**	**30%**	**16%**	**18%**	**7%**	**12%**	**0%**
Mean = 5.2									
8. Makes responsible use of company time and property									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0%	**1%**	**5%**	**7%**	**17%**	**30%**	**17%**	**20%**	**4%**	**0%**
Mean = 5.6									
9. Maintains composure and keeps emotions in check even in difficult/stressful situations									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0%	**0%**	**0%**	**11%**	**26%**	**36%**	**17%**	**10%**	**0%**	**0%**
Mean = 5.9									
11. Is free from substance abuse									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2%	**6%**	**9%**	**8%**	**33%**	**9%**	**25%**	**8%**	**0%**	**0%**
Mean = 4.4									
12, Dresses appropriately for the job and maintains personal hygiene									
Easy To Find									**Hard To Find**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1%	**5%**	**13%**	**16%**	**12%**	**27%**	**17%**	**4%**	**4%**	**0%**
Mean = 4.4									

13. Takes pride in one's work										
Easy To Find										Hard To Find
1	2	3	4	5	6	7	8	9	10	
0%	1%	5%	13%	36%	19%	16%	11%	0%	0%	
Mean = 5.1										

14. Takes pride in the work of the organization										
Easy To Find										Hard To Find
1	2	3	4	5	6	7	8	9	10	
0%	2%	5%	8%	21%	20%	33%	10%	0%	0%	
Mean = 5.4										

15. Uses appropriate language when speaking with supervisor, coworkers and customers										
Easy To Find										Hard To Find
1	2	3	4	5	6	7	8	9	10	
0%	0%	8%	16%	27%	22%	16%	11%	0%	0%	
Mean = 5.1										

16. Follows instructions and direction accurately and cooperatively										
Easy To Find										Hard To Find
1	2	3	4	5	6	7	8	9	10	
0%	0%	7%	14%	18%	35%	15%	7%	4%	0%	
Mean = 5.3										

17. Appropriately asks for help from supervisors and co-workers										
Easy To Find										Hard To Find
1	2	3	4	5	6	7	8	9	10	
0%	1%	8%	23%	13%	29%	22%	4%	0%	0%	
Mean = 5.2										

18. Shows initiative - identifies new and better processes or procedures										
Easy To Find										Hard To Find
1	2	3	4	5	6	7	8	9	10	
0%	1%	4%	7%	13%	21%	30%	21%	4%	0%	
Mean = 5.8										

19. Coachable - is interested in learning and quickly learns new assignments									
Easy To Find									Hard To Find
1	2	3	4	5	6	7	8	9	10
0%	1%	8%	16%	11%	26%	28%	11%	0%	0%
Mean = 5.3									

20. Anticipates and recognizes problems and seeks to resolve them									
Easy To Find									Hard To Find
1	2	3	4	5	6	7	8	9	10
0%	2%	0%	8%	8%	19%	38%	16%	7%	4%
Mean = 6.3									

21. Has good technical aptitude									
Easy To Find									Hard To Find
1	2	3	4	5	6	7	8	9	10
0%	0%	8%	7%	15%	18%	24%	14%	8%	8%
Mean = 5.9									