



MANUFACTURING

May 2017

Team Members:

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President

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The following document was created at the request of the Chancellor's office from the North Dakota University System. We were challenged to create a pathway for the University System on how it can support and nurture manufacturing's growth within the State of North Dakota through the year of 2030. This document is a result of teleconferences and meetings that have taken place over the last several months. The goal given to us was to have this vision completed prior to the Board of Higher Education's meeting in August of 2017.

The task was assigned to three industry representatives, Thomas D. Shorma, CEO & President of WCCO Belting, INC., Wahpeton, Guy Moos, President of Baker Boy, Dickinson, and Perry Lubbers, Vice President of Manufacturing Trail King Ind., West Fargo. Andy Peterson, President of the North Dakota State Chamber of Commerce, also was asked to participate with the group. The effort was kicked off by Chris Erickson, Public Affairs Manager for the North Dakota University System who also attended our sessions.

Chancellor Dr. Mark Hagerott attend many of our meetings providing insight and guidance. Input was also received from Dr. John Richman, President of NDSCS, Dr. Larry Skogen, President BSC, and Wayde Sick, Director Workforce Development Division Department of Commerce State of North Dakota.

It is the belief of this group that manufacturing can truly help the State of North Dakota diversify its economy by decreasing its exposure to the swings in revenues that the state sees within the agriculture and energy commodity markets.

Pathway for Manufacturing

There is a tremendous need to diversify the economy within the state of North Dakota and a clearer focus on manufacturing can do that for us. We do not share in the fortunes of manufacturing to the extent that other states do across the U.S., and that is evident from the numbers outlined below. With the volatility of commodities, manufacturing would definitely help to level off some of North Dakota's budget concerns.

As opportunities in Ag continue to shrink, with ever increasing farm sizes, and in energy, with the development of new technologies, manufacturing becomes even more vital to our state's future success. Is North Dakota in the midst of a "Resource Curse"? The Resource Curse refers to the paradox where in that areas with an abundance of non-renewable natural resource tend to have less economic growth, are less democratic and worse developed. They rely on these natural resources for the near term which affects their long term outlook.

North Dakota has a lot to offer manufacturing such as, low cost energy, central location within North America, and plenty of real estate available. What we lack is an overall commitment to manufacturing within the state and the development of the skill sets necessary to support manufacturing's current needs, let alone growth into the future.

The North Dakota State Board of Higher Education can help diversify the state's economy by creating curriculums and pathways that are focused on career opportunities in manufacturing within North Dakota. Building a strong manufacturing sector requires a cohesive workforce development strategy involving public and private interests to build a pipeline of skilled workers. State education policies will play a more significant role in enabling students to acquire work-ready skills. Eliminating barriers and providing incentives for institutions and companies to assist students in the acquisition of those skills should be the goal of state policymakers.

Manufacturing's Impact

Here are a quick few facts concerning manufacturing in the United States as compared to North Dakota.

Manufacturing in the U.S.

- The manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products.
- Facts about manufacturing in the US
 - \$2.17 trillion of value produced every year or 12% of Gross Domestic Product

- For every \$1 spent another \$1.40 is added to economy
 - Highest multiplier effect of any economic sector
- Supports 17.2 million jobs in U.S.
 - 1 in 6 private sector jobs
 - 9% of workforce
- Average pay and benefits \$77,060 annually
 - Average of \$60,168 for all careers other than manufacturing
- Performs 75% of all private sector Research and Development
 - Drives more innovation than any other sector
- Taken alone manufacturing in the U.S. would be 9th largest economy in the world

North Dakota

- \$3.7 billion or 5.8% of ND GDP
- Supports 26,000 jobs in ND
 - 5.6% of states workforce

It should be pointed out that during this latest oil slump, the state of Texas is doing very well. Alaska, Wyoming, and North Dakota are not. Why is that? Simply because of the diversity of its economy. Manufacturing has helped Texas level off the swings in their economy related to commodity markets.

May 2016 Summit

During the initial session of Envision 2030 there were several key points that came out.

- 1.) Change the perception of manufacturing
- 2.) Expand CTE into more high schools across the state
- 3.) Ramp up marketing to increase recruitment and enrollment in manufacturing programs
- 4.) Create pathways and curriculum that create credentials that are of value to the employer immediately upon graduation
 - a. Middle school through high school through technical educations at community colleges into four year institutions
 - b. Include communication and interpersonal skill training

Marketing & Perception

We have an urgent need today, we simply cannot wait until 2030. We really need to get to our students and their parents earlier to educate them on the many great careers available in the manufacturing and the technical sectors of our state. We need to inspire these young people to seek a manufacturing career and make it easy for them to do so. We need to be able to draw young people from surrounding states as well. We simply do not have enough people to fill all of the job requirements we have today and in the future within our state.

We need to be competitive with our programs. Several states across the country have recognized the need to increase the skill level of their work force. They are piloting or offering free or subsidized education through their technical colleges. Tech colleges are also collaborating with high schools putting programs together that enable them to graduate with both a high school diploma as well as an Associate's degree at the same time. If the goal of CTE expansion ultimately did happen, it could present the beginning of the natural extension of that "certified upon graduation" example right here in N.D.

How can North Dakota take advantage of such programs? How can we attract out of state students to such programs as well? Sure -- considerable diligence (Like Western Pathways) is needed to make good decisions, collaboration is required to create the right statewide structure and empowered leadership needs to be created to address the "how", now that we have helped to define the "what". The end goal is pretty clear as far as the private sector setting expectations for the state on what is needed. In the end it will not be the BIG or wealthy states that will beat out the SMALL ones, it is the FAST ones that will conquer the SLOW ones. We are a small populated state that needs to be able to react and implement much more quickly and efficiently than the large ones. Size, resilience, and speed must be our advantage.

At this point in time North Dakota is behind the effort of several other states. We need to act now. We need a comprehensive approach to diversifying our economy and creating a population that is workforce ready.

Pathways & Curriculum

We need to develop an initiative at the state level for high schools, community colleges, and our university systems where they are aligned and partnered with local industries in order to bring relevant classes to their institutions, while also bringing the students into the workplace to gain on-the-job experiences, such as apprenticeship programs. This has positive benefits for the companies because they are able to ensure a steady stream of qualified workers. At the same time, it benefits schools, which are able to provide hands-on learning experiences and

ensure students who come to their institutions will be able to get high-quality work experience and provide opportunities to reduce students' debt burdens. Upon completion of courses, students will have an opportunity to continue their education or start on their desired career path. We need to offer our high school students the opportunity to earn college credit while completing courses toward their high school diplomas. This gives students an advantage to place out of courses they've already passed while in high school. We need a clearly defined articulation agreement across the state.

We need to help students better understand how their education is integrated into future career options and what skills and credentials they need to pursue careers in manufacturing and other trades. Creating a better understanding of how specific coursework is applied in real-world scenarios builds on the achievement of the students, encouraging a deeper engagement and commitment to a future-focused perspective. It is the practical application of science and knowledge. We need to ensure that courses are relevant to the position. We need to ensure that the staff from our state institutions get out into the real world and truly understand their customers' needs and not some philosophical theory.

We must ensure that all of our state institutions are aligned, one is no more important than the other, they act as a team, with little or no internal focus. Their focus must be for the state and not for themselves. There must be a clear pathway and progression from K through 12, to a technical education provided by a community college, and through a four-year program. They are aligned and no credits from one institution should be lost in another. It must utilize and implement dual credit and certification opportunities where possible.

Our institutions must pool their resources, as within business they must be lean and competitive. There is not an unlimited source of funding, thus we need to ensure that the funding is directed to the areas of greatest needs within our state. We cannot afford duplication or redundant programs. We must take inventory of the programs we have. Where does it make sense to eliminate duplication and where does it make sense to add the right programs to support our future.

What do we believe the focus of such programs should be? First and foremost, interpersonal skills. We have lost the ability to effectively communicate in this data driven age. The ability to work and deal with people in a team environment is so very important. We need critical thinkers able to solve complex or simple problems quickly. We need to prepare people to be Managers and Supervisors within organizations. We need to keep our students in the forefront of the technological advances that are happening across manufacturing. We need to make sure that this education is again focused on the real world environment. We see Associate degrees such as a "Certified Production Technician" and Bachelor of Science in Manufacturing Management. Education also needs to ensure that it understands from all industry and business

within the state the credentials necessary for an individual to succeed within the positions that are available within our state.

Digitization Or Industry 4.0 is transforming how manufacturers need to think about human capital management. The workforce will need greater digital literacy and to have high-tech and collaboration skills. It will also need to be able to work cross functionally as well as with increasingly intelligent machines to bring higher levels of efficiency and productivity to the enterprise. Over the next five to 10 years, the analytic discipline applied to production will evolve and mature. In parallel, production environments will change with the addition of technologies such as 3D printing, collaborative robots, automated guided vehicles, and other advances. Is it plausible that North Dakota can work with its neighboring states to develop a “Manufacturing Research Initiative”, to help share in some of the costs of getting programs off the ground?