MINUTES
of the
THIRD MEETING
of the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

August 30-31, 2018
University of New Mexico-Taos
121 Civic Plaza Drive
Taos

The third meeting of the Science, Technology and Telecommunications Committee (STTC) was called to order as a subcommittee by Senator Michael Padilla, chair, on August 30, 2018 at 9:17 a.m. at University of New Mexico (UNM)-Taos in Taos.

Present
Sen. Michael Padilla, Chair
Sen. William F. Burt
Rep. Kelly K. Fajardo
Rep. Jason C. Harper
Sen. Bill B. O'Neill

Absent
Rep. Candie G. Sweetser, Vice Chair
Rep. Daymon Ely
Sen. Mark Moores
Rep. Debra M. Sariñana
Rep. Gregg Schmedes
Sen. William P. Soules
Rep. Linda M. Trujillo
Rep. Monica Youngblood

Advisory Members
Sen. Carlos R. Cisneros
Sen. Richard C. Martinez
Rep. Bill McCamley
Rep. Nick L. Salazar
Sen. Bill Tallman

Sen. Craig W. Brandt
Sen. Jacob R. Candelaria
Rep. Stephanie Garcia Richard
Sen. Ron Griggs
Sen. Mary Kay Papen
Sen. William H. Payne
Rep. Debbie A. Rodella
Sen. Nancy Rodriguez
Rep. Carl Trujillo
Sen. Peter Wirth

Guest Legislators
Rep. Alonzo Baldonado
Rep. Sarah Maestas Barnes
Rep. Dennis J. Roch

Staff
Mark Edwards, Legislative Council Service (LCS)
Ralph Vincent, LCS
Felicia Garcia, LCS

Guests

The guest list is in the meeting file.

Handouts

Handouts and other written testimony are in the meeting file.

Thursday, August 30

Welcome and Introductions

Senator Padilla welcomed the committee to the third meeting of the STTC for the 2018 interim. Members of the committee and staff were invited to introduce themselves.

Welcome to the UNM-Taos Campus

Dr. Patrick L. Valdez, chief executive officer (CEO), UNM-Taos, welcomed the committee and discussed the mission and role of the community college. Dr. Valdez described the demographics of the student body. The total student count for the 2017-2018 school year was about 1,400. In general, the student population is composed of 47.2% degree-seeking students and 38.3% dual-credit students. Seventy-three percent are part-time students, and 70% are from Taos County. The average student age is 30, and 62% of students are female. The 2017-2018 graduating class included 80 students who earned an associate degree and another 34 who earned a certificate.

Dr. Valdez described the public-private partnerships that have been developed in the community.

Other information is contained in the handout.

Committee members acknowledged the excellent work of the Taos branch of UNM, noting in particular its efforts to provide a workforce for the future needs of Los Alamos National Laboratory (LANL). It was noted that LANL currently has 12,000 employees, 59% of whom come from outside of New Mexico. Over the next five years, LANL will need 4,000 new employees, and while the pool of scientific employees from New Mexico is limited, much of LANL's workforce fills non-scientific roles.

Dr. Valdez was questioned about success metrics in the areas of retention and graduation. He answered that UNM-Taos: 1) works with the dean of instruction to offer correct courses, noting that 80% of its professors are adjunct; 2) uses a concise list of courses; and 3) uses advisor contacts that provide information to students for a transfer pathway and/or a certificate for a job. Dr. Valdez also mentioned the college's work with the Higher Education Department, the Workforce Solutions Department and community employers, such as Kit Carson Electric Cooperative and LANL.

Committee members explored how software coding camps got started and how UNM-Taos initiated this project. Dr. Valdez noted that students must get started at the middle school

level if they are to continue pursuing their interests. He also noted that science, technology, engineering and mathematics (STEM) initiatives get priority for federal grants.

Integrated Education and Training for a Renewable Energy Workforce

Dr. Randi Archuleta, dean of instruction, UNM-Taos, and Nina Gonzales, program specialist, Taos Education and Career Center, UNM-Taos, presented examples of initiatives that have been developed for education programs related to the renewable energy workforce.

The model used is a national model that addresses innovation for training students in three areas: academic; technical; and professional. As academic skills are being developed, a focus is also given to professional skills that include communications, commercial awareness, ethics, analytics and teamwork. In this model, local employers also serve as guest teachers and help design a curriculum that is relevant for the workforce. This combination of academic, technical and professional skills training has led to 12 solar certificates, 11 U.S. Occupational Safety and Health Administration certificates and a successful collaboration between the institution and employers in the area.

More information is included in the handout.

Committee members asked questions about the relationships between employers and the school and discussed the student population and demographics. Dr. Archuleta and Ms. Gonzales described how UNM-Taos periodically evaluates the requirements for earning a certificate to ensure an adequate fit with the skills needed in the labor market. These courses are offered to dual-credit students at no charge.

A member asked about training for the solar industry to help develop more skills in the workforce. UNM-Taos offers introductory classes in renewable energy and has worked with the industry to integrate the necessary education and training. Chevron sponsors full tuition for students who do not have a high school degree, while others get financial aid to cover the cost of the courses, which amounts to $78.00 per credit hour for a three-credit-hour course.

Dr. Archuleta and Ms. Gonzales also described the need for soft skills training, including punctuality, communication, customer service, professionalism and social and emotional learning. A soft skills course is required for all incoming freshmen.

The Use of Broadband to Help Meet Renewable Energy Goals

Luis A. Reyes, Jr., CEO, Kit Carson Electric Cooperative, introduced members of the cooperative's board. Mr. Reyes described the cooperative's origin and the development of its business, which provides services in rural areas. Kit Carson Electric Cooperative has 29,500 electric members, 6,700 broadband members and 3,100 propane members. It serves Taos, Colfax and Rio Arriba counties.

Mr. Reyes described the current solar plan, which will provide 100% of daytime energy requirements through renewable sources by 2023. This includes four megawatts to six megawatts of battery storage that will be installed and activated in 2018.

Kit Carson Electric Cooperative began deploying a fiber-optic network for electric utilities in 2005. The company has created 450 jobs to support its 6,700 broadband members. The company offers gigabit service commercially.

Kit Carson Electric Cooperative has successfully combined the provision of electric utilities with the provision of broadband services in its service area.

Other information is contained in the handout.

Committee members applauded Kit Carson Electric Cooperative for its success in bringing affordable utilities to its members and asked if there are lessons learned that can be passed on to other cooperatives and small providers. Mr. Reyes stated that Kit Carson's model can be used in a rural setting, but he said that it received a $64 million federal grant to expand its network. Kit Carson currently has a waiting list of 7,000 households for broadband services. Kit Carson Electric Cooperative has 37 of the 40 cellular towers in the area. Prices are becoming more affordable, but some losses are occurring when organizations build their own sources for energy "behind the meter", Mr. Reyes said.

Committee members asked questions about regulation, and Mr. Reyes stated that the cooperative's strategic plan includes becoming a "wires and services" company rather than a provider of all utilities. What is necessary to achieve this goal is a decoupling of rates so that energy production and energy transmission are regulated separately.

One member asked about the work with REDI Net to provide the last mile of broadband infrastructure. Mr. Reyes stated that the cooperative needs access to the Universal Service Fund to provide the last mile.

Committee members discussed the availability of charging stations for electric automobiles and what the state should be doing to ensure this availability. Mr. Reyes said that the state needs a policy for an electric offset of the gasoline tax to ensure that roads are maintained sufficiently. There was further discussion about the state's role in tourism and if public buildings and parks should have charging stations.

It was noted that batteries have not changed much, except for the materials used to make them, and their expected life span is 15 years.

There was much discussion on the need and possibility of reforming the Public Regulation Commission (PRC) to more closely align with today's technology and the future direction of technology in the area of utilities. Only eight states currently regulate electric cooperatives. Solar is now the cheapest resource. It is driven by customer demand and does not need PRC intervention. The general consensus is that less regulation is needed.

There was further discussion about fifth-generation (5G) technology and how this will affect the build-out of fiber-optic cables. Mr. Reyes stated that the cooperative currently charges $49.00 per month for broadband service that includes upload and download speeds of 50

megabytes. The cooperative will continue to build out a fiber-optic network but will also incorporate new technologies as they become available and affordable.

Challenging Students to Create a Twenty-First Century Workforce

William F. Blackler, former president, Board of Directors, New Mexico Supercomputing Challenge, introduced Dr. Steve Cox, assistant professor, Computational and Computer Science, Northern New Mexico College; Tracy Embres Galligan, computer and business teacher, Taos High School; and Taos High School students Delaney Galligan, Eben Bellas and Cyrus O'Hern. The panel described how the supercomputing challenge program provides students with a path toward becoming part of a twenty-first-century workforce. Mr. Blackler explained that this program provides opportunities for students to pursue their interest in STEM activities through project-based research that employs computational science techniques.

As technology has advanced and computational challenges can now be solved with common computing tools, the platforms have changed. Eleven thousand students have gone through the program since the 1990s, and successes have included a New Mexico team placing second in 2009 in the Siemens Competition. This team received a $40,000 scholarship. A New Mexico student won $100,000 in the 2011 Intel Science Talent Search, and in 2014, a New Mexico team won the Siemens Competition and received a $100,000 scholarship.

Students register for the program in September, and a kick-off is held in October at the New Mexico Institute of Mining and Technology (NMIMT). Each high school must have a teacher who will sponsor the projects. An interim report for the student projects is due in December, and the final reports and judging happen in April of the next year.

The students on the panel described their projects and their involvement in the program. Delaney Galligan conducted experiments on mitochondria. Eben Bellas has been in the program for several years and studied the correlation between the occurrence of mass shootings and the amount of news coverage; the spread of disease, in particular, sickle cell anemia, by mosquitos; and chronic concussions and recovery times. Eben Bellas also worked with another student to optimize the use of mulch to minimize water usage on farms. Tracy Embres Galligan, who is the teacher sponsor, described her experiences in teaching computers and business and her relationship with the supercomputing challenge. She noted that for every computer science student, there are four to five jobs available.

The supercomputing challenge offers support to local teachers. Dr. Cox, a 30-year teacher from Rice University, is now at Northern New Mexico College and serves as the trainer of teachers. The program has 1.25 full-time-equivalent employees and relies heavily on more than 200 volunteers. The supercomputing challenge has a budget of $120,000 this year and needs additional support from the legislature.

More information is included in the handout.

Committee members discussed the need for funding and questioned whether the state might need a comprehensive statewide program that furthers STEM education with a science coach salary built into a funding structure for each school.

Creating Local Jobs and Preventing Brain Drain: Promoting New Mexico as the Best Value in the U.S. for Software Development

John Mierzwa, CEO and co-founder, Ingenuity Software Labs, and board member, New Mexico Technology Council (NMTC), and Lisa Adkins, chief operating officer, FatPipe ABQ, FatPipe Raton and FatPipe Rio Rancho, and former board chair, NMTC, described the DART program, which focuses on creating software jobs in New Mexico and enhancing the software development workforce in the state.

DART is a systems approach to accelerate software industry job growth in New Mexico. Information technology outsourcing is a $64 billion industry, and software development accounts for $41 billion annually. Since software development is perennially rated as the best job in the U.S., the DART strategy is to create the synergies to further develop and market the software development industry in New Mexico. There are more than 700 graduates in software development-related disciplines each year, and the number is growing. In addition to degree programs, there are a number of coding "boot camps" being conducted to teach coders in the state. New Mexico is a good value for software development because of the low cost of living when compared to other areas of the U.S.

The NMTC, a nonprofit organization made up of for-profit organizations, universities and other nonprofit organizations, has developed the DART strategy to capitalize on the New Mexico workforce in software development. The first step is to create a fund to sustain a program that will persuade out-of-state firms to contract with software development firms in New Mexico. The expected funding request, to be allocated to the Economic Development Department or the Workforce Solutions Department, is roughly $2 million per year, with a five-year total of $11.9 million.

More information is included in the handout.

Committee members asked about other sources of funding. A few software firms have committed funds, and the NMTC is exploring funding from Albuquerque and Santa Fe. It was noted that the $5,700 funding needed per job created is fairly high.

One member asked about how the program would apply to solo or remote workers. Mr. Mierzwa responded that they would be recruited through this same project. The web portal would include a section on freelance developers.

Department of Information Technology: Project Status

Estevan Lujan, acting secretary, Department of Information Technology (DOIT), and Maria Sanchez, acting chief information officer, DOIT, discussed the DOIT dashboard that tracks larger information technology projects. The dashboard was updated and is current as of July 31, 2018, and the top 10 projects have not shifted since the last committee update.

The "C2" funding project for information-technology-related business start-ups is under way for fiscal year 2020 and totals $31,148,850 from the General Fund, $1,140,000 from other state funds and $18,072,480 from federal matching funds for a total of $50,361,330. Business cases will be presented on October 29 and 30.

Committee members questioned the status of the Children, Youth and Families Department (CYFD) Enterprise Provider Information Constituent Services (EPICS) project and were told that because of new federal requirements, the project has a number of change orders and only has $800,000 left unspent. The contractor is implementing new online modules for field agents and law enforcement agencies. The plan is to request additional money with a 60/40 federal match to determine how to proceed. The CYFD has not replaced its Family Automated Client Tracking System because it has realized that the EPICS system is not going to work as planned.

The committee requested a written response to Senator Padilla's letter asking why the project has been held up for 83 months and requesting an explanation of the plan to move forward through this transition.

The subcommittee recessed at 3:20 p.m.

Friday, August 31

optiPulse: Building a Paradigm Changing Technology Company in New Mexico

John Joseph, founder, inventor and president, optiPulse, and Mathis Shinnick, CEO, optiPulse, said that optiPulse is built around vertical cavity surface emitting technology using a tiny patented laser. The company received funding and began full operations in 2017.

optiPulse's patent-pending technology from Sandia National Laboratories provides affordable direct-to-consumer broadband at never-before-seen wireless speeds. The new photonics arrays can send very high-speed light pulses over long distances to discrete locations to provide wireless service. The early prototypes and chip modules have been completed, and a newer prototype, Prototype 3, is in final assembly and testing. Prototype 3 offers a 10-gigabyte-per-second (Gbps) optical wireless backhaul, with a one Gbps wireless network within a 1,000-foot radial distance. Sacred Wind Communications and Plateau Telecommunications have invested in this technology and will be involved in its testing. Central New Mexico Community College (CNM) has agreed to implement the technology on its campus for a very high-speed broadband network.

The basis for the optiPulse technology is micro-optics that are controlled by up to 20,000 chips on a four-inch wafer costing less than $1.00 to manufacture. This technology creates a beam of light over a distance of at least one kilometer. The current goal is to extend the distance to 10 kilometers, but optical power is the limiting factor.

The optiPulse technology is an opportunity for the state to be well-connected with a 5G network. The current options for the backhaul services are: 1) fiber-optic lines; and 2) wireless

technology with millimeter magnetic wave. While billions of dollars have been invested in the wireless technology, there are health concerns over the use of high-frequency beams, and there is an economics issue because of the energy requirements. optiPulse offers a new technology that could accelerate the ability of getting broadband services out to both urban and rural areas.

More information is provided in the handout.

Committee members discussed the analogy of the build-out of broadband infrastructure to road infrastructure. The benefits of having a robust broadband infrastructure include expanded options for education, telemedicine and telecommuting work.

A member asked about what the legislature can do to help this industry move forward and how the state and the industry can work together to deploy this technology. The answers were: 1) help with locating and securing manufacturing and warehouse facilities; and 2) exert legislative pressure to get the federal Securities and Exchange Commission to approve public securities more quickly. Other areas where the state can help include promoting education to develop a skilled workforce, regulation and support of technology spin-off projects.

When asked about new employment, the response was that manufacturing this technology could involve hundreds of thousands of employees. The company currently employees 18 staff members and will be hiring up to 200 more over the next two years.

SafeBeacon: Firearm Recognition Software for Facility Security

Thomas Chepucavage, founder and inventor, SafeBeacon, described an artificial intelligence technology to detect firearms that the company plans to market to banks and schools. Josh Garcia, a recent graduate of NMIMT, is the lead developer who worked with a systems integrator from California to create the software that recognizes various types of firearms. Mr. Chepucavage is working with other companies that are interested in the same school security markets to integrate this software technology, which includes alarm notifications, facility lock-downs and alerts to public safety officials.

More information is provided in the handout.

Committee members asked how the software would work with other technologies. Mr. Chepucavage explained that developers use thousands of images of various firearms to "train" the software to recognize firearms in images, but they need to combine the images with other technologies for the software to respond to potential threats. He also discussed issues with the state's "open carry" law and the problems with teaching the software to recognize a toy gun.

Mr. Chepucavage asked for support from the committee in finding a large number of images and facilities for testing. He also requested support for start-up funding.

Discussion on Developing the Labor Pool for a Dynamic Tech Industry in New Mexico

Samantha Sengel, vice president for advancement and enrollment strategy, CNM; Kyle Lee, CEO, CNM Ingenuity, Inc.; and Yolanda Montoya-Cordova, administrator, workforce innovation and opportunity, Workforce Solutions Department, were introduced.

Ms. Montoya-Cordova described the federal Workforce Innovation and Opportunity Act, which was signed into law in 2014. The Workforce Solutions Department is implementing the provisions of the act to foster better alignment of the federal investments in job training and improved service delivery to ensure that the workforce system is job-driven and that skills training is optimal. The state plan covers six core programs:

(1) adult programs;
(2) dislocated worker programs;
(3) youth programs;
(4) adult education and family literacy programs;
(5) federal Wagner-Peyser Act of 1933 programs; and
(6) vocational rehabilitation programs.

These programs are supported by 21 workforce connection centers located across the state. A highlight is the collaboration with employers and industry organizations to ensure that post-secondary and adult education curricula are relevant to the needs of growing industry sectors and the job market.

Dr. Sengel and Mr. Lee discussed the role of CNM Ingenuity, Inc., which was founded in 2014. CNM Ingenuity, Inc., is an enterprise arm of CNM that grew out of the New Mexico Research Applications Act. This organization includes the STEMulus Center, WORKforce Training and BUSINESS Solutions.

The STEMulus Center includes programs such as Deep Dive Coding, FUSE Makerspace, IGNITE community accelerator and fast track degree programs. WORKforce Training offers contract training and open-enrollment classes tailored for specific skills. BUSINESS Solutions offers space solutions, software labs, coaching paths, information technology commercialization and commercial driver's license training.

Coding schools are an example of the success of the skills-based training that is important in developing a skilled workforce in New Mexico. CNM began offering Deep Dive Coding in 2015, and more than 100 coders will be graduating in 2019.

There is a shortage of funding for the skills-based training programs that CNM has implemented. The skills-based training provided by CNM requires approximately $10,000 to $15,000 per individual, but current funding is less than $5,000 per student. The Rapid Workforce Development Act was enacted by Senate Bill (SB) 92 (2016) and provided $1.2 million for the Rapid Workforce Development Fund administered by the Economic Development Department. The fund was created to provide resources to quickly establish or

expand programs in the state's institutions of higher education to train and educate New Mexico workers for employment.

More information is provided in the handout.

Committee members asked about the status of the funding from SB 92 (2016) and were told that the funds were allocated to the Economic Development Department. CNM has not received any of it. A member reiterated that LANL will lose through attrition about 4,000 employees over the next few years, and the member suggested continued collaboration between CNM and LANL to help fill this workforce need.

One member noted that New Mexico is a great resource for bilingual customer support and that the state's educational institutions should develop a certification for bilingual customer service.

In response to a question on what is needed in southern New Mexico, Ms. Montoya-Cordova said that the Workforce Solutions Department is engaging with Dona Ana Community College and Western New Mexico University to broaden the reach for workforce training. Also, a conference is scheduled in October to focus on work between higher education institutions and the Workforce Solutions Department.

A member asked about the process of building a specific training program and the resources required for this process. The Workforce Solutions Department has an outreach training staff to discuss needs with industry personnel. CNM also addresses these needs through a program management team that develops a tailored curriculum to train for the specialized skills needed. Dr. Sengel expressed a need for funding for non-credit training to help develop these workforce skills. Committee members asked if CNM staff would gather the appropriate stakeholders and bring back a proposal for funding and the needed programs. The committee also expressed a need to modernize the Job Training Incentive Program, the Local Economic Development Act and other programs.

Adjournment

There being no further business before the committee, the third meeting of the STTC for the 2018 interim adjourned at 12:09 p.m.