NEW MEXICO LEGISLATURE

SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

2017 INTERIM FINAL REPORT

Legislative Council Service
411 State Capitol
Santa Fe, New Mexico 87501
(505) 986-4600
www.nmlegis.gov

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INTERIM SUMMARY

Science, Technology and Telecommunications Committee
2017 Interim Summary

Developing an internal workforce that is capable of meeting the needs of New Mexico's current and developing technical job market was a theme underlying much of the committee's work this year. Underscoring that theme, committee meetings at the New Mexico Institute of Mining and Technology, Western New Mexico University and New Mexico State University included extensive presentations on the curricula for science and technology-based jobs; student recruitment and retention; the requirements for high-speed broadband infrastructure for education; and school-to-market business development. Additionally, Mesalands Community College provided a specific presentation of its technician training and placement program for the state and national wind energy sectors.

Other recurring issues presented to the committee comprised four general topics:

1) energy production, including presentations on modern drilling technology and the significant effect the technology has had on the oil industry; the development of wind farms and the state's place in the national wind energy market; and how a county can market itself to solar generation firms;

2) the uses and needs for high-speed broadband infrastructure, including presentations on the successful use of automation to run large farming and ranching operations; the development and use of high-speed broadband systems in public schools; the rapidly growing demand for remote learning in higher education; business models to provide high-speed broadband services to rural and small town communities; and the high-speed broadband needs of small firms and start-ups;

3) cybersecurity, including the development of a nationally recognized cybersecurity business as a public-private partnership at the New Mexico Institute of Mining and Technology; the evolving cybersecurity approach at the national laboratories; and challenges faced by state agencies and private industry; and

4) qualified workforce creation, including inquiries into the current science and technical skills needed at employers ranging from Cannon Air Force Base to the various energy production industries to the national laboratories; presentations on redesigning curricula to overcome a large deficit in the recruitment and retention of women into science and technology careers; and inquiries into building entrepreneurial, classroom-to-business startup science and technology education programs.

Additionally, the committee spent a day at Spaceport America. That meeting focused on the business development and technology progress of the spaceport's largest tenant, Virgin Galactic, and the spaceport's potential in the growing world market for commercial suborbital launch services.

WORK PLAN AND MEETING SCHEDULE

2017 APPROVED
WORK PLAN AND MEETING SCHEDULE
for the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

Members

Rep. Candie G. Sweetser, Chair
Sen. Michael Padilla, Vice Chair
Sen. William F. Burt
Rep. Daymon Ely
Rep. Kelly K. Fajardo
Rep. Jason C. Harper
Sen. Mark Moores
Sen. Bill B. O'Neill
Rep. Debra M. Sariñana
Rep. James E. Smith
Sen. William P. Soules
Rep. Linda M. Trujillo
Rep. Monica Youngblood

Advisory Members

Sen. Craig W. Brandt
Sen. Jacob R. Candelaria
Sen. Carlos R. Cisneros
Rep. Stephanie Garcia Richard
Sen. Ron Griggs
Sen. Richard C. Martinez
Rep. Bill McCamley
Sen. Mary Kay Papen
Sen. William H. Payne
Rep. Debbie A. Rodella
Sen. Nancy Rodriguez
Rep. Nick L. Salazar
Sen. Bill Tallman
Rep. Carl Trujillo
Sen. Peter Wirth

Work Plan

The Science, Technology and Telecommunications Committee was created by the New Mexico Legislative Council on June 5, 2017. The committee proposes to hear testimony on:

1. funding and incentive mechanisms for broadband and telecommunications expansion;

2. increased technology transfer;

3. economic development initiatives related to science, technology and telecommunications;

4. intellectual property development at research institutions in New Mexico, including new and emerging technology incentives at universities;

5. small business technology needs;

6. public-private partnerships related to technology and options for state oversight;

7. updates on current information technology projects and future information technology needs in state government;

8. the potential for venture capital investment in remote work and solo work centers;

9. an examination of developments at Spaceport America;

10. cybersecurity and data breach risks;

11. New Mexico's education and training programs designed to create pathways to jobs requiring science, technology, engineering and mathematics (STEM) expertise, including careers with the national laboratories and in software-dependent video entertainment;

12. Public Service Company of New Mexico's "Transforming a New Energy Balance for New Mexico's Energy Mix" initiative;

13. updates on management programs and employment at the Sandia and Los Alamos national laboratories;

14. modern farming technology and fiber-optic-based farm management;

15. recent and developing energy production technology, including hydraulic fracturing, wellhead management and wind energy;

16. science- and technology-focused business incubator development; and

17. the planned modernization of the Office of the Secretary of State's campaign finance software system.

Science, Technology and Telecommunications Committee
2017 Approved Meeting Schedule

Date	Location
June 15	Santa Fe
July 10-11	Clovis
July 31-August 1	Truth or Consequences/ Socorro
August 23-24	Silver City
September 25-26	Las Cruces
November 8-9	Santa Fe

AGENDAS AND MINUTES

TENTATIVE AGENDA
for the
FIRST MEETING
of the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

June 15, 2017
Room 307, State Capitol
Santa Fe

Thursday, June 15

10:00 a.m.		**Call to Order/Introductions** —Representative Candie G. Sweetser, Chair
10:10 a.m.	(1)	**2017 Interim Work Plan and Meeting Schedule Discussion**
12:00 noon		**Adjourn**

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

June 15, 2017
State Capitol, Room 307
Santa Fe

The first meeting of the Science, Technology and Telecommunications Committee (STTC) was called to order by Representative Candie G. Sweetser, chair, on June 15, 2017 at 10:08 a.m. in Room 307 of the State Capitol in Santa Fe.

Present
Rep. Candie G. Sweetser, Chair
Sen. Michael Padilla, Vice Chair
Rep. Daymon Ely
Rep. Kelly K. Fajardo
Sen. Bill B. O'Neill
Rep. Debra M. Sariñana
Rep. James E. Smith
Sen. William P. Soules
Rep. Linda M. Trujillo

Absent
Sen. William Burt
Rep. Jason C. Harper
Sen. Mark Moores
Rep. Monica Youngblood

Advisory Members
Sen. Carlos R. Cisneros
Sen. Ron Griggs
Sen. Richard C. Martinez
Sen. Mary Kay Papen
Rep. Debbie A. Rodella
Sen. Nancy Rodriguez
Rep. Nick L. Salazar
Sen. Bill Tallman
Sen. Peter Wirth

Sen. Craig W. Brandt
Sen. Jacob R. Candelaria
Rep. Stephanie Garcia Richard
Rep. Bill McCamley
Sen. William H. Payne
Rep. Carl Trujillo

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

Guests
The guest list is in the meeting file.

Handouts
Handouts and other written testimony are in the meeting file.

Thursday, June 15

Welcome and Introductions

Representative Sweetser welcomed the committee to the first meeting of the STTC for the 2017 interim. Members of the committee and staff were invited to introduce themselves.

2017 Interim Work Plan and Meeting Schedule Discussion

Mr. Edwards reviewed the June 12, 2017 information memorandum from Raúl E. Burciaga, director, LCS, regarding interim committees. He then reviewed the proposed work plan and meeting schedule. Representative Sweetser then asked the committee for input on the proposed 2017 work plan and meeting schedule. Committee members discussed the dates and locations with the following comments:

- one of the meetings will include a visit to Spaceport America combined with a visit to the New Mexico Institute of Mining and Technology to discuss cybersecurity;
- one of the meetings will be held at New Mexico State University;
- one of the meetings will be held at Western New Mexico University and will be focused on development requirements for remote work centers; and
- a meeting will be held in Clovis to discuss oil production, wind energy and agriculture technology.

Other topics of interest to the committee members include:

1. business incubators;
2. venture capital issues;
3. rural electric cooperatives and broadband;
4. satellite broadband technology;
5. information technology (IT) projects in state government;
6. the state's electronic signature project;
7. legislation related to broadband from the 2017 legislative session;
8. science, technology, engineering and mathematics curricula in public education;
9. the secretary of state's campaign finance system;
10. the development of public-private partnerships for IT projects and required oversight capabilities of those projects; and
11. Sandia and Los Alamos national laboratories.

Senator Padilla made a motion to adopt the work plan and meeting schedule with the changes and locations to be determined, and this was seconded by Representative Smith. The motion was adopted without objection.

Adjournment

There being no further business before the committee, the first meeting of the STTC for the 2017 interim adjourned at 10:57 a.m.

TENTATIVE AGENDA
for the
SECOND MEETING
of the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

July 10-11, 2017
Clovis Civic Center
801 Schepps Blvd.
Clovis

Monday, July 10

10:00 a.m.		**Call to Order and Introductions** —Senator Michael Padilla, Vice Chair
10:10 a.m.	(1)	**Welcome to Clovis** —David Lansford, Mayor, City of Clovis
10:15 a.m.	(2)	**Summary of 2017 Committee Legislation** —Mark Edwards, Staff, Legislative Council Service
10:30 a.m.	(3)	**Sagamore Wind Project** —Bernarr R. Treat, Manager, State Government Affairs, Xcel Energy
11:00 a.m.	(4)	**Blowing in the Wind — Energy Production** —Loralee Hunt, Manager of Project Development, Pattern Energy Group —Ben Givens, Facility Manager, Broadview Wind, Pattern Energy Group
12:00 noon		**Lunch** —Lunch Speaker: David Robinson, Chief Executive Officer, Plateau Telecommunications
1:00 p.m.	(5)	**Wind Energy Technology Curricula** —Dr. Thomas W. Newsom, President, Mesalands Community College
2:00 p.m.		**Tour of de Maio Farms — The 21st Century Farm: Fiber-Optic-Based Farm Management**
4:30 p.m.		**Return to Clovis**

Tuesday, July 11

9:30 a.m. (6) **New Oil Field Technology**

A. Overview of Well Drilling and Completion Activities

—Kelly Tooker, Director of Oil and Gas Technology, New Mexico Junior College

B. Maximizing Recovery While Reducing Costs with Technology

—Joe Lee, Regional Technical Manager, Cudd Energy Services

11:00 a.m. (7) **Cannon Air Force Base Mission Brief: Specialized Airpower and Its Technological Dependencies**

—Major Michael C. Guerrero, United States Air Force, Cannon Air Force Base

12:00 noon **Adjourn**

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

July 10-11, 2017
Clovis Civic Center
801 Schepps Blvd.
Clovis

The second meeting of the Science, Technology and Telecommunications Committee (STTC) was called to order by Senator Michael Padilla, vice chair, on July 10, 2017 at 10:20 a.m. at the Clovis Civic Center conference room in Clovis.

Present
Sen. Michael Padilla, Vice Chair
Sen. William F. Burt
Rep. Daymon Ely (7/10)
Rep. Kelly K. Fajardo
Rep. Debra M. Sariñana
Rep. James E. Smith
Sen. William P. Soules
Rep. Monica Youngblood

Absent
Rep. Candie G. Sweetser, Chair
Rep. Jason C. Harper
Sen. Mark Moores
Sen. Bill B. O'Neill
Rep. Linda M. Trujillo

Advisory Members
Sen. Craig W. Brandt
Rep. Stephanie Garcia Richard
Sen. Ron Griggs (7/11)
Sen. Richard C. Martinez
Rep. Bill McCamley
Rep. Debbie A. Rodella
Sen. Nancy Rodriguez
Sen. Jacob R. Candelaria
Sen. Mary Kay Papen
Sen. William H. Payne
Rep. Nick L. Salazar
Sen. Bill Tallman
Rep. Carl Trujillo
Sen. Peter Wirth

Guest Legislators
Rep. Tim D. Lewis (7/11)
Sen. Pat Woods

(Attendance dates are noted for members who did not attend the entire meeting.)

Staff
Mark Edwards, Legislative Council Service (LCS)
Ralph Vincent, LCS
Sara Wiedmaier, LCS

Guests

The guest list is in the meeting file.

Handouts

Handouts and other written testimony are in the meeting file.

Monday, July 10

Introductions and Welcome to Clovis

Senator Padilla welcomed the committee to the second meeting of the STTC for the 2017 interim. Members of the committee and staff were invited to introduce themselves. Mayor David Lansford then welcomed the committee to Clovis and thanked the members for their visit. He discussed how city leaders have evaluated science and technology efforts and the relationship to population growth in the area. Senator Padilla also recognized former Representative Anna M. Crook.

Summary of 2017 Legislation

Mr. Edwards noted that the 2016 interim STTC did not endorse any legislation for the 2017 legislative session, but there were several bills of interest to the committee. Representative Smith and Senator Daniel A. Ivey-Soto sponsored House Bill (HB) 113 for the Department of Information Technology to coordinate the development of a statewide broadband network. This legislation was passed and chaptered. Representative Smith and Senator Padilla sponsored Senate Bill (SB) 24 to include broadband technology infrastructure in the Infrastructure Development Zone Act. This legislation was passed and is included in a current court case on the issue of whether a governor may veto legislation without providing an accompanying explanatory message while the legislature is still in session. Senator Padilla sponsored SB 53 to provide for Public Regulation Commission (PRC) jurisdiction over incumbent local exchange carriers and their investment in telecommunications and broadband infrastructure. This legislation was passed and chaptered. Representative Smith and Senator Carlos R. Cisneros sponsored HB 231 to terminate the Information Technology Commission. This legislation was passed and chaptered.

Sagamore Wind Project

Bernarr R. Treat, manager, state government affairs, Xcel Energy, provided an overview of Xcel Energy and its wind projects. Xcel Energy began a $3 billion expansion in 2011 that will continue through 2021. This investment includes 1,500 miles of new transmission lines and 35 additional substations in New Mexico and the Texas Panhandle. Xcel Energy is integrating renewable energy projects with its base of fossil fuel generation. More than 22 percent of the energy delivered in Texas and New Mexico by Xcel Energy is carbon-free. One of its new projects is the Sagamore Wind Project located in Roosevelt County, southeast of Portales. Brooke Trammell, Xcel Energy, and Julia Kimberly, Invenergy, which is a partner of Xcel Energy, described the Sagamore Wind Project as a 522-megawatt provider with an operational date in 2020. The project will provide 300 construction jobs and 20 to 30 operations jobs at completion and will serve just under 200,000 homes. These companies are taking advantage of

the federal renewable electricity production tax credit, which provides a rebate of 2.3 cents per kilowatt-hour for eligible wind generation projects.

The committee then entered into a general discussion. Responding to a question from the committee, Ms. Trammell:

- stated that the federal tax rebate for renewable energy is currently 2.3 cents per kilowatt-hour for approved projects that have been started by 2016. Thereafter, the rebate will be reduced by 20 percent per year. She also said the rebate is provided to the taxpayer;
- voiced a concern about the speed of the PRC's regulatory approval process because companies are under construction deadlines to take advantage of the full federal rebates; and
- said that the Sagamore Wind Project will encompass over 180,000 acres in Roosevelt County and will provide energy to just under 200,000 homes when complete. The average household uses 1,000 kilowatt-hours per month.

Asked about the qualifications of the available workforce for the wind energy industry, Ms. Trammell noted that the challenge is to find qualified employees for all aspects of the industry, from accounting to engineering. She said the preference is to hire and train locally because those employees tend to be more rooted in the community and stay with a company longer. (See the handouts in the committee file for further information.)

Blowing in the Wind — Energy Production

Loralee Hunt, manager of project development, Pattern Energy Group, and Ben Givens, facility manager, Broadview Wind, which is a partner within the Pattern Energy Group, described the Broadview Wind facility, which is located in Curry County, New Mexico, and Deaf Smith County, Texas. Wind turbine facilities deliver more than 340 megawatts of energy to Southern California Edison through the existing Western Interconnect LLC transmission lines. The project includes 141 turbines in two projects that commenced operations on March 31. Pattern Energy Group invested $92 million, with an expected overall economic impact to New Mexico of $979.8 million. The average number of construction workers for the projects was 350, and there are 18 permanent jobs for the duration of the project.

Responding to questions from committee members, Ms. Hunt and Mr. Givens said that Pattern Energy Group works through the Federal Aviation Administration's formal process for approving wind turbines to minimize the risks associated with low-level flight patterns. Committee members encouraged Pattern Energy Group to engage directly with local military base commanders with regard to the flight needs of their bases. With regard to risks to migratory birds, Ms. Hunt said that studies over the last decade show that wind turbines have minimized the impacts on migratory birds.

The committee entered into a general discussion of the in-state benefits of wind generation for power used out of state and whether such energy transmission could be taxed. Ms. Hunt said that the benefits to the state include the construction jobs while the projects are

being built plus the service technician jobs that remain in the state. After construction, there will be 18 jobs in Broadview and 100 in Corona. Additionally, landowners receive royalties for every turbine that is located on their property. She indicated that state taxes on interstate energy transmission may be difficult to implement. (See the handouts in the committee file for further information.)

Plateau Telecommunications

David Robinson, chief executive officer, and Vince Tyson, both of Plateau Telecommunications, discussed their company and initiatives in their service area. Plateau Telecommunications is a cooperative that provides telephone and broadband services over an area of 25,000 square miles. It provides DSL (digital subscriber line) service to 95 percent of its service area and is rated number six in the country for service speed. Plateau Telecommunications has covered an extensive amount of its area with fiber optics and is planning an additional 600 miles of fiber installation next year. Mr. Robinson also mentioned SB 308 from the 2017 regular session, which was sponsored by Senator Padilla, to increase the flexibility of the PRC to make changes to the State Rural Universal Service Fund, particularly in support of broadband initiatives.

Wind Energy Technology Curricula

Dr. Thomas W. Newsom, president, and Andy Swapp, program director, Wind Energy Technology Program, Mesalands Community College (Mesalands), discussed the Wind Energy Training Program and the North American Wind Research and Training Center at Mesalands, which has been in operation since 2008. The program trains wind turbine service technicians. For the 2016-2017 school year, Mesalands issued 14 occupational certificates, six one-year occupational certifications and 10 associate of applied science degrees. Mesalands also provided climb safety certifications for 432 students in Granite Services International's new-hire training program.

In the ensuing committee discussion, Dr. Newsom and Mr. Swapp emphasized that Mesalands' training program offers an opportunity for the entire state to have local residents trained in wind energy. They stated that training local residents would likely increase the ability of local companies to retain their workers over the long term. In response to a question about outreach to New Mexico high schools, Dr. Newsom said he would welcome the opportunity to work with committee members to connect Mesalands with their local schools. (See the handouts in the committee file for further information.)

Tour of de Maio Farms — The 21st Century Farm: Fiber-Optic-Based Farm Management

Committee members were taken on a tour of de Maio Farms to view the automation technology involved in operating a farm. The farm produces beef, processing up to 38,000 head of cattle annually. The farm uses a sophisticated computer system and high-speed transmission to closely track all operations, including silage production and livestock health, and to operate tractors and other equipment remotely through GPS data.

Recess

Following the tour, the committee recessed at 4:35 p.m.

Tuesday, July 11

Senator Padilla reconvened the committee at 9:32 a.m.

New Oil Field Technology

Kelly Tooker, director of oil and gas technology, New Mexico Junior College, presented an overview of well-drilling and completion activities as an introduction to the life cycle of a well. Mr. Tooker described the process of hydraulic fracturing (fracking) and discussed the water usage from fracking. The average horizontal well used an average of 100,000 barrels of water per fracking job in 2014. Water used in fracking comes from a variety of sources, and it may be fresh water, brackish water or water that is derived from an oil drilling operation, referred to as "produced water". Because of the concern about seismic activity possibly caused by fracking, Mr. Tooker also discussed the seismicity in New Mexico. He pointed out that there had been 1,111 earthquakes in New Mexico between 1869 and 1975 — a period ending more than 20 years before fracking technology was introduced.

Joe Lee, regional technical manager, Cudd Energy Services, discussed the drilling technology used to maximize oil recovery while reducing the costs. Mr. Lee first described current prevalent technology tools: well logging to map a well, core sampling, cutting analysis, mud logging and chromatographs. He described a newer technology using quadrupole mass spectrometers that has been applied to numerous horizontal and vertical drilling applications. The typical cost per well for this technology is about $10,000 and involves a mass spectrometer operated from an on-site trailer with communications back to the main office. The spectrometer allows a complete mapping of the well location for rock hardness and hydrocarbon content for industry classifications C1 through C10. Known as a "Drill2Frac" application, this method identifies and maps the geomechanical properties of a substrata of rock to create a complete map showing the optimal trajectory for drilling and fracking.

Responding to questions from committee members, the panelists said that the geologic structure of New Mexico's oil fields differs from that of Oklahoma and greatly reduces the chance of seismic activity created by disposal of fracking water. In Oklahoma, water was disposed into rock formations as deep as 15,000 feet, but the formations were susceptible to stress movements. The presenters said that these same types of formations do not exist in New Mexico. Regarding the water sources used by the industry in New Mexico, they said that there are a number of nonpotable ground water sources, and they noted in particular an extensive brackish water source in the Jal area that is about 1,200 feet deep. They concluded with some facts about employment created by drilling operations. One drilling rig represents about 135 jobs through completion of the well. Salaries range from $40,000 to $65,000 for entry-level base workers, but with typical overtime, these workers can easily earn up to $75,000 in annual salary. Specialist salaries for geologists and other scientists may range from $150,000 to $250,000 annually. (See the handouts in the committee file for further information.)

Cannon Air Force Base Mission Brief: Specialized Airpower and Its Technological Dependencies

Major Michael C. Guerrero, United States Air Force, Cannon Air Force Base (Cannon), discussed the mission of the 27th Special Operations Wing at Cannon. The operation includes about 4,800 military personnel, 650 U.S. Department of Defense (DOD) civilians and 552 contractors. The DOD invested $1.29 billion in Cannon and the Melrose Air Force Range as a foundation for the 27th Special Operations Wing. The base has two $20 million data centers with 127 miles of fiber optics and copper providing 25 gigabytes per second of bandwidth. Additionally, it has 11 distinct networks with 8,000 computers and 500 network devices.

Committee members asked if Cannon has had any training or education issues when recruiting its civilian workforce and if the base has been working with local higher education institutions. Major Guerrero was not aware of workforce issues or current initiatives for programs or special recruiting in local high schools. The committee engaged in a discussion of the base realignment and closure (BRAC) process. A committee member explained that there are no planned changes in base authorizations for 2018, and the next possible BRAC would be in 2020. With the amount of investment that the United States Air Force has made in moving the 27th Special Operations Wing to Cannon and the development of the Melrose Air Force Range, it is believed that the likelihood of a change at Cannon is minimal. Committee members also asked about potential effects of wind farms on the low-level flight missions, but no current issues were identified. Responding to a question about the latency in communications when a military aircraft is being flown from a remote device, Major Guerrero said that the Reaper aircraft missions can be controlled from anywhere, with direct links to the aircraft.

Adjournment

There being no further business before the committee, the second meeting of the STTC for the 2017 interim adjourned at 11:29 a.m.

Revised: July 28, 2017

TENTATIVE AGENDA
for the
THIRD MEETING
of the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

July 31, 2017
Spaceport America
Space Shuttle Rd.
Truth or Consequences

August 1, 2017
Joseph A. Fidel Center
New Mexico Institute of Mining and Technology
Socorro

Monday, July 31 — Spaceport America

10:00 a.m. **Call to Order and Introductions**
—Representative Candie G. Sweetser, Chair

10:10 a.m. (1) **New Mexico E911 Directors Affiliate: Current Issues**
—Ken R. Martinez, Director, Santa Fe Regional Emergency Communications Center; Chair, E911 Directors Affiliate, New Mexico Association of Counties (NMAC)
—Dave Ripley, Director, San Juan County Communications Authority; Vice Chair, E911 Directors Affiliate, NMAC
—Michelle Howard, 911 Director, Sierra County Regional Dispatch Authority

11:00 a.m. (2) **Information Technology (IT) Governance: An Overview**
—Ralph Vincent, Staff, Legislative Council Service

12:00 noon **Lunch**

1:00 p.m. **Approval of Minutes**

1:05 p.m. (3) **Spaceport America Projects and Directions**
—Daniel Hicks, Chief Executive Officer, Spaceport America

2:00 p.m. (4) **Virgin Galactic: Development and Projected Operations Schedule**
—Don Calcote, Property and Contracts Manager, Virgin Galactic

3:00 p.m. **Tour**

4:30 p.m. **Recess**

Tuesday, August 1 — New Mexico Institute of Mining and Technology (NMIMT)

9:00 a.m. **Call to Order and Introductions**
—Representative Candie G. Sweetser, Chair

9:10 a.m. (5) **NMIMT's Future: A Voyage of Inquiry, Inspiration and Innovation**
—Dr. Stephen G. Wells, President, NMIMT

9:30 a.m. (6) **The Cutting Edge of Cybersecurity Education**
A. Student Programs Accelerating Cybersecurity
—Dr. Lorie M. Liebrock, Professor of Computer Sciences, Dean of Graduate Studies, NMIMT
B. Stovepipes, Big Data and Analytics: How the Institute for Complex Additive Systems Analysis (ICASA) Builds Capacity in the Science of Protecting Infrastructure
—Michael J. Smith, Director, ICASA, NMIMT
C. RiskSense: A Success Story of NMIMT's Innovation Ecosystem
—Dr. Danny Quist, Chief Technology Officer, RiskSense
D. Technology Commercialization and Student Education Experiences at NMIMT
—Dr. Peter Anselmo, Executive Director, Center for Leadership in Technology Commercialization, NMIMT

10:15 a.m. (7) **Education Collaborations**
A. NMIMT's Collaborations with the Pueblo of Picuris: Building Commercial and Educational Opportunities
—Carlos R. Romero, Associate Vice President for Research and Economic Development, NMIMT
B. Statewide Higher Education IT Collaboration Strategies
—Joe Franklin, Director of IT and Communication, NMIMT

11:00 a.m. (8) **Fiscal Year 2017 Fourth Quarter IT Project Status Report**
—Brenda Fresquez, Program Evaluator, Legislative Finance Committee

11:30 a.m. (9) **Tour**
A. Dr. David Grow's Mechanical Engineering Lab (Building a Synthetic Hand for an NMIMT Staff Member)
B. Daniel H. Lopez Chemistry Building (Transdiciplinary Programs)

12:30 p.m. **Lunch**

1:30 p.m. **Adjourn**

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

July 31, 2017
Spaceport America
Space Shuttle Rd.
Truth or Consequences

August 1, 2017
Joseph A. Fidel Center
New Mexico Institute of Mining and Technology
Socorro

The third meeting of the Science, Technology and Telecommunications Committee (STTC) was called to order by Representative Candie G. Sweetser, chair, on July 31, 2017 at 10:00 a.m. at the Spaceport America conference room in Truth or Consequences.

Present	**Absent**
Rep. Candie G. Sweetser, Chair	Sen. Bill B. O'Neill
Sen. Michael Padilla, Vice Chair	Rep. Linda M. Trujillo
Sen. William F. Burt	Rep. Monica Youngblood
Rep. Daymon Ely	
Rep. Kelly K. Fajardo	
Rep. Jason C. Harper	
Sen. Mark Moores	
Rep. Debra M. Sariñana	
Rep. James E. Smith	
Sen. William P. Soules	

Advisory Members

Sen. Craig W. Brandt (7/31)	Sen. Jacob R. Candelaria
Rep. Stephanie Garcia Richard	Sen. Carlos R. Cisneros
Sen. Ron Griggs (7/31)	Sen. Richard C. Martinez
Rep. Bill McCamley (7/31)	Sen. William H. Payne
Sen. Mary Kay Papen (7/31)	Rep. Nick L. Salazar
Rep. Debbie A. Rodella	Rep. Carl Trujillo
Sen. Nancy Rodriguez (8/1)	Sen. Peter Wirth
Sen. Bill Tallman (8/1)	

Guest Legislators
Rep. Rebecca Dow (7/31)
Rep. Tim D. Lewis

(Attendance dates are noted for members who did not attend the entire meeting.)

Staff
Mark Edwards, Legislative Council Service (LCS)
Ralph Vincent, LCS
Sara Wiedmaier, LCS

Guests

The guest list is in the meeting file.

Handouts

Handouts and other written testimony are in the meeting file.

Monday, July 31

Introductions and Welcome to Spaceport America (SA)

Representative Sweetser welcomed the committee to the third meeting of the STTC for the 2017 interim. Members of the committee and staff were invited to introduce themselves. Christopher Lopez, vice president of site operations at SA, also welcomed the committee and thanked the members for their visit.

New Mexico E911 Directors Affiliate: Current Issues

Ken R. Martinez, director, Santa Fe Regional Emergency Communications Center, and chair, E911 Directors Affiliate, New Mexico Association of Counties (NMAC); Dave Ripley, director, San Juan County Communications Authority, and vice chair, E911 Directors Affiliate, NMAC; and Michelle Howard, 911 director, Sierra County Regional Dispatch Authority, discussed the current status and structure of New Mexico's 911 operations. In New Mexico, 911 emergency service oversight is handled by the Enhanced 911 (E-911) Program run by the Local Government Division (LGD) of the Department of Finance and Administration (DFA). The E-911 Program funding derives from a telephone service surcharge of $.51 per month per service line (land or mobile) and is used to assist local 911 emergency call and dispatch centers, known as public safety answering points (PSAPs) to establish and maintain emergency service networks, training and equipment. The E-911 Program strives for a five-year equipment replacement cycle, but funding is rotated through the 47 PSAPs around the state based upon funding and need. Over the past fiscal year (FY), the E-911 fund allocated almost $8 million for recurring statewide network costs and about $5 million for equipment upgrades.

Mr. Martinez said that statewide PSAPs typically handle more than 1.2 million calls per year, and the volume of calls has a 2% to 3% annual growth. To reduce costs and increase

efficiency, consolidating PSAP districts is an ongoing focus of the E-911 Program. Mr. Ripley said that Senate Bill 46 (2017 regular session) expanded the 911 surcharge to include voice over internet protocol, or "VOIP", phone systems and pre-paid phones and cards and is expected to increase the annual funding for the program from $11 million annually to $13 million. However, he said that E-911 funding will continue to be inadequate. Expanding on this point, Ms. Howard said that the E-911 bureau is currently down 11 employees overall and has only one 911 program employee responsible for all of the PSAPs statewide.

Mr. Martinez then spoke about Next Generation 911 (NG911). NG911 is designed to use the geographic information system, or "GIS", as the primary data component for providing 911 services in New Mexico. NG911 also calls for PSAP centers to build their communications capabilities beyond simple phone services to include text messaging, still images and video clips. He said that although E-911 equipment currently being deployed is NG911 compliant, New Mexico is one of only five states in the nation that currently have no implementation plan for NG911. Further, he said that states without an NG911 implementation plan are ineligible to receive a portion of the $115 million in federal grant money.

The presenters requested: 1) the creation of a statewide E-911 oversight board composed of 911 emergency service professionals to provide expertise on relevant legislation and to advocate for funding; and 2) development of a statewide NG911 implementation plan. The presenters also noted that some states have emergency surcharge rates as high as $6.00 per month and that New Mexico might increase its rate to provide more funding.

The committee then entered into a general discussion. Committee members expressed concerns about finding adequate funding to create an oversight board in addition to increasing the funding needed by local PSAPs. In response, Rick Lopez, director, LGD, noted that funding has been in decline over the past few years but that consolidation of PSAPs is helping to alleviate funding problems. He also stated that collaboration among center directors will be crucial in moving forward and that a voluntary professional standards committee would need to be put in place.

In response to a question about fluctuating demand for 911 emergency services at Elephant Butte Lake, Ms. Howard used the July 4 weekend as an example. On that weekend, Sierra County grows from a population of about 10,000 to more than 140,000. She said that current emergency systems of surrounding counties are not integrated and suggested that upgrading to NG911 systems would offer a centralized infrastructure to better respond to multiple coinciding emergency calls. (See the handouts in the committee file for further information.)

Information Technology (IT) Governance: An Overview

Mr. Vincent presented the committee with an overview of IT governance in an age of rapidly advancing technology. Mr. Vincent emphasized the importance of legislative oversight of IT based on the large investment in the state. Excluding IT expenses for public schools and

higher education, New Mexico spends over $300 million annually on IT hardware, software and services through purchase orders and spends over $75 million in staff costs.

Mr. Vincent said three common IT governance structures are utilized across the country: centralized; decentralized; and hybrid or federated. Most states, including New Mexico, have adopted the hybrid/federated structure, meaning that the agency maintains a certain amount of internal autonomy. Mr. Vincent explained some of the important governance characteristics within the structure in New Mexico, including the Department of Information Technology (DoIT), which is the State of New Mexico's enterprise information technology service provider. The DoIT is responsible for coordinating the state's IT strategic plan, state agencies' annual IT strategic plans and the DoIT's annual IT strategic plan.

The DoIT was established as a single, unified executive branch department to administer all laws and exercise all functions formerly administered by the now-defunct Information Technology Commission and to consolidate enterprise IT services previously duplicated within state agencies. The DoIT functions as a semiautonomous branch of the governor's cabinet rather than under the DFA or the Office of the Governor, as is common in other states. Mr. Vincent noted that it is considered best practice for the state chief information officer (CIO) to function semiautonomously and not to report to one department.

Authority for the DoIT is established by the Department of Information Technology Act, creating a central IT organization and a legislative committee with oversight. Previously, the Information Technology Commission had oversight, but the enabling legislation was repealed during the 2017 legislative session. Legislative oversight now falls to the STTC for review of governance and to the Legislative Finance Committee (LFC) for performance audits. In some states, additional IT oversight is provided by an IT governance board, which may include an IT council. New Mexico does not have either. Instead, these responsibilities fall to the secretary of information technology. In New Mexico, additional oversight is provided by a council of state agency CIOs, which allows for interaction and engagement among CIOs of various agencies throughout the community.

IT governance in New Mexico can be summarized as two functions:

(1) *strategic planning and business alignment*, which determine goals and directions; and

(2) *operational management and support*, which involve project approval, budgeting and management.

The project management roles are supported by the Project Certification Committee and Technical Architecture Review Committee.

Every project also is required to undergo an independent verification and validation component.

Budgetary authority of state CIOs varies between states, and in New Mexico, the CIO is responsible for approving projects that meet certain criteria.

The CIO, IT staff and LFC also work concurrently to review agencies' requests for funding of larger projects. Requests for FY 2018 must be filed by September 1.

Mr. Vincent mentioned that upcoming policy issues will involve cloud-managed services, an increased need for cybersecurity, artificial intelligence, machine learning and expanded information dissemination.

Responding to questions from committee members, Mr. Vincent:

- noted that many states are beginning to migrate toward cloud technology, and New Mexico should outline a policy strategy to adapt to this newer technology; and
- suggested that the current structure of IT governance allows sufficient oversight without overwhelming the CIO.

SA Projects and Directions

Daniel Hicks, chief executive officer, SA, provided the committee with an update on operations and funding for SA. He emphasized that job creation is a priority for the spaceport. He estimated that 100 new jobs paying an average salary of $60,000 will be created by SA tenants in FY 2018.

Mr. Hicks noted that the national commercial space industry is currently valued at $330 billion annually and is growing every year. He said that SA has a unique advantage compared to the other nine commercial spaceports operating around the country because it is adjacent to and collaborates with the U.S. Army White Sands Missile Range (WSMR). The requirements of WSMR create 6,000 square miles of restricted air space that is almost always available to launches from SA. Other spaceports have limited windows of time without traffic in their airspace and must request launch times from the Federal Aviation Administration.

Mr. Hicks said that other attributes that make the location of the SA site competitive include:

- over 340 days of average annual sunshine;
- a launch site that is 4,600 feet above sea level;
- there is no salt air corrosion that is associated with seaside launch sites;
- increased safety due to a low population density in the surrounding area;
- increased security because of its remote location; and
- both horizontal and vertical launch capabilities.

Mr. Hicks said that SA is focused on research and astronaut preparation for suborbital flights. He pointed out that SA is positioned to provide extended suborbital flight times as a low-

cost alternative to development of microgravity technologies in the fields of biotechnology, combustion technology, material structures, communications and microchips. He said that, ultimately, SA should become a national transportation hub that will support commercial interests as well as projects conducted by the National Aeronautics and Space Administration (NASA) and the U.S. Department of Defense (DOD).

Speaking about SA's position in the nation's space market, Mr. Hicks highlighted Florida as a competitor that is investing $30 million annually in its spaceport to pursue the commercial space industry and offset the loss of NASA's space shuttle program. However, he said, the top four national suborbital launch providers are: 1) NASA; 2) Virgin Galactic (VG); 3) Exos Aerospace; and 4) UP Aerospace. He also noted that SA recently acquired a Pipeline2Space tenant that provides suborbital launch services. He said some near- to mid-term goals for SA include launching low-earth orbit habitats; providing point-to-point transportation with space planes; and microgravity research.

Mr. Hicks also addressed efforts by SA to encourage and educate students in science, technology, engineering and mathematics (STEM) fields. In February 2017, the "What is Spaceport America?" program was launched in partnership with FieldTripZoom, Inc. This program can provide virtual tours of some SA facilities and it videoconferences with SA staff to STEM students across the world. Currently, the program is operating in 17 classrooms across New Mexico at no cost to the schools. Mr. Hicks noted partnerships with university researchers, the Spaceport America Relay Race and the Spaceport America Cup as other public outreach programs.

Responding to questions from committee members, Mr. Hicks:

- noted that $14 million has been set aside to improve and expand southern access to the spaceport. The Department of Transportation has already agreed to adopt the future road as a state highway;
- stated that SA expects to have its first commercial launch in 2018 and said that VG is preparing infrastructure to be ready by December 2017; and
- talked about the potential to create internships for students in the engineering departments of universities in New Mexico.

Mr. Hicks said that anticipated major funding requests would be for an on-site welcome center and for a shuttle service from nearby towns. He compared these new public developments with the ongoing development of VG's space flight vehicles. He said that VG has already invested close to $1 billion at the SA site and in its flight vehicles. Further, he noted that VG currently has 30 full-time employees on site, with plans to increase employment to 100 once the program is operational. In response to a question about selling SA, he stated that it would likely not be more effective and reminded the committee that commercial spaceports are an appreciating asset.

Tour of SA

Don Calcote, property and contracts manager, VG, and Greg Powell, facilities manager, VG, conducted a tour of SA and answered questions from the committee throughout the tour. Pictures were not allowed during the tour to preserve the exclusivity of the experience for future passengers. The committee was allowed inside the main hangar, currently housing the SpaceShip Two model, and to see the 2.2-mile runway and the visitors center/waiting area designed for the families of passengers.

Mr. Powell pointed out many of the energy-conserving features of the building. The U.S. Green Building Council's LEED NCv2.2 program was used as the framework for the sustainable development of SA. Mr. Calcote stated that VG is committed to its partnership with SA. The company has invested $9.3 million in local vendors and pays $7 million annually in rent. To date, VG has sold about 700 tickets to passengers from 56 different countries. Tickets started at $200,000 but have since been increased to $250,000. Mr. Powell stated that VG will require three training days for passengers, during which time the passengers will undergo flight simulations and other physical preparations. It is envisioned that these training days will be structured as vacation packages, both for the passengers and their families, benefiting tourism in the surrounding cities.

Mr. Calcote noted that VG currently has five maintenance employees and 26 operational employees. Operational staff is eventually expected to increase to 159.

Recess

The committee recessed at 6:00 p.m. after the tour.

<u>Tuesday, August 1</u> — New Mexico Institute of Mining and Technology (NMIMT)

Reconvene

Representative Sweetser reconvened the committee at 9:10 a.m.

Introductions and Welcome to Socorro

Representative Sweetser again welcomed the committee to the third meeting of the STTC for the 2017 interim and asked committee members and staff to introduce themselves. Dr. Stephen G. Wells, president, NMIMT, then welcomed the committee to the university and thanked the members for their visit.

NMIMT's Future: A Voyage of Inquiry, Inspiration and Innovation

Dr. Wells provided the committee with an overview of the university, describing it as New Mexico's "starship institution". Dr. Wells began by highlighting some statistics and features of the university. NMIMT currently has 1,525 undergraduate and 610 graduate students. NMIMT actively cultivates transdisciplinary education and research opportunities. It offers 19 academic programs and was recently approved to add two new doctoral degree programs in biotechnology and mechanical engineering. He said NMIMT provides a strong employee base

for companies in the state, noting that 55% of 2017 graduating students were employed within New Mexico by Sandia National Laboratories, Los Alamos National Laboratory and companies such as Intel and Google.

Dr. Wells touted the success of NMIMT's students, faculty and alumni, citing as examples Ed Fries, co-founder of Xbox and vice president of game publishing at Microsoft, and RiskSense, a cybersecurity firm that developed from research conducted at NMIMT. Further, he noted that NMIMT received 45 awards as well as notable national rankings in 2017, including being ranked as the number one public university, and fifteenth overall, in its doctoral programs. He said that NMIMT is ranked eleventh in the nation for state universities by salary potential; students earn an average starting salary of $50,500. Dr. Wells also highlighted the appearance of NMIMT students on the TV show *MythBusters* and how their testimonials almost unanimously emphasized small class size and close student-teacher relationships as their reasons for attending NMIMT.

Dr. Wells also made special mention of five NMIMT programs, including:

- the Bureau of Geology and Mineral Resources, a research and service division of NMIMT serving as the geological survey for the state and providing data on water and mineral composition;
- the Petroleum Recovery Research Center (PRRC), established in 1977, which serves as the research arm of the oil and natural gas industry in New Mexico and is among the nation's leading petroleum research organizations;
- the Institute for Complex Additive Systems Analysis (ICASA), a cybersecurity research division of NMIMT that has been designated by the National Security Agency and the U.S. Department of Homeland Security (DHS) as a center of academic excellence in information assurance education and as a center of excellence in information assurance research;
- the Magdalena Ridge Observatory, which consists of a fast-tracking telescope and an optical/infrared interferometer and works with the Air Force Research Laboratory at Kirtland Air Force Base to aid in national defense; and
- the Energetic Materials Research and Testing Center, which specializes in the research, development, testing and analysis of energetic materials for both corporate and government clients and which has brought $500 million in research and testing to New Mexico over the past 10 years.

The Cutting Edge of Cybersecurity Education

A. Student Programs Accelerating Cybersecurity

Dr. Lorie M. Liebrock, professor of computer sciences and dean of graduate studies, NMIMT, elaborated on some of the points made by Dr. Wells regarding cybersecurity programs at the university. She explained that students pursuing the field of cybersecurity have two degree options:

(1) computer science, which is a systems-oriented program that ensures students are prepared to design, develop and maintain secure software; or

(2) IT, an applied program that integrates the foundations of computer science with fundamental project management.

Dr. Liebrock said that students get specific training in cybersecurity and receive a cybersecurity certification with either degree.

Dr. Liebrock highlighted efforts by NMIMT to address the large disparity between men and women in the computer science field. This developing program at NMIMT is designed to engage students and teachers in middle school and high school, offer summer courses to cater to first-time programmers and provide female-focused peer mentoring, enhanced internships, funded research and conferences such as "Women in Cybersecurity".

Dr. Liebrock also talked about the Scholarship for Service program (SFS), sponsored by the National Science Foundation and the DHS since 2003. The SFS funds student education in cybersecurity or information assurance. The program provides students yearly stipends ranging from $22,000 for undergraduates to $34,000 for graduates. It also pays their tuition and provides additional funding for books, health insurance and professional development in exchange for each year that the students are employed in civil service in federal, state, local or tribal government or in a federally funded research center. She pointed out that many SFS graduates want to stay in the state to improve the infrastructure and economy and have found internships through the Indian Health Service, U.S. Army Corps of Engineers, Los Alamos National Laboratory, Sandia National Laboratories and the DoIT, among others.

Responding to additional questions from the committee, Dr. Liebrock said that there is a shortage of roughly 80,000 federal and industry jobs in cybersecurity and that this shortage is expected to increase. Talking about the need for recruitment of students into STEM fields, she said that most young women will not pursue a STEM field if not introduced at a young age. She also said that it will be important to train high school teachers and to emphasize the study of computer science as much as math and science.

B. Stovepipes, Big Data and Analytics: How the ICASA Builds Capacity in the Science of Protecting Infrastructure

Michael J. Smith, director, ICASA, NMIMT, described the ICASA program to the committee as a partnership between government, academia and industry that was created by state legislation in 2001. Since its creation, 150 students have participated in the research and development of IT infrastructure protection to support the national intelligence community and address national security concerns. Mr. Smith noted that these students have had relative ease in finding jobs, including with the DOD. He noted some of the ICASA's strengths, such as:

- abstract analysis of network dynamics, which makes the software readily re-applicable to multiple domains;
- modeling abstraction, which allows engineers to access deep information from limited observation; and
- the academic partnership with the intelligence community.

Mr. Smith then listed some of the goals of the program, including to study large-scale systems as complex networks; create innovative techniques for information assurance; convert scientific concepts into reusable, user-friendly analytic tools; develop predictive modeling and analysis platforms; and act as a national security pipeline to train military personnel. Specific problems that the ICASA seeks to address include defense of large computer networks through their platform or software; characterizing the dynamics of a network to drive situational awareness through event detection, classification and localization; border security; and monitoring of the nation's power grid. Additionally, Mr. Smith touched on one ICASA product, the Data Analysis and Visualization Environment, or "DAVE", which is a user-friendly software program that allows multiple data sets to be analyzed together.

C. RiskSense: A Success Story of NMIMT's Innovation Ecosystem

Mark J. Fidel, co-founder and head of corporate development, RiskSense, provided an overview of operations. He described the cybersecurity firm as a spin-off of the ICASA that now has a goal of serving the commercial sector. NMIMT still owns one-third of the company and has begun to see residuals from the company's success. RiskSense specializes in network security assessments, incident response and mitigation and digital forensics. The company employs a 100-member team, of which roughly one-third are software engineers, many of whom are post-graduates from NMIMT. The average age of employees is under 32, and the average pay for employees is over $80,000 a year. RiskSense is recognized as one of the most successful outcomes of the state's Job Training Incentive Program (JTIP).

Mr. Fidel said that RiskSense currently serves close to 200 clients from more than 15 states. RiskSense provides clients a platform to analyze massive amounts of vulnerability data to reduce threats to critical business systems. The firm has earned more than 27 industry awards, including Albuquerque Business First's "Fastest Growing Companies" award in 2015. RiskSense has developed strategic partnerships with companies such as CenturyLink and Imperva, Inc. Earlier this year, RiskSense released the first public scanner to detect if a machine is missing protection to block cyber attacks. Mr. Fidel cited the WannaCry ransomware as an example of cyber-attack software. WannaCry infected more than 230,000 computers in 150 countries.

In response to questions from committee members, Mr. Fidel noted that 25% of RiskSense's employee base is hired within the state. He also requested that changes be made to the JTIP to avoid penalizing companies that are hiring from out of state because those hires still encourage IT spending within the state.

D. Technology Commercialization and Student Education Experiences at NMIMT

Dr. Peter Anselmo, executive director, Center for Leadership in Technology Commercialization, and associate professor, Department of Management, NMIMT, discussed initiatives to develop entrepreneurship as part of student training. Dr. Anselmo stated that the main objectives are to involve students in the process of developing and monetizing intellectual property. He said that NMIMT strives to connect industrial contacts with the invention and research teams and to encourage input from inventors in all business aspects of their projects, allowing for more autonomy. Some aspects of this training include patent searches, market research, meetings and presentations with potential investors and participation in interdisciplinary teams. He said this initiative is continuously growing, with close to 40 students having already participated in teams in drug discovery, analytics, materials engineering, medical robotics and drug delivery, among other areas.

Education Collaborations

A. NMIMT's Collaborations with the Pueblo of Picuris: Building Commercial and Educational Opportunities

Carlos R. Romero, associate vice president for research and economic development, NMIMT, discussed NMIMT's collaboration with the Pueblo of Picuris, noting that this effort will serve as a model for future efforts in rural New Mexico. He said that NMIMT Research Park Corporation and the Pueblo of Picuris' Three Eagles Development Corporation have been combined into a joint venture corporation, creating an academia-industry pipeline. The two partners intend to foster educational opportunities for Native American students, expand capacity in both organizations in pursuing federal contracts and develop rural economies, new businesses and industry partnerships.

Responding to questions from the committee, Mr. Romero noted two characteristics that provide the Pueblo of Picuris a market niche opportunity: 1) it has access to more potential broadband capacity than most rural areas because it has existing dark fiber lines in place; and 2) as a sequestered community, it can provide a secure data pooling site for other areas. Mr. Romero also emphasized the need for enhanced math education for students at the Pueblo of Picuris schools.

B. Statewide Higher Education IT Collaboration Strategies

CIOs from several state universities discussed IT collaboration strategies. Joe Franklin of NMIMT, Jason Collet of Western New Mexico University (WNMU), Joe Gieri of New Mexico Highlands University, Norma Grijalva of New Mexico State University (NMSU) and Duane Arruti of University of New Mexico (UNM) are CIOs representing IT leaders within the Center for Higher Education Chief Information Officer Studies or "CHECS". The panel provided the committee with an overview of statewide collaborations and IT funding. The panelists said that the fast pace of technological advancements creates a short window for IT firms to get a return on their investment. These new technologies are more expensive. In addition, the newer technologies are proving more complex to manage, and they speed the change in the

cybersecurity environment. To meet these challenges, the panel suggested that a statewide IT funding program would improve each institution's ability to train staff, increase innovation, establish a network and fund common infrastructure and other projects. They said that the goals for year one of the proposed program would include establishing an administrative and technical review committee, establishing guidelines for required information, creating a rubric for prioritization to make recommendations to the legislature, holding an initial training seminar in the spring and having a summer hearing on submitted projects.

As examples of collaborative IT efforts, the panel cited:

- the Rio Grande Optical Network Project, in which NMSU, NMIMT and the DoIT are partners;
- LIBROS, a consortium of 17 academic libraries; and
- a research partnership of UNM, NMIMT and NMSU.

The panelists outlined a future road map for a shared services model to include enterprise software agreements, large-volume purchasing agreements, joint infrastructure, network services support and other collaborative efforts. They argued that a joint effort would lead to lower costs and require less bandwidth.

Responding to questions from the committee, the panelists said that collaboration among distant institutions is possible through dark fiber lines, such as those between NMSU and NMIMT. They also commented that the statewide broadband push envisioned by House Bill 113 (2017 regular session) makes progress integrating with DoIT responsibilities, but the responsibilities of the universities remain unclear, and collaboration between the universities and the DoIT has not started.

FY 2017 Fourth Quarter IT Analysis

Brenda Fresquez, staff, LFC, provided the committee with an overview of the "Information Technology Preliminary Status Report, Fiscal Year 2017 Q4". The report summarizes progress of ongoing IT projects for various state agencies. The report also provides a description, estimated cost and status update for each project. In addition, the report provides a quick assessment of a project's budget, schedule and functionality using a color scale of red for bad, yellow for making progress and green for meeting all criteria. Ms. Fresquez highlighted the Oil and Natural Gas Administration and Revenue Database (ONGARD) replacement project due to its red rating for budget, schedule and functionality. This project is meant to upgrade the current ONGARD system to the American Petroleum Institute standards. The report raises concerns about the ONGARD replacement project due to the State Land Office's (SLO's) lack of progress in planning, an unknown total cost and the Taxation and Revenue Department's availability of project resources. (The finalized version of the report is available online).

In response to questions from the committee, Ms. Fresquez stated that $6 million in funding for system stabilization was allocated in 2013 and that an additional $10 million in

funding was allocated for modernization in 2015. She said that it is likely that the SLO will request more funding for the project, but as of now, only $7 million of the $16 million in state-appropriated funds has been spent.

Tour

A. Dr. David Grow's Mechanical Engineering Lab (Building a Synthetic Hand for an NMIMT Staff Member); and

B. Daniel H. Lopez Chemistry Building (Transdisciplinary Programs)

Following the presentations, the committee toured parts of the NMIMT campus. In Dr. David Grow's Mechanical Engineering Lab, committee members were shown some of the projects and equipment in the lab, such as a few prototypes of a mechanical hand being developed using 3D printing processes to help amputees. They were also able to hear first-hand testimony from students working in the lab. The committee was taken through the new Daniel H. Lopez Chemistry Building and the introductory level chemistry labs.

Adjournment

There being no further business before the committee, the third meeting of the STTC for the 2017 interim adjourned at 11:50 a.m.

Revised: August 22, 2017

TENTATIVE AGENDA
for the
FOURTH MEETING
of the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

August 23-24, 2017
Western New Mexico University
Silver City

Wednesday, August 23

10:00 a.m. **Call to Order and Introductions**
—Representative Candie G. Sweetser, Chair

10:10 a.m. **Welcome to Grant County**
—Ken Ladner, Mayor, Town of Silver City
—Brett Kasten, Chair, Grant County Commission
—Evangeline Zamora, President, Grant County Prospectors

10:30 a.m. (1) **Western New Mexico University (WNMU): Transforming the Future Together**
—Dr. Joseph Shepard, President, WNMU
—Dr. Jack Crocker, Provost and Vice President of Academic Affairs, WNMU
—Dr. Magdaleno Manzanarez, Vice President for External Affairs, WNMU

11:30 a.m. (2) **Challenges of Remote Education**
—Jason Collet, Chief Information Officer, WNMU
—Donna Rees, Director of Extended University, WNMU
—Dean Foster, Director of Online Learning, WNMU
—April Hanson, Video Communications Manager, WNMU

12:00 noon **Lunch**

1:00 p.m. (3) **Grant County Collaboration: Building Interconnectivity**
—Alex Brown, Town Manager, Town of Silver City
—Jason Collet, Chief Information Officer, WNMU
—Ben Potts, Director of Technology, Silver Consolidated School District

2:00 p.m. (4) **Using Mixed Technologies to Build Reliable Connectivity in Rural Areas**
—John Badal, Chief Executive Officer, Sacred Wind Communications

3:00 p.m. (5) **Developing Remote/Solo Work Centers: Challenges, Benefits and Case Examples**
—Emily Schilling, Economic Development Planner, Southwest New Mexico Council of Governments
—John Badal, Chief Executive Officer, Sacred Wind Communications
—Ralph Gauer, Vice President, Karen Carr Studio

4:30 p.m. **Recess**

Thursday, August 24

9:00 a.m. **Reconvene and Introductions**
—Representative Candie G. Sweetser, Chair

9:10 a.m. (6) **Marketing a County for Solar Generation: Obstacles and Benefits**
—Jessica Etcheverry, Community Projects Director, Luna County

9:45 a.m. (7) **Finding Rural/Plata Studio Makers Lab**
—Tim B. Castillo, Co-Founder of Finding Rural/Plata Studio; Associate Professor of Architecture and Associate Dean, School of Architecture and Planning, University of New Mexico
—Ben Potts, Director of Technology, Silver Consolidated School District

11:00 a.m. **Adjourn**

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

August 23-24, 2017
Western New Mexico University
Silver City

The fourth meeting of the Science, Technology and Telecommunications Committee (STTC) was called to order by Representative Candie G. Sweetser, chair, on August 23, 2017 at 10:10 a.m. at the J. Cloyd Miller Library on the campus of Western New Mexico University (WNMU) in Silver City.

Present
Rep. Candie G. Sweetser, Chair
Rep. Jason C. Harper
Sen. Mark Moores
Sen. Bill B. O'Neill
Rep. James E. Smith
Sen. William P. Soules
Rep. Linda M. Trujillo

Absent
Sen. Michael Padilla, Vice Chair
Sen. William F. Burt
Rep. Daymon Ely
Rep. Kelly K. Fajardo
Rep. Debra M. Sariñana
Rep. Monica Youngblood

Advisory Members
Sen. Craig W. Brandt
Rep. Stephanie Garcia Richard
Sen. Ron Griggs
Rep. Bill McCamley
Sen. Mary Kay Papen
Sen. Nancy Rodriguez
Sen. Bill Tallman

Sen. Jacob R. Candelaria
Sen. Carlos R. Cisneros
Sen. Richard C. Martinez
Sen. William H. Payne
Rep. Debbie A. Rodella
Rep. Nick L. Salazar
Rep. Carl Trujillo
Sen. Peter Wirth

Guest Legislator
Rep. Rodolfo "Rudy" S. Martinez (8/23)

(Attendance dates are noted for members who did not attend the entire meeting.)

Staff
Mark Edwards, Legislative Council Service (LCS)
Ralph Vincent, LCS
Sara Wiedmaier, LCS

Guests
The guest list is in the meeting file.

Handouts

Handouts and other written testimony are in the meeting file.

Wednesday, August 23

Welcome and Introductions

Representative Sweetser welcomed the committee to the fourth meeting of the STTC for the 2017 interim. Members of the committee and staff were invited to introduce themselves.

Welcome to Grant County

Mayor Ken Ladner welcomed the committee to Silver City and thanked the members for their visit. He introduced Brett Kasten, chair, Grant County Commission, and Evangeline Zamora, president, Grant County Prospectors. Mayor Ladner stressed the importance of high-speed broadband availability and other technology efforts in relation to the population growth in the area.

The chair recognized a citizen for comments regarding people with electromagnetic hypersensitivity. This citizen, who did not want to be identified, stated that three to five percent of the population suffers from electromagnetic hypersensitivity, that shielded hard-wired connections are preferable and that Silver City already has enough wireless signals.

WNMU: Transforming the Future Together

Dr. Joseph Shepard, president, WNMU, discussed various initiatives in directing the university into the future. Dr. Shepard discussed the need for a diverse economy and drew comparisons between the development in Arizona with a population of eight million and New Mexico with a population of two million. He discussed the importance of science and technology in moving New Mexico forward and challenged the committee to look at education as the economic driver. He stressed the importance of students needing to read proficiently by the third grade and the importance of programs and technology in meeting this goal.

Dr. Shepard compared the broadband speeds that are available in the Silver City area to other parts of the state. WNMU has only 25 percent of the bandwidth available at Eastern New Mexico University, and the cost is greater at WNMU. This discrepancy is caused by WNMU's location relative to the larger transmission lines that transport the broadband data. The broadband fiber that provides Silver City access to the internet comes up from a trunk in Deming. Dr. Shepard stressed the need for investment in this infrastructure across the state because of the technology of the future and noted that 45 percent of WNMU's courses are offered online and that 50 percent of WNMU's students take classes online.

Dr. Magdaleno Manzanarez, vice president for external affairs, WNMU, discussed the importance of WNMU's role in community and workforce development. He stated that WNMU offers certifications in electrical work and welding.

Dr. Jack Crocker, provost and vice president of academic affairs, WNMU, discussed WNMU's role in distance learning and described the technologies used to provide synchronous

video conferencing as well as video capture and streaming for subsequent viewing by students. Dr. Crocker discussed WNMU's role in informing and educating students to "become the future".

The committee then entered into a general discussion. There were several questions on the role of universities and, in particular, on the role of traditional classrooms as opposed to distance learning. Distance learning options are continuing to grow because of the convenience, but universities are still a cultural hub where students can identify and participate in the stimulating opportunities that are offered on campus. Grand Canyon University in Phoenix was presented as an example of the growth in distance learning. While still relatively new, Grand Canyon University has 80,000 students, with 75 percent of the students participating solely online.

It was noted that there has been a paradigm shift for faculty. Those who have been faculty for longer than the past decade have had to learn new methods for presenting material with online courses.

WNMU has 3,500 students, with approximately 2,000 from the Silver City area. This includes about 1,000 students who attend classes on campus, including 300 student athletes. More than one-half of the student population is at least 24 years of age. WNMU's tuition is about $6,200 for 32 credit hours. Even the out-of-state tuition is less expensive for most students. WNMU has also instituted an intern program for students who are not local but can participate in an intern program in their current locations.

There was a question about why capital outlay funds could not be used to purchase equipment for classroom and research activities. It was explained that there is a guideline for spending capital outlay funds on facilities and equipment that have a life span of 10 years or more.

WNMU has to be able to predict the needs of its students in advanced technologies so that students are marketable when they graduate.

There was a concern expressed that the state is subsidizing the cost of education for out-of-state students and whether there is any benefit to the state. The annual cost for educating one student is about $15,000, but the tuition cost is about $6,200. It was stated that there is an appropriate balance that is predicated on economies of scale and the collaborative program efforts of the institutions participating within the Western Interstate Commission for Higher Education.

Challenges of Remote Education

Jason Collet, chief information officer, WNMU, Donna Rees, director of extended university, WNMU, Dean Foster, director of online learning, WNMU, and April Hanson, video communications manager, WNMU, discussed the infrastructure challenges that they face in providing video streams for online class materials. The availability of broadband bandwidth in the Grant County area is limited and the cost is significantly higher than other parts of the state, such as those within the service areas of the Rio Grande corridor and the "eastern loop" that

services Portales, Carlsbad, Clovis and Roswell. In Grant County, there are no providers that can deliver more than one gigabyte to a site, and the only residential option for broadband offers 12 megabytes over cable. These bandwidths limit what the university can provide and what its students can receive effectively. The cost per megabyte of bandwidth is about $4.50 for WNMU, while the cost at the University of New Mexico (UNM) is less than $1.00. Additionally, all of the transport of data is over a CenturyLink fiber line from a trunk in Deming with little redundancy. While WNMU has extended its online offerings, the basic infrastructure in the area does not support any further growth.

Grant County Collaboration: Building Interconnectivity

Alex Brown, town manager, Town of Silver City, Mr. Collet and Ben Potts, director of technology, Silver Consolidated School District, discussed their collaboration efforts to expand broadband within the area school system and to public buildings and the hospital. The group has collaborated with local internet service providers to create a countywide network. While there is a national goal to provide one megabyte per student, the Grant County area only has the resources for about six percent of that goal. There are 3,000 students in the local school district, and this limitation is particularly challenging to meet the computer-based testing requirements.

The group has also collaborated on other infrastructure needs, such as a network firewall and a security consultant to support the network. The group has developed a joint powers agreement to manage the project.

In the ensuing committee discussion, the members discussed legislation that was passed during the 2017 regular legislative session and questioned the progress that had been made to date. In particular, House Bill 113 directs the state's chief information officer to develop a statewide broadband network plan in conjunction with public institutions and broadband service providers. Senate Bill 24 amends the Infrastructure Development Zone Act to provide for broadband infrastructure development by a local government, and Senate Bill 63 expands allowable expenditures under the Public School Capital Improvements Act and the Public School Buildings Act to include purchasing and installing education technology improvements. The panelists were encouraged to investigate how these changes to the statutes can help the group to move forward. Other options were discussed, including the use of E-rate funds and other means to work with UNM or another higher education institution.

Using Mixed Technologies to Build Reliable Connectivity in Rural Areas

John Badal, chief executive officer, Sacred Wind Communications, discussed the achievements that Sacred Wind Communications has made in providing broadband to the Navajo Nation. Even though in its service area, the rights-of-way process is longer and the return on investment is lower than the typical business model, to date, Sacred Wind has been able to achieve 90 percent availability with 25 megabyte bandwidth in one of the most difficult regions in the country. The company has also established fiber connections to Milan anchor institutions; fixed wireless to the Pueblo of Laguna; and other fiber to fixed wireless connections down Interstate 10 to Milan, Grants and Bluewater Village. Other communities in Cibola County are next in line for the extension of broadband services.

Sacred Wind has two central offices, 28 towers, 100 miles of new copper lines, 100 miles of optical fiber and 2,400 new customer installations for voice service. The company employs 44 staff members, with most having no prior telecommunications experience. Staff are provided training and development relevant to their responsibilities. Seventy-one percent of the staff is of Navajo or Hispanic descent. The company's goal is to be employee-owned within 10 years. (See the handouts in the archives for further information.)

In the ensuing discussion, the members explored further information regarding the Public Regulation Commission's roles in rulemaking for the broadband fund, rights of way and pole attachment fees. The Public Regulation Commission is accepting final comments on proposed rules regarding the use of the broadband fund. The Public Regulation Commission does not create rules covering pole attachment fees, but the annual cost is around $20.00 per pole and there are about 22 poles per mile.

Developing Remote/Solo Work Centers: Challenges, Benefits and Case Examples

Emily Schilling, economic development planner, Southwest New Mexico Council of Governments, Mr. Badal and Ralph Gauer, vice president, Karen Carr Studio, discussed the need to build sufficient broadband infrastructure even in areas that are more remote. The Karen Carr Studio was used as an example. The studio provides digitally based visual content to museums and other institutions around the world. For a remote community, the upside of a business like Karen Carr Studio is that it does not have to be based in a large, urban area to create its product. However, the downside is that delivery of the product is dependent on broadband reliability and transfer speeds. Mr. Gauer explained that in those two delivery criteria, Silver City is currently at a disadvantage, even compared to communities in Third World African countries.

During the ensuing committee discussion, members asked questions about the methods used to entice families to relocate to rural areas and how that success relates to the availability of infrastructure, particularly the telecommunications infrastructure. The panelists agreed that a key to success is providing access to high-speed broadband for internet. They said that areas where governmental entities can help include rule changes on trenching work so that fiber is emplaced at the same time as pipelines, pole access and rights-of-way processes. It was stated that the cost to run more strands of fiber (144 strands rather than 12) is insignificant in relation to the total cost of laying fiber.

Thursday, August 24

Representative Sweetser reconvened the committee at 9:10 a.m.

Marketing a County for Solar Generation: Obstacles and Benefits

Jessica Etcheverry, community projects director, Luna County, discussed the planning and development of the 25-megawatt Alta Luna Solar Project in Luna County. Luna County officials worked with Tri-State Generation and Transmission Association, Inc., and D. E. Shaw Renewable Investments, LLC, to execute a 25-year contract to supply renewable energy from the Alta Luna Solar Project in Luna County. The project includes 258 acres and 109,239 solar panels. Tri-State Generation and Transmission Association has agreed to purchase the entire

output of the 25-megawatt solar farm over the life of the contract. The facility came online in late 2016 and serves 8,500 homes. (See the handouts in the archives for further information.)

During the ensuing committee discussion, members asked questions about storage facilities, additional projects and the destination of the power. This project did not include storage but was close enough to transmission lines to move the power out to the areas that will be serviced. Luna County will be working on a response to another request for proposals in late October for a 320-megawatt project for El Paso Electric.

There was discussion regarding the cost to the county and the benefits that were derived. Luna County will be paid $1.5 million over the 25-year life of the project, so the county elected to forego the additional property taxes on the improvements to the land. There were more than 160 jobs during the construction, and an estimated $400,000 was spent with local vendors during the planning and construction.

These projects are being developed to meet the power companies' requirement for renewable energy. The combination of solar, wind and natural gas plants has allowed companies to provide a level power output while reducing the dependence on coal, without the need for further storage.

The life of the solar project is expected to be between 25 and 30 years, and the solar panels will be replaced with newer technology as it becomes economically effective. The current technology is not affected by the wind storms that are prevalent in the area.

Finding Rural/Plata Studio Makers Lab

Tim B. Castillo, co-founder, Finding Rural/Plata Studio, and associate professor of architecture and associate dean, School of Architecture and Planning, UNM, and Mr. Potts described the Plata Studio as a collaborative effort between UNM, Silver Consolidated School District and Woodbury University to engage students in real-life problems in rural areas. The goal is a "makers lab" with a shared space for inspiration in downtown Silver City. The group has explored arts, music, robotics, fabrication, filmmaking, 3D printing, etc., and has considered developing different spaces ranging from kiosks to mobile laboratory spaces to a building in downtown Silver City.

Through the Plata Studio, these technology resource centers have been planned to train teachers and to provide students in rural school districts with hands-on opportunities in the science, technology, engineering and mathematics (STEM) innovation areas. Through agreements between school districts, these technical resources are shared and available to more teachers and students.

The follow-up questions by committee members were centered around what resources are available and the impacts of those resources on STEM innovations. The resources are still being developed, but there are makers labs in the form of mobile trailers available in the school districts. Sandia National Laboratories provided 800 computers designed for use in AutoCAD applications for the districts, and a grant has been requested to provide printers and other

equipment. Teachers will be trained and provided with the technical resources. It was pointed out that this is just the tip of the iceberg, but the group is creating lofty goals and achieving what is possible with the limited funds available. One member pointed out that graduates may still leave the area for better opportunities, but the goal should be to provide opportunities for those people to return if and when they desire.

Adjournment

There being no further business before the committee, the fourth meeting of the STTC for the 2017 interim adjourned at 10:25 a.m.

Revised: September 20, 2017

TENTATIVE AGENDA
for the
FIFTH MEETING
of the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

September 25-26, 2017
Barbara Hubbard Room
Pan American Center
New Mexico State University
1810 East University Avenue
Las Cruces

Monday, September 25

9:00 a.m. **Call to Order and Introductions**
—Representative Candie G. Sweetser, Chair

9:10 a.m. **Welcome to New Mexico State University (NMSU)**
—Garrey Carruthers, President and Chancellor, NMSU

9:30 a.m. (1) **Information Technology Projects Update and Developing Issues**
—Darryl Ackley, Secretary, Department of Information Technology (DOIT)

11:00 a.m. (2) **Update on Installation of the ONGARD System**
—Darryl Ackley, Secretary, DOIT
—John Monforte, Acting Secretary, Taxation and Revenue Department
—George Rosenbaum, Executive Director, Royalty Management, Information and ONGARD Replacement, State Land Office
—Joe Montano, Chief Information Officer, Energy, Minerals and Natural Resources Department

12:00 noon **Lunch**

1:00 p.m. (3) **Arrowhead Center: Business Acceleration/Incubation, Entrepreneurship and Technology Commercialization**
—Kathryn Hansen, Director, Arrowhead Center, NMSU

2:00 p.m. (4) **Next Generation Entrepreneurs: Critical Issues and Pathways to Business Creation**
A. Kool Armor LLC
—Carlos Murguia, Master's Student in Industrial Engineering, NMSU
B. AEGorsuch Designs LLC
—Alex Gorsuch, Master's Student in Industrial Engineering, NMSU

C. Torch Bearer Ltd. Co.
—Avinash Kuna, Master's in Computer Science, NMSU
—Alexis Cornidez, Undergraduate in Civil Engineering, NMSU
D. Supernova Communications LLC
—Patrick Hemp, Alum, Business Information Systems, NMSU
E. Backyard Farms LLC
—Rachael Ryan, Ph.D. Student in Biology, NMSU
F. Revolv Tech LLC
—Taylor Burgett, Ph.D. Student in Electrical Engineering, NMSU

3:00 p.m. (5) **From "Eureka" to the Market — Commercialization of Inventions at NMSU**

A. Bigtooth Maple Tree Variety
—Dr. Rolston St. Hilaire, Department Head, Plant and Environmental Sciences, College of Agriculture, Consumer and Environmental Sciences, NMSU
B. Novel System for the Biocontrol of Disease-Transmitting Mosquitos
—Dr. Jiannong (John) Xu, Associate Professor of Genomics, Department of Biology, College of Arts and Sciences, NMSU
C. Protocol for Lightweight and Secure Communications in Constrained Devices
—Dr. Satyajayant (Jay) Misra, Associate Professor of Computer Science, College of Arts and Sciences, NMSU

4:00 p.m. **Recess**

Tuesday, September 26

9:00 a.m. **Reconvene**
—Representative Candie G. Sweetser, Chair

9:05 a.m. **Approval of Minutes**

9:10 a.m. (6) **CenturyLink Cybersecurity and Connect America Fund Phase II**
—Katherine Martinez, Director, Legislative Affairs, CenturyLink

10:00 a.m. (7) **Moving New Mexico Toward 100% Clean Renewable Energy**
—Tom Solomon, Co-Coordinator, 350 New Mexico

11:00 a.m. (8) **Integrated Resources Planning — Transforming to a New Energy Balance for New Mexico**
—Sayuri Yamada, Director of Government Affairs, Public Service Company of New Mexico (PNM)
—Matthew Jaramillo, Federal and State Government Affairs, PNM

12:00 noon **Adjourn**

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

September 25-26, 2017
Barbara Hubbard Room
Pan American Center
New Mexico State University
Las Cruces

The fifth meeting of the Science, Technology and Telecommunications Committee (STTC) was called to order by Representative Candie G. Sweetser, chair, on September 25, 2017 at 9:12 a.m. at the Barbara Hubbard Room in the Pan American Center on the campus of New Mexico State University (NMSU) in Las Cruces.

Present
Rep. Candie G. Sweetser, Chair
Sen. Michael Padilla, Vice Chair (9/25)
Sen. William F. Burt
Rep. Kelly K. Fajardo (9/25)
Rep. Jason C. Harper
Sen. Bill B. O'Neill
Rep. Debra M. Sariñana (9/25)
Rep. James E. Smith (9/25)
Sen. William P. Soules (9/25)

Absent
Rep. Daymon Ely
Sen. Mark Moores
Rep. Linda M. Trujillo
Rep. Monica Youngblood

Advisory Members
Sen. Craig W. Brandt
Rep. Stephanie Garcia Richard (9/25)
Sen. Ron Griggs
Rep. Bill McCamley
Sen. Mary Kay Papen
Rep. Debbie A. Rodella
Sen. Nancy Rodriguez
Sen. Jacob R. Candelaria
Sen. Carlos R. Cisneros
Sen. Richard C. Martinez
Sen. William H. Payne
Rep. Nick L. Salazar
Sen. Bill Tallman
Rep. Carl Trujillo
Sen. Peter Wirth

Guest Legislator
Rep. Nathan P. Small (9/26)

(Attendance dates are noted for members who did not attend both meeting days.)

Staff
Mark Edwards, Legislative Council Service (LCS)
Ralph Vincent, LCS
Sara Wiedmaier, LCS

Guests
The guest list is in the meeting file.

Handouts
Handouts and other written testimony are in the meeting file.

Monday, September 25

Welcome to NMSU
Dr. Garrey Carruthers, president and chancellor, NMSU, welcomed the committee to the "University of Yuccas". Dr. Carruthers highlighted some positive aspects of the university. He noted that freshman enrollment increased by 11.3% this fall, resulting in the largest freshman class in 17 years. NMSU also had the highest fall-to-spring retention rate in years, Dr. Carruthers said. He also noted that over the past year, the university raised $2 million more than in any previous year. Dr. Carruthers then listed some of the university's national accolades: recognition as a top-tier university for the fifth time by *U.S. News & World Report*; a number-one ranking by the National Science Foundation (NSF) for science and engineering activities for minority-serving institutions; and a number-two ranking by the Brookings Institution in providing students opportunities for social mobility.

Dr. Carruthers said that NMSU's "Pathways Program" increased from about 280 students to 753 students this year, and the goal is to reach 1,000 students by next year. This program aids students who struggled in high school by providing extra help through learning centers on campus and creates a pathway for community college students to transfer to NMSU after one to two years.

In response to questions, Dr. Carruthers explained that the Pathways Program may affect enrollment numbers in the large 100- and 200-level classes on the main campus by accepting credits for introductory level courses from branch and community colleges such as Dona Ana Community College. However, he said that NMSU views the program as an integrated system in which the overall goal is to help more students graduate from college. Concerning the reduction in the lottery scholarship program and its effect on enrollment at state universities, Dr. Carruthers stated that the Council of University Presidents is currently working on a proposal to uncouple lottery revenue and state scholarships. He said that lottery revenue in the state has stabilized and that revenue can only supplement 60% of tuition and fees. He suggested moving to a scaled incentive scholarship to encourage students to continue beyond their freshman and sophomore years. Under this proposal, a student would receive increased assistance each year as the student moves toward graduation. Dr. Carruthers also noted that there is a national trend that shows a

decline in the number of students pursuing careers in education and social work, so NMSU has hired a new dean of education in order to develop a new attitude toward those fields of study.

Regarding the Arrowhead Center at NMSU and its entrepreneurial program, Dr. Carruthers stated that the national laboratories are integral partners in the program and that Sandia National Laboratory offers a patent application process for students. He also mentioned the center's Studio G, which provides students and recent graduates with office space, business consulting and a wide variety of additional resources for entrepreneurs to launch their own businesses.

Introductions

Representative Sweetser then invited the committee members and staff to introduce themselves.

Information Technology Projects Update and Developing Issues

Darryl Ackley, secretary, Department of Information Technology (DoIT), and Maria Sanchez, general counsel, DoIT, delivered an overview of the DoIT and a status update on current projects, funding and issues within the department. Secretary Ackley began by describing the evolution of the role of the DoIT from providing information technology (IT) infrastructure support for other departments to its current role as the state's IT service provider and technical center of excellence. He listed the DoIT's goals in its role as a center of excellence as:

- providing more transparency and oversight of all IT projects of more than $100,000 and projects that involve new systems with a lot of data;
- providing more oversight of projects by approving funding in stages, creating a value-added process;
- collaborating with other agencies to make services more effective;
- modernizing and streamlining service delivery; and
- focusing on enterprise architecture for investment.

Secretary Ackley then highlighted some of the benefits of the department's online portal, which, in coordination with the Legislative Finance Committee (LFC) and the Department of Finance and Administration (DFA), provides stakeholders with quarterly updates on projects. The portal maps out the time line for projects; shows funding "gates" or benchmarks; and gives a "Top Ten" list of projects based on total project cost and the department's overall portfolio, which currently consists of 56 open projects totaling over $360 million. He noted that from fiscal year (FY) 2018 to FY 2019, the DoIT saw an increase in IT project funding requests and in the total amount requested. Secretary Ackley then updated the committee on the progress of the Statewide Human Resource, Accounting and Reporting Enterprise (SHARE) system upgrade project. Upgrades to the SHARE system include: increased standardization, engagement and collaboration between agencies; increased platform stability, security and resilience; better workforce reporting; an effective governance board; sustainable, congruent training methods; and increased DoIT team skills and business intelligence.

Secretary Ackley pointed out that the DoIT carried over a deficit of $5.6 million from FY 2016 but closed FY 2017 with no deficit or surplus. The DoIT was able to reduce $1.2 million in annual spending through updates, cuts in unnecessary payroll and more aggressive negotiation with telecommunications providers. He also noted that if projected costs are below allocated funds, the DoIT must return the excess funding to the federal government. Some other accomplishments discussed included the implementation of cloud storage to be less dependent on underlying technology; consolidation of IT governance to a single organization; the ability to train new chief information officers (CIOs) of agencies with the creation of IT account liaisons; and overall improvement in oversight of IT projects throughout state agencies through implementation of the Project Management Center of Excellence.

Next, Secretary Ackley listed the effects expected from enactment of House Bill (HB) 113 from the 2017 regular session, including expansion of geospatial initiatives, telehealth initiatives and public safety broadband. Complementing HB 113 goals, Secretary Ackley said that the DoIT used a Federal Communications Commission (FCC) grant to implement "First Net", a program to change the public safety broadband network from analog signals to digital signals. He mentioned that the existing communication gaps for first responders are improving, but some communication is still analog. As Next Generation 911 and other data-driven systems become available, voice-based emergency calls will move to digitally based systems. He said that digitally based systems will allow large events, such as Zozobra in Santa Fe and the state fair in Albuquerque, to have a dedicated public safety network to further ensure communication.

Secretary Ackley then discussed a number of state IT initiatives. He said the Broadband for Education Initiative has a goal to provide one gigabyte per student by 2018, which is currently 99% complete. He said that the DoIT created a strategic plan that tied broadband initiatives from multiple agencies together, reducing the cost per megabyte from $15.00 to less than $6.00. He said that the DoIT is also implementing a consumption-based model that charges agencies telecommunication fees based on usage to further reduce costs.

Secretary Ackley said that the DoIT's future goals include:

- hiring a chief information security officer (CISO) — cybersecurity in the state is a major issue. Given the salary constraints and the market competition for CISOs, the DoIT has not been able to fill this position. It was noted that the median term for a state CISO is only 24 months, and some are as short as 18 months;
- becoming credit card compliant under Payment Card Industry (PCI) standards — the DoIT is working toward credit card security compliance to satisfy the requirements of the PCI standards, such as requiring all agencies to have increased levels of cybersecurity; and
- transitioning government agencies to a digital platform to improve transparency and analytics.

Responding to questions from committee members, Secretary Ackley said that the federal Intergovernmental Personnel Act of 1970 allows the national laboratories to provide a CISO for the DoIT, but this provision was only allowed for a couple of months because it was canceled by the federal government. He said that in order to attract a CISO to the position, the role of the CISO must be better defined. He also said that the department must look at expanding its internship program and should also look at collaborating with the National Guard of New Mexico on cybersecurity issues. He stated that he is currently working with other agency CIOs to implement the provisions of HB 113.

In response to inquiries about the SHARE system, Secretary Ackley stated that this platform allows more input from business owners and, therefore, better collaboration between business and technology operations. The system addresses issues of continued congruency under future administrations through a stabilized system, great staff and continuance of agency CIO training. Secretary Ackley noted that the department was able to eliminate its contingent liability.

In response to questions regarding IT project funding requests, Secretary Ackley outlined the process for new projects as follows.

1. An agency makes a request and provides information about the project, such as the goals, importance, risks, issues, alternatives and life cycles of IT, etc. A request must be submitted by September 1 of each year, along with the agency's annual budget request.

2. DoIT's Project Oversight and Compliance Group, DFA and LFC staff review the agency's business case, and the agency is provided a time to present the project to a committee, which is chaired by the CIO.

3. The DoIT, DFA and LFC consider the project proposal and make recommendations for possible funding.

4. Recommendations are provided to the House Appropriations and Finance Committee IT Subcommittee for consideration during the legislative session.

In response to questions by committee members, Secretary Ackley stated that his team is considering a public-private hybrid cloud service that will be based on agency classification. Regarding cybersecurity, Secretary Ackley said that the National Guard of New Mexico has a cybersecurity component. He said that Michigan might provide a good example of how to collaborate with a state's National Guard regarding cybersecurity issues. Secretary Ackley lastly noted that the DoIT provides broadband mapping on its website, but he admitted that it is difficult for the department to keep up with the changes.

Update on Installation of the ONGARD System

Secretary Ackley provided the committee with a brief history, overview and proposed trajectory of the Oil and Natural Gas Administration and Revenue Database (ONGARD), as well as an update on the ONGARD modernization and replacement project. He said that the ONGARD System Development Act created a joint powers agreement between the State Land Office (SLO), the Taxation and Revenue Department (TRD) and the Energy, Minerals and Natural Resources Department's (EMNRD's) Oil Conservation Division (OCD). ONGARD is a relational database system that supports collection and distribution of oil and gas revenues and is available on the DoIT site mainframe. The system is currently stable, but it is not modernized for business needs. ONGARD relies on antiquated technology such as the COBOL development language. He stated that the agencies have a strategic roadmap to modernize the system, but there is not enough funding to accomplish it. Funds intended for modernization in 2011 were instead allocated to system stabilization and upgrades, and the one-time funding allocated in 2015 proved to be ineffective. In 2015, the agencies involved began exploring an alternative option that uses three modular systems working in a federated approach.

John Monforte, acting secretary, TRD, George Rosenbaum, executive director, Royalty Management, Information and ONGARD Replacement, SLO, and Joe Montano, CIO, EMNRD, elaborated on the status of the ONGARD modernization and replacement project.

Secretary Monforte began by noting that the system has collected and distributed over $26 billion throughout its 23-year life. The taxes collected by the state that are related to the ONGARD system represent about 33% of the state's revenue. He described the current ONGARD platform as a single, monolithic system that can be split into three functions: permitting and reporting; severance tax collection and distribution; and royalty administration. He then outlined a workflow for a federated ONGARD system as follows:

1. a unit of land will enter the EMNRD OCD module for well initiation, well completion and initiation of volume reporting;
2. extractions will be reported to the TRD module for the volume-based severance tax collection and distribution; and
3. the land will be tracked by the SLO module for the volume-based royalty collection and distribution.

The panelists said that the TRD's severance tax module project has a budget of $6.8 million. The schedule, budget and scope of the project are all on target for completion by June 30, 2018. The SLO's royalty administration module project is estimated to cost $10 million, with a time line of 30 months to 36 months. To continue ONGARD service until these projects are finished, the SLO and the ONGARD service center are adapting the system to sustain it. DoIT staff will continue to work closely with the ONGARD system management team to address implementation issues.

Responding to questions, panelists explained that permits, staffing and conservation data are not within the scope of this project. However, that information is available on the OCD's website. It would be difficult to license the new ONGARD platform to other states because the method used in New Mexico to handle the tracking and taxing of the land royalties and extractions is customized to the state's tax system and distribution of land jurisdiction. Responding to a question about the collaboration between the individual entities of the system, the panel noted that each agency is a separate component that provides data to ONGARD for data sharing and collaboration.

Approval of Minutes

On a motion by Representative Smith and seconded by Representative Sariñana, the minutes from the July and August STTC meetings were approved.

Roadrunner Internship Program

The committee then recognized an audience member, Uriel Munoz, director of governmental affairs, Associated Students of NMSU, for his work with the Roadrunner internship program. The program provides NMSU freshmen, sophomores and transfer students the opportunity to get acquainted with the processes of student government and encourages students to participate in all levels of government.

Arrowhead Center: Business Acceleration/Incubation, Entrepreneurship and Technology Commercialization

Kathryn Hansen, director, Arrowhead Center, NMSU, provided the committee with a snapshot of the Arrowhead Center. She said that the purposes of the center are to promote entrepreneurship and innovation, to create economic opportunity, to provide students with client-based learning opportunities and to accelerate students' knowledge of economic development and the growing demands of the business world. She said that the Arrowhead Center has four focus areas:

1. business creation and growth;
2. education and training;
3. intellectual property (IP) commercialization; and
4. development of public-private partnerships.

Ms. Hansen said that NMSU is building a statewide innovation network that currently includes K-12 education entrepreneurship programs, business assistance, business incubation, workshops and economic studies. Ms. Hansen listed LAUNCH, Aggie I-Corps and Sprints as separate programs offered by the Arrowhead Center for business acceleration. She said that these programs are short-term programs that assist business start-ups in assessing the viability of their product based on customer feedback. These programs provide funding and team support and are seen as a pipeline to commercialization by generating market interest in IP developed at NMSU.

For longer-term business incubation, Ms. Hansen said that the center has three programs, Studio G, the Arrowhead Tech Incubator and Arrowhead Ventures, which provide new companies with funding, business mentoring and technical guidance. She said that funding sources for new companies include state and federal agencies, private investors and donors, the national laboratories in New Mexico and the Arrowhead Innovation Fund. Additionally, Ms. Hansen said that the Arrowhead Center provides companies with evaluations using an array of over 100 performance metrics to improve a company's chances of success.

Responding to questions from the committee, Ms. Hansen outlined the benefits and assistance provided through the Arrowhead Center for start-up companies. Depending on the location and needs of the company, the center provides workshops for incubation and acceleration, collaboration between start-ups, networking events, business mentorship, assistance with capital sourcing and customer acquisition and work-ready spaces. She also said that the center collaborates with the New Mexico District Office of the United States Small Business Administration in small business incubation research. She also noted that Innoventure, a core program within the Arrowhead Center, has been very successful at helping elementary, middle and high school students across the state with product design and marketing and at encouraging young entrepreneurs to think critically about the full pathway from invention to commercialization.

Next Generation Entrepreneurs: Critical Issues and Pathways to Business Creation

Students and alumni from NMSU described their individual businesses and the value of the Arrowhead Center.

Carlos Murguia, a master's student in industrial engineering and founder of Kool Armor LLC, described his innovative clothing material. He said that the material provides thermal insulation of at least 36 degrees. He credited the success of his company to the Arrowhead Center's LAUNCH program, which enabled him to receive an NSF grant and a Mexican invention voucher.

Alex Gorsuch, a master's student in industrial engineering and founder of AEGorsuch Designs LLC, described his field test kit that allows researchers to take the laboratory to the field, expediting and simplifying testing in a variety of pursuits, including agriculture, medicine and defense. As an example, he said that his field test kit could provide a substantial cost- and time-saving advantage in tackling the backlog of rape evidence kits around the country. He said that traditional testing costs $1,000 and requires at least one week per kit, whereas his product would provide immediate results at a cost of $0.28 per kit. He cited Aggie I-Corps as key to the success of his business. Aggie I-Corps, a component of the NSF I-Corps program, provides direct support for student-faculty-business mentor teams to move NSF-related technologies to market. Mr. Gorsuch currently employs one part-time employee and 15 interns.

Avinash Kuna, a master's student in computer science, and Alexis Cornidez, a civil engineering student, are the founders of Torch Bearer Limited. They described their software

development and digital marketing start-up as a one-stop shop for all web needs. Torch Bearer Limited provides multiple services, including mobile application development, website development, desktop application development, cloud applications and business model design. They also mentioned a campus organization that they recently started called the Preneur Club that allows students to discuss entrepreneurship. Mr. Cornidez said that they had contemplated establishing the company in a large, out-of-state market, but they had decided that, as a locally grown company, it was important to stay in Las Cruces and develop the local economy.

Patrick Hemp, an NMSU alumnus with a degree in business information systems and founder of Supernova Communications LLC, described his start-up wireless internet service provider. Supernova Communications currently provides service in neighborhoods near NMSU to test its business model. Mr. Hemp said that the company intends to spread service to neighborhoods across southern New Mexico. Mr. Hemp credited his initial success to the Arrowhead Center and the funding provided through Studio G. He expressed the desire to operate locally and create more technology jobs in the area as his service coverage expands. Currently, his company consists of himself and two unpaid interns. He also stated that a major benefit of being a part of the Arrowhead Center is networking with other entrepreneurs.

Rachael Ryan, a doctoral student in biology and founder of Backyard Farms LLC, described her start-up company, which cultures snails for the escargot market. She said that Backyard Farms currently maintains a herd of 400 snails. She said that the Arrowhead Center and a small business innovation research grant were crucial factors in expanding the company to an aquaponic system. She said that a challenge for Backyard Farms LLC is that aquaponic production is regulated and taxed as a manufacturing, rather than as an agricultural, enterprise.

Responding to questions from the committee, Ms. Ryan said that she has been in contact with the former New Mexico Shrimp Company to learn why that start-up venture failed. She believes her company will be more viable because snails are less sensitive to environmental factors than shrimp and because the Arrowhead Center provides support for targeted market research and consulting. She also noted that, while Backyard Farms LLC is taxed as a manufacturer, snail production is regulated by the New Mexico Department of Agriculture.

Committee members noted that workforce challenges sometimes lead start-up businesses to leave the state as they grow. Commenting on that issue, the panelists said that it is imperative not just to provide resources to small business start-ups but to advertise these resources and make them highly accessible to entrepreneurs. The panel also asked for help in attracting a labor force by providing incentives for graduates to stay in the state for work. They indicated that new college graduates are often attracted to the combination of social and career opportunities in larger markets, and they suggested using public-private partnerships to develop downtown Las Cruces as a social and technological hub. Also, most of the panelists stated that they would be willing to enter into partnerships with the state for financial assistance.

From "Eureka" to the Market — Commercialization of Inventions at NMSU

Faculty from NMSU discussed their research and commercialization initiatives before the committee. Dr. Rolston St. Hilaire, department head, Plant and Environmental Sciences, College of Agriculture, Consumer and Environmental Sciences, NMSU, described the process behind developing a new ornamental landscape tree to bring to market. He said that the process began with more than 15 years of research on indigenous maple species and the maples' environmental stressors and then screening seedlings from different locations to select the most drought- and salt-tolerant species. The result was the Mesa Glow, a bigtooth maple tree with a deep red color in the fall. Once Dr. St. Hilaire and his team had developed the tree, they partnered with an Oregon-based wholesale nursery for commercial production and licensing. Dr. St. Hilaire said that in the last two years, 700 trees have been produced and demand has, thus far, exceeded supply.

Dr. Jiannong (John) Xu, associate professor of genomics, Department of Biology, College of Arts and Sciences, NMSU, described his research and the commercialization of a method of "Biocontrol of Disease-Transmitting Mosquitos". He said the research goal had been to develop an all-natural biocontrol strategy to address two problems: insecticide-resistant mosquitoes; and general environmental concerns about chemical insecticides. Dr. Xu's system uses symbiotic bacteria to deliver anti-pathogen and anti-mosquito agents into vector mosquitoes. It is currently in the "patent pending" stage, and his team has entered into a collaborative research agreement with Pebble Labs to fund continuing research and licensing.

Dr. Satyajayant (Jay) Misra, associate professor of computer science, College of Arts and Sciences, NMSU, discussed the commercialization path for his "Protocol for Lightweight and Secure Communications in Constrained Devices". His research goal is to improve internet security by making encryption faster, more computationally efficient and scalable across constrained devices and by requiring less energy consumption. He listed the New Mexico Small Business Assistance Program, an NSF small business innovation research grant and the Arrowhead Center's LAUNCH program as critical resources for commercialization of his product.

Responding to questions from the committee, the panelists acknowledged that getting to market requires being business savvy and that partnerships with commercial institutions through the Arrowhead Center allow a broader reach for research applicability and provide a direct link to commercial industry. They also highlighted the importance of interdisciplinary teams for patent protection, marketing and the different stages of commercialization.

Responding to a question regarding the impact of increasing average annual temperatures on his product, Dr. St. Hilaire explained that while some tree species lose drought resiliency with higher temperatures, the Mesa Glow is resilient in a wide variety of western latitudes. He also mentioned that Mesa Glow was tested to ensure that it will not become invasive like the Russian olive trees, which have taken over much of New Mexico's natural bosques.

Recess

The committee recessed at 3:35 p.m.

Tuesday, September 26

Reconvene

Representative Sweetser reconvened the meeting at 9:07 a.m.

CenturyLink Cybersecurity and Connect America Fund Phase II

Katherine Martinez, director, legislative affairs, CenturyLink, presented the committee with an update on CenturyLink cybersecurity and the second phase of the federal Connect America Fund (CAF-II). Ms. Martinez highlighted some concerns surrounding cybersecurity and the importance of clearly defining an approach to cybersecurity through policy. She mentioned that hacking is an increasingly prominent risk, noting the recent political attacks, the surge in "hacktivists" and the risk to IP. She stated that hackers are costing consumers and companies about $400 billion annually. She described hacking as a highly lucrative field in which the criminals are rarely caught. She noted that the website informationisbeautiful.com is a useful tool to track breaches. She also noted that New Mexico was one of the last states to pass a data breach notification act but did pass House Bill 15 during the 2017 regular session. She suggested that the state consider allocating funds for cyber resilience. Cyber resilience is an evolving perspective that brings the areas of information security, business continuity and organizational resilience together, allowing an organization to continuously deliver services despite adverse cyber events. Ms. Martinez also recommended that the state hire a CISO to oversee cybersecurity concerns for the state.

Ms. Martinez emphasized the importance of looking at the whole "ecosystem" behind cyber attacks by looking at the third-party software and other partners for potential breaches and not just looking at the internet service provider (ISP). She also advised the committee to consider future partners to help deal with the aftermath of an attack, as rapid response is crucial. She acknowledged that a major focus for CenturyLink is to work with its customers to learn how to best protect against attack rather than just respond after an attack. Ms. Martinez cited the cybersecurity framework endorsed by National Institute of Standards and Technology as a successful model for other states. She also stated that her company went from handling 20% of the world's internet traffic to handling over 50% after merging with Level 3.

Next, Ms. Martinez provided an update on CenturyLink's broadband initiatives. From 2011 to 2016, CenturyLink upgraded broadband capabilities to 25 megabit download speeds for more than 265,000 subscribers in New Mexico, a number that compares on a population basis to other rural states. She addressed CenturyLink's concern that the $5 million of annual funding to the State Rural Universal Service Fund established by Senate Bill (SB) 308 from the 2017 legislative session is less than other states are investing. The targets for use of the fund are underserved areas where the broadband services offered do not meet the established minimum speed requirements. SB 308 does have reporting requirements that will allow for a review of the

efficacy of the fund, Ms. Martinez said. The Public Regulation Commission establishes rules for broadband service.

The CAF-II areas are mainly located in the far western and far eastern regions of New Mexico and are defined by the FCC, not CenturyLink, Ms. Martinez noted. Under the CAF-II, $11 million was allocated to service providers to expand broadband services in New Mexico. She noted that CenturyLink has upgraded 40% of its subscribers, including 10,500 living units and businesses, with download speeds of 10 megabits and uploads speeds of one megabit. She acknowledged that the last legislative session was very productive in advancing broadband access across the state through legislation that provides for keeping trenches open during road construction to allow for CenturyLink and other ISPs to lay wire, which cuts costs for the company and allows more resources for expanding coverage. For the upcoming legislative session, she suggested establishing a broadband tax deduction, noting that it is working in other states.

In response to questions from the committee, Ms. Martinez stated that CenturyLink is working to form partnerships with state universities like the New Mexico Institute of Mining and Technology and NMSU to improve statewide cybersecurity. She elaborated on the legislation that amended the Local Economic Development Act to allow ISPs to avoid conflicts with the Anti-Donation Clause of the Constitution of New Mexico when combining public road work and private infrastructure by simply requiring road construction crews to leave trenches open for conduit and fiber placing.

This "open trench" policy ultimately reduces the cost to the ISP of laying fiber by nearly one-half, and it allows the entities to work together for better broadband coverage. In response to a discussion about a broadband tax deduction, Ms. Martinez stated that a more realistic goal within the state's current tax structure is to have low tax rates and broad-based tax liability. When asked if the goals for download and upload speeds are adequate, Ms. Martinez stated that they are, based on the FCC standards for the CAF-II. The standards were incorporated in the bill language during the last regular legislative session and mainly target households rather than businesses. The new CAF-II requirements are increasing to 25 megabit download speeds and three megabit upload speeds. She said that Google fiber gigabit technology is unnecessary for the average user. She noted that ransomware concerns are encompassed in the current policy.

Moving New Mexico Toward 100% Clean, Renewable Energy

Tom Solomon, co-coordinator, 350 New Mexico, outlined the mission and concerns of the nonprofit organization, which is named after 350 parts per million (ppm), the threshold for a safe concentration of carbon dioxide in the atmosphere. He described 350.org as an international group devoted to slowing, stopping and reversing climate change to prevent catastrophic weather events. Mr. Solomon noted that the current renewable portfolio standard (RPS) for New Mexico has set a goal of reaching 20% renewable energy production by 2020, and Mr. Solomon stressed that the RPS should be extended. He stated that there will be no impact on oil jobs or oil revenue in the shift to clean electric power sources because oil is not used in New Mexico to generate

electricity. He also cited a poll by Pew Research Center that shows that 86% of adults surveyed support expanding the use of solar and wind energy.

Mr. Solomon stated that over the last 800,000 years, carbon dioxide has risen two ppm per year. He cited a study by Dr. Charles Keeling that predicts an increase in atmospheric carbon dioxide to 450 ppm by 2035, which would result in a two-degree Celsius warming. He said that each of the past three years has set a new record for global peak temperature and that 2017 is predicted to follow this trend. Recently, 195 countries signed the Paris Climate Accord and committed to reduce emissions to avoid the 450 ppm level. Mr. Solomon attributed a worldwide increase in wildfires, drought, massive hurricanes and famine to global climate change. He listed a number of negative predictions relating to the changing climate, including: a famine crisis reaching 60% of the world's population by 2060; the extinction of 90% of the world's coral reefs; and an increase in the sea level of three meters.

Mr. Solomon stated that the top priority of 350 New Mexico is renewable electricity. He said that the burning of coal and natural gas for electric energy production is the largest source of carbon dioxide emissions nationally, followed by carbon dioxide emissions from transportation. Since the early 2000s, the annual share of U.S. electricity production from coal has declined and is being replaced by natural gas and renewable energy. In New Mexico, 63% of electricity is generated by coal, 28% by natural gas and about 9% by renewable sources. He encouraged enacting legislation similar to SB 312 from the 2017 regular session to amend the Renewable Energy Act in order to extend the RPS requirements beyond 2020 and increase the requirement for renewable energy by 3% per year, reaching 50% by 2030 and approaching 100% by 2050. He noted that the Renewable Energy Act made New Mexico a national leader for renewable energy, but, now, 10 states have standards that are significantly higher than New Mexico's. He emphasized the opportunity for New Mexico to capitalize on its natural advantages in solar and wind energy to reclaim this leadership role. He said that the state's goal should be to increase its energy portfolio to 50% wind, 40% solar and 10% geothermal, based on recommendations from The Solutions Project at Stanford University.

In order to reach the proposed RPS requirements, New Mexico would have to install an average of 200 megawatts per year from 2021 to 2050. He stated that this proposal would cost $178 million per year, which amounts to 9% of the state's electricity revenue and would pay for itself in roughly 10 years. He also emphasized the significant cost reduction in both wind and solar power production over the past seven years, stating that costs have dropped 66% and 85%, respectively. He stated that New Mexico currently has 2,929 jobs in the solar industry, reflecting a 54% growth rate in 2016 alone. By extending the RPS, New Mexico will need to add at least 1,000 new solar jobs by 2021. Lastly, Mr. Solomon mentioned that New Mexico is one of only three states that lacks wind turbine manufacturing.

In response to questions, Mr. Solomon stated that there is little room for error or interpretation in the studies relating to increasing carbon dioxide levels. He said that 97% of climate scientists agree and 99.9% of climate papers support the theory that human-caused

climate warming is happening now. When asked about the impact on communities in New Mexico that depend on coal, Mr. Solomon noted that regardless of changing the RPS, coal plants are closing nationwide because coal is being out-competed by natural gas, and coal jobs have been declining for decades. He said that despite not having adequate storage capabilities to utilize stored solar energy for nighttime needs, wind is always blowing somewhere in the country and can offset that demand. He also noted that there are currently great advances happening in "grid-scale" battery research by Tesla, Inc.

Integrated Resources Planning — Transforming to a New Energy Balance for New Mexico

Sayuri Yamada, director of government affairs, Public Service Company of New Mexico (PNM), Carlos Lucero, government affairs, PNM, and Matthew Jaramillo, federal and state government affairs, PNM, discussed the plans for PNM as it celebrates its one-hundredth year of business. Ms. Yamada said that by 2022, PNM will close its remaining two coal plants operating in San Juan County. She said that the company is working with representatives from Farmington to ease the transition. She mentioned that the company has donated $750,000 to 62 nonprofit organizations, such as Luna County solar projects, Santa Fe STEM programs and the Adelante Development Center, to assist the labor force transition to other energy-related jobs. Ms. Yamada described the current time as the "energy tipping point" between traditional and sustainable energy sources. She acknowledged that this transition must be tackled at the local, state and private levels and that PNM is committed to protecting the environment for future generations.

In response to questions, the panel stated that PNM has put forth an Integrated Resource Plan for 2017 that outlines the transition from coal to renewable energy and natural gas. The investments in new infrastructure will translate to costs to the consumer, so PNM is seeking to balance affordability and sustainability. Although New Mexico is geographically ideal for nuclear energy generation, PNM does not see it as a necessary investment. The base load need is already being met by the Palo Verde Generating Plant in Arizona, and the baseload need in New Mexico has also declined due to declining population, technology advancements and the 2007 Efficiency Program Rebate. The panel members noted that there are several wind companies already in New Mexico, but these companies are generating energy to be exported to other states such as Arizona and California. They stated that PNM no longer buys excess energy from homeowners that invest in solar panels for their homes.

Adjournment

There being no further business before the committee, the committee adjourned at 12:10 p.m.

Revised: November 2, 2017

TENTATIVE AGENDA
for the
SIXTH MEETING
of the
SCIENCE, TECHNOLOGY AND TELECOMMUNICATIONS COMMITTEE

November 8, 2017
State Capitol, Room 307
Santa Fe

Wednesday, November 8

10:00 a.m.		**Call to Order/Introductions** —Representative Candie G. Sweetser, Chair
10:10 a.m.		**Approval of Minutes**
10:15 a.m.	(1)	**Sandia National Laboratories (SNL) Update** —Dr. Stephen Younger, Laboratory Director, SNL
11:15 a.m.	(2)	**Secretary of State's Update Regarding the Campaign Finance Information System** —Maggie Toulouse Oliver, Secretary of State
12:15 p.m.		**Lunch**
1:30 p.m.	(3)	**Small Cell Technology and the Wireless Consumer Advanced Infrastructure Investment Act** —Terri Nikole Baca, Director of External Affairs, AT&T —De O'Roark, Associate General Counsel, Verizon
2:30 p.m.	(4)	**Los Alamos National Laboratory (LANL) Update** —Terry Wallace, Principal Associate Director for Global Security, LANL
3:30 p.m.	(5)	**Virgin Galactic Space Flight Operations Status Update** —Richard DalBello, Vice President, Business Development and Government Affairs, Virgin Galactic
4:30 p.m.		**Adjourn**

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

November 8, 2017
State Capitol, Room 307
Santa Fe

The sixth meeting of the Science, Technology and Telecommunications Committee was called to order by Representative Candie G. Sweetser, chair, on November 8, 2017 at 10:05 a.m. in Room 307 of the State Capitol in Santa Fe.

Present
Rep. Candie G. Sweetser, Chair
Sen. Michael Padilla, Vice Chair
Rep. Kelly K. Fajardo
Rep. Jason C. Harper
Sen. Mark Moores
Rep. James E. Smith
Rep. Linda M. Trujillo

Absent
Sen. William F. Burt
Rep. Daymon Ely
Sen. Bill B. O'Neill
Rep. Debra M. Sariñana
Sen. William P. Soules
Rep. Monica Youngblood

Advisory Members
Sen. Craig W. Brandt
Sen. Carlos R. Cisneros
Rep. Stephanie Garcia Richard
Rep. Bill McCamley
Sen. Mary Kay Papen
Rep. Debbie A. Rodella
Sen. Nancy Rodriguez
Rep. Nick L. Salazar
Sen. Bill Tallman
Rep. Carl Trujillo

Sen. Jacob R. Candelaria
Sen. Ron Griggs
Sen. Richard C. Martinez
Sen. William H. Payne
Sen. Peter Wirth

Guest Legislator
Sen. Howie C. Morales

Minutes Approval

Because the committee will not meet again this year, the minutes for this meeting have not been officially approved by the committee.

Staff
Mark Edwards, Legislative Council Service (LCS)
Ralph Vincent, LCS
Maria Alaena Romero, LCS

Guests
The guest list is in the meeting file.

Handouts
Handouts and other written testimony are in the meeting file.

Wednesday, November 8

Call to Order
Representative Sweetser called the meeting to order and invited committee members and staff to introduce themselves.

Sandia National Laboratories (SNL) Update
Dr. Stephen Younger, laboratory director, SNL, described the makeup and mission of SNL. SNL's $3.17 billion budget supports five major program portfolios: 1) energy and homeland security; 2) advanced science and technology; 3) nuclear deterrence; 4) defense nuclear nonproliferation; and 5) national security. These programs include a total workforce of 12,258, with 10,941 in Albuquerque and the Waste Isolation Pilot Plant in Carlsbad. The remaining 1,317 employees are mostly in Livermore, California, with small numbers in Tonopah, Nevada; Amarillo, Texas; and Kauai, Hawaii. Forty-nine percent of the staff are classified as technical research; 33 percent are operations support; and the remainder are management and students.

The mission of SNL is to develop advanced technologies to ensure global peace, and SNL has met national security challenges through the decades since the arms race in the 1950s. The National Technology and Engineering Solutions of Sandia, LLC, management team took over operations of SNL on May 1, 2017.

All five major programs at SNL include an emphasis on cybersecurity. This includes deterrence, protection and preemptive measures to ensure that the future is safe from cyber attacks. SNL's budget also covers a broad range of government and other work, with almost 51 percent concentrated on non-nuclear weapons, another 28 percent dedicated to U.S. Department of Defense projects, 7.6 percent for other U.S. Department of Energy projects, 6.4 percent dedicated to nonproliferation projects and seven percent for other types of projects.

SNL contributes to the New Mexico economy in several significant ways:

- by attracting professionals to the state;
- by procurements of goods and services;

- with transfer of technology programs;
- by creating partnerships with New Mexico universities; and
- with a large payroll and pension plan.

Other important facts provided by Dr. Younger were:

- 38 percent of SNL employees hold a higher education degree from a New Mexico school;
- the average salary for regular employees is $100,424;
- the pension program is in excellent shape and provides more than $180 million annually to New Mexico residents;
- purchases from New Mexico businesses total over $395 million;
- New Mexico small businesses represent 66 percent of all SNL suppliers;
- SNL paid over $80 million in gross receipts and corporate taxes to the state in fiscal year 2016; and
- diversity and inclusion are integral to SNL's strategy; minority and female representation is increasing, and the laboratory has programs to continue this increase.

Dr. Younger also discussed the New Mexico Small Business Assistance Program that is in partnership with the state to bring SNL's expertise to small companies statewide. In 2016, SNL provided $2.4 million in assistance to 198 small businesses in 19 counties around the state.

Dr. Younger also talked about partnerships with New Mexico universities. SNL is involved in $4.3 million of collaborative research projects with New Mexico State University (NMSU), the New Mexico Institute of Mining and Technology (NM Tech) and the University of New Mexico (UNM). SNL is also working on a five-year tactical plan that includes more collaboration with the universities.

Questions from the Committee

Responding to questions from committee members regarding the impacts of SNL on New Mexico, Dr. Younger reiterated SNL's collaboration efforts with small businesses and technology transfer projects with universities. New Mexico businesses receive a five percent advantage when bidding on any procurement, but these go through the "national supply chain" set up by federal departments. New Mexico has been a good and friendly host of SNL, and the result has been to raise the economic status of the state. On the issue of collaboration with universities, Dr. Younger cited work with NM Tech, the U.S. Department of Homeland Security and SNL on a project in Playas, New Mexico, and the work with NM Tech and UNM on cybersecurity issues. Dr. Younger noted that SNL's first priority is work on laboratory projects, but its second priority is collaboration on research in these other areas.

Education and the creation of a viable workforce was another topic of interest. While education challenges are sometimes discussed as a hindrance to the viability of New Mexico's workforce, Dr. Younger believes that the state has made progress with various science,

technology, engineering and mathematics (STEM) education projects. SNL employs around 4,000 alumni of New Mexico's colleges and universities.

Dr. Younger stated that he was "bullish" on SNL because of its tremendous capabilities. He stated that job satisfaction, work/life balance and the work environment are important factors in hiring and keeping a qualified workforce. He also stated that the Congressional Budget Office plans to spend $1.2 trillion over the next 30 years on nuclear deterrence and that SNL is key to this effort.

Secretary of State's Update on Campaign Finance Information System

Maggie Toulose Oliver, secretary of state, briefed the committee on the status of technology projects within the Office of the Secretary of State (SOS). The information technology group at the SOS completed the business filing modernization project in June 2016 with a total cost of $1.27 million. The information technology group at the SOS expects the new election system to be operational in December 2017. Total cost on this project was $1.9 million. This system includes improved election results delivery and streamlined ballot creation. The group is also close to final implementation of an online voter registration system that provides convenient access to create and update voter records and integrates with the Motor Vehicle Division of the Taxation and Revenue Department system.

As for the New Mexico Campaign Finance Information System, Secretary Toulouse Oliver described the background and provided alternatives for a path forward. House Bill (HB) 105, passed during the 2016 regular legislative session, focused on greater transparency and more reporting capabilities of campaign finance data. The SOS does not have the resources available to develop or purchase a system to be in compliance with the requirements of HB 105. It has sought funding for this project since 2016 and has submitted a C-2 request for the upcoming legislative session in the amount of $985,000. The SOS is proposing a collaboration with MapLight on a development project to build a system using the New Mexico specifications. The resulting system could then be used by other states with similar requirements. The SOS is hoping to secure additional funding to offset the full cost of development.

Questions from the Committee

Committee members asked questions to clarify the SOS plans for the campaign finance information system. Secretary Toulouse Oliver and Kari Fresquez, elections director and chief information officer, SOS, stated that the SOS would be using the current systems if new funding is not received. The SOS has submitted a C-2 request for the project and also has included the software as part of a capital outlay request. After receiving funding, the SOS will develop a plan based on the amount available. To date, the SOS has investigated the following three ways of satisfying the requirements of HB 105: 1) in-house development starting with the current system; 2) a commercial off-the-shelf solution; and 3) collaboration with MapLight to develop a full-function system. If the SOS collaborates with MapLight, the system would be developed as an open-source solution, and the SOS would take control and manage its own copy of the solution.

There was further discussion regarding Senate Bill (SB) 96, which passed during the 2017 regular session. SB 96 was vetoed by the governor, but many of the requirements were subsequently implemented by SOS rule.

Small Cell Technology and the Wireless Consumer Advanced Infrastructure Investment Act

Representative Smith and Senator Candace Gould joined a panel with Terri Nikole Baca, director of external affairs, AT&T, and De O'Roark, associate general counsel, Verizon. The panel briefed the committee on the emergence of small cell technology and discussed the legislative needs for this new technology. Small cell technology involves low-powered cellular radio access nodes as a way of pushing 5G technology out in metropolitan areas. Wireless providers typically use small cell technology by locating these small wireless nodes in the public right-of-way areas on existing utility poles. The panel urged passage of legislation to establish the requirements for local authorities to establish rates, fees and terms for collocation of these small wireless nodes in the public rights of way.

Thirteen bills have already been passed by legislatures, including in the neighboring states of Texas, Colorado and Arizona. The key components of this legislation include rules regarding rights of way, reasonable costs and a streamlined administrative process. The example legislation is included in the committee folder.

Ed Mahr, registered lobbyist for T-Mobile Wireless, stressed the need for serious consideration of this legislation during the upcoming session. The wireless providers are working with the New Mexico Municipal League to develop legislation.

Questions from the Committee

The panel was asked to further describe the technology and its impact. The panel explained that the new 5G technology will provide the answer to growing data needs because it is up to 100 times faster and can connect 100 times as many devices as current 4G technology. The technology could be implemented in urban areas with populations greater than 10,000. In New Mexico, the wireless providers are targeting Albuquerque, Rio Rancho, Santa Fe, Farmington, Las Cruces and Hobbs. The small cell nodes use an assigned frequency that is specific to a provider, and each node is connected to a backhaul provider similar to the macro network configuration. The small cell nodes could be concentrated in high-use areas to increase load capacities. Damian Doncker, director of engineering, AT&T, explained that a fiber-based backhaul is still necessary to transport data back to the network, and the decision on how to connect it is the purview of each provider.

The panel answered questions related to rural versus urban infrastructure by stating that there are significant build-out investments in areas with low population densities. Investment decisions are based on the demands and coverage in each area. Panel members said that a service provider's choice to invest in macro or micro technologies must fit within its business accounting model.

Questions were asked about the other stakeholders, such as rural telephone companies and cable companies, as well as the involvement of the Federal Communications Commission (FCC). Proposed language has been sent to all identified stakeholders, and comments and inputs have been incorporated. The FCC may adopt high-level administrative rules, but the states will still need to provide the regulations. Municipalities may adopt home rule policies, and the providers will have to deal with local codes and/or laws.

A comparison was drawn with the development of the railroad network and the eventual regulation at the federal level to prevent exorbitant rates and administrative policies. While the proposed language does include maximum rates to be charged, there were questions regarding sufficiency. The rates being proposed are comparable to other states.

Los Alamos National Laboratory (LANL) Update

Terry C. Wallace, Jr., principal associate director for global security, LANL, provided the committee with an update on the status of operations at LANL. The laboratory was established in 1943 and currently has a workforce of 11,804, with 7,653 being LANL career employees. The other 4,151 are contractors, students, term associates and craft employees. Based on LANL's five-year projections and attrition models, as much as 32 percent of the current workforce will retire or leave by 2022. LANL's annual budget is about $2.5 billion, and about 77 percent of the budget comes from the National Nuclear Security Administration (NNSA). The remainder is derived from the U.S. Department of Energy and other strategic partnerships.

LANL is the largest employer in northern New Mexico and has a commitment to being a good neighbor in a close-knit regional community. Under its Community Commitment Plan, LANL has invested $35 million since 2006 in the areas of STEM education, economic development programs and support for community organizations. LANL also has a center to coordinate partnerships with industry and to help with licenses for technology innovations.

The primary mission of LANL is strategic deterrence, and it is responsible for about 80 percent of the nation's stockpile of nuclear materials. LANL began as a physics laboratory but is much more diverse now. As with SNL, LANL is spending increasing amounts of time on cybersecurity issues.

Questions from the Committee

Several questions from committee members centered on the steps being taken to attract and hire the next generation of employees. LANL has focused on diversity and recruits broadly, while working with New Mexico educational institutions to attract the required workforce. While UNM is the largest contributor of applicants, NMSU and NM Tech also provide a significant number. LANL has many agreements with other universities and has developed programs at Northern New Mexico College. LANL's outreach to public education groups is limited except for the STEM initiatives. It was noted that New Mexico does not have an earth science requirement for high school students.

Asked about small business procurement activities, Mr. Wallace said that much of the procurement is handled at the federal level with the NNSA, but there are significant local business opportunities.

Mr. Wallace said that the request for proposals for management of LANL had been issued, and December 11, 2017 is the deadline for submission of proposals. The contract will be awarded by October 2018. His best estimation is that LANL's activities are stable, but a report is due to be released in January.

Approval of Minutes

A motion to approve the minutes of the September 25-26 meeting was made by Senator Padilla and seconded by Representative Smith. The minutes were approved with an amendment.

Virgin Galactic Space Flight Operations Status Update

Richard DalBello, vice president, Business Development and Government Affairs, Virgin Galactic, assured the committee members that Virgin Galactic's development program is progressing well and the company's activities are coming to New Mexico soon. Currently, Virgin Galactic has 600 staff members in Mojave, California, and is building two new spaceships. Last month, Virgin Galactic received a license from the Federal Aviation Administration for suborbital launches. It is concentrating in two areas: suborbital launches for personal and research spaceflight; and small satellite orbital launches.

Virgin Galactic has a 20-year lease for the Spaceport America facility and has spent roughly $20 million in the state so far. It currently has 30 full-time employees and expects to have another 85 employees next year.

Mr. DalBello then explained Virgin Galactic's technology. SpaceShip Two is a fully reusable suborbital system designed to take two pilots, plus as many as six astronauts or a research payload into space. White Knight Two is a four-engine, two-fuselage jet aircraft capable of carrying SpaceShip Two into high altitude for launch. This aircraft has been flown more than 200 times for testing and has carried SpaceShip Two more than 40 times. He said the expectation is that the final testing program and preparation for the initial commercial launches will move to New Mexico in 2018. He added that more than 600 people from more than 50 countries have made reservations to fly into space from Spaceport America. He also indicated that Virgin Galactic will be well poised to serve a growth market in high-quality, microgravity exposure research.

Questions from the Committee

Responding to a question, Mr. DalBello confirmed that Saudi Arabia plans to invest approximately $1 billion in Sir Richard Branson's three commercial space companies, including Virgin Galactic.

Mr. DalBello was asked about Virgin Galactic's community education outreach. A committee member suggested that the company develop a short information pamphlet for public distribution that would outline the economic projections regarding space tourism and microgravity exposure research connected to Virgin Galactic's operations at Spaceport America.

It was noted that a contract has been established to begin construction on the southern road to the spaceport.

Adjournment

The meeting was adjourned at 4:35 p.m.

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