

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

**September 5-6, 2013
Rotunda Room, UNM Science and Technology Park
801 University Boulevard
Albuquerque**

The third meeting of the Science, Technology and Telecommunications Committee (STTC) was called to order by Representative Carl Trujillo, chair, on September 5, 2013 at 10:12 a.m. in the Rotunda Room at the UNM Science and Technology Park.

Present

Rep. Carl Trujillo, Chair
Sen. Michael Padilla, Vice Chair
Rep. Kelly K. Fajardo
Rep. Roberto "Bobby" J. Gonzales
Rep. Jason C. Harper
Sen. Bill B. O'Neill (9/5)
Rep. Debbie A. Rodella
Sen. John C. Ryan (9/5)
Rep. Luciano "Lucky" Varela
Rep. Monica Youngblood (9/5)

Absent

Sen. William F. Burt
Sen. Linda M. Lopez
Rep. James E. Smith

Advisory Members

Sen. Carlos R. Cisneros
Rep. Stephanie Garcia Richard (9/5)
Sen. Ron Griggs
Sen. Richard C. Martinez
Rep. Bill McCamley
Sen. William H. Payne (9/5)
Rep. Jane E. Powdrell-Culbert
Rep. Nick L. Salazar
Rep. Don L. Tripp

Sen. Timothy M. Keller
Sen. Steven P. Neville
Sen. Peter Wirth

(Attendance dates are noted for members not present for the entire meeting.)

Staff

Gordon Meeks, Legislative Council Service (LCS)
Ralph Vincent, LCS
Renée Gregorio, LCS
Cassandra Jones, LCS

Guests

The guest list is in the meeting file.

Handouts

Handouts and other written testimony are in the meeting file.

Thursday, September 5

Call to Order and Introductions

Members of the committee introduced themselves. Representative Trujillo invited Chaouki Abdallah, provost, University of New Mexico (UNM), to speak. Dr. Abdallah told the committee that the University of Tennessee had created an incredibly successful endowed chairs program and suggested that New Mexico could consider following a similar model in order to strengthen its universities and its national laboratories. Dr. Abdallah discussed endowed chairs that UNM currently has in place and the procedures that UNM has used in making its selections. He told the committee that UNM is currently collaborating with Sandia National Laboratories to hire a joint employee to work part time at both institutions. He noted that, in the past, UNM and Sandia National Laboratories have shared employees, but this is the first time they have collaborated during the hiring process. Dr. Abdallah also discussed the importance of centers of excellence in New Mexico.

Members of the committee asked questions about and discussed:

- the University of Tennessee endowed chair model;
- the relationship between UNM and Sandia National Laboratories;
- the costs of setting up endowed chairs for the various stakeholders;
- academic and scientific areas in which New Mexico could specialize;
- models and best practices for endowment; and
- issues regarding intellectual property.

Welcome to UNM

Catalin Roman, dean, School of Engineering, UNM, told the committee that economic development is one of UNM's top priorities. He told the committee that UNM has four engineering centers that receive funding from the National Science Foundation. He discussed various degree programs in engineering offered by UNM. Dr. Roman told the committee that, often, incoming students require very large up-front investments due to their lack of preparation for some of the science and math classes required in engineering programs.

Members of the committee asked questions about and discussed:

- engineering programs at UNM and New Mexico State University (NMSU);
- what college preparation students should receive while in high school;
- decreases in federal funding;
- research infrastructure;
- technology transfer issues;

- cybersecurity in New Mexico; and
- the leveraging of state funding in order to receive federal funding.

Technology Transfer Issues

Elizabeth (Lisa) J. Kuuttilla, chief executive officer and chief economic development officer, STC.UNM, told the committee that STC.UNM was formed in 1995 and serves and supports all of UNM's academic programs. The mission of STC.UNM is to nurture innovation and economic development for the UNM community. Ms. Kuuttilla told the committee that STC.UNM does this by protecting technologies developed at UNM and transferring those technologies to the marketplace; connecting the business community to UNM; and facilitating UNM's role as a contributor to New Mexico's economic development. Ms. Kuuttilla provided the committee with a list of the STC.UNM board of directors and the STC.UNM organizational chart.

Ms. Kuuttilla provided the committee with a list of STC.UNM's commercialization activities, including:

- events such as educational seminars and creative awards;
- the Joseph L. Cecchi VentureLab, which includes physical and virtual offices, business services, student intern support and an advisory group;
- licensing;
- marketing, such as social networking and technology marketing;
- intellectual property protection, including an external patent counsel and knowledge regarding academic environment considerations; and
- technologies, including STC.UNM's technology portfolio and technology scout alerts.

Ms. Kuuttilla told the committee that economic development activities are aided by the UNM president, the Economic Development Advisory Group and the Economic Development Council. Ms. Kuuttilla provided the committee with data regarding invention disclosures, patents and license agreements, all of which have steadily risen since 1996. Ms. Kuuttilla also provided information about the number of start-up companies with which STC.UNM has been involved since 1996, with nine of those start-ups companies beginning operation in 2013.

Ms. Kuuttilla discussed several of the STC.UNM start-up companies with the committee.

- Pajarito Powder is an Albuquerque-based start-up company that focuses on non-platinum fuel cell catalysts.
- Skinfrared is a company promoting technology that allows for a noninvasive diagnostic technique for skin cancer, based on infrared imaging.
- AgilVax, Inc., is a company that develops superior vaccines and integrated platforms for rapid vaccine discovery and delivery.
- Aviso Pharma, Inc., is developing a proprietary, point-of-care biomarker breath test for the rapid and accurate detection and monitoring of urease producing multi-drug-resistant pathogens.
- NaonMR has developed the first system for rapid isolation of rare cells from complex

matrices at levels of one cell/ml. or lower.

- Intellicyt develops and markets innovative high-throughput cell and bead-based screening solutions for use throughout the life sciences.

Ms. Kuutilla told the committee that the idea of "creating a rainforest in the desert", based on a book entitled, *The Rainforest: The Secret to Building the Next Silicon Valley*, involves building innovation ecosystems by using: ideas and inventions; government and trade and industry organizations; education and work force development; real estate and business infrastructure; culture, societal values, models and rules of law; money; talent; coaches and mentors; academia and research; business support services; access to global markets and supply chains; and news and media outlets. Ms. Kuuttilla identified areas of strengths and weaknesses for New Mexico.

Ms. Kuuttilla classified New Mexico's ideas, culture and academics as strong; New Mexico's government, trade, education, talent, coaches, business support services, access to global markets and news and media outlets as moderate; and New Mexico's money and real estate as being in need of more support. Ms. Kuuttilla told the committee that weaknesses regarding money could be addressed by increasing investments in New Mexico venture funds and providing gap funding to research organizations. She also told the committee that New Mexico needs to identify and create a research district. Research districts create a mutually supportive relationship between a scientific institution and a concentration of technology businesses. The most successful research districts are centers of innovative science. Ms. Kuuttilla discussed and identified potential locations for research districts in Albuquerque.

Fred Mondragon, economic development consultant, told the committee that entrepreneurship is taught at UNM. He discussed centers of excellence that have been created in New Mexico, including three centers that were funded approximately 30 years ago and that have been very successful.

Members of the committee asked questions about and discussed:

- site selection criteria for research districts;
- venture capital investments in New Mexico;
- centers of excellence;
- cybersecurity; and
- business incubators.

Telehealth

Dale Alverson, medical director, Center for Telehealth and Cybermedicine Research, UNM, told the committee that insurance coverage legislation for telemedicine services was passed and signed into law in 2013. The New Mexico Telehealth Act was passed by the legislature and signed into law in 2004. Dr. Alverson told the committee that telemedicine creates a virtual consultation and provision of service between providers and patients, which increases patient access to care. The Health Information Exchange (HIE) creates a virtual

medical record about a patient from a variety of electronic health records, which increases ease of access for authorized entities to access a patient's health information. Dr. Alverson told the committee that allowing multiple health care providers access to the same record of clinical information will make health care delivery more robust and efficient; improve continuity and outcomes; and reduce costs. He told the committee that the HIE portal might be accessed when a doctor is seeing a patient for the first time; the patient is seen infrequently; the patient is known to have received care elsewhere; the medical case is complex; the patient has had emergency room visits; and a disaster is occurring.

Dr. Alverson told the committee that the benefits of the HIE include: access, with patient consent, to each patient's health information; improved situational awareness; better evaluation capability; decreasing the unnecessary duplication of tests; avoidance of readmission; and better and more complete data analytics. The New Mexico Health Information Collaborative (NMHIC), which oversees the HIE, includes the Public Health Division of the Department of Health, patients, clinicians, hospitals, clinician offices, laboratories and emergency rooms. The HIE is cloud-based.

Dr. Alverson discussed the ways in which telemedicine might be used and accessed. He told committee members that telemedicine can be used for direct patient care; "store and forward" uses, which allow images to be stored and forwarded for review by medical specialists; and trauma triage. Dr. Alverson informed committee members that the New Mexico Telehealth Alliance includes providers, consumers, telehealth experts, communication networks and social networks. The alliance reflects the diversity of health care in New Mexico. Dr. Alverson told the committee that tools used for telehealth include videophones, Skype, IP-based software and hand-held devices. Other devices that could be used in telemedicine include remote monitoring devices and Google Glass. Dr. Alverson told the committee that when telemedicine and the HIE are used together, they create a powerful set of complementary tools in providing virtual care. They also create an improved ability to diagnose, treat and manage patients directly or through consultation with other providers. Together, telemedicine and the HIE create an interaction similar to a face-to-face interaction between a provider and a patient.

Dr. Alverson requested that the legislature:

- officially recognize the NMHIC as the statewide HIE and require health care providers to participate;
- officially recognize the New Mexico Telehealth Alliance as the statewide resource center for telehealth as a replacement for the Telehealth/HIT Commission;
- develop a statewide telehealth fund or grant program; and
- develop a matching funds pool for eligible participants.

Members of the committee asked questions about and discussed:

- telehealth and the HIE;
- access to care, particularly in rural areas;
- New Mexico health concerns; and

- legislative proposals.

Centers of Research Excellence

Representative Trujillo informed the committee that a presentation regarding centers of research excellence would be moved to Friday, September 6, 2013, due to time constraints.

Telecommunication Regulation

Jeff Lindsey, regional vice president of public policy for CenturyLink, told the committee that CenturyLink is concerned about the regulatory structure of telecommunications in New Mexico. Mr. Lindsey told the committee that the Public Regulation Commission (PRC) recently had a finding of effective competition for bundles but not for basic service. Mr. Lindsey told the committee that he does not believe that regulations in the state are keeping up with the market and asked that the legislature consider looking at changes regarding the issue. Mr. Lindsey told the committee that rural regulations have worked for many years and requested that the legislature enact rural regulations for all local exchange carriers in order to even the playing field.

Members of the committee requested that CenturyLink be placed on the October agenda of the STTC in order to examine this issue more fully.

Members of the committee asked questions about and discussed:

- CenturyLink employment;
- quality of service regulations;
- effective competition determinations by the PRC;
- regulations for different classifications of carriers;
- CenturyLink customers; and
- potential legislation.

The committee recessed at 2:40 p.m.

Friday, September 6

A motion was made and seconded and the minutes from the July meeting were unanimously approved. Representative Trujillo then indicated that the PRC and carriers will be invited to the Las Cruces committee meeting to make a presentation on current telecommunications regulations so that a well-rounded view is heard.

Centers of Research Excellence

Carlos Romero, associate vice president for research administration, and John McGraw, professor of physics and astronomy, UNM, discussed the challenges and strengths associated with making New Mexico a solid technological research community. Mr. Romero spoke of the challenge of aligning public and higher education and the research institutions so that the state can leverage its strengths. Mr. Romero posed the questions of how to bring water resources and energy together in a desert; how to leverage the oil and gas industry for power; how to take brackish water and produce electricity; and how to use existing technologies but also scale up

that use and bring what is available into the marketplace through the use of public-private partnerships and partnering with the state's institutions of higher education. He then mentioned the framework for collaboration allowed for in House Bill 562 (2013), which created a technology research collaborative (TRC). The bill also created a TRC board. (See the handout for member composition.) Mr. Romero indicated that, although this was a good start, a bit more is needed to make collaboration viable.

Mr. Romero stated that New Mexico needs to focus on bringing more New Mexico students into education, graduation and attainment of degrees in science, technology, engineering and math (STEM), as well as creating an economy that keeps these graduates in the state. He added that it would be advantageous for the state to create strategic investments and for the laboratories and universities to jointly hire personnel to address issues related to water, energy and securing cyberspace. Among New Mexico's strengths are its three nationally recognized research universities, four federally funded research laboratories, its geographic location and its history of strong support for higher education. Mr. Romero stressed that while people in all of these arenas are doing great work, there seems to be a disincentive for collaboration. He encouraged collaboration among the research universities and the national laboratories so that idle time in the laboratories could be filled and New Mexico students could experience the laboratories firsthand.

Mr. Romero posed the question of how to use state support to create centers for research excellence and stated that New Mexico needs legislative support for collaboration to be possible. He posited that to "bring it all together" will require a strong K-12 system to produce good students. He said that UNM has four STEM grants from the federal Department of Education to assist in strengthening educational programs, to aid in matriculation and outreach and to create opportunities for teachers in public schools. There is a real need to assist teachers with their comfort level in math and science. He stated that having centers of research excellence helps. He named several research institutes associated with UNM and areas of human and research development at the university that have an impact on the state's economy. Lastly, Mr. Romero cited the UNM Science and Technology Park as a prime example of the kind of partnership that can further help New Mexico's economy because of its mixed use of space for research and development, laboratories and offices for technology-based companies and university research.

In addressing what is vital to New Mexico, Dr. McGraw stressed the importance of recognizing that energy and water are inextricably linked in New Mexico. He said that in talking with colleagues at the national laboratories, he found that they all agreed that locally generated research can be done to good effect in relationship to energy and water. As an example, Dr. McGraw stated that New Mexico is a major oil, gas and coal producer with a stable base of energy generation, and research could be applied to make these processes more effective, safer and consistent. He spoke of the importance of the state taking a leadership role in exploring alternative energy possibilities, such as biofuels in the Rio Grande corridor and the eastern part of the state, nuclear energy in the western part of the state, wind energy, geothermal energy and nuclear fusion. Dr. McGraw emphasized that, with one of the greatest number of days of sunshine anywhere in the world, New Mexico is the premier place to research solar energy. He

added that the state has done research in passive thermal and heat generation for solar as well as smart grid research. At present, UNM is partnering with Mesa del Sol to see how smart technology can be used to power homes. Dr. McGraw emphasized that New Mexico needs an infrastructure that ensures that grant funding arises from collaboration and that all participants need to speak with one voice, which would put the state in a direct position to compete for existing funds. He concluded by saying that the state must realize — mentally, physically and fiscally — the advantage that it has through this core collaboration model.

Committee members' questions followed, and the following points were raised:

- the entire framework for collaboration would include getting scientists and engineers to work with each other as well as with teachers, who could then bring the research to their students and monitor experiments with their students;
- the need to be innovative in terms of collaboration and to create a stronger cyber-grid in New Mexico that will reach all community colleges;
- a question for UNM to investigate related to how many degrees need to be given each year to directly affect improvement in the state's economy;
- UNM is actively researching the issue of math anxiety among teachers and how this affects students, particularly girls who might internalize a female math teacher's anxiety; UNM is looking at correlations related to students that persist in STEM fields and how to adjust curriculum and train teachers so that more students can be successful;
- there is no funding for the TRC board, and the governor has not yet made any appointments to the board, but a funding request is being identified for presentation to the Legislative Finance Committee (LFC) for both recurring and nonrecurring funding; and
- as was done with prior legislation for a TRC, a fund needs to be established for this purpose.

Venture Space Small Business Incubator

Chris Hall, chair and professor at the School of Engineering, Mechanical Engineering Department, UNM, gave a brief recent history of the state of space technology and exploration. Although the National Aeronautics and Space Administration (NASA) no longer has a space shuttle program, space exploration is key, with a major transition in place that involves more cost-effective commercial enterprises. Dr. Hall spoke of the paradigm shift occurring in space technology, which replaces large spacecraft with small ones, known as "CubeSats". The interest in the space technology field is for cube-sized spacecraft to communicate with one another. A network of smaller cubes could eventually replace larger spacecraft, he added. Dr. Hall stated that he only sees space technology and exploration as increasing in the next several years, and he sees New Mexico as a potential center for small satellite development.

Dr. Hall talked about the Venture Space Small Business Incubator (Venture Space) as a way to attract funding by connecting New Mexico's three space-related constituencies: the engineering and science research community at UNM, the small business community and government laboratories and other organizations engaged in space research. He said that each

year about one billion dollars comes to the laboratories for research and development, but more than 60% of it goes out of state. The Venture Space partnership would use state seed funding as leverage to pursue some of this funding from existing federal programs. Dr. Hall also mentioned that there is so much good work happening in New Mexico at places such as Spaceport America, White Sands Missile Range, all the universities and government laboratories, as well as the aerospace engineering program at NMSU, which has a good reputation. He also added that Venture Space is actively engaged in collaborating with the University of Texas, New Mexico Institute of Mining and Technology (NMIMT) and UNM and has identified more than 60 potential partner organizations.

Dr. Hall highlighted several of Venture Space's activities, which include evaluating the commercial relevance of new technologies, assisting entrepreneurial space companies through using Venture Space resources, funding and mentoring UNM engineering graduate students and undergraduate project teams and teaming with NMSU and NMIMT to establish regional collaborative opportunities in the space business. He cited specific examples of student projects, which include a project at UNM's Configurable Space Microsystems Innovations and Applications Center devising a CubeSat mission design and deployable antenna for smaller spacecraft. Students from UNM, NMSU and NMIMT are all involved. Dr. Hall has encouraged the students to continue this project and to submit a proposal to NASA's Reduced-Gravity Student Flight Opportunities Program. He concluded by presenting a request for legislative funding for \$250,000, which would help to fund faculty and students providing technical support to small companies that are pursuing space ventures through Venture Space.

Discussion and questions ensued, and the following points were made:

- there is active research funded by NASA in UNM's engineering departments and at NMSU on autonomous vehicles related to the drone program, which could be a good avenue for the state to obtain federal funding;
- related to job creation, the North American Industry Classification System has categorized specific skills across the entire work force for matching to specific jobs in spacecraft technology; and
- the importance of the legislature in finding ways to fund these collaborative projects in space technology and exploration.

STEM Education

Vanessa Svihla, co-director, Interaction and Interdisciplinary in Educational Activity, and Richard Bryant, College of Education, UNM, outlined issues related to STEM education. Dr. Bryant spoke of his great passion for science education alongside his experience as a high school science teacher for 12 years. For the past 25 years, he has worked in higher education in the area of teacher preparation. He said that he would speak about the latter, while Dr. Svihla would cover the educational nature of science classrooms.

Dr. Bryant spoke of the current crisis in education as not simply related to a shortage of teachers, but to the nature of science and math, which includes national math standards in both content and process methodology. He delineated elementary and secondary teacher

requirements, both at the basic level and for those wanting endorsement in these subject areas. He added that UNM's students complete teacher training and are well-prepared for the classroom and that approximately 20% of UNM's majors are in math and science.

Dr. Svihla spoke of her work in supporting teachers and in researching the STEM education field. She said that New Mexico has strong standards, but, in many ways, the educational system is not set up for success. She cited a tendency to let textbooks drive instruction and to offer "cookbook" laboratory sessions that do not encourage intellectual curiosity. She added that, with these methods, the system is not giving students needed opportunities to learn and is not preparing them to address the larger issues that society needs to address, such as climate change and biodiversity.

In outlining typical issues that students struggle with, Dr. Svihla spoke of a range of attitudes in students: some simply are not interested in STEM education; some are well-prepared and well-advised; and others are not adequately prepared or do not understand the field enough to persevere. She emphasized that a focus on content and practice is the needed leverage point, and that includes developing an understanding of core ideas and cross-cutting themes as well as the practices of asking questions and investigating. She added that what is needed among STEM students is intellectual curiosity and critical engagement, and the educational system needs to foster these qualities.

In turning to what works in STEM education, Dr. Svihla spoke of the need for a broader model of evaluation than that of controlled scientific trials. Scientists engage in many other methods, she added, and New Mexico is quite different from other states with its rural population. In looking at curricula in the Great Explorations in Math and Science program as it relates to Illuminating Engineering Society criteria, she cited the space science sequence, which is shown to have a positive effect on achievement, as it includes professional development. She added that guided inquiry is better than direct instruction and that connecting to everyday understanding is critical. She spoke of the need to look at how students are learning; to support students in learning new practices; and to recognize that effort and perseverance are actually more important than IQ.

In seeking ways to accomplish these learning goals, Dr. Svihla indicated that research is a vital component of effective teaching, as well as matching instruction to what the task at hand requires. She highlighted a grant from the United States Department of Agriculture that allows the nutrition program at UNM to develop interactive learning assessments that allow students to provide counsel to clients virtually as a means for students to learn content. This system can later be applied to STEM subjects, linking learning new practices and being assessed in real time. She also spoke of a collaborative project with Dr. Jeff Wilson, the Dumpster Project, which asks the question, "How would you design a home for a world with 10 billion people?" and asks students to come up with a sustainable solution by turning the dumpster into such a home.

Dr. Svihla concluded by suggesting that in order to make STEM education better in the K-12 education system, what is needed is project- and problem-based instruction that is engaging

for students, performance assessments that support student learning and sustained professional development for teachers.

Committee members then engaged in questioning, and the following points were made:

- New Mexico does not have subject-specific certification at the secondary level for science teachers, and unprepared teachers exist;
- what could assist in teacher preparation is to offer multiple certifications that would include not only a general science certification but also subject-specific certifications in the fields of science as well as assessments of the teaching being done;
- teachers tend to leave schools that do not operate well institutionally, in terms of leadership, autonomy, good organization, student discipline and working conditions;
- professional development opportunities rejuvenate teachers, school administrators and school boards; it could also be advantageous to institute a Teach for America program at the state level and an induction program for new teachers; and
- there is a need to have teachers recognized as professionals, to embrace more performance-based assessments and to begin looking at the mission of school districts from the community perspective.

Public Comment

Ed Angel, professor emeritus in electrical engineering at UNM, gave testimony on the "Supercomputer Challenge" program, which teaches middle and high school students how to use supercomputers to analyze, model and solve real-world problems. He said that the program has been ongoing since 1990 and that it has been accomplished with 2.5 staff members and \$150,000. He added that the program cannot accommodate all of the students that want to come through it, and he would like to double the size of the program over the next few years. He stated that \$60,000 would fund the needed staff and help support teacher training.

Ensuing discussion among committee members focused on the following points:

- the need to ensure that the state focus on technology improvements alongside government accountability that would include strong oversight of technology decisions and a look at the efficacy of the Information Technology Commission (ITC);
- a motion was made, seconded and approved to have an added special joint meeting with the LFC to discuss technology issues; and
- a request for the Department of Information Technology to give an overview of the legislation that created the ITC.

Tour of the Center for High Technology Materials

The STTC members proceeded to a tour of the Center for High Technology Materials (CHTM) led by Dr. Sanjay Krishna, director, CHTM, and Steven R.J. Brueck, former CHTM director.

Dr. Krishna provided an overview and history of the CHTM research laboratory. The CHTM's research facilities began in 1992 with a bond issue approved by the state and dedicated

in 1997. The CHTM was constructed on the south campus in the UNM Research Park. The CHTM laboratories are devoted to the research of nanotechnology and advanced optics. The CHTM includes modern cleanroom facilities that allow for the fabrication of advanced semiconductor devices from epitaxial structures grown at the CHTM. Also within the main building are nearly two dozen laboratories that house high-power lasers, scanning electron microscopes, devices for molecular beam epitaxy and advanced work stations for numerical simulations of atomic structures and beam propagation within laser cavities.

The objectives of UNM's CHTM are to:

- foster research and education in the fields of optoelectronics, microelectronics and nanotechnology;
- enhance collaboration among UNM, federal laboratories and industry; and
- promote economic development in New Mexico.

The CHTM is a nationally recognized center for photonics and microelectronics research, and over 80% of the annual research budget of approximately \$7 million is funded by external research contracts. Capabilities include:

- high-quality and advanced research capabilities, where, for example, a novel semiconductor device can be designed, fabricated and evaluated completely in-house;
- a research environment that provides educational opportunities for graduate students, allowing them to gain an in-depth experience of their research topic and acquire a competitive edge as they enter the job market;
- that the CHTM's active research and education role also promotes economic development in New Mexico through spin-off businesses that have grown from research projects at the CHTM; and
- that the CHTM can utilize vertical integration with faculty experienced in photonics and microelectronics devices with access to powerful computing. The CHTM boasts two metal organic chemical vapor deposition reactors and five molecular beam epitaxial growth systems for the materials growth of advanced epitaxial semiconductor structures. The CHTM's cleanroom offers a full range of process equipment for the fabrication of advanced semiconductor devices. CHTM laboratories are extremely well-equipped, with electrical and optical test equipment for the evaluation of materials, devices and systems.

Adjournment

There being no further business before the committee, the meeting was adjourned at 2:30 p.m.