

THE UNIVERSITY OF TENNESSEE
BOARD OF TRUSTEES

RESEARCH, OUTREACH, AND ECONOMIC DEVELOPMENT COMMITTEE

1:00 p.m. EST
Thursday
February 28, 2013

Tennessee Room
University Center
Chattanooga, Tennessee

AGENDA

- I. Call to Order
- II. Roll Call
- III. Minutes of Last Meeting – **Action** **Tab 1**
- IV. Launch TN – **Information** **Tab 2**
- V. “Breaking the Mold: The University of Tennessee, Battelle, and the Resurgence of Oak Ridge National Laboratory” – **Information** **Tab 3**
- VI. National Academies Report: “Research Universities and the Future of America” – **Information**..... **Tab 4**
- VII. Cherokee Farm Update – **Information**..... **Tab 5**
- VIII. Chattanooga’s Smart Grid Project – **Information** **Tab 6**
- IX. UTC’s White House US Ignite Initiative – **Information** **Tab 7**
- X. UTC Service Learning Presentation – **Information** **Tab 8**
- XI. Other Business
- XII. Adjournment

THE UNIVERSITY OF TENNESSEE
BOARD OF TRUSTEES

MINUTES OF THE RESEARCH, OUTREACH AND ECONOMIC DEVELOPMENT
COMMITTEE

November 8, 2012
Knoxville, Tennessee

The Research, Outreach and Economic Development Committee of the Board of Trustees of The University of Tennessee met at 1 p.m. EDT, Thursday, November 8, 2012, in Hollingsworth Auditorium on the campus of The University of Tennessee Institute of Agriculture in Knoxville, Tennessee.

I. CALL TO ORDER

George E. Cates, Chair, called the meeting to order.

II. ROLL CALL

Executive Vice President David Millhorn called the roll, and the following members of the Committee were present:

George E. Cates
Tim L. Cross
Joseph A. DiPietro
J. Brian Ferguson
Teresa K. Fowler
Vicky B. Gregg
Monice Moore Hagler
Raja J. Jubran
Richard G. Rhoda
Shalin N. Shah
Marty Spears
Don C. Stansberry, Jr.
Victoria s. Steinberg
David M. Stern
Janet M. Wilbert

Commissioners Kevin S. Huffman and Julius T. Johnson were not present at the meeting.

Dr. Millhorn announced the presence of a quorum of the Committee. Other Trustees, members of the administrative staff, the public, and representatives of the media were also present.

III. APPROVAL OF MINUTES OF PRIOR MEETING

Chair Cates asked for any corrections to the minutes of the June 20, 2012 meeting of the Committee. Hearing none, the Chair called for a motion. Trustee Hagler moved approval of the minutes as presented in the meeting materials. Trustee Jubran seconded the motion, and it carried unanimously.

IV. OPENING REMARKS BY COMMITTEE CHAIR

Chair Cates waived any opening remarks and asked Dr. Millhorn to commence the presentations.

V. RESEARCH/ECONOMIC DEVELOPMENT NEWS AND HIGHLIGHTS

Dr. Millhorn recognized UTK Chancellor Jimmy Cheek, who introduced Dr. Taylor Eighmy as the new Vice Chancellor for Research and Engagement on the Knoxville campus as of October 1, 2012. Dr. Cheek noted Dr. Eighmy's achievements at Texas Tech University where Dr. Eighmy served as Senior Vice President for Research before coming to UTK and noted Dr. Eighmy's impressive track record in research, his vision, and his ability to work well and closely with faculty. Dr. Eighmy was welcomed with a round of applause.

Dr. Millhorn's power-point presentation (Exhibit 1) on news and highlights of research, outreach and economic development activities included statistics reflecting progress within the University of Tennessee Research Foundation (UTRF) since the implementation of a plan introduced in June 2011 to hire professional "boots on the ground" staff and to focus on deal-flow to drive success. In FY12, disclosures increased by over 60 percent (144), US patents issued increased over 20 percent (23), licenses and option agreements increased by 38 percent (22), start-up companies increased by 125 percent (9), and royalties earned totaled \$1,403,301.

Dr. Millhorn recognized the leadership within UTRF of Dick Gourley (Interim President), Dave Washburn (Vice President, Multi-Disciplinary Office) and Richard Magid (Vice President, Health Science Center Office) and thanked them for their significant contributions to the organization.

Dr. Millhorn reported that the interactive Spectrum project within the West Tennessee Solar Farm initiative is currently on exhibit at Knoxville Center Mall. After TDOT completes construction of the interactive education and teaching facility on the West Tennessee Solar Farm in early 2014, Spectrum will become part of that renewable energy facility. Dr. Millhorn noted the Solar Farm's solar contracts with local utilities are bringing in substantial income.

A book (*Breaking the Mold: UT-Battelle and the Resurgence of Oak Ridge National Laboratory*) is being created that recounts, among other things, the UT-Battelle proposal/bid process to manage ORNL and the resurgence of the Lab under UT-Battelle management. UT-Battelle has now had a successful 12-year partnership, Dr. Millhorn noted, and by the February Board of Trustees meeting more information may be known about the next rebid timeline. Dr. Millhorn said a national search is now underway for a new Deputy for Science and Technology at ORNL to replace Dr. Thomas Zacharia, who took a position at Qatar Foundation. Dr. Jim Roberto is Interim Deputy for S&T, a position he formerly held.

Dr. Millhorn provided an update on the UT-ORNL Governor's Chair (GC) and Distinguished Scientist (DS) programs, noting 10 GC appointments are currently in place with 9 at Knoxville and 1 at UTHSC, and there are 6 DS appointments. These programs are making a significant difference for UT and ORNL. Two DS, 7 GCs and 2 associated hires accounted for 36 percent of the UTK College of Engineering research expenditures for tenured or tenure-track faculty in FY12; further, GCs are responsible for or heavily involved in 2 large center grants (~\$42M). A limiting factor for expanding these programs, however, is quality research space, Dr. Millhorn noted.

Dr. Millhorn stated the National Science Foundation National Institute for Computational Sciences (NICS) Cray XT5 Kraken computer is operating at over 1 petaflop and UT, NICS and Joint Institute for Computational Sciences (JICS) high-performance computers are the most heavily used and fastest computers in the world. Titan, a Cray XK7 system, has replaced the XT5 Jaguar computer at ORNL and it is the scientific research community's most powerful computational tool for exploring solutions to some of today's most challenging problems. It is capable of a peak speed of 27 petaflops. Plans are underway for re-competition of the \$65M NSF grant and this effort will be led by Dr. Anthony Mezzacappa. This rebid will be a fierce competition, Dr. Millhorn stated, and it is extremely important for UT to win the award. Results may be known next summer. Dr.

Millhorn noted he, JICS Director Jeff Nichols, Dr. Mezzacappa, and Dr. Jeremy Smith, UT's first Governor's Chair, met in October in Memphis with UT Health Science Center, LeBonheur and St. Jude officials to discuss and facilitate mutual collaboration and opportunities.

The Cherokee Farm project, Dr. Millhorn reported, had much activity in the last few months. Work continues with TDOT to facilitate exit locations and other issues. Construction of the Joint Institute for Advanced Materials (JIAM) building, a joint UT-ORNL facility, will soon commence. To help manage lease contracts and recruit tenants, the Cherokee Farm Development Corporation (CFDC) was created as a subsidiary of the UT Research Foundation. Dr. Millhorn introduced the newly-appointed President and CEO of CFDC, Mr. Cliff Hawks, who was previously general manager of the Nashville Superspeedway and director of the Metro Nashville Sports Authority. Mr. Hawks was welcomed with a round of applause.

Chair Cates thanked Dr. Millhorn for his report and for the innovative and energetic leadership he has brought to the University and for promoting interaction among ORNL and other organizations. Chair Cates also thanked the Board members for their work and investment in UTRF, which is now seeing positive results, he noted.

VI. UT OUTREACH/ENGAGEMENT EFFORTS

Dr. Larry Arrington, Chancellor of the Institute of Agriculture, introduced the joint Institute of Agriculture and Institute for Public Service presentation (Exhibit 2) entitled *Outreach--Beyond Campus: Improving Lives, Strengthening Communities*. He noted this year is the 150th year anniversary of the Morrill Act which established land-grant universities. A video was shown of Institute of Agriculture and IPS activities and testimonies of numerous people across the state served by the Institutes with education and assistance related to financial management. Drs. Tim Cross (Dean, UT Extension) and Mary Jinks (Vice President, IPS) described the vast variety of finance programs and outreach activities serving and helping Tennessee citizens. These hands-on programs included financial assistance, guidance and training to farmers, families, cities, businesses, youth, elected officials and community leaders. Last year via UT Extension, it was noted, 9,587 Family and Consumer Science program participants reduced debt, increased savings or increased their investments, resulting in \$5.5M in economic impact statewide. IPS provided financial solutions for Tennessee companies and achieved an annual economic impact reaching \$1.2B for customers from new contracts, improved productivity, greater

sales and capital investment leading to jobs. IPS was instrumental in helping implement the Tennessee Municipal Finance Officer Certification and Education Act of 2007, Dr. Jinks noted. Asked if there is financial help to UT units and where funding came from, Dr. Jinks noted about one-third of the funding is from the state, one-third comes from local appropriations and the remaining third comes from fees, grants and contracts. Dr. DiPietro noted these Institutes, both non-formula units, connect with Tennessee citizens across the state, and no tuition dollars are used for their budgets.

VII. TN-SCORE REPORT

Dr. John Hopkins, of the Executive Vice President's Office and Director of TN-SCORE, via a power-point presentation (Exhibit 3), shared progress, early successes and plans for a statewide National Science Foundation (NSF) RII Track I Experimental Program to Stimulate Competitive Research (EPSCoR) award UT received two years ago. The objective is to build research infrastructure that contributes to the collective competitiveness of the state's research institutions. The Track I awards are the centerpiece of the NSF EPSCoR program and are five-year \$20M awards. Dr. Millhorn is Principal Investigator (PI), and Dr. Hopkins is Co-PI and Project Director for TN-SCORE. UT is the managing organization for the Cooperative Agreement, and the UTK campus is manager of the award financials. Dr. Hopkins recognized Josh Francois and Samantha Brown of his office team, not present because of a National Science Foundation Communications workshop TN-SCORE was hosting, and Dr. Stacey Patterson, UT Assistant Vice President and Director of UT Partnerships. Dr. Patterson, he noted, pulled the UT group together and began writing the winning EPSCoR proposal almost immediately upon joining the Executive Vice President's office. Dr. Hopkins also thanked the UTK Office of Research head, Dr. Greg Reed, and his staff, particularly David Smelser, as instrumental in managing a complex and challenging program.

Dr. Hopkins described the breadth of the TN-SCORE program, including 31 participating organizations (within which are 11 primary research partners, 16 collaborating partners and 4 industry partners). Significant research organizations participate, including Oak Ridge National Laboratory and Vanderbilt University. All UT campuses, all four-year Tennessee Board of Regents and many private schools participate in the program. Overall, Dr. Hopkins said, there were 201 participants in Year 2, which ended July 31, 2012. Science is the fundamental base of TN-SCORE, but there are other impact areas important to NSF and the state, and work is taking place to strengthen research

activities in themes strategic for Tennessee and leveraging them for greater benefit in workforce development and advocacy for STEM education and research. Pipelines have been created for moving research into innovation into jobs, and in using student engagement and research experiences to produce a trained workforce. Links are being created for bridging research strengths into state economic development opportunities and for creating high-paying jobs here in Tennessee, Dr. Hopkins said. It is not a quick process to build collaborative infrastructure, Dr. Hopkins noted, but results are being seen in terms of publications, inventions and new research activities. TN-SCORE is also driving more multi-institutional and team-based proposals which are keys to the big research programs so important in today's research funding landscape. An additional \$1.2M of new direct funding has been awarded and \$5.6M of co-funding has been awarded indirectly to other projects out of the EPSCoR office, Dr. Hopkins said.

Dr. Hopkins noted the heads of the three major "thrust" groups within TN-SCORE: Dr. Barry Bruce of UTK, Professor of Biochemistry, Cellular and Molecular Biology; Dr. Tom Zadwodzinski, UT-ORNL Governor's Chair in Electrical Energy Storage and Professor of Chemical and Biomolecular Engineering at UTK; and Dr. Sandy Rosenthal, Professor of Chemistry and Director of the Vanderbilt Institute of Nanoscale Science and Engineering. Dr. Hopkins also discussed TN-SCORE partners, including Oak Ridge Associated Universities (ORAU), and the teaching opportunities for junior faculty at primary teaching institutions to work with mentor faculty at primary research schools. Internship and co-op opportunities at TN-SCORE industry partners provide practical experience to the students and create relations for guiding and pursuing problem-driven research. The students, their institutions and industry all benefit from the experience. One of the "double-down" investments made with TN-SCORE is an agreement by EVP Millhorn and UTK Chancellor Cheek to invest in doctoral fellowships at UTK in an amount correlated to the TN-SCORE F&A recovery. The UTK Energy Scholars program has been created and it is integrating into the Bredesen Center for Interdisciplinary Research (CIRE). Dr. Hopkins noted this pipeline is helping to keep the best and brightest students and researchers in Tennessee.

TN-SCORE is also providing internships through its industry partners, Dr. Hopkins said. An example is a UTK Chemical Engineering graduate who interned at Eastman before landing a full-time position in their Strategic Process Innovation and Evaluation Research Lab. These links to industry are critical in providing direction to the program and relating outcomes to real-world needs.

Dr. Hopkins concluded his presentation by inviting members to support the 2013 National NSF EPSCoR Conference November 3-6, 2013 to be held in Nashville and hosted by TN-SCORE.

VIII. PARTNERSHIPS FOR INNOVATION AWARD, NATIONAL SCIENCE FOUNDATION, DISTINGUISHED SCIENTIST DR. JIMMY MAYS, CHEMISTRY, UT KNOXVILLE

Dr. Millhorn noted the next four presentations demonstrate the growing support chain for innovation capacity being developed to support research opportunities from concept to product and to use research and Intellectual Property (IP) to solve problems impacting people, build strong local and regional economies and improve the national well-being. They all sought counsel to help them grow and be where they are today.

Dr. Millhorn introduced Dr. Jimmy Mays, Distinguished Scientist and Professor of Chemistry at UT Knoxville, who led a team to recently win a prestigious Partnership for Innovation (PFI) award from the NSF and outlined these activities in a power-point presentation (Exhibit 4). This is the state's first PFI grant and the Anderson Center's first NSF award. Dr. Mays noted the PFI award is a \$600,000 grant over two years and he gave recognition to colleagues Joy Fisher and Alex Miller (UT College of Business Administration's Anderson Center for Entrepreneurship and Innovation) and Dr. Greg Reed and staff (UTK Office of Research) for their assistance in this enterprise. The goal of the PFI is to accelerate transfer of university innovations into the marketplace. Dr. Mays discussed "Superelastomers: New thermoplastic elastomers based on multigraft copolymers" and noted the PFI was in the early stage of IP and business development. The PFI technology platform is improved thermoplastic elastomers (TPEs) and the patent-pending innovation is enhancement of mechanical properties through control of polymer architecture. Dr. Mays noted the NSF PFI team members and their specific functions in the different areas of product development. The business entity BBB Elastomers LLC was created with directors Dr. Mays, Dr. Roland Weidisch (Fraunhofer Institute in Germany) and Dr. Samuel Gido (University of Massachusetts). Dr. Mays discussed the focus of the science behind BBB Elastomers and the licensing of superelastomer technology from the UT Research Foundation, as well as the development of industrial partnerships and the potential applications of the technology.

IX. UT RESEARCH FOUNDATION START-UP COMPANIES

Page 7

Research, Outreach and Economic Development Committee
Board of Trustees
November 8, 2012

The Committee next was given power-point presentations (Exhibit 5, 6, 7) by three start-up company founders, whose companies are in various stages of development. All the technologies have been developed at UT or in partnership with ORNL. Presenters were Dr. Jon Wall, Professor of Medicine in the Graduate School of Medicine and founder of Solex, a Knoxville-based company in its early stage whose technology is based on an imaging technology developed in his laboratory and licensed from the UT Research Foundation; Dr. Ed Chaum, Professor of Ophthalmology at the UT Health Science Center and founder and chief medical officer of Hubble Telemedical, a Memphis company whose technology has been jointly developed by UT and ORNL; and Dr. Michael Zemel, Professor Emeritus in the UT Knoxville College of Nutrition, founder of NuSirt Sciences (originally Nutraceutical Discoveries, Inc.), who licensed IP from UTRF developed in his UT laboratory.

Each presenter discussed the journey of its products' development, the vision and applications of its technologies, and the assistance and mentoring obtained through the development and concept-to-venture processes. UT, UTRF, ORNL and Technology 2020, among other organizations, were recognized for their invaluable assistance in these processes.

X. OTHER BUSINESS

The Chair called for any other business to come before the Committee, and there was none.

In response to a question from Trustee Wharton about an update on biofuels, Trustee Ferguson noted Genera Energy is courting companies for plant construction, and information should be known by the first of the year.

XI. ADJOURNMENT

There being no further business to come before the Research, Outreach and Economic Development Committee, the meeting was adjourned.

Respectfully Submitted,

David E. Millhorn, Ph.D.



**A Five-Year Strategic Plan to Make Tennessee
A National Innovation Leader**

LaunchTN Core Mission



To support STATEWIDE efforts at boosting entrepreneurship, promoting the commercialization of technologies, increasing the flow of capital into TN-based companies, and raising the profile of the state.

- LaunchTN Mission

Entrepreneurship

- Regional Business Accelerators
- Regional Support Network
- Access to Mentors and Industry Experts

Commercialization

- Shared Market Research for Tech Transfer
- SBIR / STTR Grant Writing Services
- Entrepreneur-Inventor Meetups Statewide
- Tech Transfer Convenings to Cover Best Practices



Anchored by:



- Public-private Sector Board of Directors
- Public & Private Sector Funding Sources



Capital Formation

- \$30 million Co-Investment Fund
- Relationship Introductions to Investors
- Reporting on Status of Capital Formation

Outreach

- Daily Clips & Facebook / Twitter Connectivity
- Monthly Newsletters
- World-class Events

LaunchTN 2012 Highlights



Entrepreneurship

- Screened several hundred companies
- Engaged over 300 mentors
- Raised over \$17 million in early-stage funding
- Created nearly 250 jobs

Commercialization

- Established three programs designed to help encourage commercialization
 1. Entrepreneur-inventor meetups
 2. Federal STTR/SBIR grant writing assistance
 3. Tech transfer officer convenings

Capital Formation










- \$7.1 million invested by co-investment fund
- \$18.6 million of associated follow-on (2.6x leverage)
- Undertook open comment period for INCITE co-investment fund and made adjustments to increase access to the Fund

Outreach

- # 1 in the country for Global Entrepreneurship Week, with events touching over 1,000 stakeholders and incorporating 60 partners
- Sponsored key events such as Knoxville's Entrepreneurial Imperative (200 attendees)
- 2013 LaunchTN conference, Southland, planning underway

LaunchTN Goals & Metrics



		2012 Actual	2012 - 2017 Cum. Goal	Multiple Increase
	Create Jobs 	Jobs Created 415	2,000	5x
				
	Increase Venture Capital Investment 	\$ Raised by TN Startups \$211MM	\$1BN	5x
		\$ Raised by Startups in Accelerators \$17MM	\$100MM	6x
	Promote Technologies 	# University Startups 24	125	5x
		# Licenses & Options 157	750	5x

TN Becomes the # 1 Place in the Southeast to Start and Grow a Business !

LaunchTN Commercialization Committee



LaunchTN Board Members



A.J. Bahou
Vice President & Chief Intellectual Property Officer
Prism Technologies, LLC.



Dr. Brian Noland
President
East Tennessee State University



Richard Smith
Managing Director-Life Sciences & Specialty Services
Federal Express



Dr. Brian DeBusk
Chief Executive Officer
DeRoyal Industries, Inc.

Other Committee Members



Alan Bentley
Assistant Vice Chancellor
Vanderbilt Center for Technology Transfer and Commercialization



Tom Rogers
Director, Industrial and Economic Development Partnerships
ORNL



Stacey Patterson
Assistant Vice President & Director of Research Partnerships
University of Tennessee

LaunchTN Commercialization Staff

- LaunchTN currently has two staff members dedicated to LaunchTN's Commercialization arm
- Search underway for permanent Commercialization Director



James Stover, Interim Commercialization Director

James@launchtn.org

James is responsible for overseeing all of LaunchTN's commercialization activities. Prior to joining LaunchTN, James was a life science and technology analyst with Square 1 Bank in San Diego and a senior research fellow in medicinal chemistry at the Scripps Research Institute. James holds a Ph.D. in Chemistry from Vanderbilt University, where he was a National Institute of Health Grant recipient.



Jill Van Beke, East Tennessee Commercialization Representative

Jill@launchtn.org

Jill most recently served as a Business Development Consultant at the Tennessee Department of Economic and Community Development, focusing on Innovation and Workforce Development-related initiatives in the East Region. Jill graduated from Columbia University with a degree in Urban Studies and concentrations in Economics and Anthropology.

Key Recent Tech Transfer Developments

DRAFT
ONLY



- Coordinated various forums and meetups to “bridge the gap” of technology transfer, such as Spark! and “Bridging the Gap”



- Awarded \$120,000 of tech maturation grants, conducted national search to identify tech transfer leadership, and added tech transfer staff



VANDERBILT
UNIVERSITY

- Doubled the size of its technology transfer staff & hired significant senior leadership talent



- Planning 2013 staff increase and considering the development of a proof of concept/prototype development fund



- 2013 planned opening of technology-focused accelerator, Crews Venture Labs (CVL)



- Introduced a streamlined licensing agreement



Tennessee Board of Regents

- Key 2012 licensing agreements for robotic technology and educational software

Key Results at UT Over 2012

DRAFT
ONLY



1

Disclosures up 40% to an all-time high of 144

2

Started 9 companies during 2012 (with licenses from UTRF)

3

Conducted more licensing deals than ever in UTRF history



Tennessee's Tech Transfer Performance

DRAFT
ONLY

- Collectively, the state's research institutions made significant progress over the past few years
- LaunchTN will be actively engaged with each during 2013

	Startups	Patent Apps	Patent Issues	Licenses & Options
2012 Amount	24	389	155	157
2011 Amount	14	250	126	140
2010 Amount	8	332	132	141
% Increase Over Past Year	+71%	+56%	+23%	+12%
% Increase Over Past Two Years	+200%	+17%	+17%	+11%



Commercialization Strategy

Program	Details
SBIR / STTR Support	<ul style="list-style-type: none"> • To support SBIR/STTR training, education and grant writing • Phase I grant writing workshops • Agency-Specific Webinars • SBIR/STTR Resource Website • Phase 0 and Phase 00 grant writing Support
Entrepreneur & Technology Matching	<ul style="list-style-type: none"> • ‘Venture-Match’ events to connect inventors and entrepreneurs • Outreach to Venture Capital / Private Equity Firms
Shared Resources	<ul style="list-style-type: none"> • Shared East Tennessee Commercialization Representative
ALCOT	<ul style="list-style-type: none"> • Participation in the Association of Licensing and Commercialization Officers of Tennessee (ALCOT) advocacy and advisory group
Other Opportunities	<ul style="list-style-type: none"> • Planning to apply for i6 challenge grant for commercialization • Other grant opportunities

SBIR / STTR Grantwriting Support

- Direct Grantwriting Services
- Lunch & Learns
- Grantwriting Workshops
- Agency-Specific Webinars
- SBIR/STTR Resource Website

GRANTWRITING CONSULTANT



Mark Henry

CEO, Grow Emerging Companies

Assisted with 1,800+ SBIR/STTR proposals

2x national win rate

Venture-Match (Speed Dating)



‘*Venture Match*’ is an opportunity to **engage** in meaningful conversations with some of Tennessee’s top **innovators** and **explore** the best emerging opportunities to **match** entrepreneurs with technologies in order to **develop** new companies, **create** sustainable jobs, and **build** value for investors.

Schedule	Details
April 2013	<ul style="list-style-type: none"> • Nashville • Speaker: David Peters (Universal Robotics) • Host: Richard Boyer and the Vanderbilt Graduate Alliance • Location: Vanderbilt University Club
May 2013	<ul style="list-style-type: none"> • Knoxville • Speaker: Lee Martin (UT) or Ronald Nutt (CTI) • Host: Shawn Carson (Tech2020) and/or Joy Fisher (UT) • Location: UT University Club
July 2013	<ul style="list-style-type: none"> • Memphis • Speaker: Mark Darty (Luminetx) • Host: Richard Magid (UTHSC) and Russell Ingram (MRC) • Location: Blue Monkey
September 2013	<ul style="list-style-type: none"> • Chattanooga • Speaker: Jayesh Doshi (eSpin) • Host: Chris Daly (Enterprise Center) and Sheldon Grizzle (Company Lab) • Location: Tremont Tavern or Hennen’s
October 2013	<ul style="list-style-type: none"> • TriCities • Speaker: TBD • Host: Audrey Depelteau (I-lab) and Bill Duncan (ETSU) • Location: Numan’s Café

Shared Resources



Shared East Tennessee Commercialization Representative

ORNL, UTRF and LaunchTN have formed a strategic partnership to accelerate commercialization of ORNL and UTRF technology across Tennessee, with an emphasis on start-up businesses.



Jill Van Beke - Jill will work to strengthen communication among the participating organizations, and to support efforts that will over time increase the volume of commercialization activity among ORNL, UTRF and other Launch Tennessee partners across the state.



This support will come in two general areas:

- Serve as the principal point of contact between LTN and the entrepreneurial initiatives of ORNL, UT, and UTRF,
- Assist with ORNL, UT, and UTRF efforts to identify and promote portfolio technologies that have significant commercialization potential, such as SPARK! and Bridging the Gap conference

ALCOT

Association of Licensing and Commercialization Officers of Tennessee (ALCOT):

Statewide advocacy and advisory group for commercialization carried out at Tennessee research institutions

- **University of Tennessee Research Foundation**
- **University of Memphis**
- **Y-12**
- **Oak Ridge National Laboratory**
- **Vanderbilt University**
- **Tennessee Board of Regents**
- **St. Jude Children's Research Hospital**
- **Key external advisors (investors and entrepreneurs)**



Other Opportunities

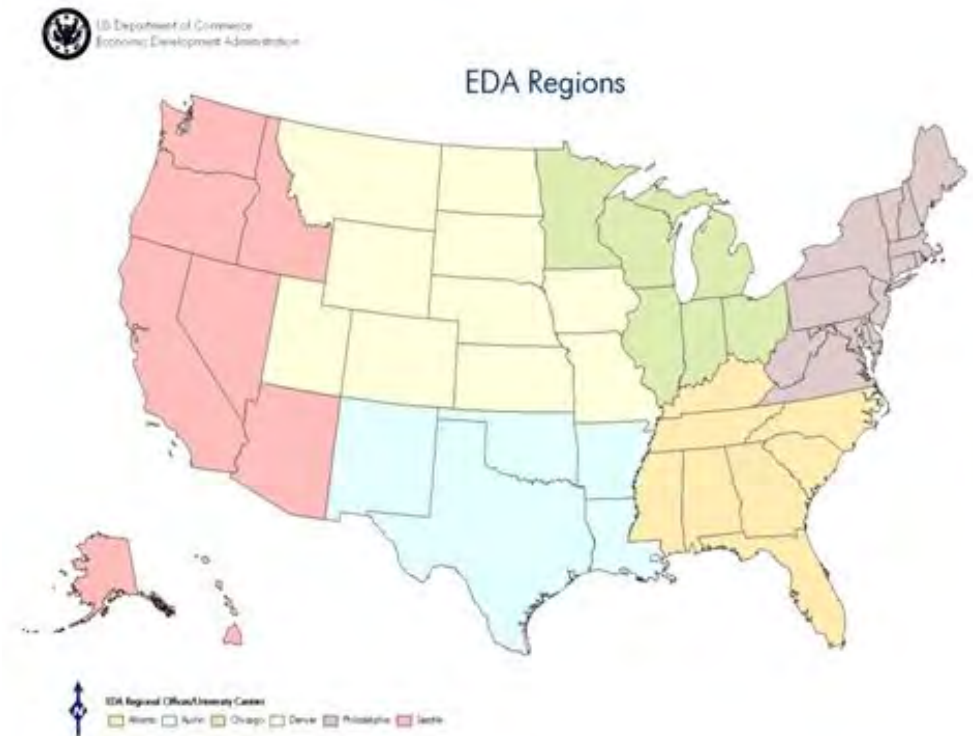


EDA i6 Challenge



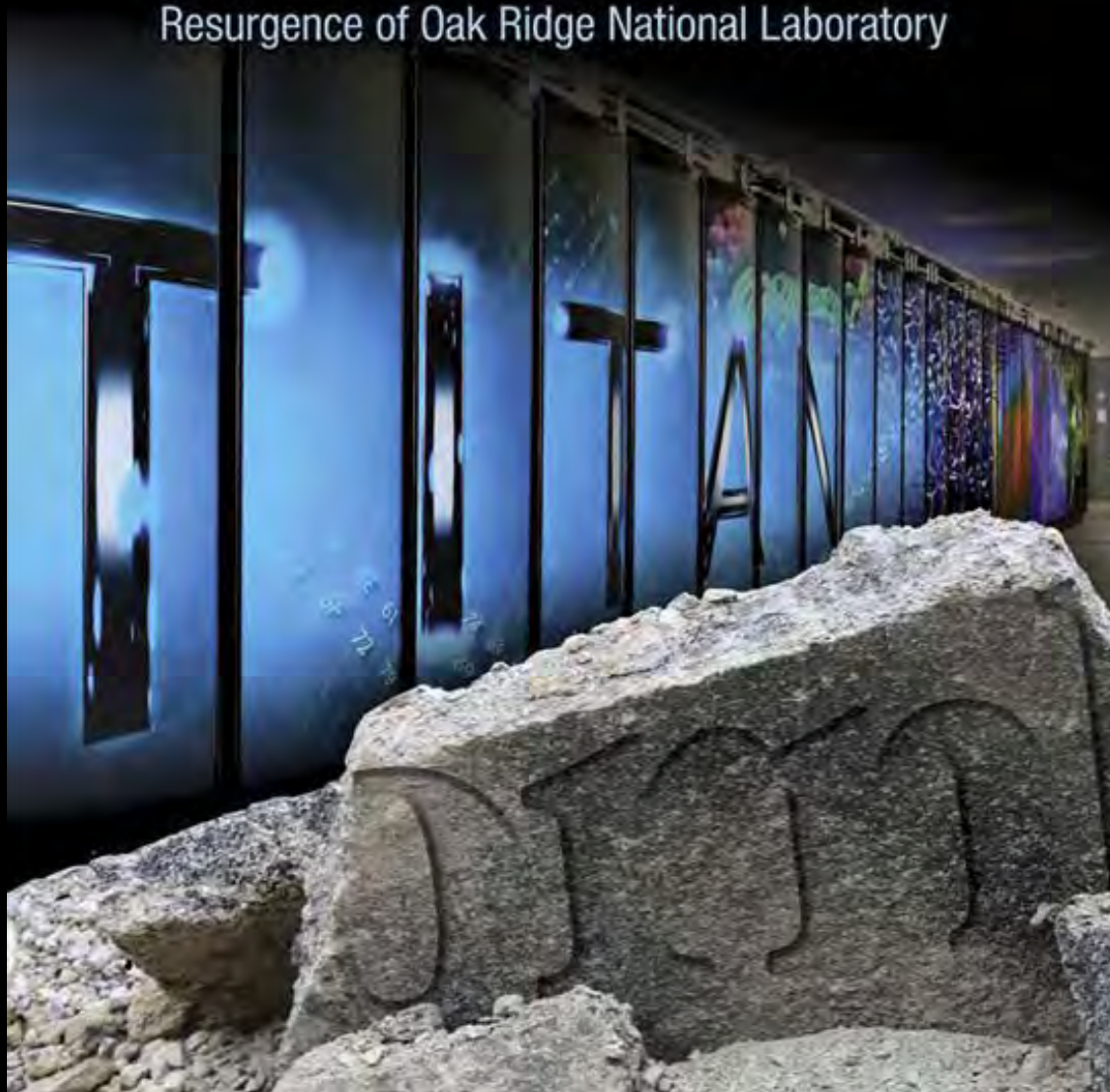
EDA's i6 is designed to accelerate commercialization by requiring team formation around existing regional infrastructure, technologies and human capital, while allowing the creation of new support networks that showcase the region's competitive advantages.

- Up to \$1M each from EDA to winning teams in 6 regions
- Up to \$6.3M in additional funding from various federal agencies
- Matching share requirement of at least \$500,000 from non-federal sources



Breaking the **Mold**

The University of Tennessee, Battelle
and the
Resurgence of Oak Ridge National Laboratory





3



YEAR ONE...



...YEAR TWELVE





Research Universities and the Future of America

4

**Ten Breakthrough Actions Vital to Our
Nation's Prosperity and Security**
Released by NAS, June 14, 2012

**NRC Sponsored Conference "Challenges
and Opportunities" Conference,**
Vanderbilt University, January 16, 2013

The American Research University

“America is driven by innovation – advances in ideas, products, and processes that create new industry and jobs, contribute to our nation’s health and security, and support a high standard of living”. “Our nations primary source of new knowledge and graduates with advanced skills continues to be our research universities”.

“However, these institutions now face an array of challenges, from unstable revenue streams and antiquated policies and practices to increasing competition from universities abroad. It is essential that we as a nation reaffirm and revitalize the unique partnership that has long existed among research universities, the federal government, the states, and philanthropy, and strengthen its links with business and industry.”

“Research Universities and the Future of America” – A National Academy of Science and the National Research Council report.



Best in the World

American Research Universities – recognized as best in the world

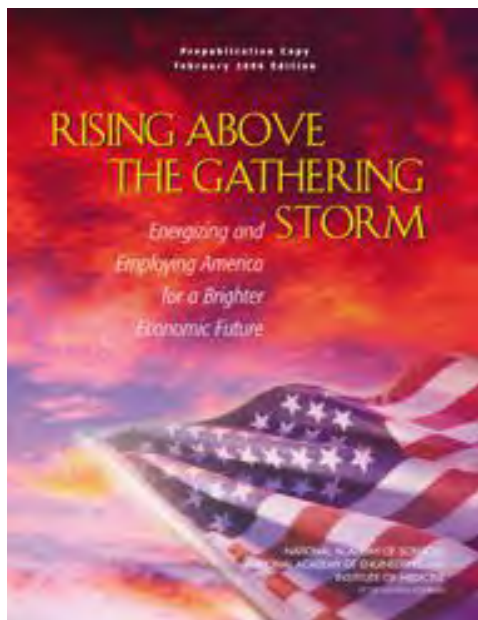
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- Ability to innovate across a broad spectrum of science and engineering
- Outstanding talent -- 48% (330) Nobel Prize awards in science
- National Laboratories provide “Big Science” capabilities

Challenges for remaining best in the world

- Long-term stable federal funding for research and appreciate of need to innovate
- Create and sustain productive partnerships with government and industry
- Educate, recruit and retain talented scientists and engineers
- Global competition





“Research is our secret weapon, our edge in an increasingly competitive world economy. Our universities, especially our 200 research universities, along with our national laboratories and private-sector research, constitute the greatest force for innovation in the world. Without this research, the U.S. could not possibly produce nearly 25 percent of all the wealth in the world each year.”

**From: “Major threats to our research universities.” Politico, 2012
By: Sen. Lamar Alexander and Hunter Rawlings III)**

150 Years of Innovation – NO ACCIDENT

4

- **Morrill Act 1862 (First Wave)** – Federal government partnered with state universities to stimulate economic growth in agriculture and industry.
- **Post World War II (Second Wave)** – Federal government enlisted America's research universities to develop innovative new technologies that advance national security, health/medicine, communications, and energy. Resulted in significant economic growth for the US and other developed countries.

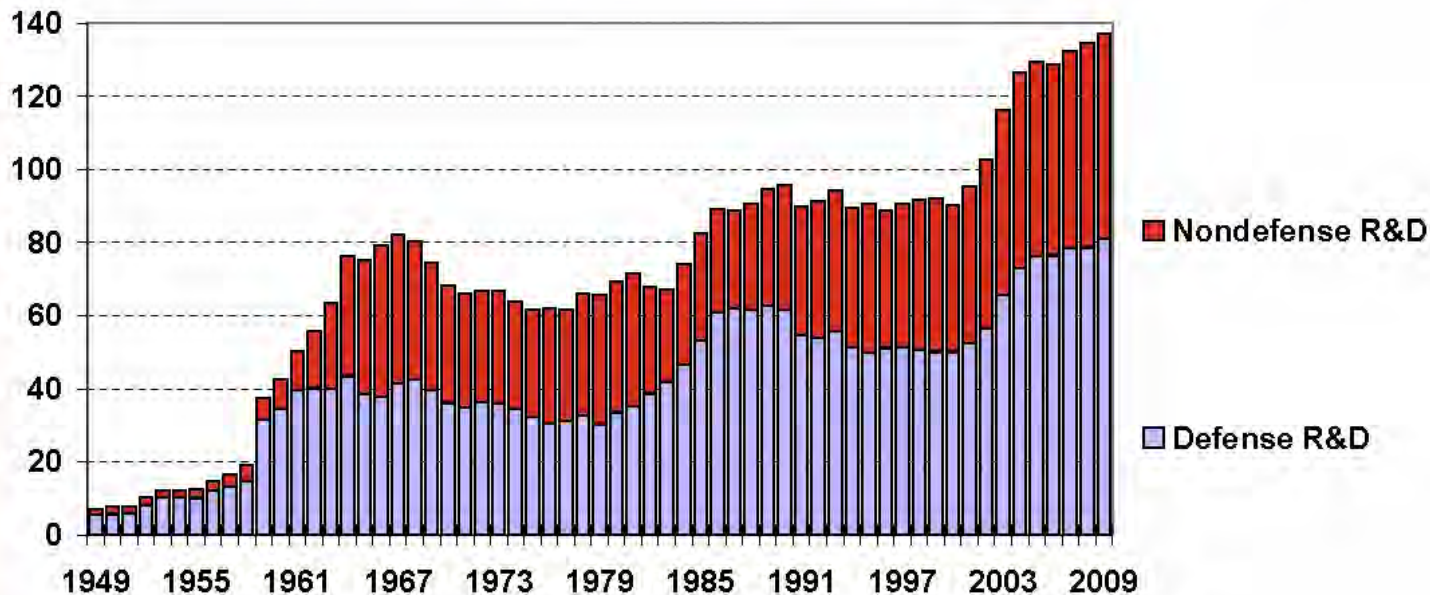
Bayh – Dole Act (adopted in 1980) – Allows university ownership of inventions made with federal funding

- **21st Century (Third Wave)** – Knowledge- and information-based science that uses very large data sets and extreme computing power to solve complex problems that impact all aspects of society. This will require unique partnerships and long-term commitments by sponsors.



Federal Spending on Defense and Nondefense R&D

Outlays for the conduct of R&D, FY 1949-2009, billions of constant FY 2008 dollars

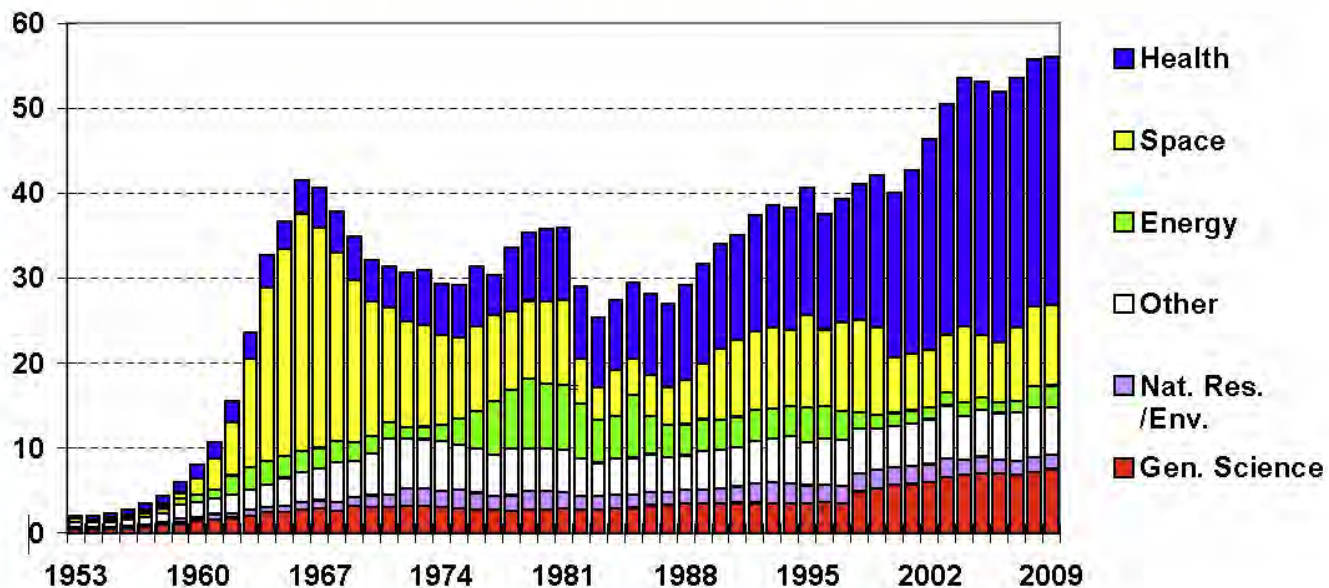


Source: AAAS, based on OMB Historical Tables in *Budget of the United States Government FY 2009*, Constant dollar conversions based on GDP deflators. FY 2009 is the President's request.
 Note: Some Energy programs shifted to General Science beginning in FY 1998.
 FEB. '08 © 2008 AAAS



Trends in Nondefense R&D by Function, FY 1953-2009

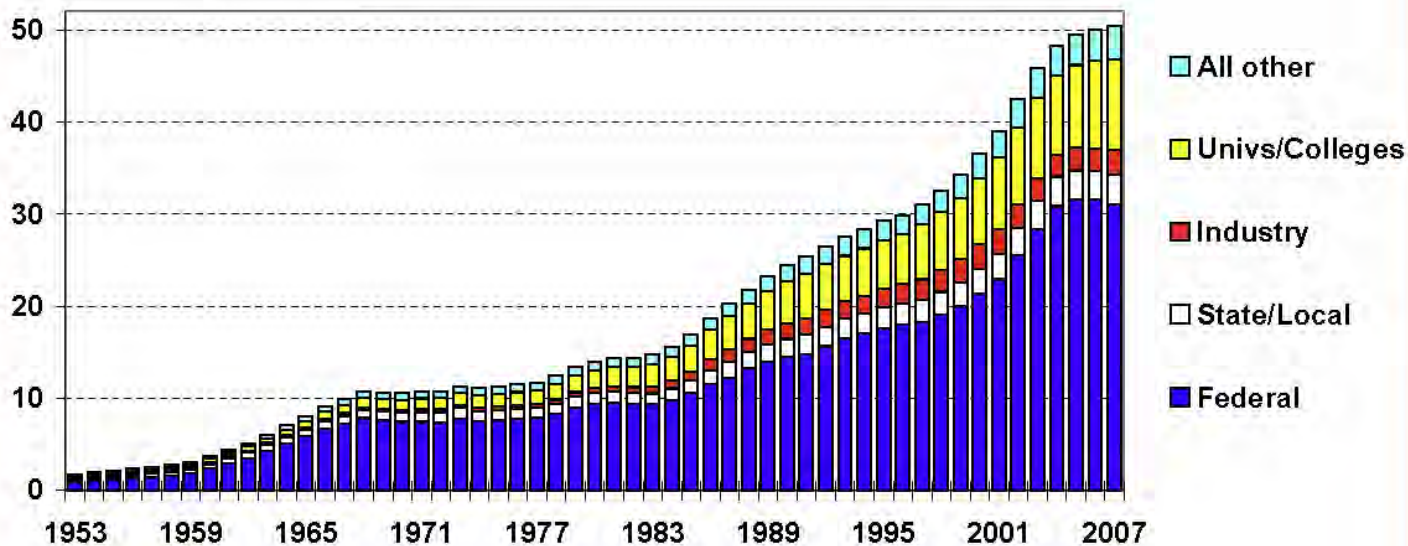
outlays for the conduct of R&D, billions of constant FY 2008 dollars



Source: AAAS, based on OMB Historical Tables in *Budget of the United States Government FY 2009*. Constant dollar conversions based on GDP deflators. FY 2009 is the President's request.
 Note: Some Energy programs shifted to General Science beginning in FY 1998.
 FEB. '08 © 2008 AAAS



R&D at Colleges and Universities by Source of Funds in billions of constant FY 2008 dollars, FY 1953-2007



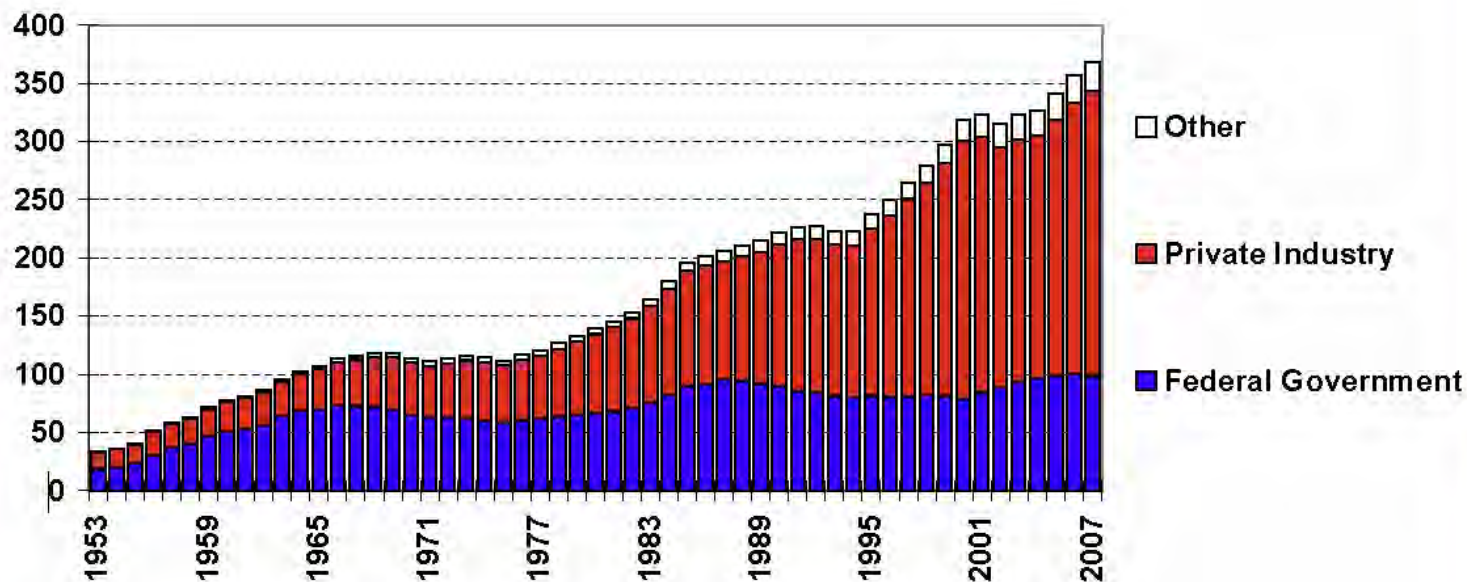
Source: National Science Foundation, Survey of Research and Development Expenditures at Universities and Colleges, Fiscal Year 2007, 2008. Constant-dollar conversions based on OMB's GDP deflators.

AUGUST '08 © 2008 AAAS



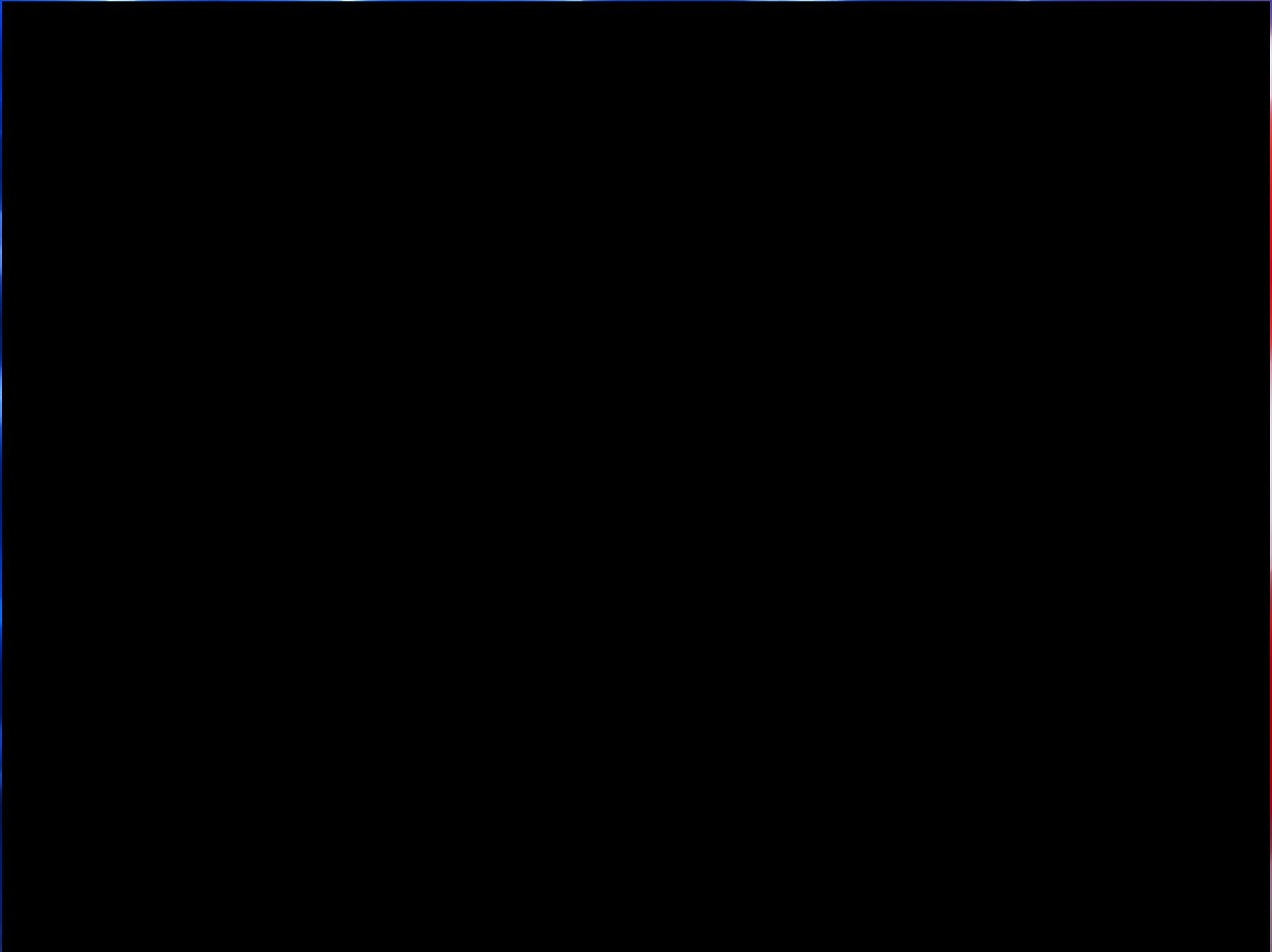
U.S. R&D Funding by Source, 1953-2007

expenditures in billions of constant 2007 dollars



Source: NSF, Division of Science Resources Statistics. (Data for 2007 are preliminary.)
 AUGUST '08 © 2008 AAAS





3 Broad Goals and 10 Recommendations

4

Goal I: Revitalize the Partnership (4 Recommendations)

- 1) **Federal Action** – Provide stable and effective funding for university R&D and graduate education. Review burdensome and out-dated policies. White House and OMB should develop a federal budget for science and technology.
- 2) **State Action** – Provide greater autonomy and increased state appropriations to enhance partnerships, graduate education and research infrastructure.
- 3) **Strengthen Partnership with Business** – Grow strong and sustainable “peer-to-peer” relationships with the business/industry sector. Facilitate the transfer of knowledge, ideas and technology to accelerate commercial outcomes.
- 4) **Improve University Productivity** – Improve funding competitiveness – Talented People and Facilities. Establish collaborations and partnerships especially when expensive equipment and facilities are involved. Educate key audiences about the importance of university research and graduate education to the state, region, and nation, including financial prosperity, public health and national security. Increase cost effectiveness and productivity to provide a greater ROI.



Goals and Recommendations (cont.)

Goal II: Strengthen Institutions (3 recommendations)

- 5) **Strategic Investment Program** – Federal government should create a strategic investment fund to support initiatives that enhance education and research infrastructure. This fund would focus on endowed professorships, career enhancement opportunities for beginning faculty, financial support for graduate students, and enhanced research facilities.
- 6) **Federal Funding of Research** – Federal agencies should pay the full cost of research, both direct and indirect costs) and eliminate cost share on all research grants. Develop consistent regulations and reporting requirements across federal agencies.
- 7) **Reduce Regulatory Burdens** – Eliminate regulations that increase administrative costs, impede research productivity and deflate creative energy.



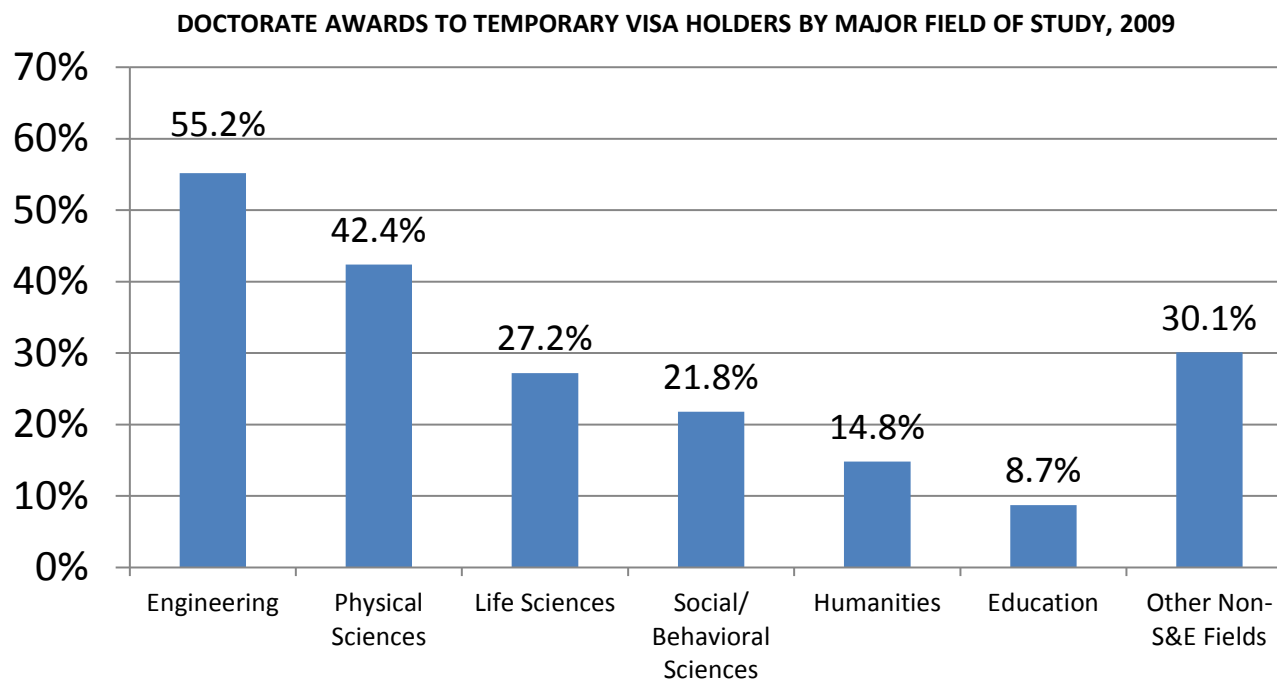
Goals and Recommendations (cont.)

Goal III: Building Talent (3 recommendations)

- 8) **Reform Graduate Education** – Increase the capacity of graduate programs to enable recruitment of a larger number of qualified students. Improve program efficiency by addressing such issues as attrition, time-to-degree, program funding, student stipends, and alignment with national priorities.
- 9) **STEM Pathways and Diversity** – Our nation's greatest asset is its people. Provide innovative STEM education and training and establish career opportunities for all Americans. Research universities should assist efforts to improve education for all students at all levels.
- 10) **International Students and Scholars** – Gain significant benefit from participation of international students and scientists. Federal government should streamline process for permanent residency and citizenship.

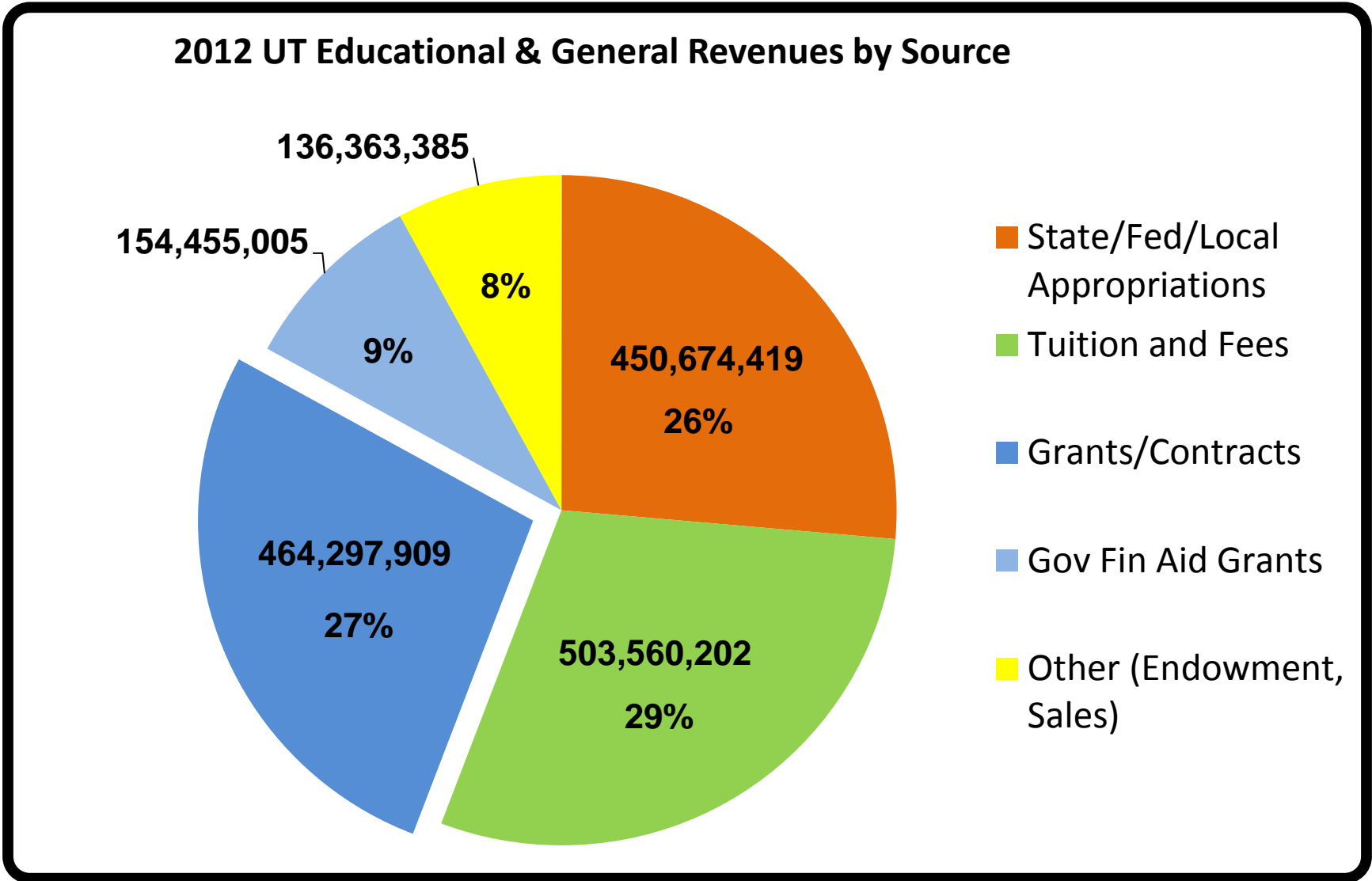


Recruit and Retain Top Talent



The number of doctoral degrees awarded to temporary visa holders (international students), shown here by field, is particularly high in the physical sciences and engineering.

Research and Sponsored Programs Funding at UT?



Conclusion

The roots of most major technological advances that we enjoy today can be traced to an American Research University. For America to retain its world leadership position in a growing global economy, it is essential that we reaffirm and revitalize the unique research and education partnership that exists among our top research universities, state and federal governments, business-sector, and philanthropy. Stable funding for research and sponsored programs is critically important for economic growth and prosperity, and for new innovations that keep our citizens safe and healthy.

National Research Council. *Research Universities and the Future of America: Ten Breakthrough Actions Vital to Our Nation's Prosperity and Security: Summary.* Washington, DC: The National Academies Press, 2012.



CHEROKEE FARM™
INNOVATION CAMPUS









Raise Awareness

- Communicate with local and state officials
- Mayor's Office
- City Council
- Local Chamber
- Governor's Office
- State ECD officials

Generate Leads

- Work Closely with the University of Tennessee
- Oak Ridge National Laboratory
- University of Tennessee Research Foundation
- State Economic Development officials
- Local Chamber officials

Marketing

- Interactive Web presence
- Collateral Material



EPB Smart Grid Overview

*UT Board of Trustees ROED Committee
February 28, 2013*



Three Problems:

Modernize Electric System

Low System Growth

How to Finance Change

One Solution:



Advanced Communications to:

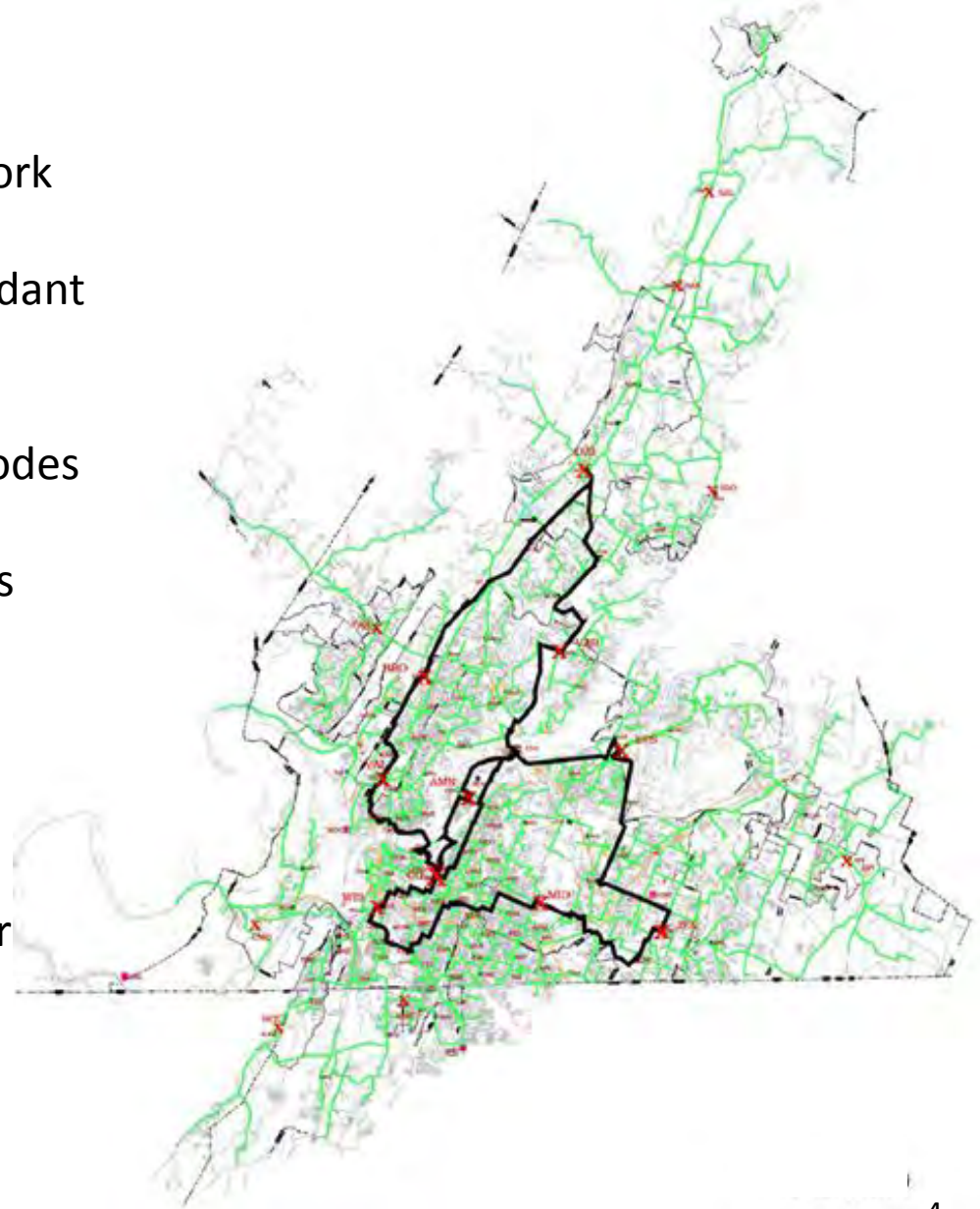
- **Modernize the Electric System**
- **Stimulate Economic Growth**
- **Commercial Products to Finance Change**



Chattanooga's Fiber Network

Fiber To The Home

- A GPON-Gigabit Passive Optic Network
 - Two multiple 10 gig fully redundant rings
 - 11 Super Nodes & 5 Remote Nodes
 - Central Office-GPON Electronics
 - 91 miles of Transport fiber
 - 784 miles of Feeder fiber
 - 3,353 miles of Distribution fiber
 - 3,242 miles of Drop fiber







Direct Customer Impacts

- Individual Events
 - July 5, 2013
 - 55% Improvement
 - 42,000 less customers effected
 - January 17, 2013
 - 70% Improvement
 - 8,056 less customers effected
 - January 14, 2013
 - 100% Improvement
 - 11,258 less customers effected



46kv Outage

On Monday, January 14 at 6:51 PM, a tree fell on a high-voltage 46kv power line just outside of Pine Ridge Substation.

As a result, 46kv breaker CNC 406 was “locked out”, causing 11,258 homes and businesses to lose power.

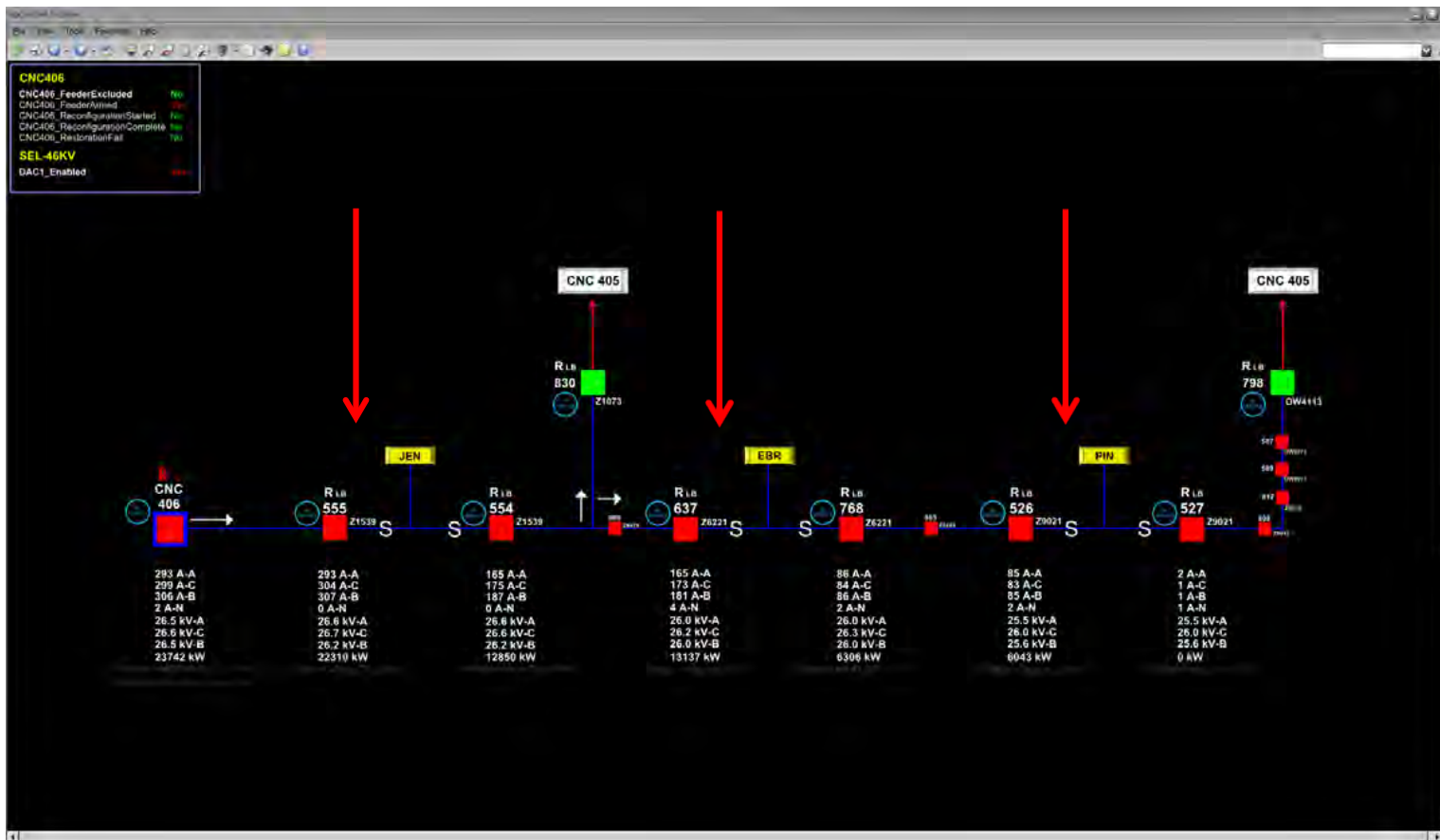


46kv Circuit & 12kv Substations Affected



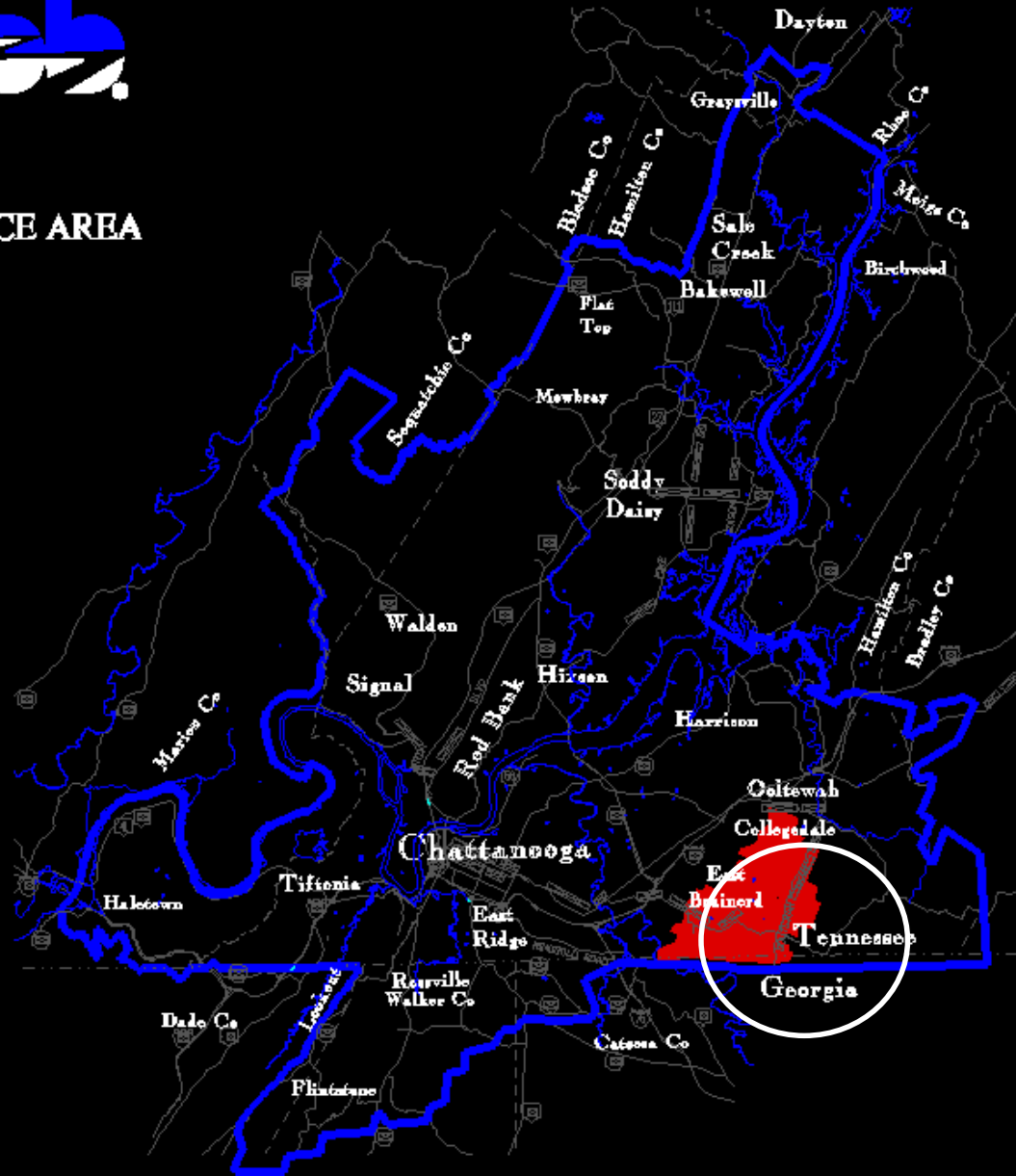
The fallen tree caused a fault on Concord 406 serving three 12kv distribution substations East Brainerd (EBR), Jenkins Road (JEN) and Pine Ridge (PIN).

6

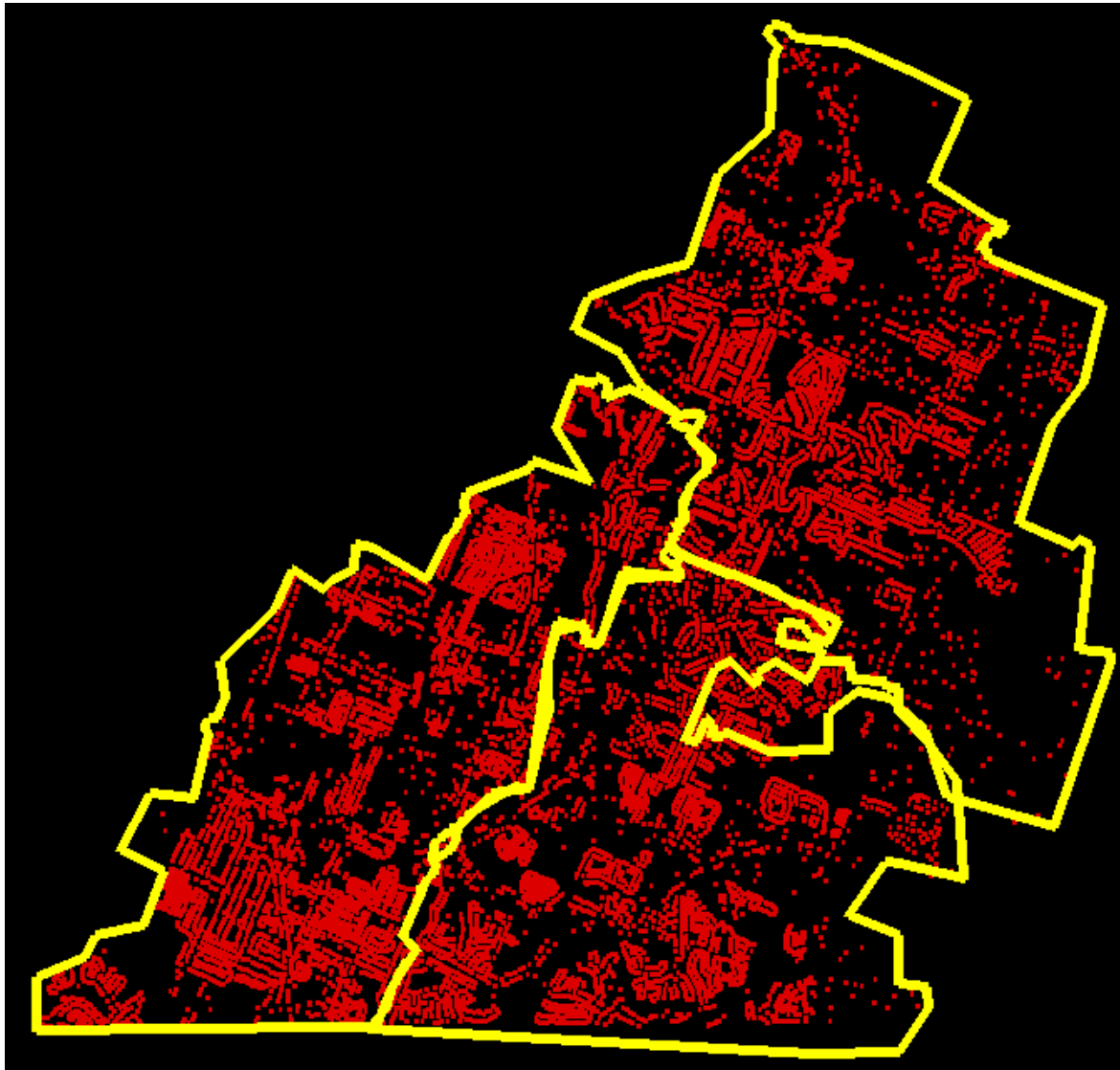




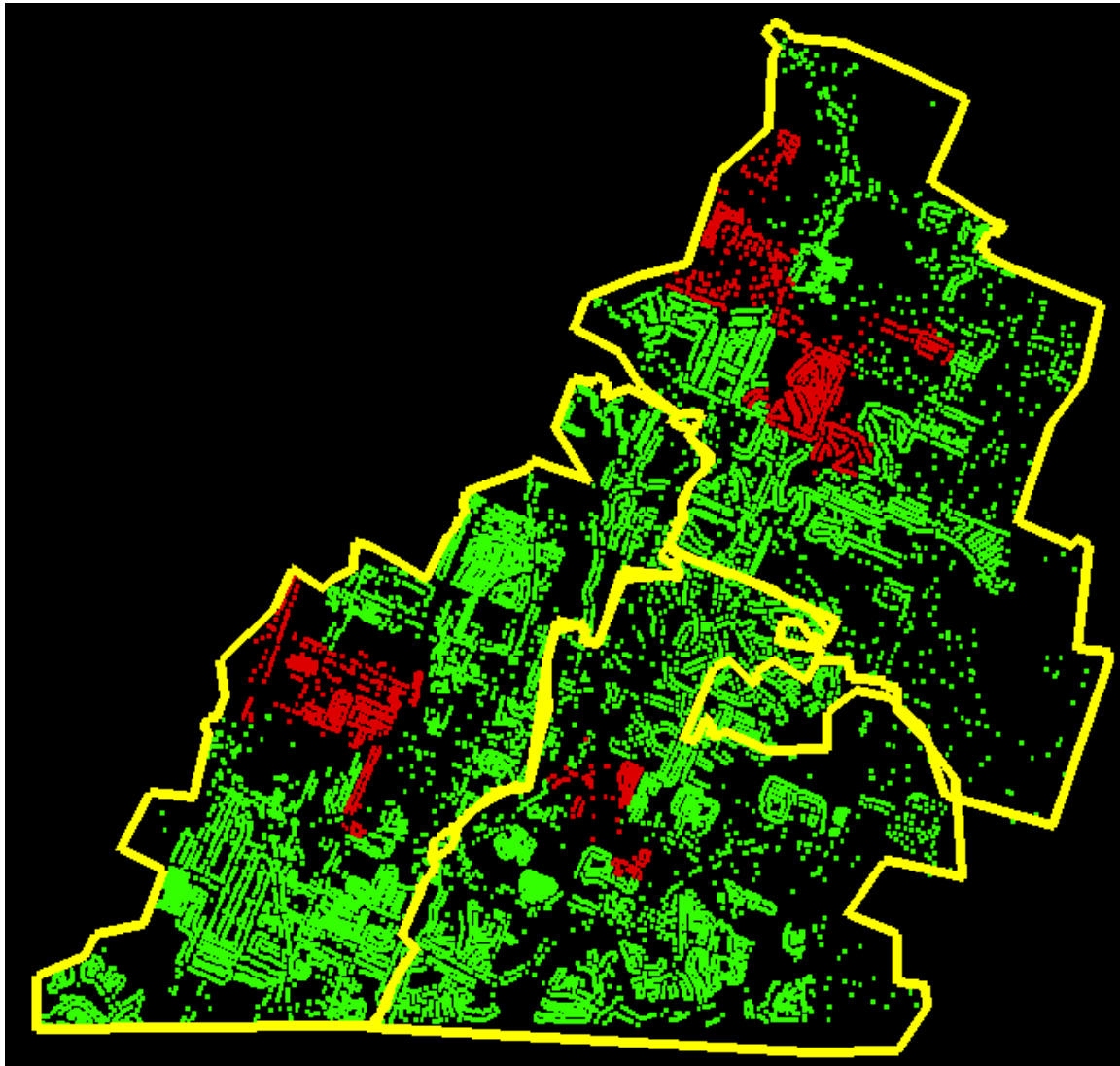
SERVICE AREA



6:51:09pm, 11,258 Customers Lose Power

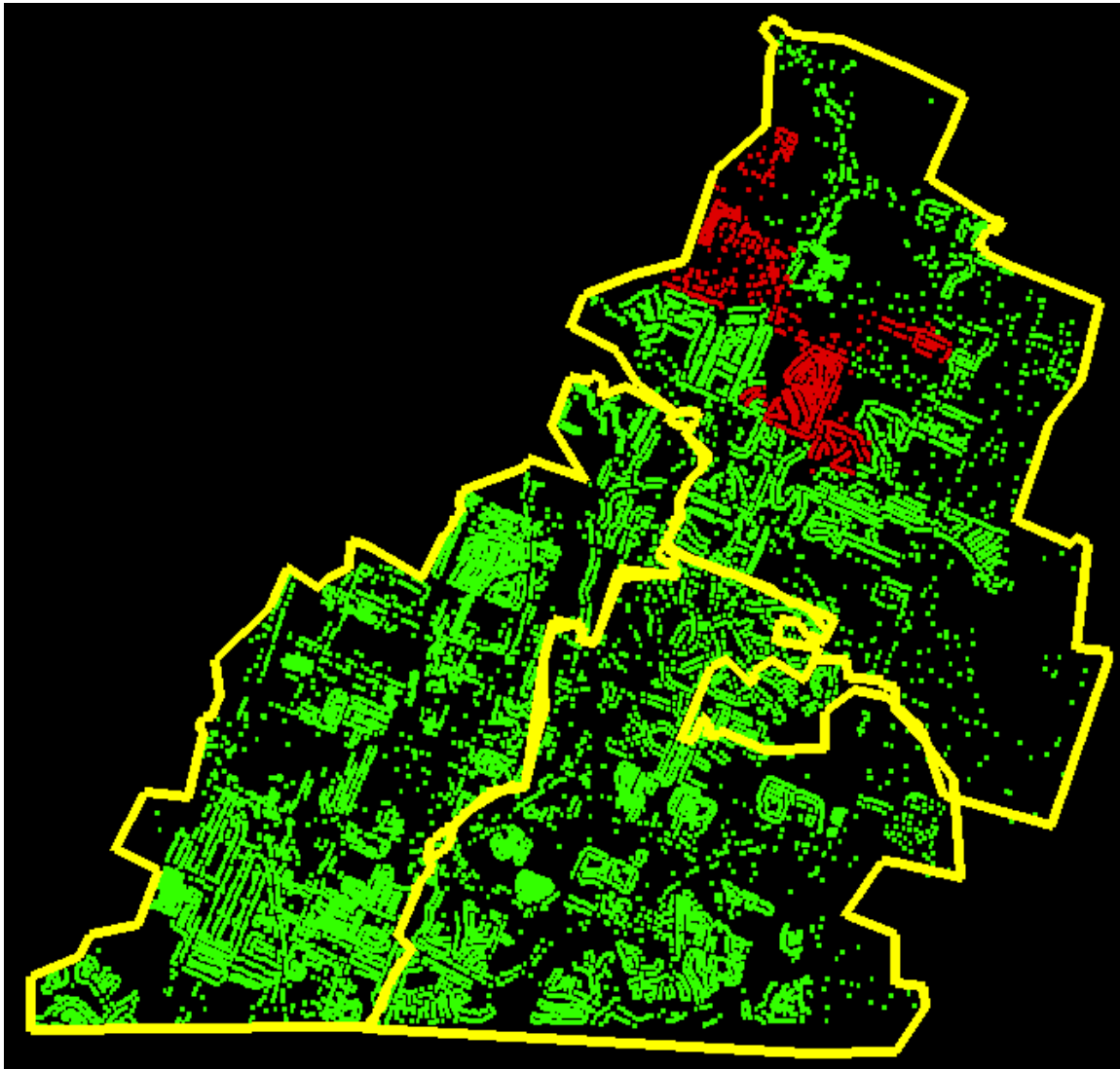


6:51:37pm, Service Restored to 10,000 Customers



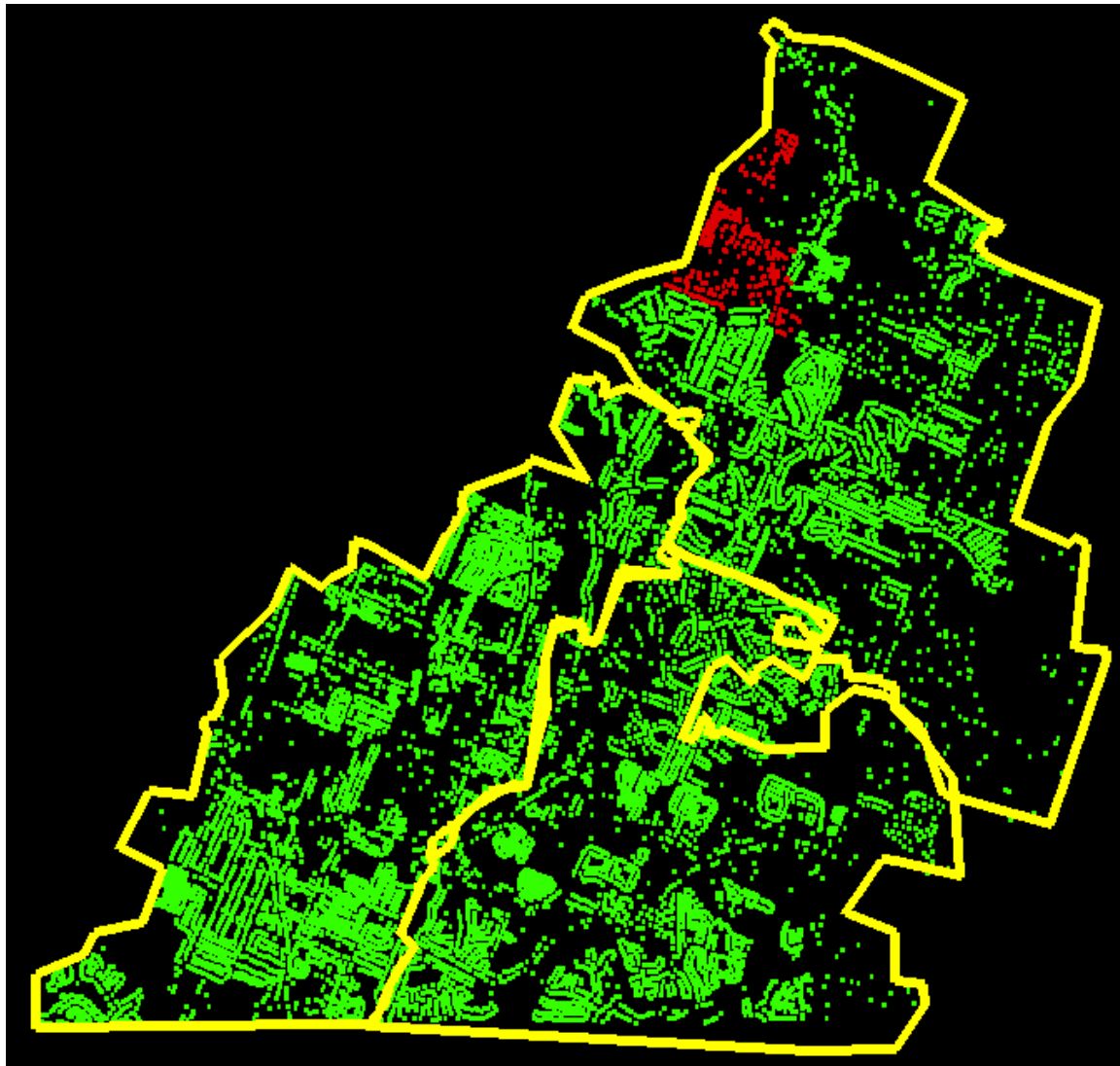
Before the 46kv breaker completed the reclose cycle, the distribution automation sensed the loss of voltage, automatically opened and closed switches to reroute power from adjacent 12kv lines.

6:51:52pm, Service Restored to Another 800 Customers



As the 46kv breaker completes the reclose cycle and locks out, the 46kv automation identifies the fault location, then opens and closes switched to energize two of the three stations.

6:55:04pm, Service Restored to 289 Customers

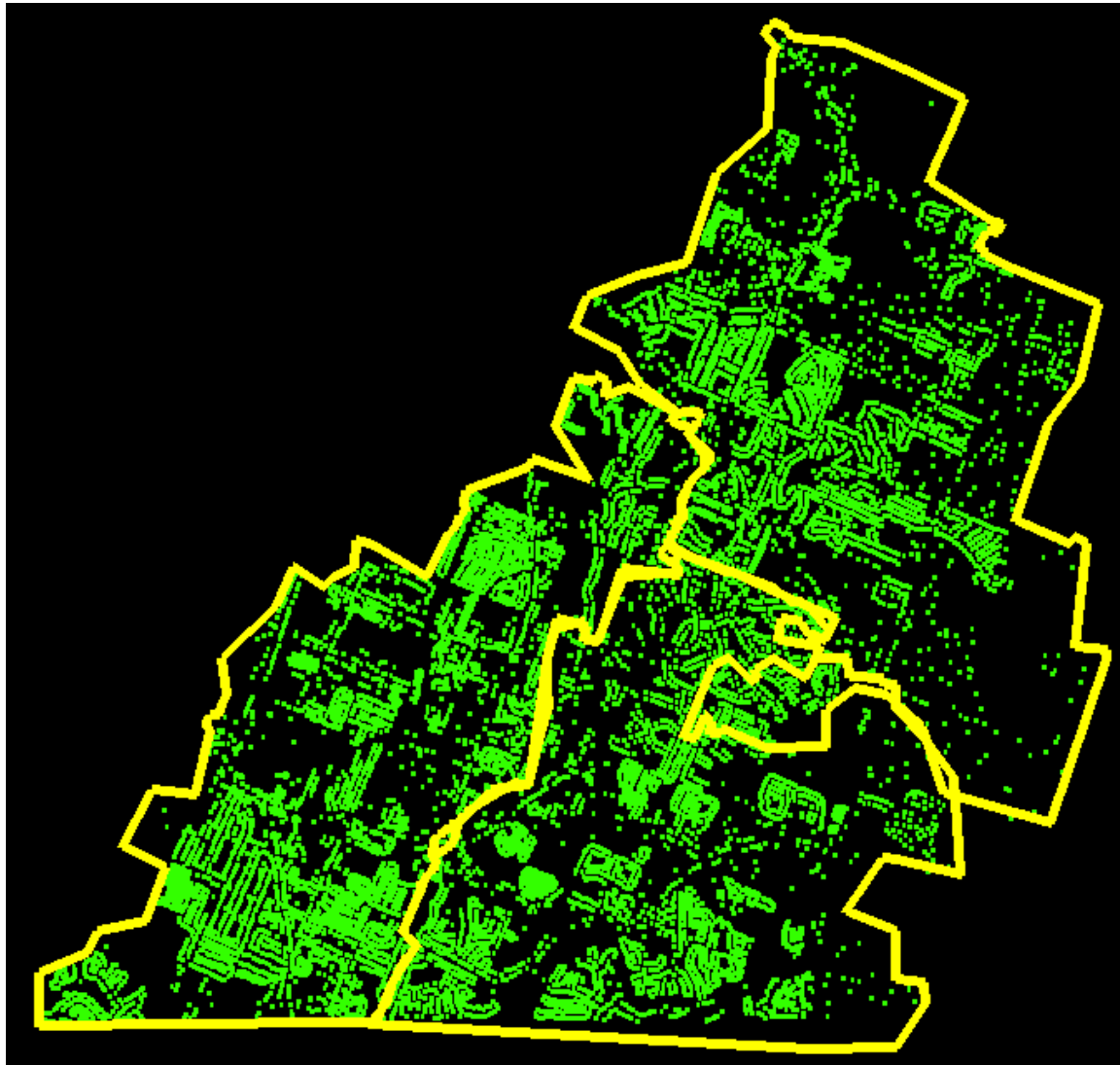


A dispatcher opens the PIN 201 breaker and closed the first PCR on the PIN 201 circuit.

The **289** customers between these two points now have electric power service.



6:57:47pm, All Service Restored



A dispatcher now opens the PIN 202 breaker and closed the first PCR on the PIN 202 circuit.

The remaining customers between these two points now have electric power service.

All electric services restored

January 14, 2013



- 11,258 customers lost power due to tree falling from outside of right of way
- All customers restored through automation or remote operation within 6 minutes
- Minimum number of switching operations required to restore service 39
- Restored to normal through automation
- Without automation over 4 hours of manual switching required just to restore service



Thank You

THE UNIVERSITY of TENNESSEE at CHATTANOOGA



SIMCENTER

NATIONAL CENTER
for COMPUTATIONAL
ENGINEERING



SIMCENTER
&
ENTERPRISES, Inc.

Public Safety and US Ignite

Dr. Henry McDonald

Chair of Excellence For Computational Engineering
University of Tennessee Chattanooga

The White House Launches US Ignite, June 14 2012

A public-private partnership to build ultra
high-speed broadband networks in
communities around the U.S.

7

"US Ignite will challenge students, startups, and industry leaders to create a new generation of applications and services that meet the needs of local communities while creating a broad range of job and investment opportunities."

US IGNITE

Chattanooga – the Prototype Smart City ?

7

- 1Gb EPB Fiber Network to 180,000 homes
- Mesh Network with City Police, Fire and Traffic WiFi Connecting over EPB Fiber through 560 Portals
- 300 Controlled Traffic Signals
- 350 Traffic Sensors for Adaptive Traffic Signal Control
- 400 Real-time Traffic Sensors for Traffic Volume
- 24,000 Actively Controlled LED street lights

City/EPB Support for Chattanooga as a Live Test Bed

The Six US Ignite Priority Areas

- Advanced manufacturing
- Health Information Technology
- Transportation
- Education and Workforce Development
- Clean Energy
- Emergency Preparedness and Public Safety

7

More Chattanooga Resources

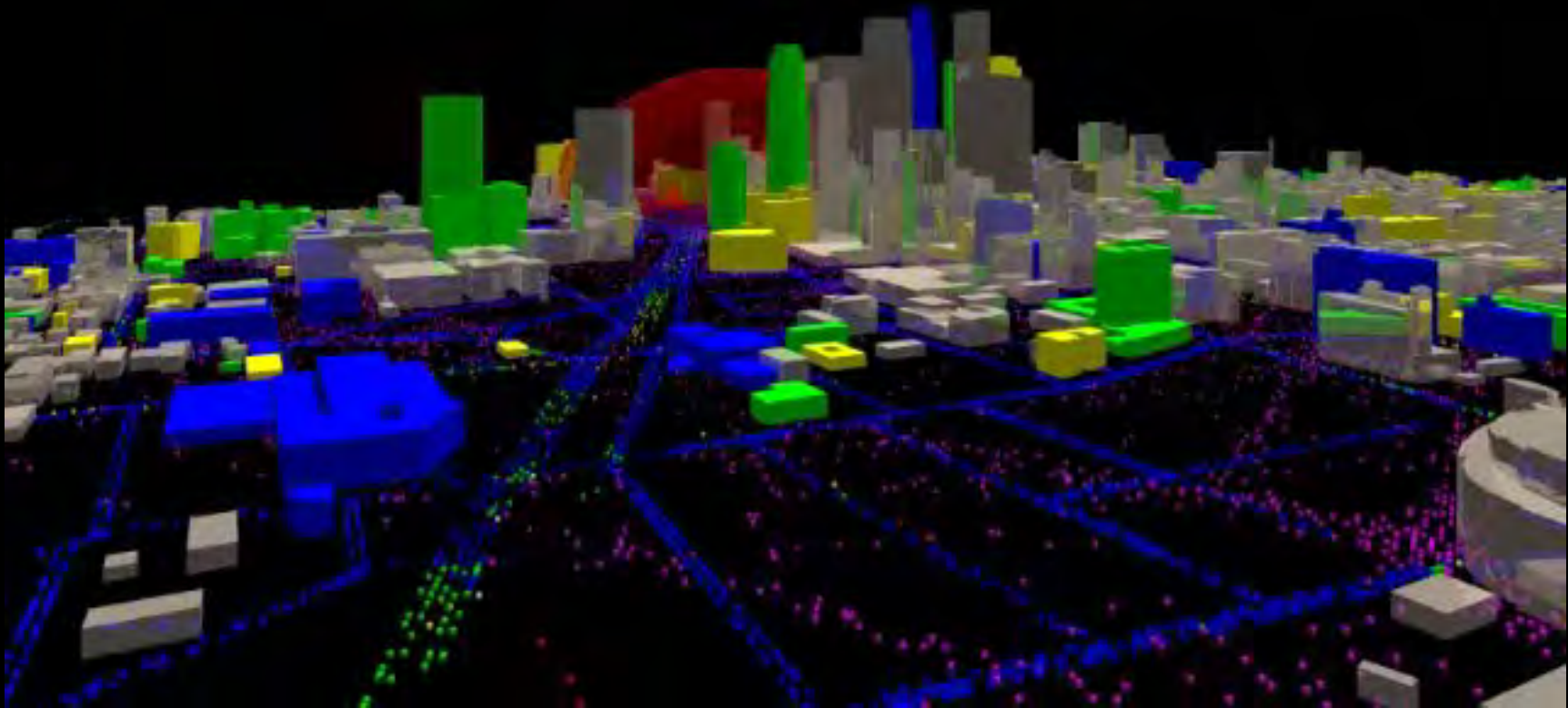
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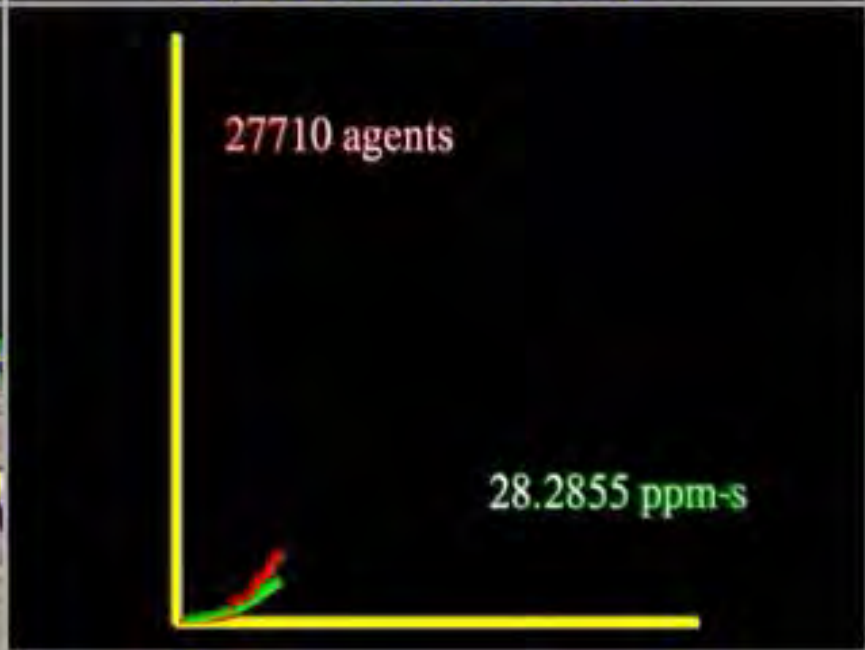
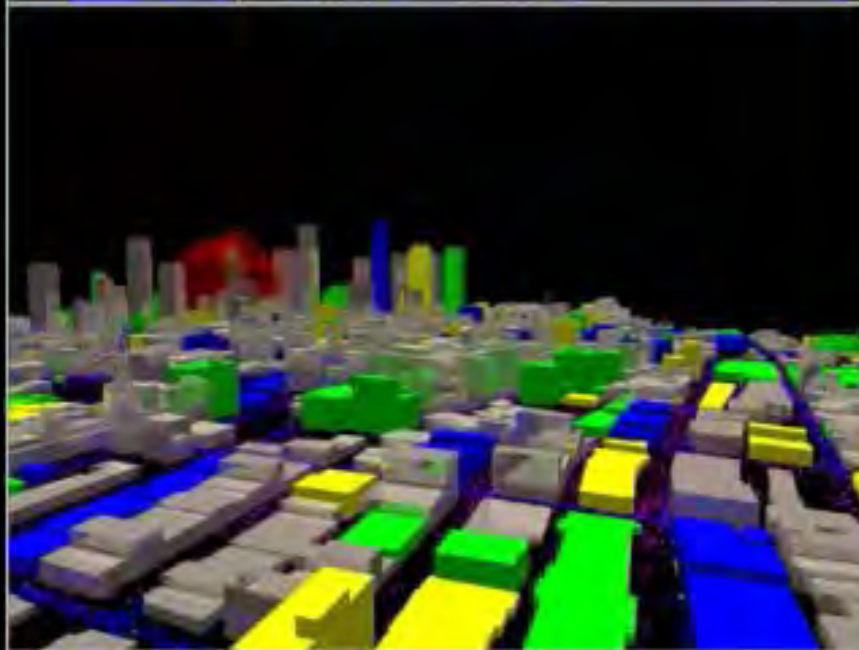
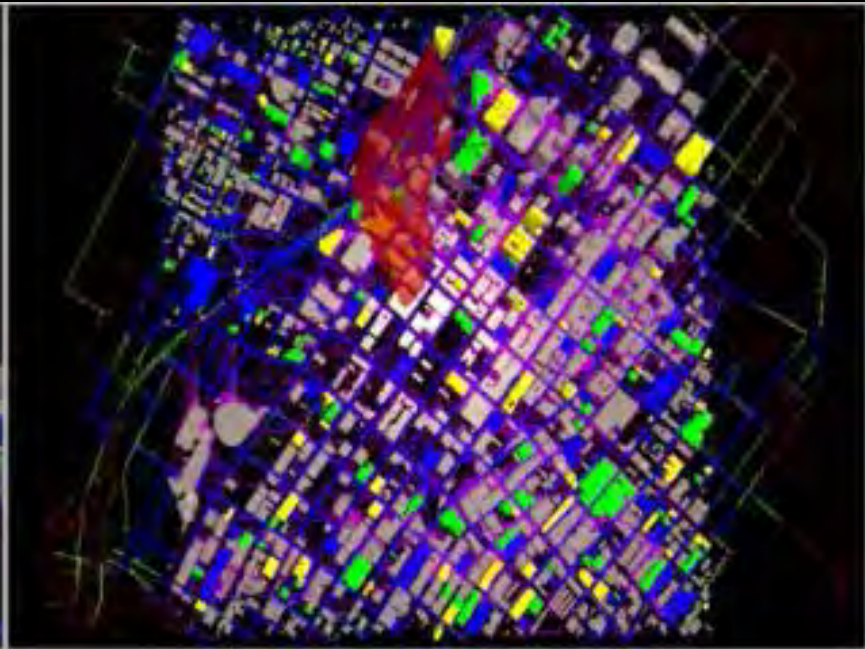
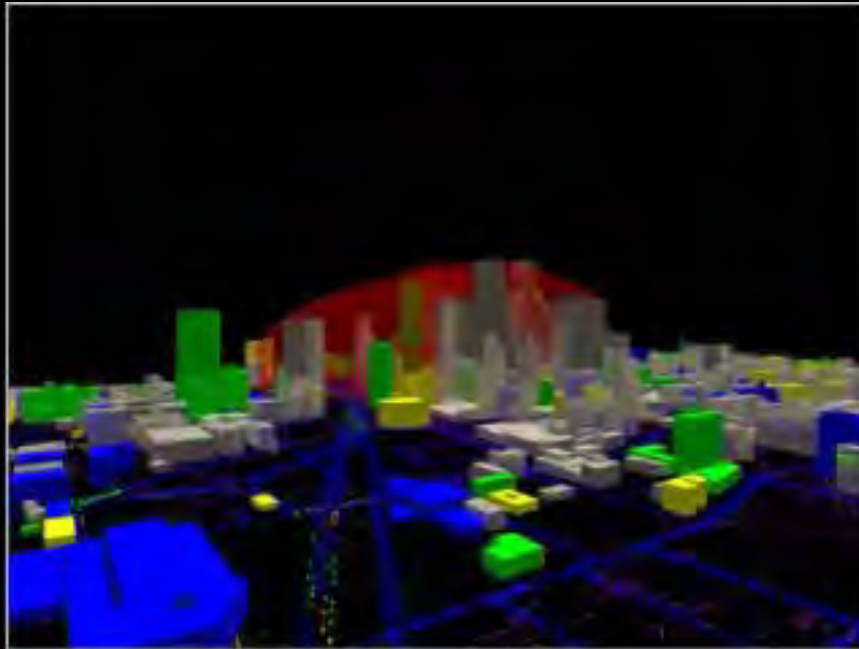
- UTC SimCenter, CECS and SimCenter Enterprises
- UTC SimCenter HP Computer System
- 10 Gb/sec Fiber to ORNL/UT NICS
- NSF Node Global Environment for Network Innovation – GENI

In light of US Ignite Priorities, City/EPB arrange for UTC to present their Disaster Mitigation work at US Ignite meeting

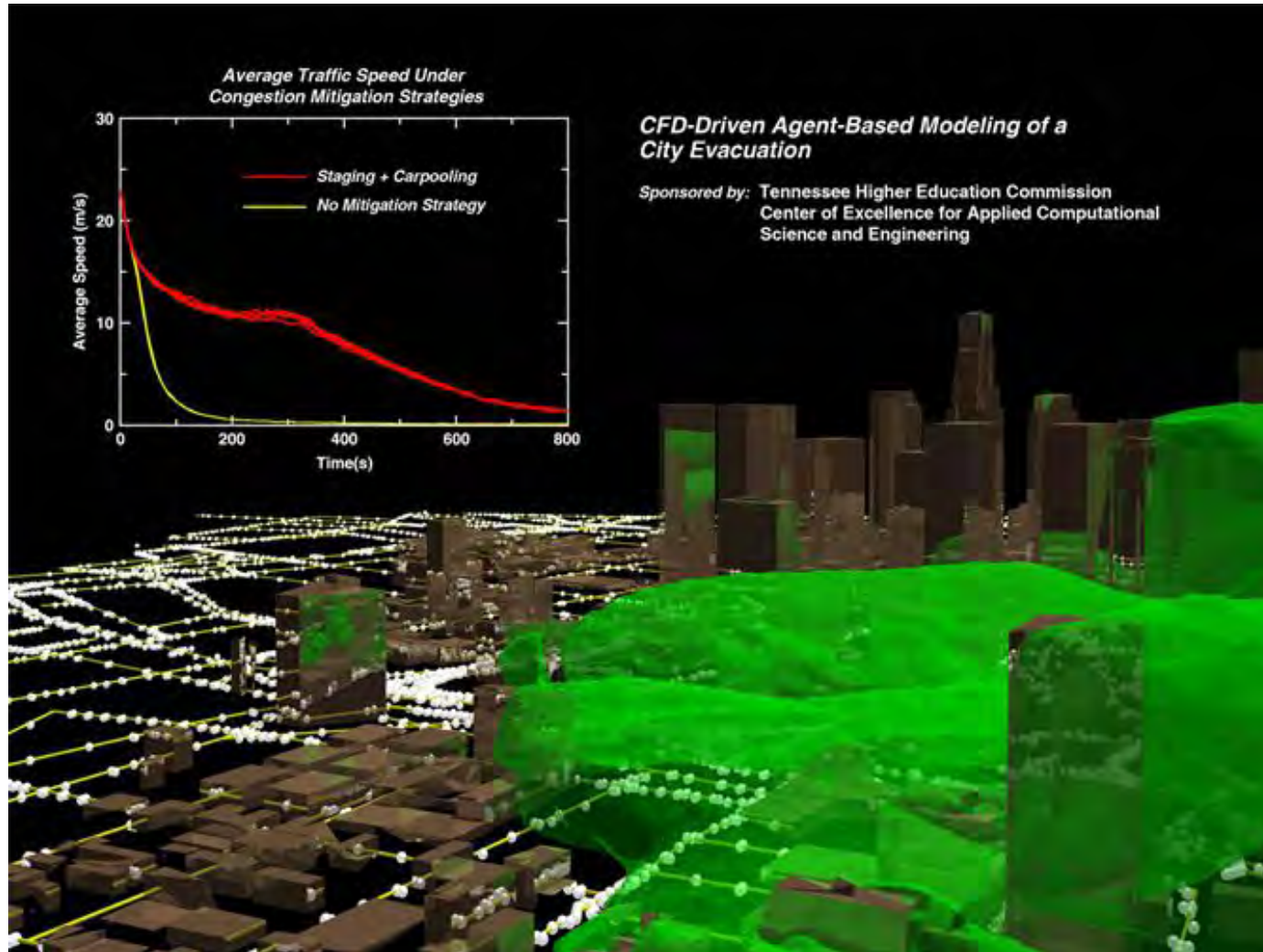








Rapid Evacuation Deployment Saves Lives



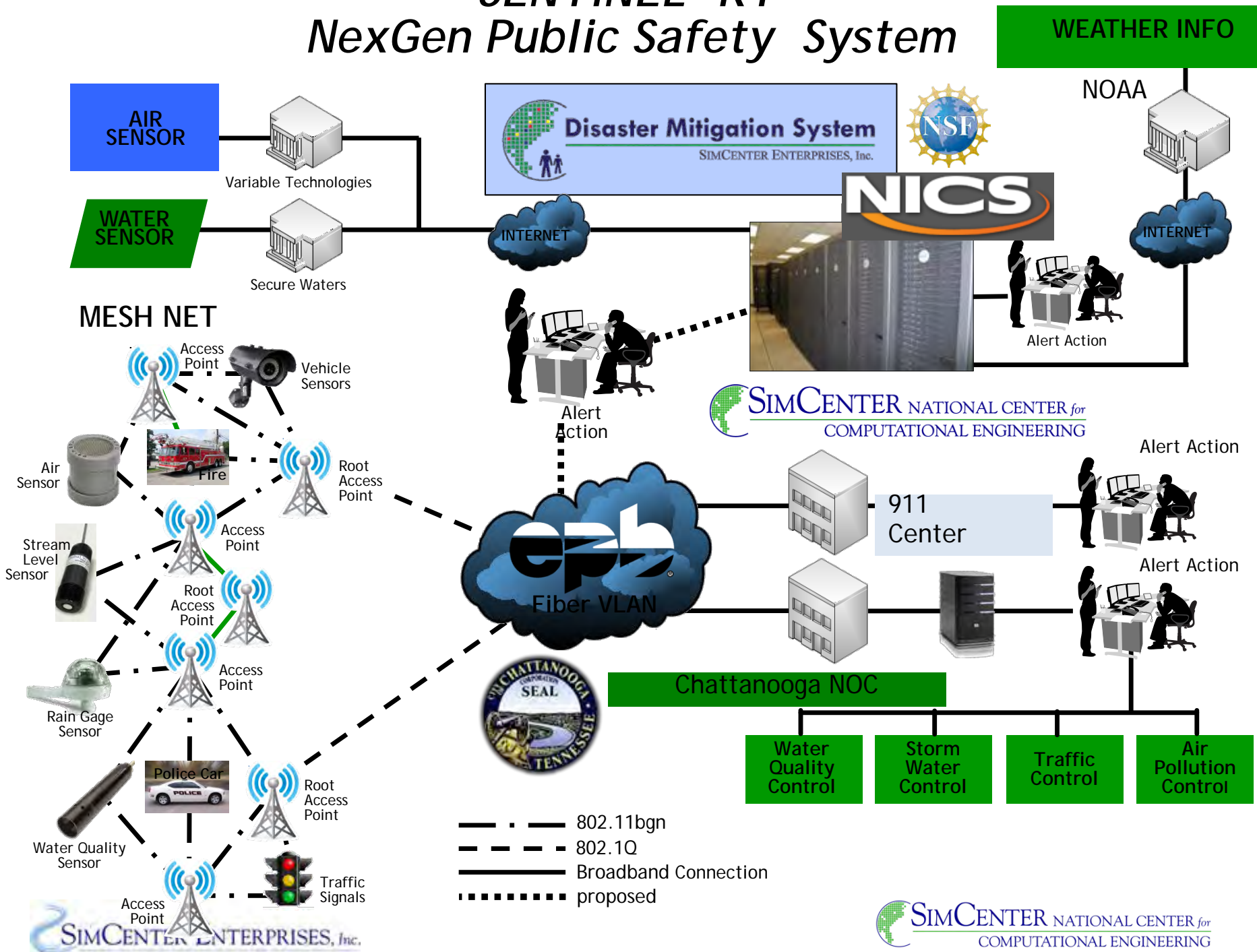
7

What are the Components of a Public Safety Disaster Mitigation System?

- Sensor and Communication Network
- Regional Weather with Atmospheric Boundary Layer (WARF & TENASI)
- Detailed City Description – including Population (GIS)
- Traffic Throughout City (TRANSIMS)
- Contaminant Release Prediction (Fire, Flood, Particulates from TENASI)
- Super-Computing and Communications (NICS, GENI)

Real Time Decision Support Tools

SENTINEL- RT NexGen Public Safety System



The NSF Eager Grant

'Eager' - Early Award of Grant for Exploratory Research

- NSF is the 'Public' component of US Ignite
- Proposal for 'Emergency Preparedness and Public Safety'

part of US Ignite program prepared and submitted by Chattanooga Team to NSF following presentations.

- SimCenter Enterprises Inc leading team of UTC SimCenter, Computer Science Department, and various local companies with EPB and City collaboration.
- Eager Grant for \$300,000. awarded Dec 2012 to jump start a pilot demonstration of the Disaster Mitigation System in the City of Chattanooga.
- **City/EPB Support for Chattanooga Live Test Bed**



Next Steps

- Continued development and testing of DMS with City of Chattanooga/EPB/UTC SimCenter
- Perform a high profile city (DC?) pilot
- Execution of DMS and demonstration with UT/NICS at ORNL using GENI link to UTC
- Stand up for profit entity to provide DMS as a service through SimCenter Enterprises

Next steps (Cont.)

- Follow-on Proposal on Public Safety Submitted to NSF with enlarged team SCE, SimCenter, CS Dept, Johns Hopkins University, UT National Institute for Computational Science at ORNL & EPB (4 years and \$3M)
- Related Proposal for Power Grid Safety submitted to NSF with SCE, SimCenter, CS Dept, Alcatel-Lucent (Bell Labs) & EPB (3 years and \$2M)

Summary

- National need to improve the alert and management of disasters.
- Supercomputing and high band width communication networks can greatly improve public safety
- UTC/UT now have great opportunity to lead in Smart Grid research and join GENI elite research universities
- Working with the City, EPB, UTC & UT research, develop, evaluate, implement and evolve a smart city management system



THE UNIVERSITY *of* TENNESSEE *at* CHATTANOOGA

SIMCENTER ENTERPRISES, *Inc.*

Thank You

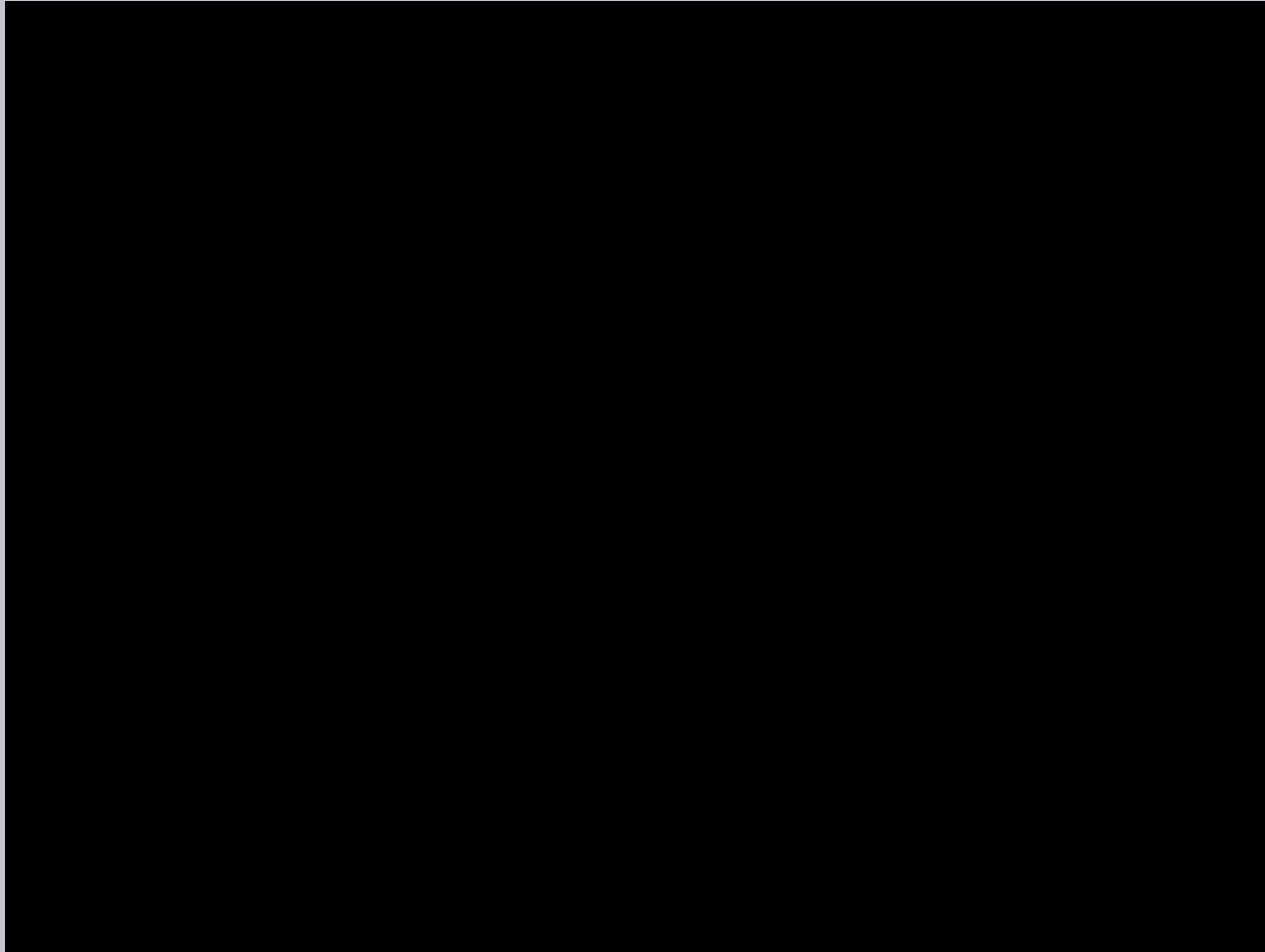
UTC FACULTY AND STUDENTS SHATTERING THE STEREOTYPE IN THE CHATTANOOGA COMMUNITY

Chattanooga
Community
Kitchen and UTC
School of
Nursing

A COMMUNITY
PARTNERSHIP

NURSES SHATTER THE STEREOTYPE

ROBERT WOOD JOHNSON FOUNDATION



http://youtu.be/nrOi3uPK_m4

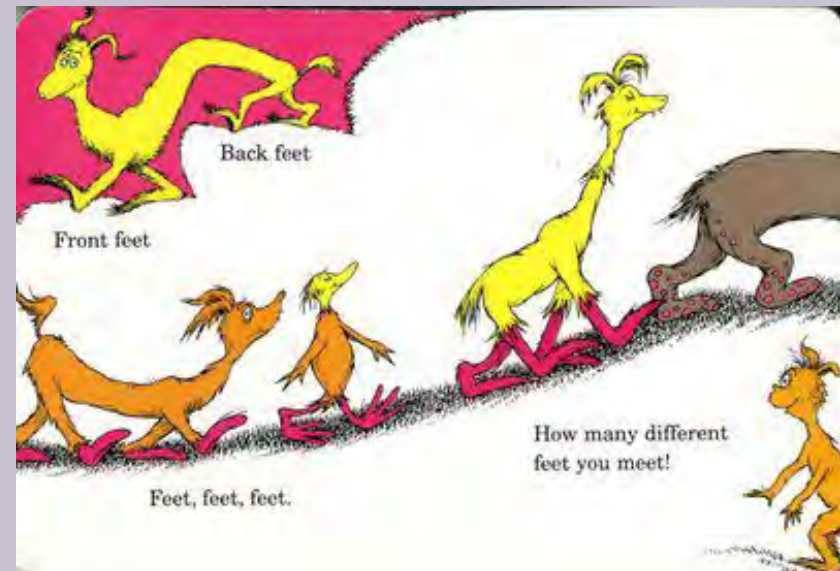
THE HUMAN FOOT IS A MASTERPIECE OF ENGINEERING AND A WORK OF ART.

LEONARDO DA VINCI



THE HOMELESS FEET WE MEET DR. SEUSS

- Many homeless people walk miles a day leading to...
 - Corns, calluses, blisters, bunions, infections, sores, pain, spurs, deformities
- Trench foot - named for WWI soldiers' feet, tissue damage from cold feet in standing water
- Fungal infections - seen in Viet Nam soldiers' feet, hot feet that are never completely dry



THE CHATTANOOGA COMMUNITY KITCHEN FOOT CLINIC

A Spiritual Beginning

- Brother Ron Fender “I was called by God to do this work.”
- Dr. Chris Seglar- a Chattanooga podiatrist called to help
- Dr. Lisa Muirhead- UTC nursing faculty, invited nursing students



THE CHATTANOOGA COMMUNITY KITCHEN FOOT CLINIC TODAY

- Synergy - spiritual and medical equity for vulnerable populations
- UTC Community nursing students staff the clinic 3 days weekly.
- Brother Ron provides foot care any time when asked by anyone.
- UTC SON's Get Healthy Grant - students provide health education in homeless population:
Teachable Moments,
Poster Presentations
Special Events such as
Health Fairs, Homeless
Connects and Diabetes
Month



THE CHATTANOOGA COMMUNITY KITCHEN FOOT CLINIC

The Vision: Growing the partnership between the UTC School of Nursing and CCK

HRSA Grant Proposal: Interprofessional Collaborative for Homeless Healthcare, Education, Learning, and Practice (IPC-HHELP)

Interprofessional teams of students (nursing, social work, nutrition) collaborating in innovative learning environments with the goal of improving primary and chronic care for the homeless population.



NURSE 4520 AND 4530 COMMUNITY CONCEPTS AND PRACTICUM

- Staffing the Chattanooga Community Kitchen Foot Clinic offers nursing students an opportunity for experiential learning to meet course objectives related to ...
 - Utilizing public health principles
 - Encountering social and economic issues that shape health
 - Community empowerment through education
 - Working with other disciplines to deliver holistic health care
 - Learning about health disparities and about (and from) vulnerable populations
 - Synthesizing the art and science of nursing





**“GOLLY”, CHERRY BREATHED, “THERE’S MORE TO THIS
THAN TAKING TEMPERATURES”
CHERRY AMES, VISITING NURSE**

- **Foot Clinic experience alone is not enough**
- **Role of faculty in transformative learning**
 - **Help students become critically aware of their assumptions about homelessness, vulnerability, and the current healthcare system**
 - **Engage students in discourse about their assumptions**
 - **Safe environment**
 - **3-4 students, pre- and post-conference**
 - **Offer alternate perspectives and encourage autonomous thinking**
 - **Also review Nursing’s Social Policy Statements**
 - **Objective - students will act from new, broader perspectives**
 - **By choosing public health nursing as a specialty**
 - **While caring for vulnerable patients in traditional settings**
 - **Through political involvement and voting on health issues**
 - **By participating in research that promotes health reform**

STUDENT PERSPECTIVES

- “I don’t really know what I was expecting but the people I’ve met here are just regular people.”
- “I feel I’m being of service but it’s hard to think of this as nursing.”
- “I kept thinking I was doing this for Jesus.”
- “I feel really thankful for all that I have.”
- “I would come back and do this on my own.”
- “I know if someone with insurance had [this problem] more would be done.”
- “The people here were really attentive when we were teaching. They asked a lot of questions which made us feel good.”

CCK HEALTH FAIR 2012



**IF YOU WANT TO BUILD A SHIP, DON'T DRUM UP THE MEN TO GATHER WOOD, DIVIDE THE WORK AND GIVE ORDERS, BUT RATHER TEACH THEM TO YEARN FOR THE ENDLESS IMMENSITY OF THE SEA.
ANTOINE DE SAINT-EXUPERY**

