



ITEA System of Systems Engineering Workshop
Reducing Risk in 2020

System of Systems Academic Panel
January 29, 2015

Mr. Derrick Hinton
Principal Deputy Director (Acting)
DASD Developmental Test and Evaluation

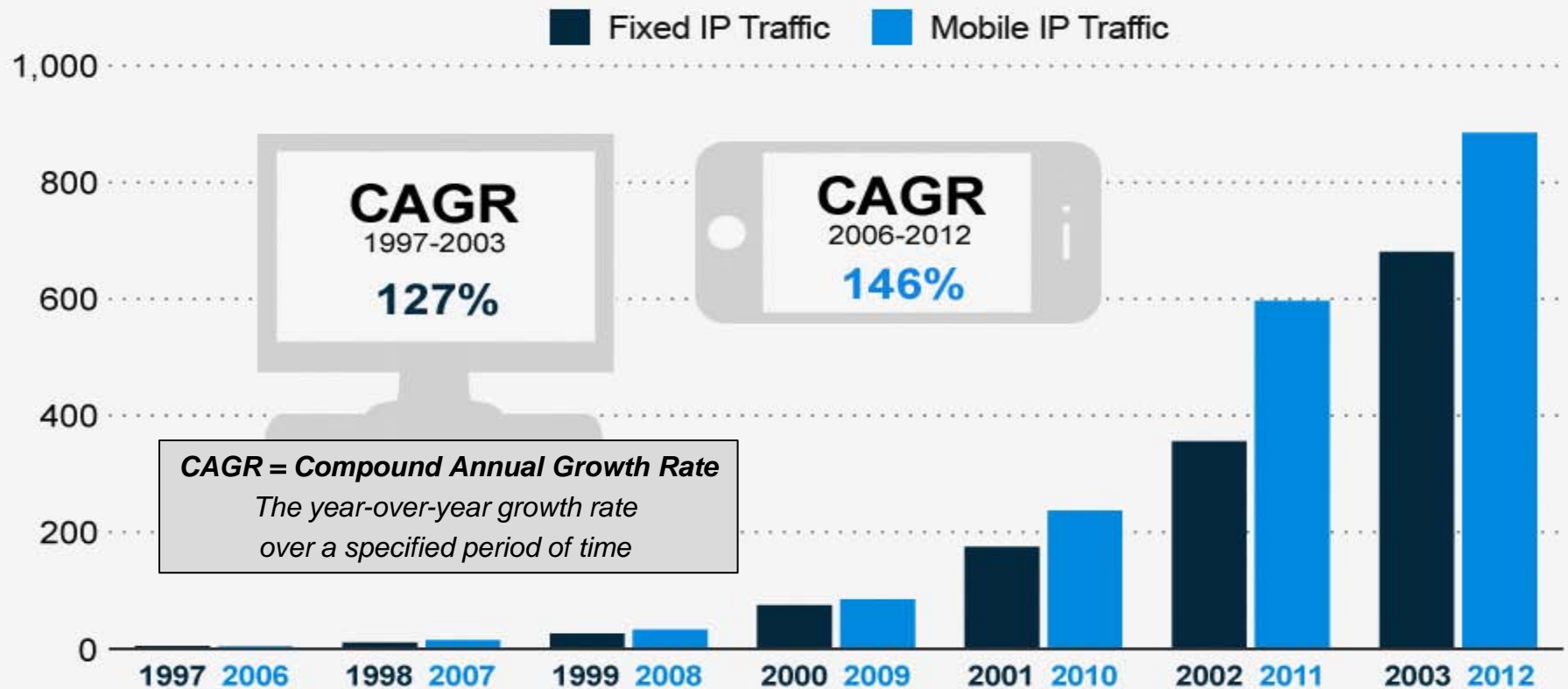


Appetite for Data is a Global Phenomenon



Mobile Traffic Is Growing at Unprecedented Pace

Global IP traffic in petabytes per month

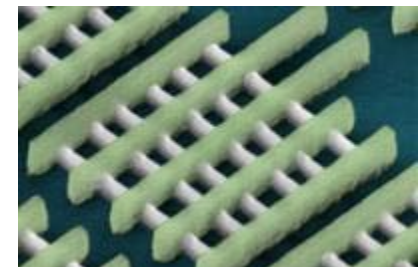




The Intel 22nm Transistor



In 2011, Intel made a radical change in its transistor design, producing the world's first 22 nm 3-D tri-gate silicon transistor



Some Facts:

The original 1947 Bell Labs transistor was large enough to be built by hand.

By contrast, more than 100M 22nm tri-gate transistors could fit onto the head of a pin.

22nm transistors can switch on and off over 100B times a second.

It would take you around 2,000 years to flick a light switch on and off that many times.

More than 6M 22nm transistors could fit in a period printed in 12 point font.

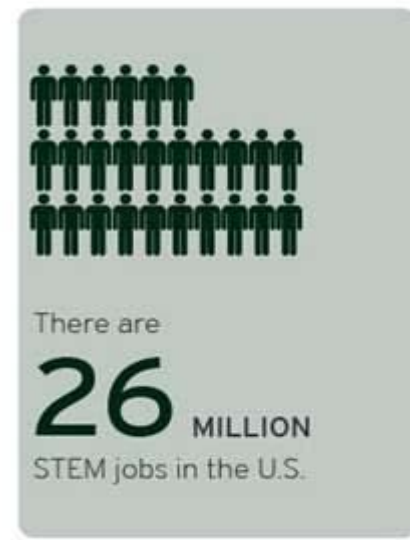
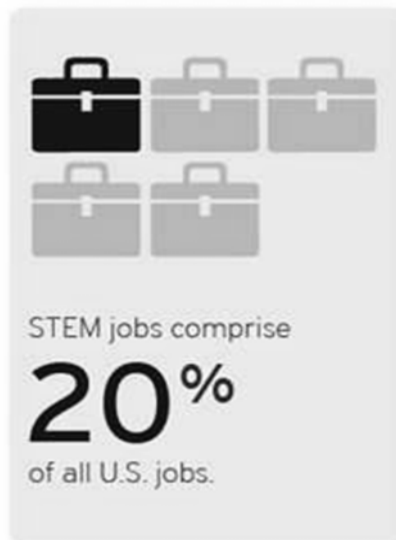
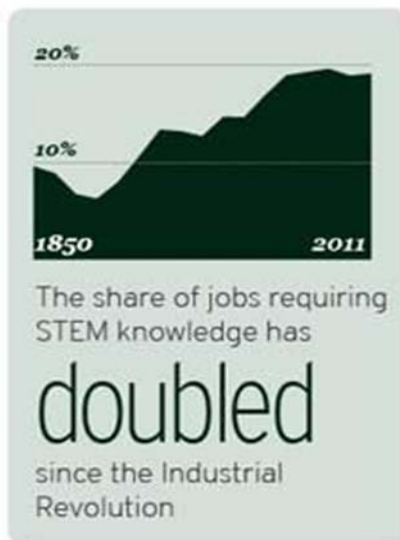
Intel's factories produce >3B transistors every second. That's an annual equivalent of over 20M transistors for every man, woman, and child on earth.

Compared to Intel's first microprocessor, the 4004, introduced in 1971, a 22nm CPU runs over 4,000x faster, uses about 5,000x less energy, and the price per transistor has dropped by a factor of ~50,000.

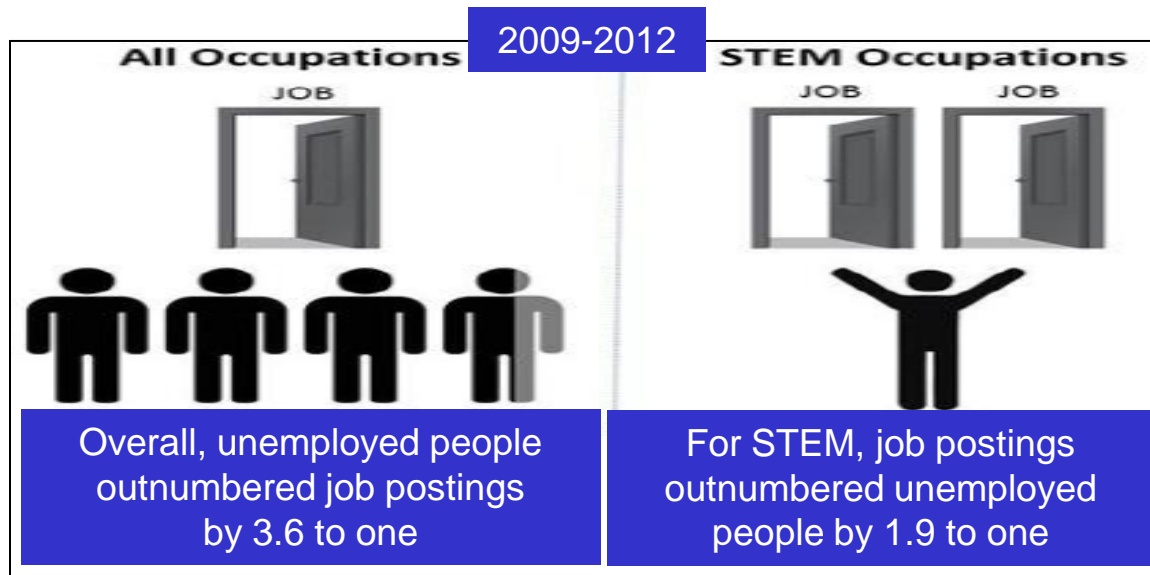


The National Picture

- STEM has been trending for years
- The US government estimates that jobs in STEM fields have grown three times faster than jobs in the rest of the US economy over the last 10 years
- The opportunities are abundant



Source: *Brookings Institution, The Hidden STEM Economy, 2013*



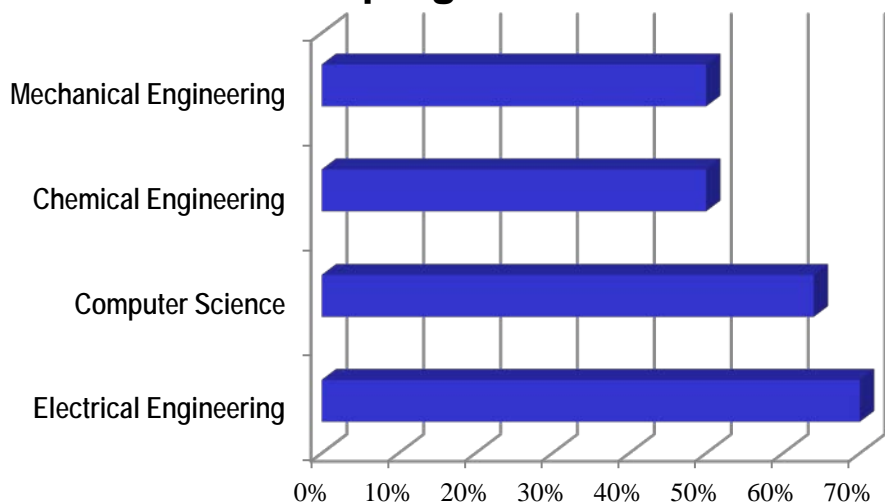
Source: *Change the Equation, STEM Help Wanted, 2012*



The Brain Drain



Foreign students enrollment in U.S. Science & Engineering (S&E) graduate programs



- International students account for:
 - 70% of full-time graduate students in the U.S. studying electrical engineering
 - 63% in computer science
 - > 50% in chemical engineering and mechanical engineering

Source: National Foundation for American Policy, *The Importance of International Students to America*, 2013

Overall U.S. Graduate Enrollment Remains Flat . . .

Yet Foreign Graduate Enrollment in Science & Engineering (S&E) Continues to Rise

- In 2012, enrollment of foreign students in S&E graduate increased 4.3%
- In contrast, enrollment of U.S. citizens and permanent residents declined 1.7%
- It is a national imperative to and recruit more American students into grad school

Source: National Science Foundation, 2014



Better Buying Power 3.0

SHIFTING EMPHASIS TO INNOVATION

"Increase DoD support for Science, Technology, Engineering, and Math (STEM) education. This BBP 3.0 initiative is focused on the long term health of the DoD acquisition enterprise, our ability to sustain technological superiority militarily, and the economic well-being of our nation. DoD and many of our partners in the Defense Industrial Base are already active in promoting STEM education. This activism includes financial and institutional support as well as a great deal of volunteer work. ***While efforts to encourage young people to pursue STEM related careers now may seem a long way from our immediate concerns, in the long run our society, and our military, is highly dependent on our ability to encourage students to enter and remain in technical career fields.***"

USD(AT&L) Mr. Frank Kendall – "Improve the Professionalism of the Total Acquisition Workforce" section, BBP 3.0 (interim version) 19 Sep 2014



Mr. Michael Acosta



- **35+ years of experience in business management, strategic planning, engineering design and development, and economic development**
- **Recent STEM Program Consultant for Workforce Solutions Upper Rio Grande (regional workforce development organization in El Paso, TX)**
- **Past National President of MAES (the Society of Mexican American Engineers and Scientists)**
- **18+ years at University of Texas at El Paso (ret. 2013)**
 - PI (Principal Investigator) on major grants at UTEP totaling > \$3.5M
 - PI for an additional \$400K grant to initiate the Bi-National Sustainability Laboratory (BNSL)
 - Director of the Border Office of the U.S. – Mexico Foundation for Science (FUMEC) (bi-national non-profit organization at UTEP)
 - Interim Executive Director for the Hub of Human Innovation (regional technology business incubator established in El Paso, TX)
- **21 years as engineer/manager at IBM**



Dr. Patricia Sullivan



- **Associate Dean for Outreach and Public Service, College of Engineering, New Mexico State University**
 - Directs statewide engineering outreach services under the College's Engineering New Mexico Resource Network including technical engineering business assistance, professional development, and educational outreach programs
 - Co-PI (Co-Principal Investigator) for a National Science Foundation (NSF) grant to broaden participation among minority engineering students through engagement in innovation and entrepreneurship
 - Co-PI for an i6 Challenge grant through the U.S. Economic Development Administration (EDA) to foster regional economic development through innovation and new business start-ups
 - Co-lead for a NSF funded Pathways to Innovation cohort at NMSU with a focus on integrating innovation and entrepreneurship into the engineering curriculum through a blending of industry and educational experiences
 - Commissioner for the Western Interstate Commission for Higher Education (WICHE)
- **PhD in Industrial Engineering with a focus on renewable energy regulatory policy**



Mr. Paul Mann, SES



- **Executive Director, U.S. Army White Sands Missile Range (WSMR), Army Test and Evaluation Command (ATEC)**
 - Responsible for the successful operation of the largest over-land missile test range within the Department of Defense (DoD)
 - Responsible for the development, approval and implementation of all scientific and technical policies and procedures in support of stakeholders
 - Leads the resource management plans/programs and provides technical direction to the workforce
- **B.S. Mathematics *cum laude*, University of La Verne**
- **M.P.A., Public Administration, American University**
- **Executive Fellowships, Harvard University and Georgetown University**
- **Executive PM Course, DAU**
- **DAWIA Level III, Program Management and Systems Engineering**



Dr. Shawn Smith, PMP, RCDD



- **Corporate Capture Manager, Engility Corporation**
- **Currently leads technical solutioning efforts focused on Test and Evaluation, Technology, and Systems Engineering services in the Navy and Defense Information Systems Agency (DISA) markets**
- **Technical background includes designing, installing, and maintaining military and civilian strategic and tactical communications systems**