Science, Technology and Engineering Education in 21st Century Diplomacy and Development

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Outline of Remarks

Science and Technology Adviser to the Secretary

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S&T and Engineering Defined

Science and Technology Adviser to the Secretary

Science is the study of the natural world and has two parts:

(1) a body of knowledge that has been accumulated over time
(2) a process—scientific inquiry— that generates knowledge about the natural world.

Engineering, too, consists of a body of knowledge—in this case knowledge of the design and creation of human-made products—and a process for solving problems. It is an oversimplification, but in many ways engineering is the practical application of scientific knowledge.

Technology is a product of engineering and science.

"A scientist studies what is, an engineer creates what never was."

Theodore Von Karman

Role of S&T in Global Affairs

Science and Technology Adviser to the Secretary

Observations

- S&T and engineering advances have enormous, immediate influence on global and national economies, and on international relations.
- Nations are largely shaped by their expertise in and access to S&T and engineering assets.
- Major S&T advances of our time not only offer remarkable new opportunities, but often challenge our social institutions and ethical principles.
- In an increasingly global world, accurate S&T information must inform foreign policy and foreign policy must promote justified scientific goals.

S&T in 21st Century Diplomacy and Development Policy

Science and Technology Adviser to the Secretary

"In the 21st century, American foreign policy must have a sound scientific foundation. And we must build on that foundation to stem the spread of infectious diseases such as HIV-AIDs, to stop proliferation of weapons of mass destruction, to lift people out of poverty, and lead states onto the path of sustainable development. Now more than ever, American science must enlighten American statecraft. But the partnership between science and statesmanship is a two-way street. American diplomacy must also help advance world science."

Secretary Colin Powell – May 2004

"I think science, as a diplomatic tool, is great…openness in recognizing that there are no boundaries and therefore keeping ourselves open to other people, making sure that we are at the center of scientific discourse. Today, dynamic advancements in science and technology are transforming he world — making it possible for more and more people to compete equally across all fields of human endeavor. America must remain at the forefront of this new world."

Secretary Condoleezza Rice – May 2005

S&T in 21st Century Diplomacy and Development Policy

Science and Technology Adviser to the Secretary

"We also need to work with our friends around the world. Science, technology and innovation proceed more rapidly and more cost effectively when insights, costs and risks are shared; and so many of the challenges that science and technology will help us meet are global in character. This is true of our dependence on oil, the consequences of climate change, the threat of epidemic disease, and the spread of nuclear weapons. And that is why my administration is ramping up participation in -- and our commitment to – international science and technology cooperation across the many areas where it is clearly in our interest to do so."

President Barack Obama – April 2009

"I think science diplomacy and science and technology cooperation between the United States and other countries is one of our most effective ways of influencing and assisting other nations and creating real bridges between the United States and counterparts. Science and technology is one of the highest priorities for the countries with whom we are dealing. And we have to be more creative and more focused, and we need more partners. "

Secretary of State Hillary Clinton – July 2009

U.S. Department of State and U.S. Agency for International Development

STRATEGIC PLAN - Fiscal Years 2009-2014

Mission Statement

Advance freedom for the benefit of the American people and the international community by helping to build and sustain a more democratic, secure, and prosperous world composed of well-governed states that respond to the needs of their people, reduce widespread poverty, and act responsibly within the international system.

Strategic Goals

Achieving Peace and Security – Counter-terrorism, WMD, Conflict Prevention, Crime, Homeland Security

Governing Justly and Democratically – Rule of Law, Human Rights, Good Governance, Political, Civil Society

Investing in People – Health, Education, Social Services for Vulnerable Populations

Promoting Economic Growth and Prosperity – Markets, Trade, Investment, Energy Security, Environment

Providing Humanitarian Assistance – Protection, Assistance, Disaster Prevention and Mitigation, Migration

Promoting International Understanding – Foster Positive Vision, Common Interests, Marginalize Extremism

Strengthening Consular, Management Capabilities – Consular Services (visas, passports), 21st C Workforce

Science, Engineering, Technology (SET) Support State/USAID Joint Strategic Goals

Hard Power

Peace and Security - SET for National Security, Regional Stability, CT

"Smart" Power

Good Governance – SET Meritocracy, Transparency, Protection of IPR
Investing in People - K-12 Science and Math, Higher Education, Research
Economic Growth – SET Partnerships Foster Innovation, US Business

Soft Power

Humanitarian Assistance – SET for Sustainable Development
Promoting International Understanding – SET for Diplomacy, Outreach

Intelligent Power or "Enlightened Self-Interest"

Strengthening Consular and Management Capabilities – SET Literacy

STAS Mission Statement

Strengthen State S&T Strategic Planning and Human Resources as Hard, Soft, "Smart" Power Assets for U.S. Diplomacy and Development Policy

STAS Core Objectives

(1) Increase S&T Literacy at State – Personal and Training
(2) Build Partnerships with Outside S&T Community – Domestic, Foreign
(3) Advise the Secretary, other Senior Staff on Critical, Current S&T Issues
(4) Lead Strategic Planning Initiatives Anticipating Mid, Long-term S&T Issues, Trends
(5) Foster Diplomacy for S&T and Innovation at USAID

Experts Conclude S&T Are Core Drivers of Change

USCNS – "The Roadmap for National Security – Imperatives for Change" (1996-98)
NDU "The Global Century – Globalization and National Security" (2000)
NIC "Global Trends 2015" and "Mapping the Global Future 2020" (2003, 2006)
RAND "Global Technology Revolution 2020" (2006)
NRC Report "The Pervasive Role of S&T and Health in Foreign Policy" (1999)
NRC Report "The Fundamental Role of S&T in International Development" (2006)
State Department "Project Horizon" at the Year 2025 (2007)
NIC Global Trends 2025 (2009)

Project Horizon – An Overview

Project Horizon **brought together USG national security and global affairs agencies for joint, scenario-based strategic planning based on alternative scenarios at the year 2025**

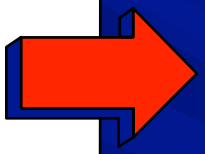
- **Purpose**
  - **To develop strategic interagency capabilities in which the U.S. Government should consider investing in order to prepare for the threats and opportunities that will face the U.S. and the world over the next 20 years**
  - **To provide participating agencies with a scenario-planning toolset that can be used to support both internal and interagency, joint planning**
  - **To provide a starting point for a permanent interagency planning process**
- **Participants**
  - **USG senior executives from more than 15 agencies, strategic planners, and subject matter experts together with select academics and private sector participants**
  - **Participating agencies: NSC, Agriculture, Commerce, Defense (OSD and J5), Energy, EPA, HHS, DHS, ODNI, Labor, National Defense University, MCC, State, Treasury, and USAID**

Building the Scenarios

- Based on 200 interviews, ‘drivers’ were identified and then distilled into dimensions of broader, more universal scope

PARTIAL LIST OF DRIVERS

- Level of Stability and Conflict
- Non-traditional actors
- Borders: nature and permeability
- Charismatic leadership (source of)
- Terrorism
- Global Media
- Religion
- Poverty & Development
- International Crime/Illicit Economy
- The Global Commons
- Energy
- Agriculture/Food
- Water & Other Critical Resources
- Global Health
- Environment
- Demographics
- Science and Technology
- Global alliance structures
- Role/structure of transnational business and business organizations
- Dynamics of international debt
- Unemployment/ social fabric
- Global Culture
- Global Perception of the U.S.
- U.S. Economy GDP growth;
- Availability of capital/ investment climate
- Employment
- Trade and investment (FDI) relationships
- Resource dependency
- U.S. Political Landscape
- Locus of political power
- Public perception of government
- Integration/ fragmentation of U.S. society
- Education
- Health care
- Aging population of U.S.; societal and political effects



DIMENSIONS

- **Challenge to Nation State Power and Influence**
- **Gap in Global Standard of Living**
- **U.S. Economic Competitiveness**
- **Perception of Serious Threat to U.S. Security and/or Quality of Life**

HORIZON – Forces for Change

Most frequently mentioned forces for change expected to drive the landscape of threats and opportunities through 2025

1. Global Interdependence
2. Science & Technology (S&T) Competition
3. China and India
4. Natural Resources/ Energy
5. Global Perceptions of the U.S.
6. Changes in Military Power
7. Environmental Change
8. Global Health and Disease
9. Advances in Science and Technology
10. Globalization, Poverty, and Development
11. Demographics
12. Religion
13. Sovereignty and the Role of the Nation-state
14. Terrorism
15. Interagency Issues

The Project Horizon Scenarios: An "Electron Cloud" in 2025

- *Asian Way*
  - In this world, the global economy increasingly is dominated by Asian mega-corporations that are expanding at the expense of the formerly dominant American and European military and economic powers
- *Be Careful What You Wish For*
  - Not without its problems to manage, this is a world of opportunity, freedom, and great technological advance. The USG is overstretched operationally and finds a world made up of activist fellow democracies challenging in unexpected ways
- *Lockdown*
  - This is a multi-threat world marked by persistent terrorism, nuclear proliferation, and the most challenging economics the U.S. – and the world – have faced in more than 50 years – two WMD attacks in 15 years
- *Congagement*
  - Political and economic power increasingly are organized regionally. It is a vibrant, tense and highly competitive world with multiple points of friction
- *Profits and Principles*
  - Many have benefited from hyper-capitalism, many others have not. Public institutions are increasingly weak while new, powerful organizations are emerging. The global clash between profits and principles is causing fear that these divergent paths could end up on a collision course

Strategic Interagency Capabilities: Recommendations - All Scenarios

- Quadrennial Strategic Review
  - **A coordinated interagency strategic planning process for USG global affairs activities that links the President's National Security Strategy and other National Strategies with agency-level Strategic and Performance Plans, Budget Submissions, and Performance and Accountability Reports**
- Government-Wide Information Sharing
  - **Transformed government-wide information sharing, including revised doctrine, procedures, and incentive structures for shifting the USG from a "need to know" model to a "need to share" model of information access**
- Global Domain Foresight
  - **The ability to maintain anticipatory global domain awareness to enable proactive responses to emerging man-made and natural threats**
- Interagency Fusion Groups
  - **The streamlined ability to create, staff and monitor time-limited interagency organizations specifically focused on emerging strategic issues featuring clear lines of accountability, cross-agency resource control and authority**
- Global Health Engagement
  - **A strategic approach to the mobilization of interagency and non-governmental public health assets to advance U.S. leadership and public diplomacy efforts**

Strategic Interagency Capabilities - All Scenarios

- Global Hazards Planning and Response
  - **An integrated USG preparedness planning and rapid response function capable of managing the interagency response to significant global hazards in partnership with other nations and non-governmental actors as appropriate**
- **Human Resources Model for Global Affairs**
  - **A revised set of cross-government HR policies, procedures, and incentive structures to enable the rapid assembly of capable, integrated, and trained USG personnel for global affairs activities**
- **Global Affairs Learning Consortium**
  - **A jointly governed network of global affairs training institutions (e.g., FSI, NDU, etc.) that mutually leverages training, exercise, and experimentation offerings to create a rich, coherent curriculum for USG global affairs professionals**
- **USG Public Private Partnership Framework**
  - **USG capacity to partner effectively with private sector entities, state and local governments, and non-government organizations (NGOs), foundations, and educational institutions**
- **Science and Technology Incentive Framework**
  - **An S&T incentive framework that better aligns USG S&T investments with emerging, long-term global priorities and rewards collaborative S&T across the interagency and with academic, private sector and other national partners**

Secretary's Advisory Committee on Transformational Diplomacy

Five ACTD Working Groups

Transformational Diplomacy
Workforce and Training
State Department in 2025
IT Transformation
Private Sector Partnerships

Key Recommendations

Expand and Modernize Workforce – More S&E Expertise Here and Abroad
Integrate Foreign Affairs Strategies and Resources
Strengthen Ability to "Shape" the World with Proactive Diplomacy
Harness 21st Century Technology and Knowledge Management
Engage the Private Sector through Greater Public-Private Partnerships
Streamline the Organizational Structure
Track and Measure Success

"A Call to Action – The Advisory Committee on Transformational Diplomacy"
Released February 5, 2008; see links at www.fido.gov and www.state.gov

Some Programs, Activities Where SET and Innovation Are Seminal

Science and Technology Adviser to the Secretary

Short to Medium Term (1-3-5 years)

Food Security, Soil Conservation, Agro-biotech, Nutrition

Sustainable Development of Watersheds, Natural Resources

Environmental, Meteorological, Climate Research

Alternative Energy Technologies – Bio-fuels, Wind, Fuel Cells, Fission

Nanotech, Biotech, Info-tech and Synergies Between

Critical Infrastructure Protection – Canada, UK, Australia, Singapore

Remote Sensing, Geospatial Sciences for Sustainable Development

International Space Station, New Deep Space Missions

CT, Non-proliferation, Dual-Use Technology Export Controls

Some Programs, Activities Where SET and Innovation Are Seminal

Science and Technology Adviser to the Secretary

Mid- to Long Term (5-10-15 years and Beyond)

- Shifting Demographics and Aging Populations
- Megacities Lacking Infrastructure and/or in Regions Vulnerable to Earthquakes, Other Natural Hazards
- Food, Fiber, Fuel – Competition for Arable Land and Water
- Alternative Energy Technologies – Hydrogen, Breeders, Fusion
- Adaptation (*with a capital "A"*) to Local Regional Climate Change
- Next Generation Internet – Social Web 2.0 (2000-2010) to Semantic Web 3.0 (2010-2020) to Intelligent Web 4.0 (2020-2030)

Multilateral Organizations and Mechanisms

- OECD S&T Policies, Programs, including Global Science Forum
- OAS Collaboration S&T, Engineering Education and Research
- UN Organizations - WHO, WMO, UNEP, IPCC, UNESCO
- UNCTAD Commission on S&T for Development – Two Mandates

Five Pillars of U.S. Foreign Policy Obama Administration

"Smart Power" translates into five specific policy priorities:

- Update and create new vehicles for cooperation to address a multi-partner vs multi-polar world
- Pursue principled engagement with those who disagree with us, e.g., Syria, Iran, North Korea
- Elevate development as a core pillar of American power and engrain in strategic planning, e.g., Quadrennial Diplomacy and Development Review
- Ensure that civilian and military efforts operate in a coordinated, complementary fashion, e.g., Iraq, Afghanistan
- Shore up traditional sources of influence – economics and the power of American example – life, liberty, pursuit of happiness

Secretary Clinton, Council on Foreign Relations, July 15, 2009

Quadrennial Diplomacy and Development Review (QDDR)

- To identify and close critical gaps in the ability of State Department and USAID to meet current and emerging challenges

- Five Working Groups
  - I. Building a Global Architecture of Cooperation
  - II. Leading and Supporting Whole-of-Government Solutions
  - III. Investing in the Building Blocks of Stronger Societies
  - IV. Preventing and Responding to Crisis and Conflicts
  - V. Building Operational and Resource Platforms for Success

- All WGs will address Strategic Priorities, Key Capabilities, Policy Gaps and Organizational Change Analysis, e.g., needed structural and institutional changes, process changes, human capital and management systems

Phase 1 Completed December – Phase 2 Underway - June

Cairo “New Beginning” Initiative

- “I've come here to Cairo to seek **a new beginning** between the United States and Muslims around the world, one **based on mutual interest and mutual respect**, and one based upon the truth that America and Islam are not exclusive and need not be in competition. Instead, they overlap, and share common principles -- principles of justice and progress; tolerance and the dignity of all human beings.
- “**On education, we will expand exchange programs, and increase scholarships**, like the one that brought my father to America. At the same time, we will encourage more Americans to study in Muslim communities. And we will match promising Muslim students with internships in America; **invest in online learning for teachers and children around the world; and create a new online network**, so a young person in Kansas can communicate instantly with a young person in Cairo.
- “**On economic development, we will create a new corps of business volunteers to partner with counterparts in Muslim-majority countries**. And I will host a Summit on Entrepreneurship this year to identify how we can deepen ties between business leaders, foundations and social entrepreneurs in the United States and Muslim communities around the world.
- “**On science and technology**, we will **launch a new fund** to support technological development in Muslim-majority countries, and to help transfer ideas to the marketplace so they can create more jobs. We'll open **centers of scientific excellence in Africa, the Middle East and Southeast Asia,** and appoint **new science envoys** to collaborate on programs that develop new sources of energy, create green jobs, digitize records, clean water, grow new crops. Today I'm announcing a new global effort with the Organization of the Islamic Conference to eradicate polio. And we will also expand partnerships with Muslim communities to promote child and maternal health.”

Barack Obama, Cairo, Egypt, June 4, 2009

U.S. National Security Strategy
Obama Administration

"We must first recognize that our strength and influence abroad begins with steps we take at home. We must educate our children to compete in an age where knowledge is capital, and the marketplace is global. We must develop clean energy that can power new industry and unbound us from foreign oil and preserve our planet. We have to pursue science and research that unlocks wonders as unforeseen to us today as the microchip and the surface of the moon were a century ago."

Four Principles:

1. build strength abroad by building strength at home through education, clean energy and innovation;
2. promote "the renewed engagement of our diplomats" and support international development;
3. rebuild alliances;
4. promote human rights and democracy abroad.

Barack Obama, Commencement Speech at West Point, May 22,2010

S&T Diplomacy and Development Overarching Objectives

To better utilize science, engineering and technology in diplomacy and development, the U.S. should strive to:

- Use S&T collaboration as a springboard for expanding and strengthening long-term, two-way relationships with foreign counterparts
- Promote S&T as engines for mutual economic advancement and prosperity
- Inspire new audiences with the power of S&T to improve their daily lives and address and solve common global problems
- Convey and share values inherent to scientific inquiry such as transparency, peer review, critical thinking, problem solving and innovation

Operational Imperatives for S&T Education and Outreach

1. Expand people to people exchanges in S&T and engineering research cooperation, STEM education and promote them as good news for all citizens
2. Leverage platforms and spaces through more direct public /private partnerships, networking and e-learning to broaden our reach with S&T programs and information
5. Ensure that content resonates with diverse audiences and captures their imagination, inspires youth and engages women as active participants in science and engineering, entrepreneurship and innovation
6. Strengthen institutional institutions and mechanisms to facilitate deeper, more diverse S&T collaboration

Increase Use of Virtual Platforms

Provide access to scientific information

Expand use of virtual libraries

- Provide scientific journal content in security-risk environments, especially where scientific institutions are weak
- **Promote distance education opportunities "in" America**
- Encourage aspiring scientists to "go to MIT" (open courseware)
- Facilitate attendance by organizing "real" classes at Centers / Corners

Engage in substantive discussion

Promote DVCs/CoNX with U.S. leaders on S&T topics

- Expand offerings to discuss the science behind policy issues and well-known innovations
- **Utilize social networking platforms for dialogue on scientific issues**
- Stimulate discussion on science's role in solving local problems, U.S. science policy etc.

Empower citizen scientists

Encourage connections between aspiring scientists, engineers

- Facilitate connections between local school science clubs, science fairs etc
- **Leverage partnership with GLOBE to create participatory experiment on important policy issue**
- Example: Students collect local soil salinity, rainfall, ground water, and feed global database -tied to curriculum unit on effects of desertification on food security
- U.S. and foreign classes hold regular webchat to discuss experience

Capturing the Imagination
Inspiring Youth and Foreign Publics

Space USA

Capitalize on intense youth interest and U.S. leadership
Partnership with NASA including Student Ambassadors, translated materials, Space Camp promotions, astronaut tours

National Geographic Expeditions

PD events for outgoing NatGeoSoc expeditions
Students follow expedition on GPS, web, mobile
Follow-up session upon return

"The Science behind the iPod"

Partnerships with leading U.S. tech companies
Video series and exhibition seeing mechanics inside popular products and underlying science

Military Gadgets

Youth often in awe of military technology (fighter jets etc.)
Partner with DoD to exhibit old military gadgets and provide tours of naval vessels as appropriate

Youth Afternoons at Tech Trade Shows

Tech shows often bring cutting-edge products to cities
Organize youth afternoons before or after shows for exclusive youth access

Science Museum Traveling Exhibit

Partner with U.S. science museums to send parts of closing exhibitions to American spaces abroad

Zoo partnerships

Encourage partnerships between U.S. and foreign zoos to create youth programming based on citizen science research (e.g. local animal watching)

Sampling of "New Beginning" Initiatives

- **MCC Investment** - $700 million to Morocco through a Millennium Challenge Corporation Compact to support to SMEs in agricultural sectors and artisan crafts, and strengthening financial services and enterprise support.
- **Science Envoys** - Dr. Bruce Alberts, former NAS President; Dr. Elias Zerhouni, former NIH Director; Dr. Ahmed Zewail, Nobel Prize chemist.
- **Higher education** – increase cooperation with Pakistan and establish new partnerships between U.S. community colleges and Muslim counterparts to share knowledge, train students, expand scholarship opportunities, and expand "Access" program to provide English language instructions to students in poor communities.
- **US-Egypt Science Year – 2011** – focus on education, technology innovation, and energy; create STEM magnet schools in Cairo, Alexandria, and third city; establish science "boot camps" for American and Egyptian students and teachers; enhance Egyptian teacher training opportunities, scholarships and online math and science instruction courses; expand the Internet-based Global Ring Network for Advanced Applications Development (GLORIAD) into research institutions, universities, and schools.

Sampling of "New Beginning" Initiatives

- **Geospatial Sciences for Sustainable Development in Africa -** cooperation on remote sensing and geospatial sciences to address sustainable development issues, e.g., watershed management, food security, public health and urban infrastructure. Regional initiative with Senegal, Burkina Faso, Niger, Nigeria, Uganda, Rwanda, Kenya, Botswana, and South Africa.
  http://www.state.gov/g/stas/130872.htm
- **Summit on Entrepreneurship** – April – new public/private partnerships with US and foreign business communities: Global Entrepreneurship Program; Global Technology and Innovation Partnerships; Partners for a New Beginning; e-Mentor Corps for on-line expertise in business planning and financing
- **Technology and Innovation Fund** - initiated by Overseas Private Investment Corporation
- **State and AID S&T Capacity** – hiring more scientists and engineers, increasing the number of environment, science, technology, and health officers at our embassies and strengthening the strategic role of the new S&T Adviser at USAID.

Final Thoughts and Observations

Cliff Missen – University of Iowa

"Replace Bandwidth with Storewidth" – eGranary Digital Library

Andy DiPaolo - Stanford

"It is not about technology – it's about innovation to improve learning."

Milton Chen – George Lucas Educational Foundation

"We must regrind our lenses to monitor the periphery, the edges of our business."

"Weapons of Mass Instruction"

Chuck Vest - National Academy of Engineering

"An uncommon education for the common man. " James Burrell Angell, U Michigan

"Openness in higher education empowers democratization, underpins innovation, cooperation and cooperation, enables access to expensive and intellectually intensive materials, and speaks to institutional and national values. Internet and WWW increase speed and interaction and have created the "Meta -university."

"Then came another great thought - LINC and BLOSSOMS."

Colin Powell – Rule #13

"Perpetual optimism is a force multiplier."

Websites of Possible Interest

Science and Technology Adviser to the Secretary

Office of the S&T Adviser

http://www.state.gov/g/stas

UNCTAD Commission on S&T for Development

http://www.unctad.org/Templates/StartPage.asp?intItemID=4839&lang=1