Acknowledgements

• Jee-Peng Tan and Sajitha Bashir
• The World Bank
• The New Jersey Center for Teaching and Learning
• Worcester Polytechnic Institute (WPI)
• African Governments
  – Gambia, Ghana, Ethiopia, Zanzibar, Lesotho, Malawi, Mauritius, Mozambique, Nigeria, Rwanda, Burkina Faso, Benin, Guinea, Senegal, Togo, Niger, Mauritania

• Participating Institutions and Collaborators
  – From Africa, Japan, India, China and the United States
The World Bank and Higher Education

The Context of S&T in Africa

• 83 Scientists and engineers per million people in Africa compared with 1000-4000 in the developed world

• Jim Wolfensohn and the African Heads of State

• The Origins of the Nelson Mandela Institutions
  – Interactions with Nasr El-Rufai and President Obasanjo
  – The government of Tanzania (Hippolyte Fofack, Burton Mwamilla, Evelyn Mwebede and Presidents Mkapa and Kikwete)
  – 2iE in Burkina Faso (Francophone team with strong support from the governments of France & Switzerland)
The Pan-African AIST Flower Model

- **Burkina Faso**
  Center for water and environmental engineering

- **Nigeria**
  Center for offshore petroleum engineering (G2i)

- **South Africa**
  Center for applied mathematics (partnering with the existing African Institute for Mathematical Sciences)

- **Nigeria**
  AIST campus in Abuja

- **Tanzania**
  AIST campus in Arusha
More Recent Initiatives by the World Bank

- 46 new African Centers of Excellence (ACE) in West, Central, East, and Southern Africa
- Partnership for Applied Sciences and Technology (PASET)
  - Regional Scholarship Fund
  - Research and Innovation
- Focus on training of trainers at the tertiary level (University/Polytechnic professors)
The Need to Now Focus on the Bottom of the Pyramid

- The emerging challenge is the problem of the youth bulge in Africa
- 70% of the population is below the age of 30
- This are declining levels of achievement in STEM fields
- Need for a strategic STEM initiative at the K-12 level
The MS4SSA Program

• The origin of the MS4SSA idea- Jee-Peng Tan
• Subsequent interactions with Sajitha Bashir, Harisoa Rasolonjatovo, Ryoko Tomita Wilcox, Toby Linden, Ekua Bentil at the World Bank
• Collaborations with NJCTL (Bob Goodman, Rosanna Satterfield, Michelle Lageman)
• Subsequent interactions within WPI (President Laurie Leshin, Provost Bruce Bursten, Kim Hollan, Alex Pottinger, Arthur Nzihou, Pam St. Louis, WPI faculty/staff/students)
• Participants from Africa, China, India, Japan, USA
The Goal and Strategy of the MS4SSA Initiative

• The goal is to develop and diffuse modules for the training of the next generation of Africans in STEM fields that can contribute to the development of Africa

• The strategy involves
  - The development of train the trainer modules
  - The development of global best practices
  - the training of students by trained trainers using MS4SSA modules
The Implementation of the MS4SSA Vision

• The initial development of the vision and the modules- World Bank, NJCTL and WPI
• Interactions with 17 African countries and collaborators - US, Japan, India, China
• MS4SSA conference and training workshop (May 15th- 26th, 2017)
• Initiation of African nodes and individual country programs (June 2017 and beyond)
• Training of the initial cohort of trainers in Africa
• Scaling and assessment of program
The Key Components of the MS4SSA Conference

- Welcome and opening remarks by President Laurie Leshin (WPI) and Mr. Makthar Diop (World Bank)
- Overview of World Bank Programs- Dr. Sajitha Bashir (World Bank)
- Global best practices and case studies (this conference)
- TTL and Advisory Board Meetings (this conference)
- Country perspectives and planning sessions (May 17th-26th)
- WPI/NJCTL Module Training Modules (May 17th- May 24th)
Building on The Emerging Culture of Robotics in Africa
Integrating Robotics Into the Culture: Battlecry WPI

MS4SSA
Math and Science for Sub-Saharan Africa
Global Best Practices - Lessons from the World

- Presentations from different parts of the World
- African country perspectives and the African Institute for Mathematical Sciences (AIMS)
- Japan - JICA experience in Africa
- India - Perspectives from the Indian Experience
- China - The Shanghai Model
- US - NJCTL, Middlesex High School, WPI
- Integrate key concepts into African nodes/country plans
MS4SSA Advisory Board Members

• Nkem Khumbah (University of Michigan)
• Pradipta Banerji (IIT Bombay)
• Jee-Peng Tan
• Pete Gange (Middlesex High School)
• Martha Cyr (WPI)
• Shola Odusanya (AUST/SHESTCO)
• Xingfeng Huang (Shanghai Normal University)
• Shimpei Taguchi (JICA)
• Aissa Wade (AIMS & Penn State University)
Initial African Countries in the MS4SSA Initiative

- East Africa: Ethiopia, Rwanda, Zanzibar, Mauritius
- Southern Africa: Lesotho, Mozambique, Malawi
- West Africa: Mauritania, Guinea, Senegal, Ghana, Burkina Faso, Niger, Nigeria, Benin, The Gambia
Responsibilities of the Regional Nodes

• The selected nodes will work closely with African countries in their regions to develop train-the-trainer programs and implementation programs.

• More nodes may also emerge as additional countries meet the requirements.

• The nodes will work closely with WPI, NJCTL and the World Bank on the implementation of national/regional goals.

• They will gradually become independent and self-sustaining as time goes by...
The Selected African Regional Nodes

- The initial nodes have been selected through an open and transparent process.
- Proposals were evaluated by a panel and selected on the basis of clearly defined merit review criteria.
- The initial nodes are:
  - Nigeria
  - Rwanda
  - Niger
  - Gambia
- More nodes may emerge as additional countries meet the requirements.
MS4SSA Approach to Strengthening and Promoting a STEM Culture

• Work with African Nodes and Country Teams on Implementation Plans

• Strengthening STEM and access to STEM
  – Mathematics, physics, chemistry, biology in secondary school (NJCTL informed by global best practice partners)
  – Mathematics and science in primary/middle school (NJCTL informed by global best practice partners)

• Promoting a culture of STEM
  – Materials science and engineering (synthesis/creativity)
  – Robotics (problem solving, coding, logic and creativity)
  – Project-Based Learning (problem solving, team work)

• Assessment of programs and their effectiveness
Summary and Concluding Remarks

• This talk summarizes the vision and implementation of the MS4SSA Initiative.
• This is an initiative inspired by the need to train the next generation of African STEM experts.
• The initiative involves an integrated approach to curriculum development/pedagogical approaches/implementation strategies.
• This conference will discuss global best practices and case studies for K-12 STEM fields.
• It will be followed by a 8 day train-the-trainer workshop.
• We welcome your involvement in our efforts to train a critical mass of world class Africans with expertise in STEM fields.
THANK YOU!

THANK YOU!