Background Note 1 for
UN Workshop on building capacity and scaling up adoption of STI4SDGs Roadmaps in Africa
Oct. 12-13, 2023, in Addis Ababa, Ethiopia; co-organized by DESA, ECA, and EC/JRC.

SUMMARY OF KEY FINDINGS AND POLICY RECOMMENDATIONS FROM THE 2018, 2019, AND 2023 GLOBAL SOLUTIONS SUMMITS

Prepared by
Alfred Watkins, Chairman and Founder, Global Solutions Summit
alfred.watkins07@gmail.com
and
Ibrahim Eiweida, Intern Extraordinaire, DESA and Fordham University

The present background note was prepared in response to the Addis Ababa workshop on building capacity and scaling up STI actions and adoption of countries' STI4SDGs Roadmaps in Africa. It comprises inputs from involved contributors through consultations in the preparation process and reflects on key questions put forward, including how can the global community facilitate the transfer of environmentally sound technologies to developing countries? How can developing countries incorporate the structural impediments blocking them from benefiting from STI into their Roadmaps? How can STI4SDGs Roadmaps be designed and deployed as potential pathways to sustainable recovery and future resilience? In specific, the document synthesizes and summarizes the key findings and policy recommendations emanating from the 2018, 2019, and 2023 Global Solutions Summits (GSS) hosted by the UN in conjunction with the UN's annual STI Multistakeholder Forum.

I. Introduction

Although the overarching theme of each Summit was the same -- Scaling Technology Deployment for Achieving the SDGs in Emerging Markets -- each Summit focused on a different facet of the STI4SDG challenge. GSS 2018 showcased innovative business models for deploying development solutions from the laboratory to the last mile, especially in the context of fragile states. GSS 2019 discussed practical, action-oriented proposals for harnessing research and deployment so that the 4 billion people currently inhabiting the bottom rungs of the income pyramid can enhance their quality of life while simultaneously boosting their income. GSS 2023[1] noted that scientific discoveries, by themselves, will not help countries achieve the SDGs unless countries in Africa and other emerging regions develop comprehensive, sector-by-sector STI roadmaps detailing the specific science and deployment policies and programs each country intends to implement in order to convert results in the lab into scalable, tangible results on the ground.

The objective of all three Summits was to support the design, development, and deployment of development solutions on the scale required to put the global community on a trajectory to achieving the SDGs by 2030 or shortly afterward . What will it take to move newly discovered as well as existing scientific innovations from the shelves of research labs into the hands of the hundreds of millions of people in tens of thousands of communities in dozens of countries who need them to secure potable water, sanitation, electricity, high-quality affordable health care, food security, meaningful employment, and gender equity, among SDG objectives?

[1] The GSS 2023 program was explicitly designed to amplify the discussions at the Fifth African Science, Technology and Innovation Forum 2023 which convened in Niamey, Niger on February 26-27, 2023 and the STI in Africa Day which convened at the UN on May 2, 2023.

From this perspective, STI for the SDGs has a double meaning. On the one hand, STI stands for **S**cience, **T**echnology, and **I**nnovation. But in terms of achieving the SDGs, it also stands for **S**olving specific problems, **T**ransforming each country's socio-economic development trajectory, and generating a positive, sustainable **I**mpact on society, the environment, and the economy.

II. Inclusive Innovation Roadmaps

Roadmaps provide travelers with detailed step-by-step directions for getting from their origin to their destination. In the case of STI4SDG roadmaps, this means focusing on two essential pillars: (i) mission-oriented research and technology scouting[2] related to specific SDG challenges and (ii) deployment mechanisms for moving new and existing innovations from the lab to potentially thousands of rural and urban communities.

This last step is particularly important since, in the least developed countries, technical solutions for many problems that as recently as ten years ago were beyond the reach of most people at the bottom of the pyramid are now available and affordable. But as UN Secretary-General António Guterres observed in his Foreword to the Global Sustainable Development Report 2019, despite the increased affordability and ubiquity of these new technologies and "despite considerable efforts these past four years, we are not on track to achieve the Sustainable Development Goals by 2030." Dr. Akinwumi Adesina, President of the African Development Bank, explained in a speech to the UN Food and Agricultural Organization in Rome that this is because "Technologies to achieve Africa's green revolution exist. For the most part, they are all just sitting on the shelves."

Why? What accounts for the confluence of scientific abundance and scant progress on the ground? And more importantly, as each GSS discussed in considerable detail, how can STI4SDG roadmaps reverse this unfortunate situation?

A. Research

Maurizio Vecchione, then the Executive Vice President at Global Good, told the 2019 Summit that the global community is facing an R&D gap whereby "We are focusing on transforming lives that don't need to be transformed and ignoring the needs of the bottom four billion." To rectify this situation, Dr. Ramesh Mashelkar told the 2019 Summit that scientists and engineers must cultivate a new mindset based on a "healthy disrespect for the impossible.[3] Rather than attempting to tackle problems that can be solved easily, they must focus instead on finding solutions to difficult problems by discovering better-performing products that can be sold at a fraction of the price compared to the conventional products marketed to the global middle class. Mashelkar summarizes this challenge in the pithy phrase, "Much More for Much Less for Many More" or M-L-M.[4] By this he means:

- **Much More (performance)** generated by products whose performance and quality **equals or exceeds** that of goods and services consumed by the global middle class.
- **For Much Less** money. In other words, not a 10% price reduction but a 10X or greater price reduction compared to similar products currently on the market for the global middle class. The goal, according to Mashelkar, is nothing less than "radical affordability" and "affordable excellence" so that

[2] For a more detailed discussion of technology scouting see the GSS report, Technology Scouting and Deployment, prepared in November 2020 for The World Intellectual Property Organization (WIPO) Regional Bureau for Asia and the Pacific and the ASEAN Committee on Science, Technology, and Innovation.

[3] Mashelkar, R A. From Leapfrogging to Pole-vaulting. Penguin Random House India Private Limited. Kindle Edition, Location 3649.

[4] A comprehensive discussion of MLM is available in C.K. Prahalad and R.A. Mashelkar, "Innovation's Holy Grail." Havard Business Review, July-August, 2010 available at: https://hbr.org/2010/07/innovations-holy-grail.

- **Many More (people)**, primarily the billions of people at the so-called "bottom of the pyramid," can benefit from these innovations.

Focusing on the bottom four billion is not just a feel-good humanitarian objective to salve the conscience of over-indulged wealthy consumers. As Vecchione told the 2019 Summit, the global population is expected to grow from 7 billion today to between 10 and 11 billion by 2100. With a projected 1 billion population increase in Asia and a 3 billion population increase in Africa, virtually all this population growth in the ensuing decades will be concentrated in what is today considered to be the developing world. As a result, by 2100, Europe and North America will account for only 8% of the global population; the remainder will be concentrated in the so-called Global South. These seismic demographic changes, Vecchione asserted, will completely transform "every facet of industry, economy, and sustainable development." In their wake, the bottom of the pyramid will become the largest slice of the pyramid, and the needs of the developing world will be tantamount to the needs of the world.

B. Deployment

Harnessing Inclusive Disruptive Innovation for the SDGs is a two-step process. The first step, R&D and invention, happens when scientists and engineers develop high-performance, low-cost technological solutions that are affordable to the billions of people at the bottom of the pyramid. Since the goal at this stage is to create products that are as good if not better than the goods and services currently sold to middle-class consumers in high-income countries, the technical and scientific challenge is substantial.

But R&D and Invention – More performance for Less Cost -- is only the first step along a much longer road to inclusive disruptive innovation. The indispensable second step -- Deployment -- occurs when entrepreneurs develop innovative business models and harness the surrounding ecosystem to deploy these radically affordable inventions at scale in new, unique, and inclusive ways. This is the so-called deployment challenge, which cannot be overlooked in STI policy discussions. Deployment is not a scientific challenge, per se. Scientists, in all probability, will not play a leading role in deployment, although it is the fruits of their labor that will be deployed. It is the domain of entrepreneurs and business leaders who have to develop the necessary business models, supply chains, community organizations, product marketing, and financing mechanisms that will move the technology from the lab shelves into the hands of people who need it most. It is, at a minimum, the purview of entrepreneurs, community leaders, equipment vendors, logistics experts, payment mechanisms, finance for social enterprises and consumers, government officials, foundations, NGOs, social enterprises, SMEs, large corporations, and local universities who comprise the deployment ecosystem.

It is tempting to assume that research and deployment follow inexorably from one to the other. But in the real world, there is nothing inexorable or inevitable about this process. On the contrary, there is an enormous chasm – or series of broken circuits – hindering the transition from Step 1 to Step 2. This is primarily because Step 1 is the domain of scientists and engineers, while Step 2 is the domain of supply chains, entrepreneurs, business models, and the myriad of other actors -- primarily non-scientists -- involved in deploying, operating, and maintaining technology that will service hundreds of millions of people in thousands of communities in dozens of countries.

Seen from this schematic perspective, M-L-M or inclusive disruptive innovation, is akin to a relay race in which the baton is passed smoothly, quickly, and efficiently from the scientists and engineers who took the lead in Step 1 to a completely different group of individuals who will take charge during Step 2.[5]

[5] Ideally, research and deployment should not be seen as sequential processes but as a simultaneous, iterative process. For example, before beginning their research, scientists should ask local communities how they perceive the problem and what they would like to see in an ideal solution. At the same time, scientists need to consult with all the individuals who have responsibility for operating, maintaining, repairing, and using the solution in specific communities. Otherwise, an ideal solution from the perspective a scientist may be unfeasible from the perspective

Failure to pass the baton, smoothly and efficiently, according to Mashelkar, prevents "sustainable scalability" and, in the words of Adessina from the African Development Bank, leaves solutions sitting on the shelf.

III. Policy Recommendations: Repairing Broken Circuits with STI4SDG Roadmaps

Well-designed and implemented STI4SDG roadmaps can repair these broken circuits.

The first step in any roadmap development exercise is developing community consensus around a set of specific goals and destinations. These might include such development objectives as (i) providing power to urban and rural communities that do not currently enjoy affordable, reliable, and renewable energy access; (ii) building local manufacturing capacity to participate in smart global and regional value chains; (iii) building smart cities to accommodate the projected urban population increase; and (iv) generating additional value added in mining and agriculture.

The next step is to compile a comprehensive Needs Assessment listing the policy reforms, capacity-building requirements, institutional reforms, specific investments, and implementation arrangements required to attain that goal. The final step is specifying how a community, region, or country intends to fill the gaps between what currently exists and the requirements specified in the Needs Assessment.

A Roadmap should ideally discuss such issues as:

- Funding and institutional mechanisms for promoting mission-oriented research to solve specific problems related to developing and deploying solutions to achieve a specific goal or objective.
- Mobilizing the engineering capacity required to move technologies from the laboratories to farms, factories, and local communities.
- Promoting wide-ranging community consultation during both the Needs Assessment, technology selection, and implementation phases of the work program. Consultation helps to ensure that the roadmaps are designed with bottom-up community input rather than top-down decrees.
- Mechanisms for involving the Diaspora in technology scouting and deployment.
- Plans for building institutional capacity, perhaps housed in local university engineering faculties, to evaluate competing technologies on a range of criteria, including whether they are affordable, scalable, and financially and operationally sustainable.
- The respective roles of the national government, business organizations, universities, foundations, and other civil society organizations in both the design and implementation of the roadmaps. And within the government, what is the appropriate division of labor between the Ministry of Science and Research vs. such other line ministries as Economy, Education, Infrastructure, etc.
- Workforce development programs spanning the gamut from scientists in research labs to engineers to specialized technicians and craftsmen. An effective roadmap will need to specify who will organize and finance essential workforce skill development programs and enterprise capacity-building programs that can spawn further local innovations.
- How the community intends to employ hackathons, start-up weekends, government procurement programs, and competitions[6] to mobilize students at local universities and youth.

---

of those who will be responsible for getting that solution off the shelf and into the hands of the intended beneficiaries.

[6] One example of a competition designed around the SDGs is the IEEE Empower a Billion Lives (EBL) program – "a global competition aimed at fostering innovation to develop solutions to electricity access. Solutions are expected to be scalable, regionally relevant, holistic, and leverage 21st-century technologies with exponentially declining prices." EBL employs a bottom-up process for identifying issues and solutions that generate economic and social impact in their communities, using energy access and other enabling technologies.

- How does the community plan to use such innovative business models as cooperatives, franchises, social enterprises, and for-profit businesses, among others, to scale deployment from a few pilot families or communities to thousands of families, and how could the UN help to scale these models from one community to thousands of communities in dozens of countries.