



The African Manifesto for Science, Technology and Innovation

Prepared by:

The African Technology Policy Studies Network (ATPS) under the auspices of the Science, Ethics and Technological Responsibilities in Developing and Emerging Countries (SETDEV) Project



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“ From the onset,..., we reject the idea that existing international division of labour in science is adequate for development. It provides no basis whatsoever for development; amongst other things, the less developed countries must have an indigenous scientific capacity. ”

Sussex Manifesto, 1970



- Preface
- Acknowledgements

Preface

This Manifesto is called the *African Manifesto for Science, Technology and Innovation*. The Manifesto is a tool for shaping shared visions about science, technology and innovation (STI) in Africa, for Africans, by Africans, in a multi-lateral dialogue, with the rest of the world.

The production of the Manifesto was led by the African Technology Policy Studies Network (ATPS) in collaboration with African, Indian and European Partners and Stakeholders, under the auspices of an European VII Framework programme project, *Science Ethics and Technological Responsibilities in Developing and Emerging Countries (SETDEV)*¹.

The African Manifesto for STI makes a case for Africa's sovereignty in science, technology and innovation. It argues for full socialisation and democratic governance of STI a pre-requisite for sustainable development in Africa.

The content and vision of the Manifesto were shaped by a dynamic multi-lateral dialogue amongst SETDEV partners and key stakeholders in Africa collated through targeted focus group discussions, bilateral interviews and high level meetings with key officials, policy roundtables, workshops, international conferences and case studies in selected countries across the continent.

The Manifesto remains an open document. Your visions

for STI in Africa are very important and we would like to hear them, and integrate them into the Manifesto as much as possible. We invite you to kindly send comments and inputs to further shape the Manifesto to the drafting team, e-mail: AfricanManifesto@atpsnet.org

You can also follow the dialogue on:

- ATPS blog: <http://www.atpsnet.org/blog/index.php>
- Twitter at <http://twitter.com/ATPSNETWORK>,
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- Upload useful video messages and case studies at <http://www.youtube.com/user/atpsnetwork>.



¹ The SET-DEV project is coordinated by the Italian National Research Council (CNR), with 11 participating institutions from Europe, India and Africa, with the African Technology Policy Studies Network (ATPS), leading the African processes within the project, including the development of the African Manifesto for STI.

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Right: A small scale vegetable seller with fresh produce - Picture credit: FARA



“ By harnessing science and technology, African countries have a stronger chance of addressing poverty, disease and environmental destruction ”

The New African, Vol. 494, p. 19

1 Towards Self Rule in Science, Technology and Innovation in Africa



Science, Technology and Innovation (STI) underpin almost every aspect of human existence. Therefore, optimizing the benefits of STI is an increasing priority for the governments and the people of Africa. Developing a STI strategy, which gives due consideration to Africa's environment and concerns, is one of the most effective weapons for winning the struggle towards reduction and eventual elimination of absolute poverty in Africa. In recent years, African governments, scientists, policy makers, private sector actors and many important civil society organisations are beginning to re-discover the importance of STI in driving technical and economic progress. STI is key to fostering productivity growth an achieving social welfare and sustainable development. The vision for a significant improvement in the physical quality of life, competitiveness and overall prosperity in Africa can only be achieved and sustained through a sincere commitment to STI development.

If we compare traditional societies with those of the present, it becomes clear that norms and processes of creating a meaningful environment for living are currently being heavily transfused with science based knowledge. In the last few decades significant advancements have been made in the global economy resulting in a departure from traditional production processes. The increasing needs of the society in the face of limited resources have propelled renewed thinking towards efficiency. This requires improved

knowledge of science and technology, and of course a revolution in the entire knowledge system towards a culture of innovation.

1.1 Why The African Manifesto?

The Manifesto is envisioned by Africans and for the needs of Africa. It is part of a growing awareness of the role of STI as the engine of development in Africa. These realizations have been expressed by many African leaders. For example, in 2008, Liberian President, Ellen Johnson Sirleaf, reminded delegates at the Science in Africa Summit that: "No country on earth has developed without deploying, harnessing and utilizing STI, whether through technology transfer or homegrown solutions". President Kagame of Rwanda, on the other hand, stressed that: "We in Africa must either begin to build our scientific and technological training capabilities or remain an impoverished appendage to the global economy" (The New African, vol. 494, p. 78).

The political statements are anchored in decades of attempts by the African governments to turn around their development fortunes through efforts to mainstream STI in Africa's development policies and actions. Some of these include: the Monrovia Strategy (1979); the Lagos Plan of Action,(1980); the Abuja Treaty (1991); and most recently, the adoption of Africa's Science and Technology Consolidated Plan of Action (CPA) by the African Union

in January 2007. The past two decades have also seen the formation of dedicated STI Ministries, National Commissions, National Councils, and State Agencies as well as pan-African Governmental and Non-Governmental Institutions committed to STI capacity building and policy making in Africa.

Despite these efforts, Africa remains the poorest and most economically marginalized continent in the world. The politics of globalization, internationalization and regionalization of STI have defined and shaped STI in ways that effectively exclude the African voice, its knowledge systems and communities and to a large extent, the African development agenda. In Africa, most of STI related Ministries and National Government Agencies are yet to be fully resourced, while most African STI institutions continue to rely largely on external funding, limiting their ability to respond to Africa's STI needs proactively and effectively. Questions regarding how STI agendas are prioritized, how STI knowledge is produced and circulated, monitored and evaluated still remain. On the global scale, the notion that the existing international division of labour in science and technology is adequate for development remains irrespective of calls for its rejection by the Sussex Manifesto, 1979. The self doubt which this engendered and the associated knowledge dependence espoused monologues and binomial linear relationships between the "global North" and the "global South"; the "Knows" and the

Know Nots"; and the "Haves" and the "Have Nots" in ways that hinder innovation in Africa by Africans. African countries have therefore largely remained a primary exporter of raw materials and primary products with minimum value additions and a consumer of STI in the global market. More recently, the demands for comprehensive action to redress the interlinked global challenges of economic recession in the North, poverty reduction in the South, and climate change are re-shaping the forms and directions for STI in the global economy, offering the opportunity for critical reforms in the global and regional STI agendas.

Conventional forms of STI knowledge generation, circulation, monitoring and evaluation are now increasingly questioned as calls for more inclusive approaches grow. Yet, African STI still remains marginalized, locked in her rich but complex history. Africans continue to pursue international excellence in contemporary methodologies and apply contemporary incentive structures and tools for monitoring and evaluation often based on international standards, contexts, pedagogies, epistemologies, and needs.

The Manifesto envisions a new renaissance in Africa, a new world order in which there is self-rule and democratic governance of STI in Africa for African development. It sets out three core actions required to achieve this vision:

- Restoration of confidence in African STI and African

- experts by Africans;
- Concerted public and private investments in building sustainable STI infrastructures;
- Adoption of proactive policies to fully embed African STI in African societies.

The Manifesto recognizes a number of critical challenges that might limit the full operationalization of this vision, including historically path dependence shaped by Africa's colonial experiences, informed "literary studies" rather than "pure science & technology education" in Africa.

The language of STI also means that the plurality of knowledge systems and traditional knowledge communities in Africa are seldom recognised and harnessed for development. The nature and type of incentives, the institutionalization of STI and global STI leadership that re-inforces the colonial stereotypes also alienates Africa's STI from African communities and African problems. The geopolitics of STI, the globalization and internationalization of STI and its funding and knowledge support structures exacerbate the global divide in which STI agenda setting and prioritisation remain the pre-prerogatives of the global North. Africa's STI productivity remains very low (<2% of the global output); and her investment in STI is even lower with only South Africa approaching an investment rate of 1% of her GDP on research and development in the whole of the sub-Saharan Africa. Low capacity and poor

communication infrastructure are amongst the challenges Africa will face in meeting these goals.

Achieving the vision would therefore require transformational changes in how STI is socially defined and constructed, prioritized and funded, communicated, monitored and evaluated in Africa. A better understanding of the changing forms and directions of STI politics in the global economy would be required to ensure more balanced criteria within which African STI is governed and evaluated.

The Manifesto believes, that by, harnessing STI, African countries have a greater chance of addressing poverty, diseases and environmental destruction efficiently and sustainably. It provides a shared vision of a world in which the unheard voices, the marginalized majority and the marginalized cultures and traditions of STI in Africa can be mobilized for African development. It is a call for diverse and fairly distributed forms of STI as a valid and timely way to embed STI in African societies. This is a shift towards greater respect for cultural variety, regional diversity, and democratic accountability in STI governance in Africa. To achieve this vision would require transformational changes in the current global STI agenda, the social inequity it creates, and the knowledge dependence that has informed and shaped Africa's exclusion in the global STI development. It is however the responsibility of Africa

and “the African” to shape Africa’s own STI agenda, funding strategies, capacity development programs, organisational reforms and develop its own rules for effective but contextualized criteria for monitoring, evaluation and accountability. To be effective, these tools must be fully embedded in Africa’s societies, cultures and human experiences. African governments need to engage in, and better understand, the geopolitics of science, technological advances and innovation in the global knowledge economy, and take ownership and effective leadership of the STI policy processes in Africa for African development.

The Manifesto recognises the diversity in Africa’s cultural and historical experiences and the heterogeneity in the current levels of scientific and technological advancements in the continent. With 53 sovereign countries, Africa is the second largest continent in the world. She can contain within her borders, the whole of North America (9.46 million square miles) and the whole of Europe (3.93 million square miles). Nigeria, the most populous country in Africa, is composed of more than 250 ethnic groups with different cultures, histories and languages. So, however similar some of the historical, economic, social, and environmental features of Africa may seem, it is just too vast a continent for any generalisations about it to hold. This calls for more disaggregated and context specific recommendations at the national, regional and continental levels.



The African Manifesto for STI is a measured call for collective action at the continental level while providing templates for disaggregated and democratic governance of STI at the regional and national scales. Africans must stand together to rebuild confidence in home grown STI, build sustainable infrastructures for sustainable STI development to improve its global competitiveness, and translate the rhetoric of the past two decades to relevant actions to regain their sovereignty in the governance of STI for African development.

1.2 Where are we coming from?

Science, Technology and Innovation (STI) in Africa are as old as humanity itself. STI has been an integral part of the pre-historic man and thus integral to Africa and the evolution of mankind. Documented evidence suggest that Africa is amongst the most strategic continents in the history of STI development, globally.

Some of the most important technological innovations for human survival have unique origins in Africa. For instance, development in tool making industry has its root in Africa. About 2.3 million BC “homo habilis’ residing in East Africa developed the first tool-making industry called “Olduwan”. Following this, the Acheulean stone tool industry (characterized by hand axe) emerged in Africa in 1.5 million BC, and spread to Middle-East and Europe around

800,000 and 600,000 BC. A significant development, which influenced all later stone tool industry, is the creation of bone tools and black blades in Southern and Eastern Africa around 90,000 to 60,000 BC. Use of iron in smelting and forging for tools appeared in West Africa around 1200 BC making it the first birth place of the iron-age. Before 1800, Africa’s methods of extracting iron were employed in Brazil, until more advanced European methods were instituted, while copper smelting developed independently in West Africa around 900 AD.

Investigation into space and time also began in Africa. “Paleolithic Africans” began a process of stargazing as far back as 40,000 years ago. The process transformed into a systematic observational science in the Nilotic lands of Africa between 6,000 and 12,000 years ago. The most important result of the Nilotic stargazing was the invention of the calendar and the basis for the modern astronomy. The “proto-technology” of the modern world is traceable to the iron-ore mining 43,000 years ago in Southern Africa and the emergence of “proto-mathematics” from the Africa’s Great Lakes region over 25,000 years ago. From these beginnings, science and technology underwent a steady development in Africa, with the continent reputed to be the remotest origin of formal mathematics, astronomy, engineering, architecture, navigation and map-making. The recent discovery of the Timbuktu manuscripts rekindled confidence that Sub-Sahara Africans were studying

mathematics and astronomy at least over 300 years ago. Other discoveries also record that there were advanced concepts of modern physics in Mali. From the foregoing, it could be said that Africa had great beginnings in its role in shaping global science and technology. However, the current state of STI in Africa raises many questions. The tide has since tilted to a new world order in which scientific knowledge and modern technologies are largely produced in the global North and consumed by the global South, with Africa's productivity in STI ranking amongst the lowest, globally. Investments in STI also follow the same pattern with only South Africa approaching the African Union recommended target of 1% of GDP in public expenditure on research and development in the whole of Sub-Saharan Africa.

The other countries in Sub-Saharan Africa invest less than 0.5% of their GDP on research and development. At 62%, Sub-Saharan Africa holds the unenviable world record of the lowest adult literacy rate, followed closely by South and West Asia. In 2005, poverty levels in Sub-Saharan Africa stood at 51% followed closely by southern and south east Asia at 39% and 19% respectively. In 2008, the Gross Enrolment Ratio (GER) in tertiary education in Africa was also amongst the lowest globally with only Mauritius, Liberia, Cape Verde and Nigeria recording more than 10% enrolment ratio.

This dismal record should be seen at the backdrop of continued pockets of outstanding contributions to global STI development by African people and expressed overtures of political commitment to STI development by African governments. Some examples include the Supercomputer invented in the 1980s by the Nigerian, Phillip Emeagwali; the M-PESA (Swahili word for "Mobile money") and the USHAHIDI.com technologies (Swahili word for "testimony") invented in Kenya and the NigerSat 1 launched by the Nigerian Government, amongst others.

Some argue that Africa's colonial history is to blame for the truncation of Africa's STI development; others blame current challenges in Africa's ability to govern itself and properly harness its STI endowments as an economic block under the African Union due to continued neo-colonial influence and widespread corruption; others blame African countries for inability to prioritise self rule and national sovereignty in their STI governance as low investments by national governments leave the power to define the STI agenda in Africa in the hands of development partners and external donors; others blame the current globalized knowledge systems in which "traditional" or "indigenous" practices are deemed inferior and "uncodified" knowledge systems and technologies are regarded as "unscientific"; others blame poor STI infrastructure and incentive structures, which have led to Africa becoming amongst the largest exporters of scientists and technical experts and



the largest importers of scientific and technical knowledge.

Empirical evidence shows that, in the wake of poor African leadership, a debilitating STI infrastructure and policy environments since the 1970s, Africa's best intellectuals (medical doctors, economists, space scientists, etc.) leave the shores of the continent in thousands each year to make significant contributions to STI development elsewhere. For STI development in Africa to yield any of the desired outcomes, Africa must reject from the onset, these notions of knowledge dependence, and bilateral binomial relationships in which the North is the dominant source of scientific and technological knowledge. Like the Sussex Manifesto (1979), we must reject the idea that existing international division of labour in science is adequate for development. African governments and their development partners must embrace a culture of supporting, nurturing, celebrating and sustaining African science, technology and innovations that are fully embedded in African societies. Amongst other things, Africa must build her own critical mass of indigenous scientific, technological and innovative capacity. African science and technology must be driven by the needs of the African peoples. Institutional and policy reforms will be required to achieve this.

1.3 Socio-Economic Context

Africa has over 900 million inhabitants speaking over

2,000 languages, and constituting about fourteen percent of the world's population, living in about twenty percent of the global land coverage. Seventy one percent of Africans are youth, aged under- 25 years. Sixty six percent of the population in Africa depends on agriculture for livelihood, while about its fifty per cent lives below poverty line of US\$1 per day, if standard GDP measures are used. However, standard measures such as Gross Domestic Product and Per Capita Income, which place Africa amongst the poorest continents of the world, fail to account for the large informal/traditional economies in Africa, hence erroneously orchestrating the "inferiority complex" and "dependency syndrome" in Africa. Average life expectancy is 46 in sub-Saharan Africa; 67 in North Africa, with malaria and HIV/AIDS being the most common sources of death. Infant Mortality rate (birth to 1 year old) is 102 per 1,000 in sub-Saharan Africa; 33 per 1,000 in North Africa. Over 15 million are refugees outside their countries of domicile, while over 12 million are internally displaced due to various social/armed conflicts across the regions of Africa.

This Manifesto recognises that Africa is unlikely able to build the scientific, technological and innovation capacity it needs simply by adopting the research training schemes and technologies developed in the advanced countries and offered by development cooperation agencies. It is apparent that if Africa hopes to prosper and if world leaders expect globalization to foster sustainable

Left: Members of a community in Orom, Northern Uganda, carry out routine maintenance on their community water pump.
Picture credit: AMREF

development and poverty reduction, building indigenous Science, Technology and Innovation (STI) capacities of African countries is an absolute necessity. In today's rapidly changing global economy, the critical economic development and socio-environmental sustainability question is no longer whether countries should build STI capacity but what type of capacity to build and how to build it, given each country's socio-economic and bio-physical constraints. The case for Africa will not be an exception.


1.4 Political Context

Africa's political landscapes have undergone many evolutions in past decades, from the traditional kingdoms and chiefdoms to modern forms of government. While there are significant success stories in many African countries where modern democracy has prevailed, the general picture is that of a struggle which has hindered scientific, technological and economic progress since the years of independence. Africa is seemingly left behind the train of global development due to huge human, natural, material and financial resources being lost to wars and recurring social unrest. Ethnic and religious diversity and largely uneducated inhabitants make the continent susceptible to civil conflicts often instigated by a continued struggle for natural resources.

Africa's rich natural endowment in oil deposits, gold,

diamond, fertile soils, water resources, etc. has since turned the continent into a political land mine with both external and internal interests shaping the continued struggle for power. The resultant effect is what development economists popularly refer to as the "resource curse". The struggle for access to and control of African natural resources is expected to deepen in the coming decades as the triple global challenges of climate change, poverty and economic crisis exacerbate the global struggle for survival. The African continent, blessed with vast natural and human resources, and bio-diversity remain a prime and economically viable focus of attention. We have seen increased external interest in land and water resources for production of bio-energy crops and other agricultural products of high demand in the global markets. Unless Africa wakes from its slumber and learns from its past, the history of industrial revolution is likely to repeat itself as industrialised countries race to chart new forms of knowledge economies through scientific, technological and innovation capacities to de-couple economic growth from Green House Gases (GHG) emissions and environmental pollution. Also past development constraints faced by Africa could in part, but largely be traced to colonialism and uneven knowledge-trade relations between Africa and the rest of the world.

The political divisions that shaped the 53 countries within Africa were drawn by colonial rulers for their own



The political divisions that shaped the 53 countries within Africa were drawn by Colonial Rulers for their own colonial interests, during the scramble for Africa. These lines of division continue to drive policies, processes and determine how Africans see themselves.

colonial interests, during the scramble for Africa. These lines of division continue to drive policies, processes and determine how Africans see themselves. However, current challenges in Africa are largely attributed to the poor quality of African leadership; lack of transparency and accountability now entrenched at all levels of the African social, economic and political experiences; and continued multi-lateral interests in Africa by multi-national companies in the globalized world. While Africa cannot stay reclusive from the globalized world, she needs to re-think the rules of her engagement in the global community. There is need for transformational and visionary leadership to harness the wealth of scientific and technological knowledge and

skill based in the West, while encouraging indigenous skill development and capacity building on the continent, guided by the socio-cultural, economic, environmental and political realities of Africa. There are currently few national programs in science, technology and innovation across Africa that can survive without development funding. Yet experience has shown that development funding alone cannot fully sustain

development in Africa. Concerted collaborative efforts to build local capacity in STI research and development and policy processes are critically and urgently needed. African governments (under the auspices of the African Union) must develop programs which evolve a pan-African perspective, which encourage STI knowledge to be owned and shared across boundaries, and which invest in home grown STI capacities at the individual and institutional levels. Building cooperative platforms to harness the synergies and complementarities amongst existing African STI institutions and experts will no doubt yield development dividends more than the current proliferation of institutions and mushrooming of centers of excellence often driven by external interests. The collective capacity for growth far

exceeds any individual pockets of success in any area. Credit must, however, go to the early post-independent African leaders who saw the need to use science and technology to accelerate Africa's development and made serious investments in higher education and in some research infrastructure. Subsequent leaders succumbed to the neo-liberal ideology of market determinism and failed to prioritize investments in science and technology, including investments in higher education within the limited resources. Most development partners did not help matters as development aid and donor funding prioritized technology transfer mechanisms with little effort to support indigenous capacity in science, technology and innovations for development. Science and technology ministries and African institutions were unlikely recipients of development investments, and when they were, it was under misguided multilateral or bilateral arrangements that put the donor on the driver's seat; that did not allow for Africa's participation and ownership; and did not recognize the social and cultural milieu required for STI to thrive. It is no wonder that in spite of billions of dollars spent on the International Agricultural Research Systems, Africa is yet to witness a sustainable green revolution.


It was against this background that institutions such as the African Technology Policy Studies Network (ATPS), the African Academies of Science (AAS), the African Union-NEPAD platform on Science and Technology, the African Union (AU) and the United Nations Economic Commission for Africa (UNECA) Science and Technology divisions emerged to provide African perspectives on STI and to

widen Africa's participation in the global STI discourse and to agitate for Africa's scientific sovereignty. It has not been without serious challenges. These institutions rely significantly on donor assistance, some of which are yet to be fully embedded in African realities. In addition, African leaders continue to treat STI matters as if they were not critical for development, with Ministries of Science and Technology treated as third-tier Ministries, often with limited resources. Only few African countries are known to invest in Pan-African STI institutions. In some cases, Science and Technology is housed under another Ministry without clear mandates and responsibilities.

But there is now a glimmer of hope. Success stories are beginning to emerge once again. The new environment: democratization of the political space; increased attention to the emergence of new and more confident, accountable leadership; the decline of the market-deterministic dogma; an emerging new incentive structure for professors and researchers; refocusing of science for agriculture; and a paradigm shift in the donor-relations and multilateral arrangements with respect to STI for Africa, all provide a new impetus for advancing the use of STI for development in a new and significant way. The ongoing global conventions on climate change represent another positive incentive for charting new development paradigms for a low carbon economy.

It is in order to seize the moment and include other neglected actors and segments of the society in the dialogue, that the African Manifesto has been written.

Right: Young woman looks out a window:
Picture credit: AMREF



“ There is one thing developing countries cannot do without: home grown capacity in scientific research and technological know-how. Increasingly a nation’s wealth will depend on the knowledge it accrues and how it applies it, rather than the resources it controls. The “have” and the “have-nots” will be synonymous with the “knows” and the “know-nots” ”

Serageldin. 2008.

2 The New Vision on Science, Technology and Innovation for Africa’s Development

The African Manifesto is a vision of African visions, a dream of African dreams and a tool for African development through self-rule in science, technology and innovation. It envisions a new renaissance in science, technology and innovations for Africans, by Africans in Africa and in the Diaspora in dialogue with the rest of the world. This vision calls for Africa to generate, master and utilize scientific and technological knowledge for the sustainable development of Africa. It calls for Africans to take leadership and full control of that knowledge, technology and innovations required for African development. This vision builds on the conviction that if political sovereignty is necessary, scientific sovereignty is even more important in present day Africa. The development of science, technology and innovation in its own terms is critical to Africa's sustainable development and to its inclusion in the global world order.

2.1 Towards Socialisation of Science, Technology and Innovation in Africa

For science, technology and innovation to work, they need to be rooted firmly in society. That is equally true for Africa, Europe and India, as indeed for any society. It is equally true for sciences and technologies that are iconic for the modern age, such as nano-science and genetic engineering, as for sciences and technologies that are considered 'traditional' such as indigenous medicine and craft pottery making. This Manifesto spells out the

various strategies that are needed to root African STI in African societies. These strategies for what we call the "socialisation of STI" range from connecting the agenda of African STI to the needs of the African people, to recognizing the relevance of different African knowledge and technology systems, via developing African styles of research and scientific production, to African forms of stimulation, regulation and evaluation of STI.

2.1.1 On the Need to Embed African STI in the African Agenda

Science, technology and innovation are the key drivers for economic growth and transformation of any nation or society. A deliberate investment in STI is, therefore, seen as one of the most crucial priorities for any country to realize its short term, medium term and long-term development objectives (thus stated by UNESCO and the African Union in 2009).

STI indeed underpin every one of the UN Millennium Development Goals, and is the only option for effective response to the complex challenges of poverty alleviation, climate change adaptation and mitigation, and response to other challenges facing humankind today. Therefore, Africa can no longer stay reclusive and let her STI agenda be defined externally through donor partnerships and bilateral North-South relationships. Strengthening our

economic and social development can only be achieved by harnessing the fruits of scientific discoveries and technological innovations. How, then, can we formulate an African agenda for STI? Such an agenda will include two elements: (1) prioritizing an overall emphasis on science, technology and innovation in development policy planning, and (2) recognizing a variety of knowledge communities and technology systems, including indigenous knowledge, science and technology.

The new priority for STI has to include an attention to design, user involvement, capacity building, grassroots participation, transparent leadership and STI governance, and process improvement. This is the place to test the partnership between the researchers, the government, the civil society, and the private sector (both formal and informal) as linked in a quadruple helix. This calls for re-orientation of the mindset of academic researchers, collaboration across disciplines within the academic sciences and with non-scientists. African development challenges, social problems and societal goals are multi-faceted, so should the research agenda to address them. This will require an investment in training, re-tooling and re-skilling; in curriculum reform in STI institutions; and in restructuring the pedagogies, and incentive structures in science and technology to improve skills in multi-disciplinary and transdisciplinary research, systems thinking and responsible innovation. Indigenous African knowledge

and technology systems were effective in sustaining rural livelihoods for centuries, but they are not sufficient to secure sustainable development in a globalised world. Global socio-economic and environmental challenges including climate change and population growth are likely to exacerbate international competition for energy, food, water, land and other materials. Developments in innovative science and technology can extend and improve these indigenous knowledge and technology systems in Africa to enhance factor productivities and value addition. Africa's STI must meet international quality standards and be fully codified and tested for robustness, reliability, repeatability, and up-scaling. This is necessary to secure Africa's competitiveness in the global economy that is increasingly driven by STI now, more than ever. It is only by shaping Africa's STI to address the African agenda that it can address Africa's development challenges and yield desired development gains.

2.1.2 On the plurality of knowledge and the autonomy of different forms of science and technology

Both indigenous and global knowledge platforms provide formidable repositories of scientific and technical information relevant to addressing Africa's development challenges. There is, however, a crucial difference between mere information and living knowledge. Only

when information is organized, adapted and adopted for use within a specific cultural milieu, it can be characterized as knowledge. Therefore, this Manifesto questions the universalistic concept of science and technology and pleads for a socialisation of STI, i.e. embedding STI in societies that it aims to serve.

For instance, Africa has certain peculiar disease conditions and some acquired through lifestyle changes that are becoming pandemic. It is an illusion that the medical and pharmaceutical sciences required to take care of these diseases can be disconnected from the disease cultures, and dislocated in the global North or West. Why leave the solution of Africa's problems to African Centres for Tropical Medicine in non-African temperate regions? Furthermore, why leave the solutions to African tropical agriculture in centres and green houses established in the Northern hemisphere with temperate climates? Why leave solutions to African economies and poverty alleviation research to research stations and centres established thousands of miles from the poor African communities and researchers with no experience of poverty and its complex causalities and ramifications? While Africa can benefit from the global knowledge systems, it is necessary for a sustainable development that African governments and African people proactively engage in creating a STI strategy that is fully embedded in African history, culture, traditions, and socio-political and economic realities.

To achieve this, the plural knowledge systems held in different indigenous knowledge communities must also be proactively engaged in the STI dialogues. If we consider only one system of "modern" STI, then Africa will remain at the lower rung of the global science and technological ladder, orchestrating the knowledge dependence syndrome; if we recognize the value of our indigenous STI systems as part of a broad spectrum of parallel systems of knowledge and technology, then Africa can take its fate in its own hands and build a future on original innovations at the cross roads of these various knowledge systems. Significant opportunities for leapfrogging development exist as Africa can learn from the successes and mistakes of the industrialized nations and chart a more efficient development path with reduced environmental externalities.

Then African scientists will have the opportunity to be in the forefront of world research in developing new forms of STI that effectively contribute to such varied problems as recurrent droughts causing vast starvation and fatalities, or recurrent floods leading to numerous deaths and destruction of property, or low energy use intensity in most African cities, etc. Also the classic problems of global trade exploitation can then be addressed: exporting crude oil and importing refined oil; exporting cocoa and importing chocolate; exporting cassava and importing starch; having trees that can produce paper but importing paper; having

land and water but importing food. This is no anti-science plea. On the contrary: Africa will continue to learn from the developed and emerging countries, because “he who started cooking before you, is likely to have more broken pots”, as the saying goes. Africa will not seek to re-invent the wheels of STI or repeat the mistakes of industrial revolution, but rather learn from these experiences to leapfrog development in African STI by integrating the positive aspects of the western styles of STI with those of African indigenous knowledge and technology. As another adage goes, “when the frog in front falls into a pit, other behind takes caution”.

2.1.3 On Capacity Building, Capacity Utilization and Public Engagement in STI

The capacity of African institutions to support hard and soft skill development on STI is not yet adequate to move Africa into the new mode of control over (self rule in) STI that this Manifesto calls for. The infrastructural decay in STI institutions, low innovative capacities of African graduates to address African development challenges, and mass migration of many STI experts (natural scientists, doctors, economists, engineers, etc.) to the already industrialized countries in the northern hemisphere go along to worsen the hope of realizing a sustainable development in STI in Africa. Worse still, these industrialised countries provide active policy incentives that act as effective “pull

“ he who started cooking before you, is likely to have more broken pots ”

Traditional Nigerian Proverb

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factors” that exacerbate the brain drain syndrome. Many developed countries now have highly skilled visa programs which entice African experts trained in Africa to migrate to their countries, effectively subsidizing their own STI training budget with those of the so called poor developing countries.

Furthermore, African government’s lack of attention to STI investments and recognition of African STI experts, leave the African STI sector in a very debilitating state, providing “push factors” for the mass migration to “greener pastures”. African STI infrastructures are in a very poor state, remuneration of African experts is very low, and in most cases, existing capacities are neither recognised nor utilized as foreign consultants are preferred, partly due to bilateral funding conditionalities. These neo-liberal policies of globalisation of STI constitute an invisible hand that drives the continued poor investments in STI capacity building in Africa, on the one hand, and poor utilisation of existing skill base leading to frustrations and external migration of African experts, on the other.

These circumstances call for urgent action by African governments and African people to enact policies that support capacity development and effective capacity utilisation in Africa for African development. Necessary economic and policy incentive structures that will encourage African STI experts to develop home-grown

solutions to Africa’s numerous STI challenges and discourage African experts from migrating elsewhere are urgently needed. At the same time, capacity should be built amongst the general African public to understand scientific and technological challenges and opportunities, and to proactively participate in shaping Africa’s solutions to them.

“Africans must demystify science and technology from its current perception as an “ivory tower” activity to a space for gaining knowledge and codifying experiences through systematic observation, experimentation and measurement of phenomena and the formulation of laws to describe the observed facts in general terms. The traditional means of gaining knowledge through multiple perspectives, lateral thinking and shared opinions within communities need to be mainstreamed into the new African scientific paradigm.”

Expressed in the currency of modern scientific language, this is a call for problem solving through multi-disciplinarity, transdisciplinarity and systems thinking. Only with such an improved public understanding of, and space for, participation in science, technology and innovation, can we hope that the African public will engage in the democratic governance of STI.

2.1.4 On the Language of STI and the Culture of Science Communication

The limited socialisation of STI in Africa can be attributed in part to the language of science and technology and the established culture of science communication. To improve the communication between scientists and the public, to improve the public engagement with science and technology, and to enhance the societal engagement of scientists, important investments have to be made in simplifying and standardising the language(s) of STI, and language education at all levels. This pertains to the language of the modern scientists as well as the multiplicity and limited capacity of African languages to communicate STI in general.

There is not one African language, and most of the African languages are limited in their ability to communicate scientific terms and phenomena comprehensively. The African Union has adopted English, French and Arabic as its official languages, but many African countries typically have over three different major languages of their own, and the “language of science” is yet another one. The elite character of the language of STI tends to exclude many in civil society, government, and private sector (formal and informal). This is not very different from other regions of the world, but the existence of so many basic vernaculars in Africa does increase this problem, leaving

scientists communicating to each other, leaving out the majority of the population. With an unenviable record of having the lowest adult literacy percentage of the population (62%), the language exclusion not only confers “foreignness” to STI in Africa, but it also prevents the emergence of knowledge networks where collaboration, user participation, and participative STI governance can be nurtured. The question is how to translate between the language of science and the African languages, and how to facilitate two-way communication between scientists and other Africans. To start with, science communication, STI policy, and STI entrepreneurship should be made an integral part of the curricula for all science and engineering subjects. Writing for popular audiences and developing the attitude and skills to translate research into innovation would not only boost the confidence of researchers, it would make science more relevant. Secondly, general primary, secondary school and university education should prioritize science and technology subjects, and

The elite character of the language of STI tends to exclude many in civil society, government, and private sector (formal and informal)...leaving scientists communicating to each other, leaving out the majority of the population. With an unenviable record of having the lowest adult literacy percentage of the population (62%), the language exclusion not only confers “foreignness” to STI in Africa, but it also prevents the emergence of knowledge networks where collaboration, user participation, and participative STI governance can be nurtured.



Investing in African women is investing in the present Africa in a structural and deep way. In agriculture, in the informal sector, in the production of crafts and arts, in health care, in water and environmental management, women play a central role.

programmes of public education of STI should provide an *éducation permanente* to allow African citizens to interact meaningfully with scientists and engineers. Knowledge brokerage institutions in Africa should also be strengthened for effective knowledge valorisation on the continent.

2.1.5 On Youth and Gender Engagement

STI cannot become socialized and embedded in African culture if significant sections of the African population do not participate in the discourse. The role for civil society in such engagement with STI is crucial to enhance the socialisation of STI. To strengthen civil society, this Manifesto makes a plea for investing in STI capacity building for African women and youth.

Investing in African youth is investing in the future of Africa. Gross enrolment ratio in tertiary education in many African countries is currently low with only Mauritius, Liberia, Cape Verde and Nigeria exceeding 10%. Better education and more opportunities to make a living will keep the youth in Africa and stimulate their engagement with the shaping of a new and sustainable Africa. Investing in African women is investing in the present Africa in a structural and deep way. In agriculture, in the informal sector, in the production of crafts and arts, in health care, in water and environmental management, women play a central role. Their role in the family also shapes the mood and temperament of the

continent. Furthermore, women are increasingly emerging as bearers of valuable knowledge and agents of change. Yet their voices have hitherto been marginalized with few African women engaged in STI governance positions throughout the continent. In order for these voices to be heard, we need more proactive investments in programs such as the African Women Forum for Science and Technology (AWFST) and the African Youth Forum for Science and Technology (AYFST), and other similar initiatives that have emerged in the past decades. It is from these fora that specific concerns can be articulated and eventually merged with other views on a platform that articulates Africa's agenda for the future. Support to this kind of programs should have mentoring and incubation facilities to build a culture of innovation amongst African youths and women. We need to give African women and youth the confidence to embark on science, technology and innovation related careers, knowing that they can succeed and operate at world-class levels.

2.1.6 On Knowledge Circulation, Valorisation and Appropriation Strategies

Harnessing science and technology for sustainable development requires a free circulation of knowledge, and strategies to translate scientific knowledge into effective use (valorisation) and adoption by a broad range of social groups in society (appropriation). Explicit policy measures

to enhance such circulation, valorisation and appropriation need to be developed at national, regional and pan-African level. Inevitable tensions will arise with the protection of intellectual property rights, as governed by a number of complex international agreements. The Convention on Biodiversity, for example, underlines the importance of traditional knowledge as advocated in this Manifesto, and creates a framework for ensuring that local people share in the benefits arising from the appropriation and use of local knowledge systems and of the resources of their local environment. Plant breeders' rights and farmers' rights are equally recognized in the Convention. These resources are of great importance for Africa's sustainable development and they must receive adequate attention. Similar international agreements should further safeguard African access to medical knowledge and innovation as well as access to technologies and innovations for climate change adaptation and mitigation.

2.1.7 On the Nature of STI Incentives

To achieve a strong science-society interface in Africa, the current incentive system in science and technology needs to be changed. The current incentives make African scientists try to mimic their colleagues abroad, focusing sometimes on self-defined and donor defined research priorities and aiming for outputs that have international relevance with have little or no practical application in

Africa. In addition, there is the tendency for global STI agenda to dominate the work of African scientist to the detriment of their attention to local problems. Much donor funding stimulates attention to such foreign issues, forcing African researchers away from the problems of their own society.

A new system of incentives would reward local publications and reports, sometimes in one of the African languages, in addition to scientific publications in international peer-reviewed journals. The collaboration with scientists of other disciplines and with other groups in society should also be rewarded. This requires new forms of “measuring” scientific production, in addition to publications of indeed any sort. Africa also needs to reward and encourage scientists’ involvement in education, in innovating science curricula at all levels of education, and in engaging with civil society.

In addition to developing such a new system of incentives, this also requires re-orientation and re-training of the STI practitioners. This new orientation of African researchers and the new incentives will promote a focus on local problems and innovation and an engagement in a broad range of collaborative research activities.

2.1.8 On Systems Thinking and the Collaboration

Current African science is carried out in disciplinary silos with little knowledge flows between them. This effectively inhibits innovation. Neither is there much knowledge flow between scientific laboratories and non-academic partners such as industry and other user groups. So, even if Africa starts looking to science for answers, the solutions will take far too long to reach society and solve the problems of poverty and unsustainable use of resources in Africa. While disciplinary science remains important to create in-depth understanding of phenomena and inform evidence-based policymaking, the systemic and dynamic nature of the current development agenda of Africa means that trans-disciplinary approaches, systems thinking and innovation must be taken more seriously.

“Innovation does not happen in the disciplinary silos, but in interactions amongst the key actors in an innovation system, including policymakers, private sector actors, science experts and the civil society. These interactions must be profound and mutually re-inforcing as in a quadruple helix of policy, science, industry and civil society.”

In most African countries there is very little interaction between universities and industry and very few universities

in the region conduct research and training programmes pertinent to industrial needs. To bridge the existing gap between scientists, technologists and industrialists, African governments should encourage and support the establishment of interdisciplinary and transdisciplinary research and training centres and strengthen existing institutions in areas of science and technology most relevant to the development of local industry. The industrial sector should on the other hand expand its involvement in the activities of the research and higher education institutions engaged in science and technology. In particular greater importance should be given to the development of strong linkages between engineering institutions, small-scale industries and the agricultural sector with the principal aim of producing simple and modern tools and equipment required by farmers to increase their productivity and efficiency. Small research and training units should also be formed and strengthened in areas of cutting-edge technologies relevant to industry such as lasers, fibre optics, composite materials, pharmaceuticals, fine chemicals, information and communication technologies, biotechnology and nanotechnology. The most successful newly industrialized countries of the South are those which have been able to form a strong alliance between science, technology and industry. It has now been established that multi-lateral collaboration amongst the quadruple helix breeds innovation, while bilateral relationships lead to knowledge dependence.

2.1.9 On Integration

In addition to the quadruple collaboration between research, industry, civil society and government, also collaboration over other borders and divides need to be stimulated. Governmental ministries in Africa often display the same isolated and inward-looking practices as academic disciplines: much can be gained if a more problem-oriented style of policy making were developed. Similarly, national interests sometimes block the realization of African goals. This Manifesto thus advocates more strategic cooperation between different African countries both within the established regional blocks and at the pan-African level under the African Union.

To ensure the successful implementation of STI programmes and activities in different countries in Africa, there is need for their proper coordination and integration in the innovation system into all national and regional socio-economic planning issues. Presently, coordination of STI programmes and activities seem to be within the purview of the ministries of science and technology. While they should continue to serve as the main STI ministry for successful implementation of STI policy, there is an urgent need to begin to coordinate all STI programmes and activities into national and regional systems of innovation.

STI is cross-cutting to most Ministries including agriculture, energy, water resources, education, science and technology, mining, trade and industry, etc. These interconnections need to be systematically streamlined within national systems of innovation to effectively harness synergies and complementarities within the system.

“ Innovation does not happen in the mainstream but in the interactions of actors within an innovation system. ”
K. Urama, 2009

2.1.10 On STI Investments

Despite considerable empirical evidence from South-East Asia and other emerging economies showing that investment in STI yields direct and indirect benefits to national economies, Africa still fails to give priority to investment in STI. African countries are characterized by low investment in science and technology, a concentration of investment in public large enterprises in big cities and an exclusion of the large mass of population from the formal economy. This low level of investments has led to declining quality of science, engineering and technical education at all levels.

For science and technology to make an effective contribution to development, African governments must devote a critical minimum of investment in research and development. At

present very few African governments allocate more than 0.3% of their Gross National Product (GNP) to research and development, while the majority of industrialized countries allocates over 3%. This Manifesto calls for a tripling of the existing resources to bring them close to the level of 1% of the GNP as recommended by UNESCO and more recently by the African Union 2007 Summit. Indeed it is only South Africa that has met this figure and the difference in development dividends are clear.

2.1.11 On Regulation and Mediation of STI

STI needs to be regulated. STI knowledge can be used to do good, but can also be used to destroy. Africa needs a regulatory framework that facilitates a democratic balancing of risks and benefits. Risk in innovation and science is necessary to make progress, but ethical considerations for the common good are equally necessary. We saw how the failure of proper regulation of the financial world produced the global financial crisis. Lack of proper regulation of STI could cause a loss of lives and destruction of ecosystems.

The level of informality in Africa is high and attempts to impose standards may be seen as stifling creativity and home-grown solutions. Good regulations, however, do not stifle creativity, but create space for it while safeguarding a balance between risks and benefits. Rules and standards are not enough; enforcement is equally important. The

Building the infrastructure of STI should not be a stand-alone activity. It should be linked to industrialization concerns, the requirements in the key sectors such as agriculture, water resources management, and STI policy goals and targets.

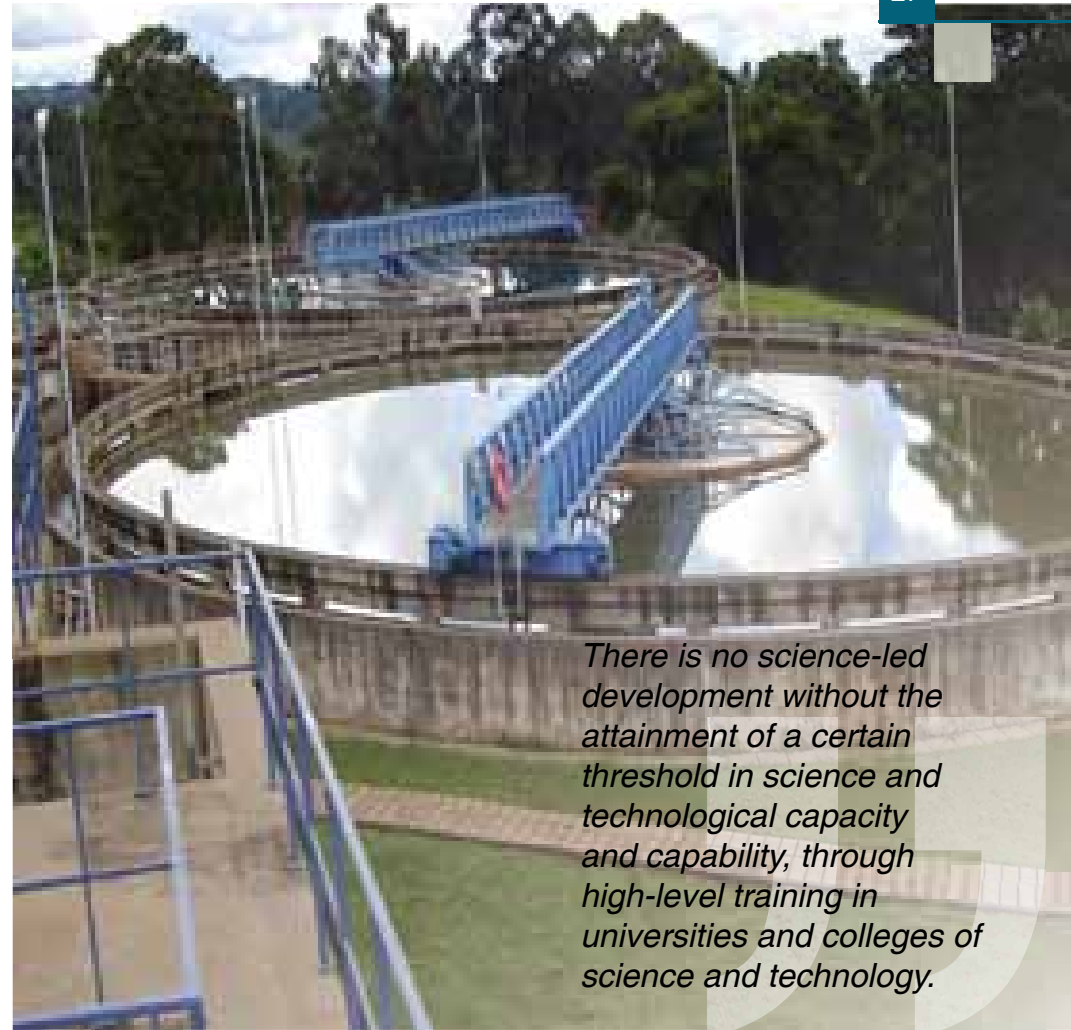
regulators must be empowered to regulate, and at the same time the regulator needs to be regulated to avoid corruption that can subvert the entire system. This Manifesto calls for a regulatory framework that accords with international standards, bearing in mind that African circumstances may require creative learning from best practices elsewhere.

2.1.12 On Innovation Incubation

Finally, for Africa to advance its development through STI, proactive programmes to identify and harness the STI capacities of African people, especially youths and women needs to be strengthened. Programs such as the African Youth Innovation Incubation (Y I CAN) and Women Innovation Incubation (WE CAN) provide platforms for fostering and harnessing innovation capabilities amongst the African youths and women to create a crop of African innovators today for African development tomorrow.

2.2 Building Sustainable STI Infrastructure

Science, technology and innovation infrastructures across Africa have been in a very bad shape. This refers to both the human and physical infrastructure. Rebuilding these infrastructures would require a lot of resources, creativity and prioritizing. There is no science-led development without the attainment of a certain threshold in science



There is no science-led development without the attainment of a certain threshold in science and technological capacity and capability, through high-level training in universities and colleges of science and technology.

and technological capacity and capability, through high-level training in universities and colleges of science and technology. The technological revolution in Asia was preceded by heavy investment in higher education, targeting especially scientists, engineers and mathematicians. To build these infrastructures requires devoting consistently a high proportion of the national budget to higher education and improving the incentive structure for scientists and innovators. Currently, only the Republic of South Africa has attained the expenditure target of one percent of GDP for Research and Development as mandated by the African Union. Unless this level of funding is attained, it would be difficult to modernize the physical infrastructure and bring it to world standard.

This Manifesto seeks to build a coalition of actors that not only assists the government to prioritize STI funding but join forces to agitate for increased funding for higher education and R&D from both domestic and external sources. Prioritizing implies making choices amongst competing needs. Building both human and physical STI infrastructure should be guided by a vision of where the leadership wants to take the society, the needs of the society, and its resource endowment and comparative advantage, including dynamic comparative advantage.

Building the infrastructure of STI should not be a stand-alone activity. It should be linked to industrialization

concerns, requirements in key sectors such as agriculture, water resources management, and STI policy goals and targets. This is one avenue through which industry-university (knowledge generating institutions) linkages can be fostered. This can also force the rationalization of scarce STI assets. Attempts in the past to establish specialized universities have failed in many African countries. We therefore have many Universities of Science and Technology or Agriculture, established for the primary purpose of generating STI knowledge, become multi-purpose universities, taking their scarce resources in the study of arts and humanities. This mushrooming of universities of science and technology has led to poorly resourced and ill-equipped universities of STI in many African countries. The Manifesto calls for a return to the policy of strengthening existing trans-disciplinary centers of excellence with a specialization in core areas of need in African development struggle: sustainable energy, infrastructure, entrepreneurship development, technical education, agriculture, ICT, STI policy research and advocacy, etc, tailored to the special needs of African countries.

2.3 Restoration of Confidence in African Science, Technology and Innovation

This Manifesto will have had a major impact if African researchers can once again regain their confidence and

This Manifesto will have had a major impact if African researchers can once again regain their confidence and trust their capacity to do world-class science and technology, and innovate; and if African Leaders can be convinced that home-grown solutions are not inferior.

trust their capacity to do world-class science and technology, and innovate; if African leaders can be convinced that home-grown solutions are not inferior and if the African people become supportive of their own knowledge class. To break the cycle of knowledge dependence and improve the demand for African knowledge a quick major scientific breakthrough would be required. For this breakthrough to occur, a critical mass of African scientists working together on major African concerns is necessary. This implies the strengthening of existing regional platforms and centers of excellence on STI such as the AU-NEPAD STI unit, African Technology Policy Studies Network (ATPS), the African Centre for Technology Studies (ACTS), the network of African Academy of Science (AAS) and the associated national academies, etc.

But more importantly, it would require the continuous sensitisation and training of the political class, proper involvement of the civil society and the retooling of and greater support for STI policy advocacy institutions. In tackling the issues of confidence, African Scientists abroad could play a significant role. They can bring cutting-edge knowledge and collaborate with home-based scientists in a non-condescending way. Development partners can facilitate these collaborations in a manner that encourages multilateral dialogue and a shared vision for Africa's development.

But more importantly, development partners must de-link knowledge and aid and return to the core principles of

the Paris Declaration, if confidence is to be restored. The autonomy to determine development and research priorities by Africans must be assured and donors must acquire the longevity of venture capitalists. The rate at which they change their programs and personnel cannot augur well for true partnership; while Africans, policymakers and all, must acquire the discipline for transparency, accountability and responsibility. Aid can be effective once we avoid the traditional donor behaviour: mistrust of the system; lack of trust in the capacity of Africans to deliver; inability to appreciate that learning involves provisions for curiosity and mistakes; excessive use of ill-equipped expatriates who, have very little knowledge of the local contexts, cultures and social conditions. Excessive focus on short term scientific publication outputs rather than medium term innovation incubation and the curiosity required to innovate is also another constraint. This assumes that Africans will do their part, acquire superior knowledge, use their capacity wisely and drive the dialogue with confidence, following established international norms and standards.

But more importantly, development partners must de-link knowledge and aid and return to the core principles of the Paris Declaration, if confidence is to be restored...Africans must be assured and donors must acquire the longevity of venture capitalists. The rate at which they change their programs and personnel cannot augur well for true partnership; while Africans, policymakers and all, must acquire the discipline for transparency, accountability and responsibility.



“ We in Africa must either begin to build our scientific and technological training capabilities or remain an impoverished appendage to the global economy ”

Paul Kagame, Rwandan President, cited in the New African, Vol. 494, p. 78.



3 A Call for Self-Rule and Democratic Governance of STI in Africa

“ If political sovereignty is necessary, then scientific sovereignty is perhaps more important in present-day Africa. ”

E. Mveng 1983

This Manifesto is in more ways than one, a Call for Action by the African governments, the African peoples and the Development partners.

3.1 Self Rule of African STI in the Global Scene

In conclusion, this Manifesto is a call to the many peoples and governments of Africa to rise up to the challenge of taking their proper place in the ongoing global STI revolution. This Manifesto promotes self-rule in a manner that clearly allows autonomy in the origination of ideas, experimentation and curiosity in order to provide solutions that are home-grown and encourages “Africanness” of viewpoints.

The time has come for Africa to address the current unbalanced global governance of STI which has entrenched knowledge dependence for far too long. Africa needs to move away from the current binomial, linear, unequal partnerships where the funding for scientific research, knowledge and technology generation largely flow from North to South.

African needs to move away from imported, supply driven, scientific processes forced in through development funding packages or through poorly negotiated international agreements, by which recipients acquire no specific knowledge or skills during the process. This Manifesto

stands for multi-lateral (North-South-South-North) relationships in knowledge, capacity and financial flows for STI development in Africa.

“ We believe that mutual interaction and mutual learning amongst the global community is a necessary condition for leapfrogging STI development in Africa. This relationship must however be carefully negotiated and carefully governed to ensure full sovereignty of different knowledge communities, countries and regions in the ” relationship.

For equity, social justice and our common humanity, the need to accord knowledge emanating from Africa equal treatment and consideration in the international STI discourse is imperative. In line with our earlier call on the socialisation of science in Africa, the time is now ripe for all Africans to exercise sovereignty over their knowledge and science, be treated and respected, knowing that they have much to contribute to global STI.

3.2 Leadership for a Democratic Governance of STI

And how can all of this new renaissance in African STI be achieved? The key missing link is good leadership. STI-led development is a leadership endeavour, requiring strong political vision to drive the African agenda and enforce governance processes that prioritises investments in STI. STI prioritisation is a comparatively new endeavour for

Right: A young innovator from Ghana with his shea nut processor.
Picture credit: Flickr

political leadership in Africa, but the past decade has seen the emergence of an unprecedented political will for the use of STI as the engine of development. In 2008, Liberian President Ellen Johnson Sirleaf reminded delegates at the Science in Africa summit that: “No country on earth has developed without deploying, harnessing and utilizing science and technology, whether through technology transfer or homegrown solutions.”

Bingu wa Mutharika, the Malawian President, branded his maiden speech as New Chairman of the AU with a slogan “Feeding Africa through New Technologies: Let Us Act Now.” President Kagame, on the other hand, during his 2008 address at the Royal Society in London underscored the fact that, “We in Africa must either begin to build our scientific and technological training capabilities or remain an impoverished appendage to the global economy” . The 2010 African Development Forum hosted by the African Union, the Economic Commission for Africa and the African Development Bank also prioritised STI in Africa’s response to climate change and other development challenges.

Following the example of South Africa, whose development of Science, Technology and Innovation (STI) policy has long been at the forefront of the African success stories, other countries in Africa such as Nigeria, Kenya, Tanzania, Malawi, and many others are also strengthening their National Systems of Innovation with thriving Ministries of S&T, and National Commissions and Councils for S&T.

The long term visions for development in many African countries, including Kenya’s Vision 2030 and Nigeria’s Vision 2020 all have STI as their bedrocks.

These developments and political commitments, including the formation of dedicated S&T units at NEPAD, the United Nations Economic Commission for Africa (UNECA), are all seeds of the new era. Pan-African NGOs championing STI capacity building and the emergence of civil society organisations advocating for STI investments in Africa, are all testimonies of this changing vision. There is also a growing army of African youth and women in research centres, civil society organisations, private sector networks, innovative entrepreneurs, social groups which – throughout all Africa - practise in their daily actions, science, technology and innovation activities at the grassroots.

However, African leaders, who have come to recognise the centrality of science and technology for an African renaissance, seem still uncertain of how to translate this orientation into practice. What is needed is to create a democratic space where these diverse actors can join efforts and enter into a dialogue to ensure that science, technology and innovation thrive and flourish for the benefit of the African peoples. For a start, mechanisms should be put in place to celebrate achievements in STI leadership in Africa. This Manifesto therefore encourages the establishment of an African Leadership Prize in Science and Technology. This should not be a prize for a scientist but a prize for an African Head of State or Head of Parliament, who has demonstrated strong and visible leadership for STI in Africa.

STI-led development is a leadership endeavour, requiring strong political vision to drive the African agenda and enforce governance processes that prioritises investments in STI.

Progress towards an African STI that finds its proper place in the global scientific community can be a long term perspective, but we do not think that it is a wild speculation.

Our conviction is reinforced by the passionate response that we received across Africa during the process of drafting the Manifesto, but it is also based on recent evolutions occurring in the continent as the effect of the social action by numerous and diverse actors, who are already on the move in the African societies.





4 Can We Achieve This?

“ Our journey has never been one of shortcuts or settling for less. It has not been the path for the faint-hearted - for those who prefer leisure over work, or seek only the pleasure of riches and fame. Rather, it has been the risk-takers, the doers, the makers of things,... who have carried us up the long, rugged path towards prosperity and freedom ”

President Barack Obama, Inaugural Address, 20 January 2009.

Africa has experienced a boisterous revolution instigated by ICTs, which have not only affected the continent's governance pillars but have had far-reaching ramifications for the environment, commerce, poverty alleviation, STI dialogue, agriculture, and community life. According to the International Telecommunication Union (ITU), in the last decade alone Africa has recorded the biggest growth in mobile phone penetration and internet connectivity and is striving to close the digital divide by having a presence in the global knowledge economy. By 2008 mobile phone users in Africa had reached 370 million people. Overall internet use in Africa has grown by 238% between 2005 and 2008. Rarely has the continent come out to address science and technology as now. The African Information Society Initiative (AISI) launched in 1996 is perhaps one of the most comprehensive regional ICT-for-development frameworks of its kind. Preceding the Geneva Action Plan of the World Summit on the Information Society (WSIS) of 2003 and the WSIS Tunis commitments in 2005, AISI can be credited for being a reference point for an African digital vision and agenda in a globalised world.

This diffusion goes together with innovation that is improving people's daily life in many ways. In a number of African countries notably Kenya, South Africa, Tanzania and Zambia, mobile telephones have become an easy means for poor individuals to gain access to banking services. The technology M-PESA (Swahili for "Mobile Money") provides the possibility of making person-to-person payments, transfers and pre-paid purchases

without a bank account. This is an African success story that has completely changed the regional business terrain. It has empowered the local people, from the capital city Nairobi to the rural outposts, by giving them what had hitherto been impossible owing to a banking regime with strict regulatory frameworks. To the Kenyans this is a typical everyday mobile transaction. To the world, this is an unbelievable first. It is mobile commerce at its best.

Another example. USHAHIDI.com (which means testimony in Swahili) is a website initially developed as a tool for citizens to report and map violence, which they witnessed after the post election crisis in Kenya at the beginning of 2008 via sms and mobile phone. This prototype software, which combines crisis information from citizen generated reports, media and NGOs and mashes these data up with geographical mapping tools, is now used worldwide to track unrest in similar crisis related situations (e.g. in



M-PESA: Swahili for Mobile Money that provides person-to-person payments, transfers and pre-paid purchases without a bank account

India, Mexico, Lebanon, Afghanistan and the Democratic Republic of Congo). It operates as an early warning system and assists in visualization for response and recovery.

Africa is now rife with similar innovative breakthroughs in several areas of STI which, in most cases, remain obscure in the serenity of our rural villages or in the periphery of our cities. This Manifesto proposes and supports mechanisms to identify, mentor and incubate such innovations by African youth, women and men to boost their impact on the overall STI system and to contribute to raising awareness about African capacity for research and innovation.

4.1 A Call to Coordinated Action

Thus it seems that a quiet revolution is taking place in Africa geared to tie STI to society in ways that were hitherto unimaginable. In our continent we are starting to think and act seriously about stepping up our efforts in using STI for making a difference in the lives of ordinary people. By harnessing STI, African countries have a stronger chance for sustained economic growth, for addressing poverty, disease and environmental destruction. It is a huge effort and it needs the contribution of Africans and friends of Africa. To achieve the vision, Africa must embark on transformational changes in how STI is socially defined, prioritised, constructed, funded, communicated, monitored and evaluated for African development. The following specific actions are recommended:

1. **Reject knowledge dependence**, i.e. the idea that the existing international division of labour is STI is adequate for development. The system whereby STI knowledge is predominantly generated in and funded by the global North can only lead to “the global South” remaining a perpetual “appendage” to the global economy, as “consumer”, not “producer” in the new knowledge economy.
2. **Encourage bottom-up innovation and democratic governance of STI in Africa for African development.**
– More inclusive forms of knowledge generation and knowledge circulation in which the voices of the African is treated with equal respect irrespective of social or academic status, income, gender, country, race, religion, or age.
3. **Encourage new forms of STI in Africa**, focusing on poverty reduction, inclusive wealth and environmental sustainability and respect for the diversity of knowledge systems in Africa, while taking into account global policy priorities. Local needs and priorities should drive the STI agenda within the context of global agendas and not vice versa.
4. **Encourage new forms of STI monitoring and evaluation**, and inclusive incentive structures: Develop alternative matrices for the evaluation of STI taking into account international standards as well as local relevance.
5. **Encourage coordination and collaboration:** through formation of National Systems of Innovation (NSI) platforms to foster innovation

through collaboration amongst the relevant governments Ministries, Agencies and Parastatals and amongst the quadruple helix.

6. **Full socialisation of STI in Africa:** Create policy environments to espouse the principles of Self-rule, African Ownership, and Democratic Governance of STI research prioritisation processes and policies in Africa for African development.

These recommendations can be translated into specific calls for action for specific people in the African society and the international community. These calls to action targeting specific African stakeholders: governments; scientists; private sector, civil society, Africans in Diaspora as well as development partners will be published separately.

What will you do?

4.2 An Open Dialogue

The African Manifesto for STI is a passionate call for the Africans to take responsibility and act in every capacity to secure self rule in STI for African development. It starts the participatory dialogue that will lead the African people to collectively build the new Africa STI agenda, rather than attempting to say a final word on the issues at stake.

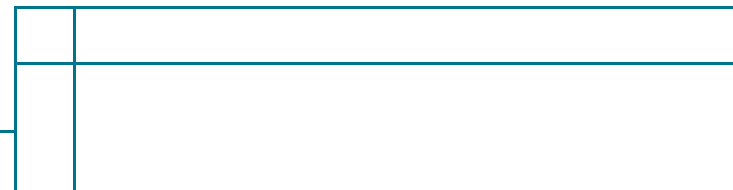
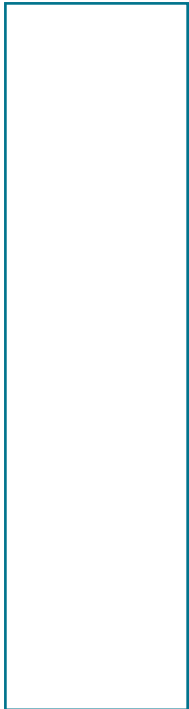
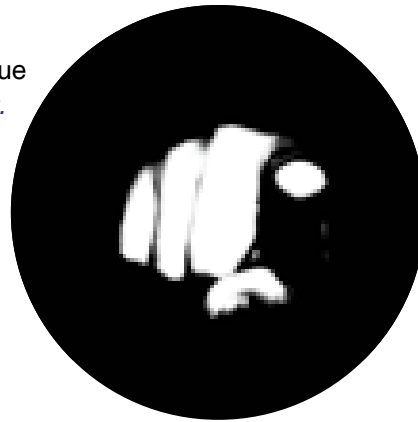
The final word belongs to all Africans who are willing to take the necessary action to change the status quo and mainstream STI in national and pan-African policy dialogues; it belongs to those visionary leaders who would buy into the vision and prioritise STI in national budgets and investment strategies.


The final word belongs to you!

We therefore invite you and all Africans and friends of Africa who share in this responsibility to share their views, make their contributions, and keep the dialogue going. More importantly, those who would like to innovate by implementing the recommendations of the Manifesto would be celebrated heroes of Africa. We hope that we have provoked a living dialogue that will grow into an African vision and have encouraged as many African peoples and stakeholders of all ages to join the multilateral dialogue on STI and its relation to African society. We call on you to kindly contribute to the effort to make African science, technology and innovation speak to all Africans, listen to all Africans, address the needs of African society, and is owned by Africans. We call on you to build once again an African development paradigm that is anchored on science, technology and innovation as the norm.

You can contribute to or follow the dialogue on e-mail at AfricanManifesto@atpsnet.org;

- or blog: <http://www.atpsnet.org/blog/index.php>
- Twitter at <http://twitter.com/ATPSNETWORK>,
- Facebook at <http://www.facebook.com/atpsnet?ref=search&sid=149300024.3173025637..1>,
- Upload useful video messages and case studies at <http://www.youtube.com/user/atpsnetwork>.





It was against this background that institutions such as the African Technology Policy Studies Network (ATPS), The African Academies of Science (AAS), The African Union-NEPAD platform on Science and Technology; the African Union (AU) and the United Nations Economic Commission for Africa (UNECA) Science and Technology divisions emerged to provide African perspectives on STI and to widen Africa's participation in the global STI discourse and to agitate for Africa's scientific sovereignty.



“Building Africa’s Science, Technology and Innovation Today,
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