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# SCIENCE AND TECHNOLOGY FOR DEVELOPMENT: THE INSTITUTIONAL LANDSCAPE IN AFRICA AND EUROPE

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On behalf of the Uganda National Council for Science  
and Technology and the Research Council of Norway.

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## EXECUTIVE SUMMARY

1. This report analyses how research outputs from Framework Programme projects, especially those related to sustainable development, could be translated to inform the implementation of EDF development cooperation activities across various domains of socio-economic development. This would ensure greater take-up of development-orientated FP research, and strengthen innovation.

2. For the benefit of a diverse readership this report provides essential contextual information. A significant number of African scientists, policy-makers and development practitioners may not necessarily be familiar with the elaborate EU system of support to S&T and development. Conversely, their European counterparts find themselves largely unfamiliar with the African institutional terrain and the policy frameworks of S&T and development cooperation. Therefore, brief overviews of the EU's FPs and the EDF have been included. Similarly, measures taken at the African end with respect to S&T under the auspices of the AU and NEPAD are highlighted. Joint European-African initiatives to bridge the divide between S&T and development are also noted.

3. The developed countries have generated capabilities for effective application of scientific and technological innovation as tools for achieving national development goals. By contrast, the developing countries have relatively modest capacities in science and technology, and hence a low potential for innovation. As a result, their development is lagging behind the rest of the world. Capabilities in science, technology and innovation are an important determinant of progress and transition to knowledge-based societies.

4. The promotion of science, research and technological innovation is an essential part of national development strategies worldwide. From the macro perspective, S&T development is critical for achieving and maintaining high rates of economic growth. There is worldwide evidence that the greater use of technology is a major factor in meeting the objective of productivity-driven growth and industrial competitiveness.

5. Two future scenarios are on the horizon for most African countries. At the one extreme, Africa is likely to be trapped at a low level of economic development and being the major locus of extreme dollar-a-day poverty in the global economy. African countries will probably be lagging behind other developing countries and be obliged to call on the international community for aid to tackle intermittent humanitarian crises and for peace-keeping missions to deal with recurrent conflicts. African countries will also be epicentres of the global refugee population, incubators of global health crises and major sources of international migrant workers who leave their countries for the sake of earning a living because their life-chances are simply too restricted at home. This scenario reflects the much-touted Afro-pessimism.

6. The scenario at the other extreme envisages a progressive transition in which sustained and accelerated economic growth is achieved through the development of productive capacities.

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7. With the associated expansion of productive employment opportunities, there could be substantial poverty reduction. In that scenario foreign aid is supporting development rather than just engaging in 'fire fighting' when complex humanitarian emergencies arise. Moreover, dependence on development aid can be reduced as economic growth is more and more sustained by domestic resource mobilisation and Africa is no longer marginalised from beneficial international private capital flows.

8. The basic challenge of development is to increase the knowledge intensity of African economies. Unless African countries adopt policies to stimulate technological catch-up with the rest of the world, they will continue to fall behind other countries technologically and face deepening marginalisation in the global economy.

9. Most African countries are far from making any internationally significant technological breakthroughs. The critical factor in technological learning is the domestic knowledge system which may enable the creation, accumulation, use and sharing of knowledge. Those systems should support effective acquisition, diffusion and improvement of foreign technologies. The domestic knowledge systems in Africa are very weak and the level of technological capabilities of domestic enterprises is very low. A strategy for catch-up needs to focus on the building of a domestic knowledge base, but also facilitate the transfer and effective absorption of foreign technology.

10. The capability of African universities to interact with industry is very limited. African institutions of higher learning and research cannot be called 'developmental universities'. The reasons are many: sub-standard quality of teaching and research because of resource constraints; explosion in student enrolment leading to the prioritisation of teaching at the expense of research and innovation; a university environment not conducive to research in terms of laboratories; brain drain of highly skilled professionals and a high percentage of faculty vacancies; low salary levels; and teaching practices not orientated towards the acquisition of problem-solving skills or exposure to real life situations.

11. There is not enough basic or applied research undertaken in African universities, partly attributable to lack of incentives on the part of faculty members for undertaking industry-relevant research; and a publication-based merit system for professional advancement that neglects industrial innovation.

12. The obverse side of the technological coin is industry itself, to which blame should also be attributed. African manufacturing is dominated by a low level of processing of natural resources and the production of simple consumer goods for local consumption, and has remained substantially untransformed from its colonial raw material production and export origins. Africa has the highest share of resource-based exports, while its share of high-technology products is the lowest. Over three-quarters of all exports are based on primary products. A major challenge is the establishment of a well-resourced facility and process, involving industry, government, universities and the technology institutions.

13. The EU's 7<sup>th</sup> Framework Programme for Research and Technological Development (FP7) extends over the period 2007–2013, with a total budget of EUR 50 billion. It has two main strategic objectives: to strengthen the scientific and technological base of European industry; and to encourage Europe's international competitiveness by supporting research that underpins EU policies.

14. FP7 aims at supporting European scientific and economic development through strategic partnerships with 'third countries'; facilitating contacts with research partners in 'third countries' with a view to providing better access to research carried out elsewhere in the world; and addressing specific problems that 'third countries' face or that are global in nature. It is open to participation by researchers and institutions from any country in the world.

15. FP7 is made up of five major building blocks—the so-called Specific Programmes: cooperation; ideas; people; capacities; and nuclear research. Thematic areas of priority include health; food, agriculture, fisheries, and biotechnology; information and communication technologies (ICT); nanosciences, nanotechnologies, materials and new technologies; energy; environment (including climate change); transport (including aeronautics); socio-economic sciences and the humanities; space; and security. FP7 is based on co-financing; when a FP7 grant is given a certain percentage of the total costs is expected to be covered by the participants involved.

16. The Cotonou Agreement was signed on 23 June 2000 in Cotonou, Benin, for a period of twenty years (revised in 2005). It is designed to promote the economic, social and cultural development of the African, Caribbean and Pacific (ACP) states. It is based on five interdependent pillars: the reinforcement of the political dimension of relations between ACP countries and the EU; the promotion of participatory approaches, involvement of civil society, the private sector and other non-state actors; development strategies and priority of poverty reduction, with a special focus on the Millennium Development Goals; the establishment of a new framework for economic and trade cooperation; and reform of financial cooperation.

17. The main instrument used for programming grants is the country support strategy (CSS), which is drawn up for each ACP state by the Commission and the country in question. The CSS sets out general guidelines for using the aid funds, supplemented by an indicative operational programme containing specific operations and a timetable for their implementation. The joint institutions for EU-ACP cooperation are the Council of Ministers; the Committee of Ambassadors; and the Joint Parliamentary Assembly.

18. Under the Cotonou Agreement, the EU's principal instrument for development cooperation with Africa is the European Development Fund (EDF), which provides funding for development cooperation with African governments through national programmes as well as Africa's regional economic communities. The EDF also operates thematic development cooperation programmes in areas such as health and the environment as well as programmes with a pan-African focus. While the EDF covers all ACP countries, the large number of African states forms a majority.

19. The 10<sup>th</sup> EDF (2008–2013) has an overall budget of EUR 22,682 million. Of this amount,

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EUR 21,966 million is allocated to the ACP countries, EUR 286 million to the OCT and EUR 430 million to the Commission as support expenditure for programming and implementation of the EDF. The amount earmarked for the ACP countries is divided as follows: EUR 17,766 million to the national and regional indicative programmes; EUR 2,700 million to intra-ACP and intra-regional cooperation; and EUR 1,500 million to Investment Facilities. An increased share of the budget is devoted to regional programmes, thereby emphasising the importance of regional economic integration as the basic framework for national and local development.

20. There has not been consistent alignment and little synergy between the objectives of EDF programmes for Africa, on the one hand, and the opportunities for African participation in successive S&T Framework Programmes on the other. Consequently, very few national or regional activities funded by EDF have a specific science and technology capacity-building orientation. Science and technology projects have not been optimally integrated within the broader thematic development cooperation activities. The notable exception is the EDF-funded ACP Science and Technology and Innovation Capacity-Building Programme that was launched in 2007.

21. In 2005 the EU Council, EU Member States, the European Parliament and the EU Commission adopted a policy statement referred to as the European Consensus on Development. This document forms the common basis of the EU's actions in the field of development. It recognises that the world is facing a formidable development challenge, above all in reducing poverty and food insecurity and that the developing countries carry the main responsibility for their own development, even though the international donor community also has a duty to make a contribution towards that end.

22. Africa's science and technology landscape is summarised in the New Partnership for Africa's Development (NEPAD) Consolidated Plan of Action (CPA) which refers to Africa as the poorest and economically most marginalised continent in the world. The continent as a whole has made only modest progress in the area of science, technology and innovation owing to numerous endemic constraints.

23. Most African countries established Councils or Commissions of Science and Technology as the overall sector coordination agencies for science and technology policies shortly after independence. Nearly half a century later, only a few African countries—such as South Africa, Egypt and Nigeria—have developed and implemented comprehensive national S&T policies.

24. Africa's STI system is fragmented. There is currently no sustainable provision for financing the implementation of STI policies. More than half of R&D funding for most African countries emanates from external sources. Owing to chronic under-funding, SETIs find it difficult to acquire and maintain infrastructure for R&D and administration. Demands by stakeholders on the STI system have further overstretched the limited financial and human resources. The financial resources accruing to the STI system are limited, stemming from competing demands on the national revenue base and other unforeseen circumstances such as compelling needs for changes in national development priorities.

25. As a result of globalisation the world has become an increasingly integrated economy driven by

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information, technology and knowledge. Like other developing regions, Africa is currently afflicted by both the digital and economic divides between developed and developing economies that tend to exacerbate the challenges of underdevelopment.

26. The African Union was formed with a mandate to devise strategies and programmes for accelerating development on the African continent. An important means in fast-tracking Africa's development cooperation is science and technology. This strategic element is articulated in NEPAD's CPA which seeks to develop and use science and technology to achieve Africa's socio-economic development and full integration into the world economy. It emphasises capacity building, knowledge production (scientific research) and technological innovation. Its priorities are clustered around biodiversity; biotechnology and indigenous knowledge; energy, water and desertification; material sciences, manufacturing, laser and post-harvest technologies; information and communication technologies; space science and technologies; and mathematical sciences. The plan is implemented through networks of centres of excellence.

27. The effective implementation of the CPA requires concerted efforts of the respective national institutions; commitment and support by the African Heads of State and the AU; harmonisation and regionalisation of national policy frameworks; development of effective and functional public and private sector partnerships; significant funding contributions by African governments, development partners, and local and foreign private investors; strong institutional and human resource capacities; and integration of NEPAD indicative plans into national development programmes.

28. Africa's participation in the EU Framework Programmes is very limited. This low participation in both INCO and non-INCO calls by African researchers is attributed to the nature of the FP instruments; Africa's fragmented economic structures and an apparent disjoint among science, technology and development; gaps between development policy and practice; and Africa's limited participation in global policy and decision-making fora.

29. There is a plethora of policy documents and instruments related to S&T, on the one hand, and development issues, on the other—at both EU and AU ends. What is needed is to integrate those policies and actions into a coherent whole with a view to informing and underpinning development efforts with technologies stemming from research projects. A long overdue 'marriage' between S&T and development is called for.

30. An ACP-EU Forum on Research for Sustainable Development, held in Cape Town in July 2002, adopted the Cape Town Consensus, which acknowledged the essential role of scientific and technological research in sustainable development. It called for appropriate and timely arrangements for the most effective utilisation of funding instruments in the FPs in the EDFs in support of science and technology cooperation and research capacity building. The attendant Plan of Action also made a plea for collaboration and inter-linkages between researchers and policy-makers, and for fostering the creation of regional research and innovation systems.

31. In late 2007, the Joint Africa-EU Strategy was launched, accompanied by an Action Plan. The Joint Strategy's 8<sup>th</sup> Partnership on Science, Information Society and Space is more specific as far as

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objectives, activities and outcomes are concerned. Under the 8<sup>th</sup> Partnership the African Union Commission and the European Commission have compiled a Book of Projects, also referred to as 'Lighthouse Projects'. The majority of these projects are not research projects *per se*, but all of them are geared to harnessing S&T for development.

32. Case studies of one individual country and a Regional Economic Community (REC) have been included in the report. An economically small African country such as Tanzania which has been relatively successful in tapping into FP funds was selected for further investigation. It emerged that the access to EU grants by Tanzanian researchers was purely a result of personal initiatives and contacts with EU-based professional peers through international networks and conferences. The institutional mechanisms for disseminating information on research opportunities and for facilitating successful responses by African scientists to the grant opportunities were lacking or weak. The Tanzania Commission for Science and Technology (COSTECH) with a statutory mandate to support research and development is inadequately financed to effectively coordinate responses to both national and international research funding opportunities.

33. Tanzanian researchers point to the elaborate and somewhat rigid nature of the FP application procedures as impediments to Tanzania's further success in accessing grants. Bureaucratic requirements and competitiveness were singled out as critical limitations for African researchers to effectively respond to FP calls for proposals jointly with European counterparts, let alone win an FP grant without assistance from EU-based professional consulting firms specialising in the technical and formal aspects of writing applications.

34. The 10<sup>th</sup> EDF also comprises Regional Indicative Programmes (RIPs) for eight recognised Regional Economic Communities (RECs) on the African continent—among them the East African Community (EAC). The negotiations regarding a Regional Strategy Paper (RSP) and an attendant Regional Indicative Programme (RIP) for the period 2008–2013 were recently concluded, the objectives of which being poverty reduction and the achievement of the MDGs by supporting economic growth and promoting trade. It has two focal areas: regional economic integration and political integration and cooperation. A bill for the establishment of an East African Commission for Science and Technology has been tabled but its passage into law is still pending.

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## ACRONYMS AND ABBREVIATIONS

ACP	African, Caribbean and Pacific
AMCOST	African Ministerial Council on Science and Technology
APRM	African Peer Review Mechanism
ARD	Agricultural Research for Development
ANSTI	African Network of Science and Technology Institutions
ASTII	African Science, Technology Indicators Initiative
ATPS	Africa Technology Policy Studies
AU	African Union
AUC	African Union Commission
CAAST-Net	A Network for the Coordination and Advancement of Sub-Saharan Africa-EU Science and Technology Cooperation
CEMA	Economic and Monetary Community for Central Africa
CODESRIA	Council for the Development of Social Science Research in Africa
COSTECH	Commission for Science and Technology (Tanzania)
CPA	Consolidated Plan of Action (AU/NEPAD)
CSS	Country Support Strategy
DCI	Development Cooperation Instrument
DST	Department for Science and Technology
EARD	Europe and Agricultural Research for Development
EAC	East African Community
EC	European Commission
ECOWAS	Economic Community of West African States
EDF	European Development Fund
EIARD	European Initiative on Agricultural Research for Development
ERA	European Research Area
ERC	European Research Council
EU	European Union
EUR	Euro (currency)
FDI	Foreign Direct Investment
FP	Framework Programme
FP7	7 <sup>th</sup> Framework Programme for Research and Technological Development (2007–2013)
GDP	Gross Domestic Product
GNP	Gross National Product
HIPC	Highly Indebted Poor Countries Initiative
ICC	International Criminal Court
ICPC	International Cooperation Partner Country
ICT	Information and Communication Technology
INCO-NET	International Cooperation in Science and Technology Network
IOM	International Organisation for Migration
IST	Innovation, Science and Technologies
IST-DEV	Innovation, Science and Technologies for Development
LDC	Least Developed Country
MDG	Millennium Development Goal
MTEF	Medium Term Expenditure Framework
NEPAD	New Partnership for Africa's Development

NGO	Non-Governmental Organisation
NIC	Newly Industrialising Country
OCTS	Overseas Countries and Territories
OECD	Organisation for Economic Cooperation and Development
PCD	Policy Coherence for Development
PRSP	Poverty Reduction Strategy Paper
PSTICB	Programme on Innovation, Science and Technologies
R&D	Research and Development
RCN	Research Council of Norway
REC	Regional Economic Community
SADC	Southern African Development Community
SETI	Science, Engineering and Technology Institution
SICA	Specific International Cooperation Action
SME	Small and Medium Enterprise
S&T	Science and Technology
STD	Science and Technology for Development
STI	Science, Technology and Innovation
UIS	UNESCO Institute for Statistics
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCST	Uganda National Council for Science and Technology
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Scientific and Cultural Organisation
WMD	Weapons of Mass Destruction
WP	Work Package
WSSD	World Summit for Social Development
WTO	World Trade Organisation

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## INTRODUCTION

The CAAST-Net project is designed to establish a platform for improving cooperation in science and technology (S&T) between Europe and sub-Saharan Africa. Towards this end, CAAST-Net will offer critical analyses of the existing S&T cooperation landscape between Europe and Africa. Informed by such analyses, CAAST-Net will initiate and support Europe-Africa S&T policy dialogues to enhance cooperation and improve coordination of partnership initiatives. More specifically, CAAST-Net outcomes will include the identification of research topics for Europe-Africa cooperation and recommendations for their inclusion in the 7<sup>th</sup> Framework Programme (FP7) of the European Union (EU), as well as the promotion of better synergies between the outputs of S&T endeavours and the broader objectives of development towards poverty reduction and food security within the context of development cooperation instruments such as the European Development Fund (EDF). CAAST-Net has been developed with the support of the African Union (AU) as well as the New Partnership for Africa's Development (NEPAD) and as an FP7 INCO-Net platform it is endorsed by the European Commission.

CAAST-Net has been developed against the background of the emerging global consensus that S&T is essential not only to modern economic competitiveness, but also to sustainable development and poverty reduction. In Africa, a growing number of governments are prioritising S&T as a key sector of their national and regional growth and development programmes. Consequently, increasing attention is given to S&T in Europe-Africa cooperation programmes. The internationalisation of research and development (R&D) is also a policy objective shared by Europe and Africa. Responding to this dynamic yet complex environment, in which current S&T cooperation initiatives frequently lack coherence with policy objectives and suffer from fragmentation, the analytical, policy dialogue and partnership interventions proposed by CAAST-Net are envisaged to play an essential role in optimising the evolution of the Europe-Africa S&T relationship.

Under the umbrella of CAAST-Net, Work Package 2 (WP2), as one of seven constituent work packages, is addressing the interface between, on the one hand, S&T under the Framework Programmes, and, on the other, the broader development endeavours towards poverty reduction and food security, especially within the context of the EDF as a main instrument of development cooperation.

In addition to the opportunities for African researchers to participate in the EU's Framework Programmes for Research, the EU maintains long-standing development cooperation relationships with African governments as currently governed by the Cotonou Partnership Agreement. These relationships could potentially be leveraged to support capacity-building for African S&T—specifically basic research infrastructure, which the competitive, excellence-based Framework Programmes are unable to support. These capacity-building efforts are essential for bolstering Africa's long-term potential to participate meaningfully in the Framework Programmes. At the same time there is also rich potential for a greater focus on S&T activities within development cooperation programmes, which would ensure a more efficient and rapid attainment of development objectives such as the Millennium Development Goals (MDGs). Indeed, the development cooperation

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instruments could offer support for R&D activities focused, for example, on African priorities such as poverty reduction and food security, which the present Framework Programme modalities are ill-suited to support.

Under the Cotonou Partnership Agreement, the EU's chief instrument for development cooperation with Africa is the EDF. The EDF provides development cooperation funding to African governments through national programmes, and to Africa's regional economic communities (RECs) through regional programmes. The EDF also operates thematic development cooperation programmes in areas such as the health and the environment as well as programmes with a pan-regional focus, such as the so-called All-ACP (Africa, Caribbean and Pacific) Programmes.

Over the years there has not been consistent alignment and indeed very little synergy between the objectives of EDF programmes for Africa, on the one hand, and the opportunities for African participation in successive Framework Programmes, on the other. Consequently, very few national or regional EDF-funded activities have a specific science and technology capacity-building component. Similarly, S&T has also not been optimally integrated within the broader thematic development cooperation activities.

WP2 will analyse the existing landscape as far as S&T is concerned in relation to broader development efforts in Africa and recommend how synergies between the EU's respective instruments for S&T and development cooperation with Africa could be improved. The goal is partly to promote a higher priority of science and technology capacity-building activities in African countries' EDF National Indicative Programmes, and partly to support their science and technology capacity-building programmes, as well as the Regional Indicative Programmes of the RECs within a wider regional context. Second, the analysis will also determine how different EDF activities focused on thematic areas (for example, health, the environment or agriculture) could be enhanced through a stronger S&T emphasis. Third, consideration could be given to the possible allocation of EDF funding to support African participation in FP7, for example through a mechanism to fund part of FP7 project costs, for which African FP7 participants do not receive EC funding. Similarly, the EDF might be used as an FP7 seed funding instrument for proposal preparation which normally carries high transaction costs.

Following the analysis, WP2 will, through the convening of an appropriate forum, seek to strengthen and inform the dialogue between stakeholders from the African S&T community and European and African policy-makers responsible for EDF programming i.e. identification of the EDF spending priorities. While the final identification of such priorities remain the prerogative of the European Commission and the African governments and organisations concerned, the analytical work and awareness-raising efforts of WP2 will serve as a platform for a possible greater take-up of S&T priorities in the EDF, in both national and regional programmes, to achieve greater synergy. WP2 concurrently analyses how the research outputs from FP projects, could be meaningfully applied in the implementation of EDF development cooperation activities.

In summary, the objectives of WP2 are:

- i. To promote greater take-up of development-orientated FP research in order to facilitate innovation;
- ii. To promote better synergies between EDF development goals and FP7 S&T cooperation with Africa;
- iii. To develop means and mechanisms to strengthen regional indicative programmes;
- iv. To identify regional S&T bodies in Africa (e.g. NEPAD, CODESRIA, ANSTI, and the EAC) which might undertake further actions/activities related to enhanced African participation in FP7.

This report analyses how research outputs from Framework Programme projects, especially those related to sustainable development, could be translated to inform the implementation of EDF development cooperation activities across various domains of socio-economic development. This would ensure greater take-up of development-orientated FP research, and strengthen innovation. Significantly, the report includes an empirical analysis of the issues underlying Africa's access to the EDF and effective participation in successive FPs using the EAC and Tanzania as case studies. The report desists from making comparisons with the utilisation of the European Regional and Structural Funds and other cohesion instruments to support science and technology capacity-building in the EU's lesser developed regions due to the obvious differences in the S&T development fundamentals between Africa and Europe, i.e. the apparent absence of a suitable comparator country. If overlooked, these wide differences might render the resultant comparisons of little practical value in the African context.

## Structure of the report

This report covers a broad canvas of frameworks and policies in two major fields: (i) science and technology; and (ii) development. It looks in particular at the linkages or lack of such between those two fields and provides an overview of the S&T development and policy environment in terms of Europe-Africa S&T and development cooperation. It furthermore seeks to identify the current impediments to enhanced synergy between S&T and development and how the research outputs from FP projects could be exploited to inform the implementation of EDF development cooperation activities—across sectors such as agriculture, water and sanitation, and public health to strengthen innovation.

For the benefit of a diverse readership this report provides essential contextual information. A significant number of African scientists, policy-makers and development practitioners, who constitute a large section of the readership of this report, may not necessarily be adequately familiar with the elaborate EU system of support to S&T and development. Conversely, their European counterparts find themselves largely unfamiliar with the African institutional terrain and the policy frameworks of S&T and development cooperation, respectively. Therefore, brief overviews of the EU's FPs and the EDF have been included. Similarly, measures taken at the African end with respect to S&T under the auspices of the AU and NEPAD are highlighted. Joint European-African initiatives to bridge the divide between S&T and development are also noted.

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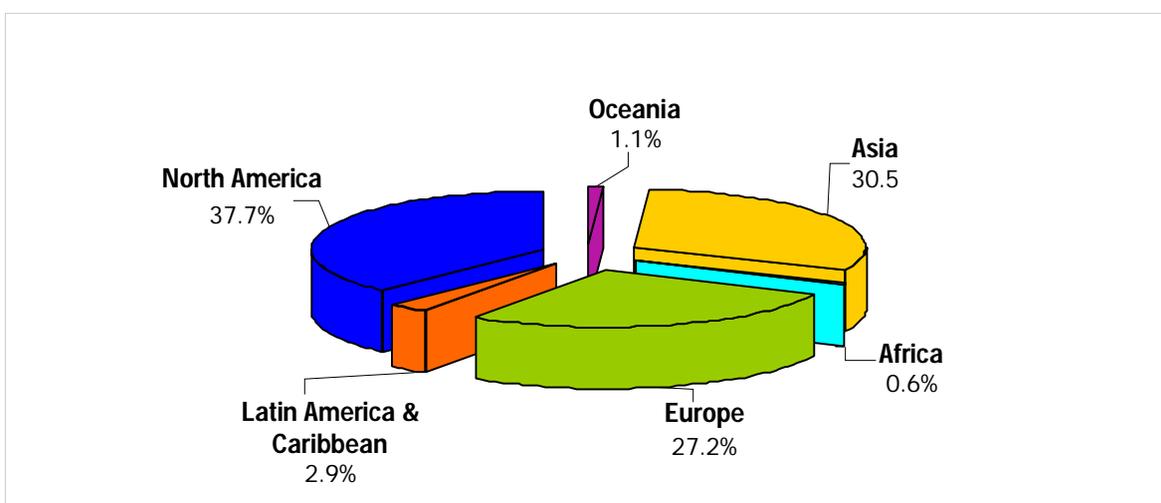
After the introduction and an account of the structure of the report, the third section discusses the interface between S&T and development. It emphasises the critical role that S&T has played historically and continues to play in the development of advanced economies, and the potential role it has for lifting developing countries out of poverty. Sub-sections discuss macroeconomic and sectoral perspectives, as well as African capabilities for international research collaboration, including an analysis of African knowledge systems with universities at the core. The fourth section provides a background to the EU Framework Programmes on S&T and African participation in them, followed by the fifth section on Europe-African development cooperation within the Cotonou Partnership Agreement, principally the European Development Fund in a sub-section. The sixth section deals with the European Consensus on Development.

Section seven presents Africa's S&T landscape, including sub-sections on institutional and systemic S&T challenges, as well as those of a global nature. The eighth section recounts Africa's development cooperation efforts, including a sub-section on African participation in EU framework programmes. Section nine is devoted to policy initiatives and actions to bridge the gap between S&T and development, with sub-sections on the 2002 Cape Town Declaration and Consensus, and the more recent Africa-EU Strategic Partnership of 2007, especially the 8<sup>th</sup> Partnership on Science, Information Society and Space and its concomitant Lighthouse Projects. The penultimate tenth section provides case studies of Tanzania as an individual country and the East African Community as a regional economic community. The final section pulls together some concluding remarks.

# 1. THE INTERFACE BETWEEN S&T AND DEVELOPMENT

S&T as a system and a process is driven by the continuous need for innovation. The developed countries of the world have generated capabilities for effective application of scientific and technological innovation as tools for achieving their national development goals. By contrast, the developing countries have relatively modest capacities in science and technology, and hence a low potential for innovation. As a result their development is lagging behind the rest of the world.

Using expenditures on research as an indicator of STI development, Figure 1 below shows a global comparison of the levels of investment and expenditures in science, technology and innovation. It indicates that North America, Asia and Europe spend far more on research and development in total compared to other parts of the world.

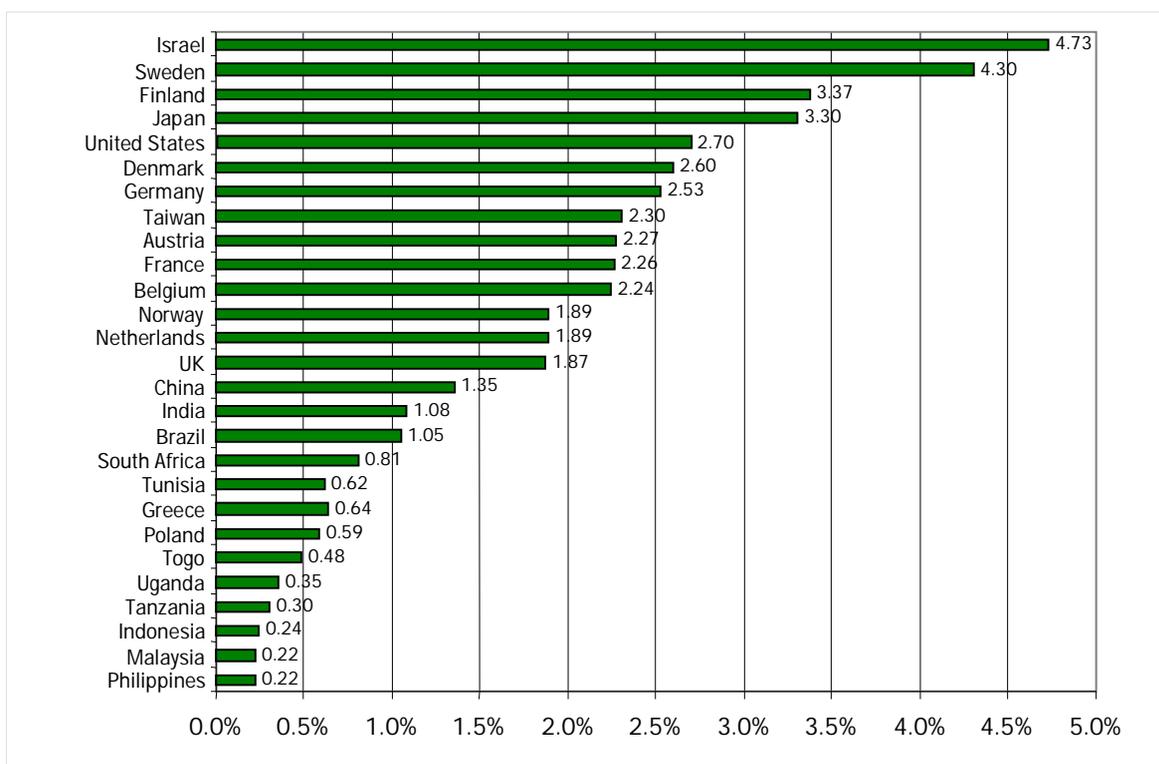


**Figure 1.** Share of World Gross Expenditure on R&D (2000). Source: UNESCO Institute of Statistics (UIS) Estimates, 2005.

In order to achieve the societal development objectives, along with the UN Millennium Development Goals (MDGs) and to realise other national development aspirations, especially the eradication of extreme poverty and deprivation among the population, it is imperative for Africa to give far higher priority to S&T as a vital tool for accelerating socio-economic progress. This can be done through the formulation of deliberate government policies, conscious planning, and the exploitation of appropriate STI capabilities.

However, statistics on the situation for African countries show that the average of R&D expenditure as a share of GDP is only 0.28%. This is far below the world average of 1.79% or the 1% recommended by the African Union (see Figure 2 below). These statistics and figures illustrate an explicit relationship and interdependency between S&T, economic growth and social transformation. They further demonstrate that STI capabilities are an important determinant of progress and transition

to knowledge-based societies. In other words, the extent to which a country has embraced and harnessed S&T has a bearing on its level of development. Global experience bears this out as illustrated through two perspectives on the interface between S&T and development: the macroeconomic and the sectoral dimensions.



**Figure 2.** Government budget allocated to R&D as a % of GDP (2004/2005). Sources: OECD, Main Science and Technology Indicators; Eurostat; UNCST 2006.

## 1.1 The macroeconomic perspective

In theories of economic development, a major conclusion is the need for deliberate policy and conscious planning. The rapid growth and industrialisation of the Newly Industrialising Countries (NICs) have been attributed to 'free markets' coupled with careful policy interventions by governments, through the fostering of cooperation between the public and private sectors. The promotion of science, research and technological innovation is an essential part of national development strategies worldwide. From the macro perspective, S&T development is critical for achieving and maintaining high rates of economic growth.

Only then can the economy be transformed and living standards improved, which are the key goals of most governments' development strategies. The catalytic role of S&T was recognised in the early stages of the industrial revolution that between 1750 and 1830 transformed Great Britain from a largely rural economy whose population made a living almost entirely from agriculture to a town-centred society engaged in manufacturing. S&T enabled Great Britain's economy and those of many

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other countries to increase productivity, reduce costs, improve product quality and gain a competitive advantage in trade, industry and commerce.

Countries such as China, India and Brazil have attained high rates of technological progress using modest capital inputs. This was as a result of enhanced productivity through conscious nurturing of science and technology and their integration into national policies and development programmes. In most of Africa, this transformation still lies in the future. African governments have a major role to play in ensuring that such a transformation also takes place on the African continent. However, this will not happen without the adoption and integration of S&T policies coupled with concomitant economic and other policies for enhancing international competitiveness. The growth challenge for African economies demands complementing the existing sources of growth such as macroeconomic stability and other economic policy reforms with science and technology interventions. S&T development interventions hold the promise of transforming African economies from over-reliance on investment-driven growth towards productivity-driven growth.

There is worldwide evidence that the greater use of technology is a major factor in meeting the objective of productivity-driven growth and industrial competitiveness. As Africa continues to aim at attracting capital in the form of foreign direct investment (FDI) and encourage domestic savings to stimulate rapid economic growth and poverty reduction, the high rates of physical investments will need to be combined with improvements in technology development and application to achieve optimum effect. The supply of a technologically proficient workforce with the required skills and expertise will help to increase local and foreign investment, raise productivity, and, in turn, raise wages and incomes. In this respect, greater utilisation and upgrading of technology will contribute towards raising individual and firm-level productivity. At the firm level, technological progress will reduce the amount of labour required. But this initial consequence is only the first round effect of technological progress. Subsequent positive effects include job creation, which will offset the initial decline in the need for labour. For example, the rising incomes resulting from the first round effect are likely to be sufficiently high to generate a higher level of aggregate demand which, in turn, will lead to expansion of economic activity and substantial employment creation. These prospects lie in the deliberate fostering of S&T and its integration into economic and other policies within a national development framework.

S&T plays a significant role in improving efficiency, productivity and international competitiveness. The contribution of the manufacturing sector is enhanced through integration of S&T into the production process. In the same vein, the services sector is also strengthened and developed into a modern, efficient and competitive sector by means of S&T applications such e-commerce, e-business, e-banking, e-learning, e-conferencing and such other technology-enabled service delivery mechanisms.

In the new millennium, Africa is faced with challenges and opportunities that need proactive policies. It is imperative, therefore, that its tools for competing effectively in the global arena are improved. The challenge is to improve and broaden the S&T base to comprise all types from Information and Communications Technology (ICT), biotechnology, traditional knowledge, nano

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technology to other new and transformative technologies as the means of creating new opportunities for socio-economic development in Africa.

## **1.2 The sectoral perspective**

The sectoral and cross-cutting perspectives relate to the prospects for enhancing the performance of particular economic and social service sectors. There is a wide range of problems that are amenable to solution by means of S&T, for example hunger and malnutrition; illness and disease; deterioration of the biosphere; depletion of resources, including water; natural disasters; poor rural and urban management; and the energy crisis. Strategic S&T policies are required to address the above problems. This is clearly evidenced by the experiences of developed countries through their advanced application of S&T in agriculture, food processing, infrastructure, health, communication, energy, transport, housing, production of goods and services, and extraction of mineral resources. Modern technologies are thus utilised to improve the life and welfare of the population.

An examination of the contribution of S&T to development from the macroeconomic and sectoral perspectives—using local and international illustrations, and in consideration of Africa's efforts towards total eradication of poverty and underdevelopment—leaves Africa with no option other than adopting and implementing comprehensive science, technology and innovation development policies and programmes. Such a policy environment will set Africa on a new trajectory of development by enabling accelerated economic growth and societal transformation in the foreseeable future.

## **1.3 African capabilities for international research collaboration**

The Framework Programmes of the EU offer some opportunity for African research institutions to collaborate with European partners in various fields, even though the thematic priorities set by the EU may not be consonant with those of sub-Saharan Africa. The key question, however, is to what extent African research institutions have the capabilities required to enter into such collaborative relationships.

In terms of economic growth Africa in general has maintained a strong growth momentum in recent years. The average growth rate achieved in 2007 was 5.8 per cent, up from 5.7 per cent in 2006 and 5.2 per cent in 2005. The real economic growth rate for Africa is projected to be 6.2 per cent in 2008. This impressive growth has largely been driven by robust global demand and fairly high commodity prices. Other factors contributing to high growth rates include the consolidation of macroeconomic stability, including an annual inflation rate contained at about 7 per cent and low fiscal deficits; rising oil production in the oil-producing countries; increased in-flow of private capital; debt relief through the HIPC initiative; and increasing non-fuel exports.

Foreign direct investment is increasingly coming in from Asia, especially China, India and the Gulf States. Still, growth rates tend to be volatile and vulnerable to price fluctuations of key export commodities such as coffee, cocoa, tea, cotton and tropical timber.

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Other shock risks are natural calamities such as droughts and floods. Persistently high oil prices are a major concern for the non-oil producing countries (only 13 African countries export oil). Although the recent dramatic drop in oil prices may have given a temporary respite for non-oil producing countries the volatility of prices presents challenges of planning. The global financial crisis as from late 2008 has also had adverse repercussions on growth.

This growth performance has not translated into substantial gains in terms of social development. The distributional effects of growth have not been equitable; in some countries the Gini coefficient (measuring income inequality) has even increased slightly. Job creation has been sluggish and the agricultural sector from which the overwhelming majority of Africans derive their income has been lagging behind other sectors. In other words, notwithstanding impressive growth rates, no major dent has been made in the poverty problem.

Discussions about Africa's development challenges typically centre on conventional economic indicators, especially growth rates in the real sectors such as agriculture, mining, manufacturing and tourism. Only exceptionally do knowledge, technological development and innovation receive appropriate attention as driving forces of growth processes. The treatment of technological change is conspicuously absent in most poverty reduction strategies. The neglect of R&D in the development discourse is alarming and reflects an outdated mode of thinking about the continent's place in the world economy as being that of primary commodity producer, occasionally venturing into simple manufacturing. To many, African high tech seems like a contradiction in terms. At least it is a far cry from the current state of affairs.

By contrast, the debates about growth in Europe are preoccupied with the contributions science and technology can make. Productivity gains are associated with technological development. The fact that FP7 refers to the global knowledge economy is a reflection of the great importance the EU attaches to technological development and innovation. The situation in Africa is fundamentally different and requires some hard choices on the part of African governments and business communities. In its 2007 report on the Least Developed Countries (LDCs), UNCTAD put it starkly. Although referring to the LDCs in general, the two future scenarios drawn up apply to most African countries.

At the one extreme, Africa is likely to be trapped at a low level of economic development. By the time the MDGs are to be achieved in 2015, Africa will be the major locus of extreme dollar-a-day poverty in the global economy. African countries will probably be lagging behind other developing countries and be obliged to call on the international community for aid to tackle intermittent humanitarian crises and for peace-keeping missions to deal with recurrent conflicts. African countries will also be epicentres of the global refugee population, incubators of global health crises and major sources of international migrant workers who leave their countries, sometimes risking their lives, for the sake of earning a living because their life-chances are simply too restricted at home. This scenario reflects the much-touted Afro-pessimism. At the other extreme, it is possible to envisage a progressive transition in which sustained and accelerated economic growth is achieved through the development of productive capacities.

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With the associated expansion of productive employment opportunities, there could be substantial poverty reduction. In that scenario foreign aid is supporting development rather than just engaging in 'fire fighting' when complex humanitarian emergencies arise. Moreover, dependence on development aid can be reduced as economic growth is more and more sustained by domestic resource mobilisation and Africa is no longer marginalised from beneficial international private capital flows.

Sustained economic growth and substantial poverty reduction in Africa and elsewhere in the developing world require the enhancement of productive capacities. The basic challenge of development is to increase the knowledge intensity of African economies. Unless African countries adopt policies to stimulate technological catch-up with the rest of the world, they will continue to fall behind other countries technologically and face deepening marginalisation in the global economy. Moreover, the focus of those policies should be on proactive technological learning by domestic enterprises rather than on conventionally understood technological transfer, and on commercial innovation rather than on pure scientific research.

Processes of technological change in rich countries, where firms are innovating by pushing the knowledge frontier further, are fundamentally different from such processes in developing countries, where innovation primarily takes place through enterprises learning to master, adapt and improve technologies that already exist in more technologically advanced countries. The central issue is not acquisition of the capability to invent products and processes. Rather, policies to promote technological change in LDCs, as in all developing countries, should be geared to achieving catch-up with more technologically advanced countries.

Currently, most African countries are far from making any internationally significant technological breakthroughs. It is now commonly recognised, however, that creative technological innovation also occurs when products and processes that are new to a country or an individual enterprise are commercially introduced. Firms imitate pioneering firms and innovation occurs through 'creative imitation'. The assimilation and the absorption of foreign technology involve costs and risks, and success depends on technological effort—investments in technological change—of various kinds, and the development of competences and capabilities at the enterprise level. Technology is not simply technological means (such as machinery and equipment) and technological information (such as instructions and blueprints), but also technological understanding (know-how) of the technological processes. Adaptation of technology involves technological learning and produces core competence and dynamic capabilities in design and engineering.

The critical factor in such technological learning is the domestic knowledge system which may enable (or constrain) the creation, accumulation, use and sharing of knowledge. Those systems should support effective acquisition, diffusion and improvement of foreign technologies. In short, there is a need to increase the absorptive capacity (or assimilation capacity) of domestic firms and the domestic knowledge systems in which they are embedded. Regrettably, the domestic knowledge systems in Africa are very weak and the level of technological capabilities of domestic enterprises is very low. A sustainable process of knowledge accumulation that could accelerate the development of productive capacities in African economies is therefore by no means a simple task.

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But it is not an impossible one. A strategy for catch-up needs to focus on the building of a domestic knowledge base, but also facilitate the transfer and effective absorption of foreign technology.

What is the state of affairs at African universities as a major part of the domestic knowledge systems, especially linkages to industrial innovation? In general, universities contribute to knowledge systems in several ways:

- i. Provision of educated graduates in a range of disciplines, including the fields of science, engineering and management, thus ensuring a continuous supply of a skilled workforce for industry and the public sector;
- ii. Conduct basic as well as applied research of relevance to the needs of the private sector in manufacturing and agriculture;
- iii. Production of prototypes and patents for commercialisation in the domestic economy and abroad;
- iv. Dissemination of research findings by means of conferences, workshops, meetings and networks, as well as informal means of interaction;
- v. Indirect transmission and dissemination of knowledge through collaborative ventures and exchange of personnel;
- vi. Transmission and dissemination of research findings under commercial arrangements such as research contracts, licences, consultancies, etc.

Unfortunately, the situation in Africa does not conform to the optimal situation depicted in the bullet points above. The capability of African universities to interact with industry is very limited. African institutions of higher learning and research cannot be called 'developmental universities'. The reasons are many. First, there has been a proliferation of public and private universities across the continent but the quantity has not been matched by quality of teaching and research, mainly because resources have been spread too thin. Second, there has been an explosion in student enrolment, aggravating the resource constraint which has led, in effect, to the prioritisation of teaching at the expense of research and innovation. Third, poor economic conditions have not created a university environment conducive to research in terms of laboratories, etc. Fourth, the brain drain of highly skilled professionals—driven mainly by low salary levels and poor working conditions—has led to a high percentage of faculty vacancies. In years ahead this problem will be exacerbated by an ageing faculty due to retire. Fifth, low salary levels compel university into supplementary income-generating activities such as consultancies that detract them from their principal tasks.

Notwithstanding the explosion in university enrolment, sub-Saharan Africa has the lowest tertiary enrolment rate in the world, particularly in the scientific and technical fields. A gross tertiary enrolment rate of 5% compares with 70% for North America and Europe, and a world average of 24%. With regard to tertiary-level enrolment in the technical fields, the rate of enrolment in 1995 was 0.28% in sub-Saharan Africa, compared to a developing country average of 0.82%, and 4.06% for the developed countries. With 12% of the developing world's population, Africa accounts for only 4.4% of tertiary level enrolment.

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What is more, enrolment is heavily biased in favour of liberal arts, which is partly a reflection of secondary schools not turning out enough science-ready university entrants. Tertiary *technical* enrolment accounts for only 3.1%, and *engineering* enrolment for 1.7% among this group of countries. The total number of engineers enrolled in the whole of Africa represents around 12% of the corresponding figure for South Korea alone. This bias in the disfavour of science and engineering enrolment is partly explained by the unit cost of graduates being much higher.

Apart from the enrolment bias, the teaching practice is not orientated towards the acquisition of problem-solving skills or exposure to real life situations. A particular aspect is the absence or virtual collapse of graduate study in most universities, which are not turning out the number of PhDs in mathematics, the sciences and engineering that is required for high-tech ambitions, nor the number of master graduates in those disciplines for leadership in SMEs so as to enhance their global competitiveness.

There is not enough basic or applied research undertaken in the universities. What exists in the way of research activity does not attract the interest of industry. This is partly attributable to the lack of incentives on the part of faculty members for undertaking industry-relevant research. Apart from the lack of incentives, time for research is limited due to heavy teaching loads. This is especially serious in the technological fields where, additionally, issues such as the development of new products and successful linkages with industry are rarely taken into account for purposes of promotion and career advancement. This publication-based merit system for professional advancement within universities constitutes a major disincentive to engaging in R&D activities that may lead to industrial innovation but not to scientific publications. Furthermore, owing to the 'publish or perish' syndrome, research agendas tend to focus on purely academic and scientific objectives, with a view to publication in refereed journals but with little regard to developmental needs that are relevant to the local entrepreneurs and industries.

Perceptions on the role of universities in the modern innovation and economic era also affect the performance of the existing knowledge system. The majority of leading public universities on the continent still holds the traditional view that the role of universities is to generate new knowledge through research, publication of research results and the training of students, and stops short there. It is not considered the role of universities to contribute to solving industrial problems. In such instances, research commissioned by industry is often considered 'inferior' or 'not being real science'.

It takes two to tango, however. The obverse side of the technological coin is industry itself, to which blame should also be attributed. The technological development of firms is driven by competition and trade policies, governing rules and regulations, physical infrastructure, skills and financing. In general, African manufacturing is dominated by low level of processing of natural resources and the production of simple consumer goods for local consumption.

Africa's industry has remained substantially untransformed from its colonial raw material production and export origins. At a time when world trade has shifted strongly from resource-based to technology-based products, Africa has the highest share of resource-based exports, while its share

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of high-technology products is the lowest. More than three-quarters of all exports are based on primary products. There is hardly any high-tech, that is, truly R&D-intensive industry, such as wireless technology, advanced biotechnology, materials science, and so on. As a result, no technological culture has evolved.

In order to overcome the disjuncture between the existing African knowledge system and industrial innovation, a major challenge will be the establishment of a well-resourced facility and process, involving industry, government, universities and the technology institutions. A second challenge is the revitalisation and strengthening of Africa's universities and other elements of the knowledge system, and the facilitation of their repositioning to provide the intellectual prowess of a new drive for African development across the board. There are some signs that such a trend is emerging, especially at new universities and specialised research institutions set up with a specific mandate to engage in innovation with industrial partners. But there is still a long way to go. The case for such a revitalisation drive is generally accepted—nationally, continentally and among Africa's donors. The principal gain will be the combination of increased access with quality and lifelong learning skills, as well as the general spread of the scientific approach to life. This will have immediate benefit not only for the quality of individual and social life, but also for the quality of the labour force as a whole, and thus for the productive sector, including industry.

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## 2. THE 7<sup>TH</sup> RESEARCH FRAMEWORK PROGRAMME (2007–2013)

The efforts of the EU within the field of research, science and technology are reflected in its successive framework programmes (FPs). The current one is the 7<sup>th</sup> Framework Programme for Research and Technological Development (FP7) which extends over the period 2007–2013. Its total budget of EUR 50 billion represents a substantial increase over its predecessor—FP6—which attests to the high priority accorded research. This investment in technological development seeks to maintain the EU's leadership position and its competitiveness in the global knowledge economy. Science and technological advancement has become an international endeavour, reinforced by accelerating globalisation. The cost of large-scale research infrastructure in many fields and the need for pooling human research competence, call for international partnerships. As a result, the EU is promoting collaboration between research centres within its borders and cooperation with centres of excellence elsewhere in the world. The purpose of the framework programmes is to promote such collaboration through the co-financing of projects.

The Framework Programmes have two main strategic objectives:

- i. To strengthen the scientific and technological base of European industry;
- ii. To encourage its international competitiveness by supporting research that underpins EU policies.

Towards that end, FP7 aims at (i) supporting European scientific and economic development through strategic partnerships with 'third countries' in selected fields of research and by engaging the best third-country scientists to work in and with Europe; (ii) facilitating contacts with research partners in 'third countries' with a view to providing better access to research carried out elsewhere in the world; and (iii) addressing specific problems that 'third countries' face or that are global in nature (for example, contributing towards achieving the Millennium Development Goals (MDGs); meeting the challenge of climate change; combating loss of biodiversity; or counteracting water and energy scarcity).

Compared to its FP6 predecessor the approach of FP7 contains some novel features. Three basic principles underlie international research collaboration in the context of FP7 in order to expand its scope: (i) unlike previous framework programmes FP7 provides for a broad opening of international research collaboration in both programmes and in research themes across the entire Framework Programme, and the programming of specific priorities for 'third countries' and regions across the thematic work programmes; (ii) by defining specific actions for collaboration with 'third countries' and regions in each of the thematic programmes FP7 ensures that budgets for international cooperation are included at the level of each of the relevant calls for proposals; and (iii) the principle of partnership and dialogue will be applied in the specific international cooperation actions for 'third countries' and regions under FP7. Specific International Cooperation Actions (SICAs) will aim for a fair level of participation by 'third countries' in cooperation with their European counterparts.

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As a matter of general principle, FP7 is open to participation by researchers and institutions from any country in the world. However, the EU Member States enjoy the broadest rights and access to funding, and the same conditions apply to countries associated with FP7, i.e. contributing to its overall budget. Another important eligible group comprise developing countries, which are entitled to funding under the same conditions as EU Member States. The only restriction is that the consortia in which developing countries participate must have the required number of participants from EU Member States or associated countries.

FP7 is made up of five major building blocks—the so-called Specific Programmes: (i) cooperation; (ii) ideas; (iii) people; (iv) capacities; and (v) nuclear research. The Cooperation programme forms the core of FP7 and accounts for two-thirds of the budget. It is intended to foster collaborative research across Europe and other partner countries through projects run by international consortia comprising industry and academia. Within the global FP7 budget EUR 32,413 million has been allocated to this programme, accounting for 64 per cent.

Thematic areas of priority include health; food, agriculture, fisheries, and biotechnology; information and communication technologies (ICT); nanosciences, nanotechnologies, materials and new technologies; energy; environment (including climate change); transport (including aeronautics); socio-economic sciences and the humanities; space; and security.

All of the above thematic areas are open to all non-associated third countries, e.g. African countries. However, under each of them there may be Specific International Cooperation Actions (SICAs) which are dedicated to third countries which are listed as International Cooperation Partner Countries (ICPCs). The SICAs aim at reinforcing the research capacity in non-associated third countries and at addressing the needs of developing and emerging economies by means of dedicated cooperative research in certain thematic areas.

The *Ideas* programme is geared to supporting ‘cutting-edge’ research on the basis of excellence only. It is not confined to any thematic area but can be undertaken in any area of science and technology, including engineering, socio-economic sciences and the humanities. By contrast to the *Cooperation* programme, cross-border partnerships are not required in the *Ideas* programme. The amount set aside for the *Ideas* programme is EUR 7,510 million which is equivalent to nearly 15 per cent.

The *People* programme provides support for researcher mobility and career development, both for researchers within the EU and internationally. The budgetary allocation for the *People* programme is EUR 4,750 million or 9.4 per cent of the total.

The *Capacities* programme serves to strengthen the research capacities that Europe needs if it is to maintain and improve its position in the globalised knowledge economy. It covers a number of activities, spanning research infrastructure; research for the benefit of SMEs; regions of knowledge; research potential; science in society; and specific activities of international cooperation. The allocation to this programme is EUR 4,097 million or about 8 per cent.

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The *Nuclear Research* programme is rather narrowly defined in terms of subject area. It includes fusion energy research and nuclear energy, including nuclear waste management and environmental protection; nuclear safety; and nuclear security. To this programme has been allotted EUR 1,751 million or about 3.5 per cent of the global budget.

Measures have been taken to simplify procedures to reduce the transaction costs for potential participants who do not have prior experience with the framework programmes, for example, African research institutions.

FP7 is implemented through different types of project, referred to as 'funding schemes'. There are six such 'funding schemes' which include collaborative projects, networks of excellence, coordination and support actions, individual projects, support for the training and career development of researchers, research for the benefit of specific groups—in particular SMEs.

It is important to take note of the fact that FP7 is based on co-financing. When a FP7 grant is given a certain percentage of the total costs is expected to be covered by the participants involved. The reimbursement arrangements vary by type of 'funding scheme', the legal status of the participants, and the type of activity. The standard reimbursement rate is 50 per cent for research and technological development activities. For the majority of African research institutions contemplating participation in FP7 projects this reimbursement principle and the rate of reimbursement could be a major challenge. The challenge is twofold: (i) owing to cash flow constraints the reimbursement principle as opposed to advance payment of the grant by instalment might be a problem; (ii) the volume of the contribution itself by the participating institutions could also be a serious hurdle.

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## 3. THE COTONOU PARTNERSHIP AGREEMENT

The Cotonou Agreement was signed on 23 June 2000 in Cotonou, Benin, for a period of twenty years, and revised in 2005. It is designed to promote the economic, social and cultural development of the African, Caribbean and Pacific (ACP) States.

The Cotonou Partnership Agreement represents a new stage in cooperation between the ACP states and the EU, dating back to the signing of the first cooperation convention (Yaoundé Convention) in 1964 and continued with the four subsequent Lomé Conventions, the last one expiring on 29 February 2000.

Given the limited success of the main approach of non-reciprocal trade preferences in the previous conventions and the need to adapt to international developments such as globalisation and technological advances, plus the far-reaching social changes in ACP States, the Agreement establishes a new approach to cooperation in this field.

The new approach of the Agreement attaches more attention to the political dimension, and provides more flexibility and entrusts the ACP States with greater responsibilities. It has three main dimensions: politics; trade and development; and an approach that is both integrated and sectoral. Operations focus on specific sectors (health, transport, among others) and combine many aspects of cooperation (for example, economic, environmental, social cooperation) in order to ensure that aid is better targeted.

### 3.1 Pillars of the partnership

The partnership is based on five interdependent pillars:

- i. the reinforcement of the political dimension of relations between ACP countries and the EU;
- ii. the promotion of participatory approaches, involvement of civil society, the private sector and other non-state actors;
- iii. development strategies and priority of poverty reduction, with a special focus on the Millennium Development Goals;
- iv. the establishment of a new framework for economic and trade cooperation;
- v. reform of financial cooperation (rationalisation of financial instruments and a system of flexible programming).

#### ***Pillar I: Political Dimension***

The Agreement puts greater emphasis on the political dimension which encompasses all of the Agreement's objectives and operations and represents global commitments on the part of the ACP states. The key elements of this pillar include political dialogue; peace-building policies, conflict prevention and resolution; respect for human rights, democratic principles based on the rule of law

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and transparent and accountable governance; and good governance.

## ***Pillar II: Promotion of Participatory Approaches***

The Agreement envisages a substantial role for non-state actors in the design and implementation of development strategies and programmes, for example the private sector and economic or social partnerships. The role of civil society is particularly important as non-governmental organisations (NGOs) should be strengthened in order to guarantee a significant contribution to the development process. Further, the participation of these actors depends on certain criteria relating to their management and form of organisation. The 2005 revision took the participatory approach further: the insertion of provisions to facilitate non-state actor access to indicative programme resources, under a strategy approved by the Commission and the ACP state concerned. These actors can benefit directly from financing via grant contracts drawn up between the Commission and the body in question. This will apply provided that the types of non-state actor and the types of activity to be supported are identified in the country strategy paper; the insertion of a provision whereby local authorities may participate in the consultation process and in the implementation of programmes.

## ***Pillar III: Development Strategies and Priority of Poverty Reduction***

The integrated approach of the partnership stresses three key areas for cooperation, while always taking into account the overriding objective of poverty reduction. These include economic development, social and human development, and regional cooperation and integration. The comprehensive framework for development strategies also provides for systematic consideration of three cross-cutting issues in all fields of cooperation: gender equality; sustainable management of the environment and natural resources; institutional development and capacity building. The question of integrating sustainable management of the environment covers several subjects, such as tropical forests, water resources, desertification and the use of renewable energy sources.

## ***Pillar IV: The Establishment of a New Framework for Economic and Trade Cooperation***

The new framework makes significant amendments to the existing system in order to bring it into line with World Trade Organisation (WTO) rules and to enable the ACP States to play a full part in international trade. New trade agreements: The Agreement provides for the negotiation of new trading arrangements with a view to liberalising trade between the two parties, putting an end to the system of non-reciprocal trade preferences from which the ACP States currently benefit. Negotiations on the new regional economic partnership agreements began in October 2003 with CEMAC (Economic and Monetary Community of Central Africa) and ECOWAS (Economic Community of West African States). The Community's policy will take account of the social and economic constraints of the countries belonging to these RECs in two ways: (a) through social and human development policies (fight against poverty) and, (b) through cooperation and enhancing the capacities of ACP States in international bodies.

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Trade-related areas: Trade cooperation is not restricted to traditional trading activities, it also affects other trade-related areas such as the protection of intellectual property rights, trade and labour standards, and so on.

Trade prospects for the least developed ACP States: An improvement in the EC's trade regime for all of the least advanced countries (39 of which are part of the ACP group) is envisaged. This process will be implemented over five years and will ensure that LDC exporters will benefit from duty free access for essentially all of their products into the EC market no later than by 2005.

## ***Pillar V: Reform of Financial Cooperation***

The guiding principles of financial cooperation reflect the comprehensive approach of the partnership which entails consistency, flexibility and efficiency (ensured by specific rolling programming for each country or region accompanied by regular reviews); change in nature of assistance with a move towards budgetary and sectoral support programmes; indicative financial allocations rather than established rights; comprehensive approach: participation of non-state actors; dialogue at local level, time-frames and upstream co-ordination.

### ***Rationalisation of cooperation instruments***

In order to simplify the process and make financing more flexible, provision is made for the rationalisation of cooperation instruments, especially of the European Development Fund (EDF), the main instrument for Community assistance to the ACP States. In contrast to the previous Conventions, the EDF will no longer be divided into several instruments with rigid allocation systems. In addition, resources will no longer be blocked in order to achieve a specific goal.

All EDF resources will be channelled through two instruments:

- i. *Grants - grant facility.* These totalled EUR 11.3 billion under the 9<sup>th</sup> EDF, EUR 1.3 billion of which was set aside for regional programmes. They were administered jointly by the Commission and the ACP States. Each country received a lump sum.
- ii. *Risk capital and private sector loans - investment facility.* This new instrument, allotted EUR 2.2 billion from the 9<sup>th</sup> EDF, was administered by the European Investment Bank. The Bank provided loans, equity and quasi-capital assistance. It also provided guarantees in support of domestic and foreign private investment.

### ***Reform of the programming system***

The new system for programming the aid granted by the Community enhances the flexibility of the partnership and entrusts the ACP States with greater responsibility, particularly by establishing a system of rolling programming that eliminates the concept of non-programmable aid, in other words aid programmed unilaterally by the Community. The ACP States now have greater responsibility for determining objectives, strategies and operations and for programme management and selection.

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The programming process is centred on results. Financial assistance of a given amount is no longer an automatic right. Grants are allocated on the basis of an assessment of needs and performance in accordance with criteria negotiated between the ACP States and the Community. These criteria reflect the partnership's main objectives, such as progress in institutional reform, poverty reduction, among others.

The main instrument used for programming grants is the country support strategy (CSS). A CSS is drawn up for each ACP State by the Commission and the country in question. The CSS sets out general guidelines for using the aid funds, supplemented by an indicative operational programme containing specific operations and a timetable for their implementation.

An annual review is provided for in order to adjust the CSS, the operational programme or the resources allocated. Halfway through and at the end of the period of application of the financial protocol, the annual review includes an assessment of the cooperation strategy, which would either confirm the thrust of the CSS or suggest appropriate adjustments. The volume of resources allocated to the country concerned may be adjusted as a result. Provision is made for local actors to be involved in the annual review in accordance with the principle of decentralisation.

The regional programmes are subject to a system of rolling programming based on the same components. However, the regional programmes are reviewed only halfway through and at the end of the period of application of the financial protocol.

The Agreement on additional support in cases of fluctuation of export revenues: Additional support in this area is needed because of the ACP States' vulnerability resulting from a high degree of dependence on export revenues in the agricultural or mining sectors, particularly those ACP States which are least developed, landlocked and insular or in post-conflict and post-natural disaster situations. The new system of rolling and flexible programming, however, makes it possible to ensure similar support via the funds allocated within the framework of the CSS and the operational programmes.

## ***Financial resources***

An amount of EUR 90 million was transferred to the intra-ACP envelope under the 9<sup>th</sup> European Development Fund (EDF). This amount was allocated to finance devolution for the period 2006–2007, managed directly by the Commission.

## ***The new multi-annual financial framework (2005)***

At the ministerial conference concluding the negotiations on the revision of the Agreement, the parties reached a preliminary agreement on the multi-annual financial framework for cooperation. The EU undertook at least to maintain aid for ACP countries at the level provided by the 9<sup>th</sup> EDF, excluding outstanding balances. Additional aid would be provided to take account of inflation, growth within the EU and the effects of the accession of ten new Member States, as estimated by the EU.

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This threshold was guaranteed without prejudice to the eligibility of ACP States for additional resources under other financial instruments which already existed or might be created. The successor to the 9<sup>th</sup> EDF was approved at the European Council meeting on 16 December 2005. Under a 10<sup>th</sup> EDF, EUR 22,682 million at 2005 prices will be allocated to cooperation with the ACP countries for the period 2008–2013.

### ***Implementing procedures and bodies responsible for implementation***

The Commission undertakes the financial execution of operations centrally and by decentralised management. In accordance with the principle of decentralisation, the execution duties are carried out by the ACP States. The government of each ACP State appoints a National Authorising Officer to represent it in all operations financed from Fund resources.

## **3.2 Institutional Arrangements**

The joint institutions for cooperation established by the previous Lomé Conventions remain in force:

- i. Council of Ministers
- ii. Committee of Ambassadors
- iii. Joint Parliamentary Assembly

### ***Council of Ministers***

The Council of Ministers consists of members of the Council of the EU, members of the European Commission and a member of the government of each ACP State. It meets once a year on the initiative of the presidency (most frequently) and in different geographical locations as appropriate. The presidency alternates between a member of the EU Council and a member of the government of an ACP State.

The tasks of the Council of Ministers include initiating political dialogue; adopting political guidelines and taking decisions required for the implementation of the provisions of the Agreement; examining and resolving any issues impeding implementation of the Agreement; and ensuring the smooth operation of the consultation mechanisms.

Decisions of the Council of Ministers shall be arrived at on the basis of consensus. It may take decisions that are binding on the parties and draw up resolutions, recommendations and opinions. It may also delegate responsibilities to the Committee of Ambassadors.

### ***Committee of Ambassadors***

The Committee of Ambassadors assists the Council of Ministers. It is made up of the permanent representative of each EU Member State, a Commission representative and the head of mission to

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the EU for each ACP state. The presidency alternates between the permanent representative of a Member State appointed by the Community and the head of mission representing an ACP State, appointed by the ACP States.

### ***Joint Parliamentary Assembly***

The Assembly is an advisory body made up of an equal number of representatives of Members of the European Parliament and representatives of the ACP States. The latter are members of parliament or, where appropriate, representatives appointed by the national parliament. In the absence of a parliament, the participation of a representative is subject to prior approval of the Assembly. The Assembly may adopt resolutions and submit recommendations to the Council of Ministers. It meets twice a year in plenary session, alternating between the EU and an ACP country. The members of parliament may also meet at regional or sub-regional level if desired.

## **3.6 The European Development Fund**

Under the Cotonou Partnership Agreement, the EU's principal instrument for development cooperation with Africa is the European Development Fund (EDF), which provides funding for development cooperation with African governments through national programmes as well as through Africa's regional economic communities. The EDF also operates thematic development cooperation programmes in areas such as the health and environment as well as programmes with a pan-African focus. While this Fund covers all ACP countries, the large number of African states forms a majority. The 1957 Treaty of Rome made an early provision for the creation of the EDF with a view to granting technical and financial assistance—initially to African countries which at that time were still colonies of some EU Member States forging historical links that linger to date.

Even though a heading has been reserved for the Fund in the Community budget since 1993 following a request by the European Parliament, the EDF does not yet come under the Community's general budget. Significantly, it is funded by the EU Member States, subject to its own financial rules under the management of a specific committee. The aid granted to ACP States and Overseas Countries and Territories (OCTs) will continue to be funded by the EDF, at least for the period 2008–2013. This mode of funding has been a source of concern among ACP countries because it is perceived to ensure a less predictable flow of aid resources. The EU Member States have their own bilateral agreements and implement their own aid programmes with African countries that are not financed by the EDF or any other Community funds. These additional bilateral channels are significant and complement EDF funding. Bilateral funding can, in principle, accrue to S&T programmes, but this is rarely the case.

Each EDF covers a period of about five years. Since the conclusion of the first partnership convention in 1964, the EDF cycles have generally followed the partnership agreement/convention cycles. The 9<sup>th</sup> EDF (2000–2007) has expired but the programming of the 10<sup>th</sup> EDF (2008–2013) under the revised Cotonou Agreement was only recently completed. The EDF consists of several instruments, including grants, risk capital and loans to the private sector.

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The erstwhile Stabex and Sysmin instruments designed to assist the agricultural and mining sectors were abolished by virtue of the new partnership agreement signed in Cotonou in June 2000. This agreement also streamlined the EDF and introduced a system of rolling programming, making for greater flexibility and giving the ACP States greater responsibility.

The 9<sup>th</sup> EDF was allocated EUR 13.5 billion for the period 2000–2007. However, the development aid provided through the EDF must be seen in a broader European framework of aid provision. Within the EU, the funds of the Community's general budget may be used only for certain types of aid. Moreover, in addition to managing part of the EDF's resources (loans and risk capital), the European Investment Bank (EIB) has contributed a total of EUR 1.7 billion from own resources for the period covered by the 9<sup>th</sup> EDF.

The 10<sup>th</sup> EDF covers the period from 2008 to 2013 and will provide an overall budget of EUR 22,682 million. Of this amount, EUR 21,966 million is allocated to the ACP countries, EUR 286 million to the OCT and EUR 430 million to the Commission as support expenditure for programming and implementation of the EDF. The amount earmarked for the ACP countries is divided as follows: EUR 17,766 million to the national and regional indicative programmes; EUR 2,700 million to intra-ACP and intra-regional cooperation; and EUR 1,500 million to Investment Facilities. An increased share of the budget is devoted to regional programmes, thereby emphasising the importance of regional economic integration as the basic framework for national and local development. An innovation in the 10<sup>th</sup> EDF is the creation of 'incentive amounts' for each country. From the point of view of science and technology it is imperative that some EDF funds be allocated to creating better synergies between S&T and development efforts.

Over the years there has not been consistent alignment and indeed very little synergy between the objectives of EDF programmes for Africa, on the one hand, and the opportunities for African participation in successive S&T Framework Programmes on the other. Consequently, very few national or regional activities funded by EDF have a specific science and technology capacity-building orientation. Correspondingly, science and technology projects have not been optimally integrated within the broader thematic development cooperation activities. The notable exception is the EDF-funded Africa, Caribbean and Pacific (ACP) Science and Technology and Innovation Capacity-Building Programme that was launched in 2007.

### **3.4 The European Consensus on Development**

The Cotonou Partnership Agreement and its EDF are implemented within a broader policy framework governing the EU's relations with development cooperation partners. In 2005 the EU Council, EU Member States, the European Parliament and the EU Commission adopted a policy statement referred to as the European Consensus on Development.

This document forms the common basis of the EU's actions in the field of development. It starts from two overriding principles. First, the recognition that the world is facing a formidable development challenge, above all in reducing poverty and food insecurity.

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Second, developing countries carry the main responsibility for their own development, even though the international donor community also has a duty to make a contribution towards that end. The EU is committed not only to providing aid—with efficiency and quality—but also to entering into economic and trading partnerships with developing countries.

By way of introduction the Consensus sets out a vision based on common objectives, values and principles. The overarching objective is the eradication of poverty in the context of sustainable development, including the pursuit of the Millennium Development Goals. The common values include respect for human rights and fundamental freedoms; peace; democracy and good governance; gender equality; the rule of law; and solidarity and justice. Effective multilateralism is seen as an important means of upholding those values.

The common principles to guide development actions are multiple. The cue is taken from the Paris Declaration on Aid Effectiveness, adopted in March 2005. The signatories of the Paris Declaration make five main commitments: (i) ownership, i.e. partner countries are to exercise effective leadership over their development policies and strategies and to co-ordinate development actions; (ii) alignment, i.e. donors are to base their overall support on partner countries' national development strategies, institutions and procedures; (iii) harmonisation, i.e. donors' actions are to be harmonised, transparent and collectively effective; (iv) managing for results, i.e. managing resources and improving decision-making for results; and (v) mutual accountability, i.e. donors and partners are both accountable for the development results of their cooperation.

While reiterating the principles of the Paris Declaration the European Consensus on Development goes further in specifying additional principles. To promote good governance the EU sees in-depth political dialogue as essential with regard to human rights, the rule of law, the fight against corruption, and democratic rule. Whereas the EU relates principally to state institutions it encourages broad participation by stakeholders in civil society in recognition of their contribution to the protection of human rights, and the promotion of democratic practices and social justice. As a human right gender equality is a guiding principle in EU development policies. With a view to addressing the problems of fragile states the EU will engage in institution-building and forge linkages between emergency aid, rehabilitation and long-term development.

In terms of the volume of resources put at the disposal of development partners the EU has adopted a time table for its member states to reach the 0.7 per cent of GNI goal by 2015, with an intermediate collective target of 0.56 per cent by 2010. If these targets are met it would mean a doubling of EU aid to EUR 66 billion by 2010. It is paramount that the aid flows are stable and predictable, which would involve joint multi-annual programming. Apart from the quantitative side of the aid flows the EU is also committed to enhancing the quality of its aid as spelled out in the Paris Declaration.

Towards that end, multiple aid modalities may be used, depending on the circumstances of the countries concerned: project aid; sector programme support; sector and general budget support; humanitarian aid and crisis prevention support; assistance to and via civil society organisations; debt reduction, and the like.

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Significantly, the EU puts emphasis on policy coherence to avoid one policy or action undermining or cancelling out other policies or actions. It is mandatory to ensure coherence between policies in such fields as trade, environment, climate change, security, agriculture, fisheries, social dimension of globalisation, employment and decent work, migration, research and innovation, information society, transport and energy. In this vein the EU supports the pro-poor completion of the Doha Development Round and intends to use EU-ACP Economic Partnership Agreements (EPAs) as vehicles for policy coherence.

The second part of the European Consensus on Development policy document sets out the renewed European Community Development Policy, intended to implement the European vision presented in the first part with the resources entrusted to the Community (as distinct from those of the Member States), in accordance with Articles 177–181 of the Treaty. It specifies the Community's role and added value and how the objectives, values, principles, policy coherence and commitments defined in the common vision will be operationalised at the Community level. Beyond the values and principles enumerated in the first part, applicable to the entire EU family, the Community has certain comparative advantages. The Community's global presence, its promotion of policy coherence, its specific competence and expertise, its right of initiative at the community level, its facilitation of coordination and harmonisation as well as its quasi-supranational character are among its comparative advantages and added value. This makes its actions as a delivery agent complementary to the bilateral actions of Member States and other international donors. Of special significance is the Community's role as a regional actor which provides a comparative advantage in region-to-region collaboration.

In the operationalisation of the policy and principles the question of objective and transparent criteria for resource allocation is important. These are to be based on needs and performance. The needs criteria include population; per capita income and poverty levels; income distribution; and level of social development. The performance criteria subsume political, economic and social progress; good governance; and the effective use of received aid.

Though responding to the needs of development partners the Community also applies a principle of concentration, i.e. selecting a limited number of areas of intervention when aid is programmed. These areas of concentration include trade and regional integration, primarily through EPAs; the environment and the sustainable management of natural resources; infrastructure, communications and transport; water and energy; rural development, territorial planning, agriculture and food security; governance, democracy, human rights and support for economic and institutional reforms; conflict prevention and fragile states; human development (education, health, culture and gender equality); social cohesion and employment. In addition to these substantive areas, a number of cross-cutting issues are being mainstreamed, such as human rights; gender equality; democracy; good governance; children's and indigenous peoples' rights; environmental sustainability; and combating HIV and AIDS. The issue of policy coherence is reinforced. Support for global initiatives is reiterated in relation to the MDGs and global public goods. Similarly, co-ordination with the policies and programmes of the Bretton Woods institutions is reaffirmed and enhanced cooperation with the UN system and other relevant institutions such as the OECD/DAC, especially the latter's Good Practice Guidelines.

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In order to improve the quality of its aid delivery the Community has taken a number of measures: (i) improved programming within a coherent project cycle with a focus on poverty eradication; (ii) created one single entity—EuropeAid—responsible for the implementation of assistance; (iii) completed a devolution process giving 80 delegations responsibility for aid management; (iv) strengthened the human resources needed to speed up implementation; (v) improved working methods through harmonised and simplified procedures, better information systems and better trained staff; (vi) instituted a process of quality support and monitoring of the different stages of project management; and (vii) speeded up the implementation of assistance.

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## 4. AFRICA'S INSTITUTIONAL S&T LANDSCAPE

Africa's science and technology landscape has been summarised in the New Partnership for Africa's Development (NEPAD) Consolidated Plan of Action (CPA) which refers to Africa as the poorest and economically most marginalised continent in the world. The continent as a whole has made only modest progress in the area of science, technology and innovation owing to numerous endemic constraints. These include weak inter-institutional linkages and collaboration; disjointed STI and overall development policies; weak policy implementation capacity; small national allocations for science and technology at below 1% of GDP; limited capacity for translating research results into industrial products and services (innovation chasm), including weak institutions; and lack of political will and long-term commitment to science, technology and innovation. These challenges are categorised below.

### 4.1 Institutional challenges

*The policy framework:* Immediately after independence, most African countries established Councils or Commissions of Science and Technology as the overall sector coordination agencies for science and technology policies. Nearly half a century later, only a few African countries—such as South Africa, Egypt, Ghana and Nigeria—have developed and implemented comprehensive national S&T policies. While others have outdated policy frameworks in need of revision, the majority of African countries are still at the consulting stage in the elaboration and formal adoption of such policies. The absence of comprehensive and overarching national STI policies has resulted in thwarted development and the effective relegation of STI as a driving force of development in Africa.

*The institutional and legal framework:* Africa's STI system is fragmented. It is governed by a combination of line ministries and numerous autonomous institutions (Councils, Commissions, and Authorities) whose mandates, in some instances, with regard to S&T appear to overlap rather than complement and reinforce each other. The existence of a plethora of science, engineering and technology institutions (SETIs), often with somewhat parallel or overlapping mandates, complicates the national STI coordination function of governments. Moreover, the statutes that established the Councils or Commissions on Science and Technology in most cases do not explicitly spell out their regulatory functions or adequately empower them to fulfil the coordination function and effectively execute their mandates. These Councils or Commissions, therefore, have adopted guidance and advice approaches rather than the more effective legal and regulatory approaches in the management of science and technology development.

*The financial resources base:* There is currently no sustainable provision for financing the implementation of STI policies, especially R&D, which has so far been put in place across the continent. As a result, sector support for STI is inadequate and scattered across various economic sectors. Consequently, the system is under-funded to the extent that over 50% of R&D funding for most African countries emanates from external sources. The modest financial resources availed to publicly funded SETIs have limited the scope and magnitude of their programmes and constrained institutional development in terms of S&T infrastructure, human resources and programmes.

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*Institutional infrastructure and human resource capacity:* Owing to their chronic under-funding, SETIs find it difficult to acquire and maintain infrastructure for R&D and administration. Similarly, SETIs face human resource capacity challenges largely due to uncompetitive pay levels, and non-conductive work facilities and conditions.

## 4.2 Systemic S&T challenges

*Institutional capacity:* Demands by stakeholders on the STI system have further overstretched the limited financial and human resources available for science and technology. At the sector level, the prevailing STI labour situation in Africa—in the face of human resource constraints, aggravated by the growing brain drain of graduates—cannot support the required expansion of industry and other productive sectors, i.e. more engineers, technicians and artisans. According to the International Organisation for Migration (IOM), Africa has already lost one-third of its human capital and is continuing to lose skilled personnel at an increasing rate, with an estimated 20,000 doctors, university lecturers, engineers and other professionals leaving the continent annually since 1990. There are currently over 300,000 highly qualified Africans in the Diaspora—30,000 of them with PhDs, a majority of whom are medical doctors and researchers.

*Financing:* The financial resources accruing to the STI system are limited, stemming from competing demands on the national revenue base and other unforeseen circumstances such as compelling needs for changes in national development priorities. Moreover, STI by its nature is not favoured by the current funding modality of annual and medium-term expenditure frameworks (MTEF) because of the long time lag between research output and product development, exacerbated by a high degree of uncertainty and unlikely immediate and direct contributions to GDP as required under the MTEFs. STI requires a different funding arrangement that entails sustained long-term financing commitments.

## 4.3 Global challenges

These challenges are largely a result of globalisation by virtue of which the world has become an increasingly integrated economy driven by information, technology and knowledge. Like many other developing countries, African countries are currently afflicted by both the digital and economic divides between developed and developing economies that tend to exacerbate the challenges of underdevelopment. These divides threaten to further exclude Africa from participating in or benefiting from cutting-edge technological advances. The digital divide is typified by the relatively low level of penetration of information and communication technology, while the economic divide is characterised by Africa's co-existence with relatively economically advanced economies in a trade relationship where Africa is a net importer and a market for technology-intensive and high value products from developed economies, and predominantly an exporter of raw materials and unprocessed agricultural produce.

The economic divide is exacerbated, on the one hand, by Africa's low productive capacity and bargaining power in the global marketplace, and, on the other, by the inability to cope with the rapid pace of technological advancement in the developed world.

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Furthermore, the global trade and intellectual property policies tend to disfavour countries that are still in their infancy in terms of technological advancement. This stifles opportunities for technology transfer and local innovation leading, *inter alia*, to technological terms of trade and balance of payments favourable to the relatively advanced economies.

The budding local scientific innovation and product development is variously affected by unfavourable global terms of trade and intellectual property policies. The local market for nationally produced commodities is open to competition from commodities produced at an advantage of scientific knowledge and economies of scale. The foreign, highly protected markets are almost impenetrable by locally produced commodities from Africa. The opening of foreign markets through international and regional trade initiatives could provide an opportunity for Africa to develop local innovation and product development capacity.

These challenges have hampered Africa's effective participation in global STI policy initiatives and prevented its full integration into the global scientific, technological and economic arena.

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## 5. AFRICA'S DEVELOPMENT COOPERATION EFFORTS

African states have all devised development plans or other planning instruments—such as Poverty Reduction Strategy Papers (PRSPs) or comparable home-grown poverty reduction strategies and sectoral documents – that establish national priorities and give direction to various interventions. Resources to implement such strategies are mobilised from domestic and international sources. Some countries have a broader domestic revenue base than others, which gives them greater financial autonomy. The poorer countries, on the other hand, tend to become aid-dependent on multi- and bilateral donors.

The African Union (AU) was formed with a mandate to devise strategies and programmes for accelerating development on the African continent. An important means in fast-tracking Africa's development cooperation is science and technology. This strategic element is articulated in NEPAD's CPA which seeks to develop and use science and technology to achieve Africa's socio-economic development and full integration into the world economy. It emphasises capacity building, knowledge production (scientific research) and technological innovation. Its priorities are clustered around biodiversity; biotechnology and indigenous knowledge; energy, water and desertification; material sciences, manufacturing, laser and post-harvest technologies; information and communication technologies; space science and technologies; and mathematical sciences. The plan is to be implemented through the establishment of networks of centres of excellence dedicated to specific R&D and capacity-building programmes complementing other AU and NEPAD programmes in the areas of agriculture, the environment, health infrastructure, industrialisation and education.

The policy actions proposed in the CPA include: the African Science, Technology and Innovation Indicators Initiative (ASTII); and improving regional cooperation in STI through capacity building, exchange of good practices, the formation of a common African framework for cooperation in science and technology, and active participation in EU, WTO, UNCED and WSSD processes; building public understanding of STI; building a common African strategy for biotechnology; building science and technology policy capacity; and promotion of creation of technology parks. The arrangements for funding and implementation of the CPA are such that the African Ministerial Council on Science and Technology (AMCOST) is expected to exercise policy oversight in implementation of the programmes. The Steering Committee for Science and Technology comprised of high level technocrats from the four regions of the continent are to oversee the development and implementation of the programmes. The AU Commission is responsible for providing overall political and policy leadership for implementation of the CPA. The AU convenes the meetings of AMCOST, initiates policy processes, mobilises financial resources for implementing the CPA, leads AU-NEPAD delegations to international processes and negotiations on STI, provides a focal point for liaising with UN agencies on policy, and creates various schemes for promoting STI within Africa and beyond. The NEPAD office for science and technology and AMCOST provide overall technical and intellectual leadership for the implementation of the CPA.

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The implementation of the CPA is an enormous challenge. The nature of the CPA is that of an action programme or a broad framework that provides guidelines to national programme priorities, but financing of its implementation has not fully materialised. It would, therefore, be helpful to indicate whether the AU will fund national economies to implement the plan or national economies will be directly funded by donors. This raises the question as to how NEPAD could best deploy its efforts between regional programmes and national programmes, as well as how to foster linkages, partnership and collaboration with regional blocs such as the EAC, SADC, ECOWAS, among others.

It should be noted that effective implementation of the CPA requires: (i) concerted efforts of the respective national institutions; (ii) commitment and support by the African Heads of State and the AU; (iii) harmonisation and regionalisation of national policy frameworks; (iv) development of effective and functional public and private sector partnerships; (v) significant funding contributions by African governments, development partners, and local and foreign private investors; (vi) strong institutional and human resource capacities; (vii) integration of NEPAD indicative plans into national development programmes or PRSPs of various African countries to facilitate the realisation of the MDGs and promote sustainable development across Africa.

## **5.1 African participation in EU Framework Programmes**

Africa's participation in the EU Framework Programmes is very limited as evidenced in the table overleaf. Some comments on the statistics below are warranted:

Data on African participants in non-INCO calls were used as a proxy for those in INCO calls since INCO statistics indicate only the number of participants and not the countries. Overall number of proposals submitted per country is minimal, less than 20 for most countries save for South Africa, Morocco, Egypt and Tunisia. However, the success rate for the few proposals that are submitted is rather high, even at 100% for some countries. This prompts questions about the factors underlying this high success rate, as well as the distinction between the INCO and non-INCO calls in terms of eligibility, application procedures, sophistication requirements, size of grant, and so on.

This low participation in both INCO and non-INCO calls by African researchers is attributed to (a) the nature of the FP instruments, (b) Africa's fragmented economic structures and an apparent disjoint among science, technology and development, (c) gaps between development policy and practice, and (d) Africa's limited participation in global policy and decision making fora.

### ***Nature of the FP instruments and procedures***

The Framework Programmes are primarily designed to address S&T priorities of the EU and its member states. African involvement is relevant only to the extent it is seen as enhancing the EU member states' efforts towards achieving their research objectives through providing research materials, testing sites, exchange of skills and intellectual contribution to research and technology programmes. Moreover, the competitive nature of these instruments and their requirement for high standards of scientific excellence tends to reward the already excellent and well endowed first world

**Table 1.** African applicants and participants in non-INCO calls in FP6.

Applicant Country Name	Number of Applicants	Number of Proposals	Number of Participants	Number of Projects
Algeria	56	52	16	16
Angola	3	2		
Benin	12	10	5	3
Botswana	15	14	2	2
Burkina Faso	27	19	6	2
Cameroon	18	18	6	6
Cape Verde	9	7	4	3
Chad	1	1		
Comoros	1	1		
Congo	1	1	2	2
Congo (Democratic Republic of)	3	3	1	1
Djibouti	2	2		
Egypt	182	139	35	33
Equatorial Guinea	1	1		
Eritrea	3	2		
Ethiopia	30	22	8	7
Gabon	12	11	5	5
Gambia	4	3	2	2
Ghana	47	41	9	8
Guinea	3	3	3	3
Guinea-Bissau	5	4	1	1
Kenya	86	67	19	14
Libyan Arab Jamahiriya	4	4		
Madagascar	4	4		
Malawi	4	4	2	2
Mali	14	12	8	6
Mauritania	5	5	2	2
Mauritius	3	3		
Morocco	209	165	52	44
Mozambique	22	21	4	4
Namibia	13	11	3	2
Niger	18	12	7	3
Nigeria	18	18	4	4
Rwanda	2	2	1	1
Sao Tome and Principe	3	3		
Senegal	40	33	18	12
Seychelles	2	2	1	1
Sierra Leone	5	5		
Somalia	1	1		
South Africa	384	295	99	81
Sudan	3	3	2	2
Swaziland	14	14		
Tanzania (United Republic of)	20	19	8	7
Togo	2	2		
Tunisia	165	144	40	35
Uganda	29	24	8	6
Zambia	3	3	3	3
Zimbabwe	15	14	1	1

**Source:** CAAST-Net Work Package 1, 2008.

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institutions to the exclusion of developing country institutions, the majority of which are faced with various capacity challenges that limit their ability to participate effectively in global competition.

### ***Africa's fragmented economic structures and disjointed science, technology and development environment***

Africa's S&T and economic landscape is such that there is lack of cohesion between science and technology and development. Coupled with fragmented economic and other productive systems, this state of affairs has militated against Africa's participation in EU research programmes. While developed countries have effectively integrated research, science and technology endeavours into their economic and productive systems, this does not hold true in Africa. The absence of these vital links makes it difficult for countries to prioritise S&T as critical elements in their development efforts. Consequently, most of the development strategies and programmes for which African countries seek external development assistance do not explicitly include science and technology as a priority requiring substantial funding from domestic and foreign sources alike.

### ***Gaps between technology policy and practice***

While most African countries pronounce their commitment and support to science and technology at the level of rhetoric, and have articulated national visions, policies and programmes, many implementation challenges prevent them from realising their visions and ambitions. These gaps, among others, include limited access to adequate and reliable information about global opportunities for development cooperation among themselves as well as with the rest of the world. There is, therefore, a wide information gap between Africa and the EU due to the existing technological divide that has resulted from Africa's inability to implement its S&T policies and programmes.

### ***Africa's limited participation in global policy decision-making forums***

Africa's presence in international policy decision-making forums is still inadequate for ensuring effective involvement and participation in international programmes such as the FPs. This is compounded by the limited flow of information between Africa and Europe—or rather the inability to access the available information—and among African states, as well as several other resource constraints facing Africa. It is only fairly recently (about 25 years ago) that S&T cooperation between the EU and developing countries began as part of a broader development agenda.

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## **6. BRIDGING THE GAP BETWEEN S&T AND DEVELOPMENT**

There is a plethora of policy documents and instruments related to S&T, on the one hand, and development issues, on the other—at both EU and AU ends. What is needed is clearly to integrate those policies and actions into a coherent whole with a view to informing and underpinning development efforts with technologies stemming from research projects. A long overdue ‘marriage’ between S&T and development is called for. However, this is not an easy task. Bridging the gap between S&T and development efforts has been the subject of a longstanding and continuing discussion.

### **6.1 Cape Town Declaration and Consensus 2002**

Towards closing the gap, an ACP-EU Forum on Research for Sustainable Development was convened in Cape Town on 29–30 July 2002. That event resulted in the Cape Town Declaration which acknowledged the essential role of scientific and technological research as a fundamental engine for sustainable development; and a pledge to place research at the forefront of development and the effective integration of research into national development plans in order to accelerate the achievement of sustainable development. The companion document—the Cape Town Consensus—calls upon the ACP States and secretariat, and the EU member states and the European Commission to make appropriate and timely arrangements for the most effective utilisation of funding instruments in the 6<sup>th</sup> Framework Programme and in the 9<sup>th</sup> European Development Fund, in support of science and technology cooperation and research capacity building, respectively.

The attendant Cape Town Plan of Action makes a plea for collaboration and inter-linkages between researchers and policy-makers, and for fostering the creation of regional research and innovation systems. To implement the Plan of Action it was envisaged that funds would be earmarked and made available under the 9<sup>th</sup> EDF and that a fund would be set up to strengthen science networks and evidence-based policy making. The Cape Town forum set the tone and direction for closer synergies between S&T and development efforts. A major weakness, however, was the lack of adequate mechanisms for operationalisation and implementation, especially funding.

### **6.2 The Joint Africa-EU Strategy 2007**

The sentiments of the Cape Town forum of 2002 have since been reiterated and taken further. In late 2007, the Joint Africa-EU Strategy was launched, seeking to bring the relationship between the African and European continents to a new, strategic level with a view to strengthening political partnership and enhanced cooperation at all levels.

While reaffirming previous principles of collaboration, the new strategic framework lists four main areas for which specific strategies will have to be put in place: (a) peace and security; (b) governance and human rights; (c) trade and regional integration; and (d) key development issues.

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The rubric of key development issues subsumes, *inter alia*, the component 'Development of Knowledge-Based Societies'. The inclusion of this component is based on the recognition that S&T and innovation are essential engines of socio-economic growth and sustainable development in Africa; that competitiveness in the global economy is increasingly dependent on knowledge and innovative ways of applying modern technology, especially Information and Communication Technology (ICT); and that meeting the MDGs requires a special effort to build scientific and technological capacities in Africa. In the area of ICT, the aim is to bridge the digital divide that limits African access to modern telephony and internet services. To achieve that objective, policy and regulatory frameworks must be harmonised, and accompanied by investment in broadband infrastructure and support for non-commercial e-services.

In parallel, similar efforts are envisaged to address the scientific divide and increase Africa's research capacities. Africa's currently inadequate technical capacity will have to be upgraded through the establishment of specialised networks in regions and sub-regions in order to underpin economic growth and sustainable development of the African continent. Collaborative links between African regional and sub-regional players and European partners will contribute to the sustainability of established scientific centres and networks of excellence.

The overall Africa-EU Strategic Partnership is accompanied by a First Action Plan covering implementation during the initial years from 2008 until the next EU-Africa Summit to be held in 2010. Similar to the Cape Town documents and the overall Africa-EU strategy document, the action plan is conspicuously vague with regard to implementation, and especially the funding arrangements. In a non-committal fashion it is stated that the actions under each of the discrete Partnerships will be financed out of existing or new financial resources, which could include, where appropriate, the 10<sup>th</sup> European Development Fund (EDF) and its facilities and trust funds; the relevant EU budgetary instruments (the European Neighbourhood Policy Instrument, and the Development Cooperation Instrument) and the geographical and thematic programmes deriving from these; bilateral contributions from both African or EU States; contributions from interested third states, international financing institutions, international organisations and civil society groups as well as private sector investments.

The 8<sup>th</sup> Africa-EU Partnership on Science, Information Society and Space as part of the First Action Plan is more specific as far as objectives, activities and outcomes are concerned. With respect to priority 1—the development of an inclusive information society—it stipulates among the outcomes a more sustainable, accessible, affordable and effective African ICT infrastructure. In terms of priority 2—S&T capacity building in Africa and the implementation of Africa's Science and Technology Consolidated Plan of Action—five outcomes are listed: (i) a strengthened African S&T base; (ii) an increased number of scientists, technicians and engineers; (iii) the mainstreaming of S&T into sectoral programmes and projects of regional economic communities (RECs); (iv) improved infrastructure and facilities for R&D; and (v) strengthened AU-EU cooperation in science and technology programmes.

But again the funding arrangements remain non-committal. They simply echo what was stated in the

overall text: the appropriate financing sources in accordance with their respective scope and their relevance to objectives and activities concerned, their specificity and eligibility criteria, such as the 10<sup>th</sup> EDF, the ENPI, the DCI; bilateral contributions from EU member states and African States; the African Science and Technology fund; and the EDCTP, Thematic Budget Investing in People. It is noteworthy that the 7<sup>th</sup> Framework Programme is not mentioned as a possible source of finance.

### 6.3 Lighthouse Projects

Under the 8<sup>th</sup> Partnership on Science, Information Society and Space, the African Union Commission and the European Commission have compiled a Book of Projects, also referred to as 'Lighthouse Projects'. The Book of Projects comprises altogether 19 out of which the 12 listed below are related to science and technology with an estimated funding requirement of EUR 192.5 million over a five-year period:

- i. EU-AU African Research Grants;
- ii. Popularisation of Science and Technology and Promotion of Public Participation;
- iii. Development of a Common African Union Science and Technology Policy Framework;
- iv. Pan-African Intellectual Property Organisation (PAIPO);
- v. African STI Incubators Network;
- vi. Securing and Using Africa's Indigenous Knowledge Base;
- vii. Building Africa's Scientific and Institutional Capacity in Agriculture and Natural Resource Management;
- viii. Harnessing Biotechnology for the Advancement of African Agriculture;
- ix. Desertification and Forestry;
- x. Water Management for Food Security in Africa in View of Climate and Demographic Changes;
- xi. African STI Observatory and Institution for Science and Technology Policy;
- xii. The African Institute on Climate Change (AICC).

The majority of these projects are not research projects per se, but all of them are geared to harnessing S&T for development. However, lighthouse project no. 1 is closer to a research effort proper. Its aim is to increase the capacity of African research infrastructures, and to consolidate their accumulated body of scientific knowledge. The Department Human Resources Science and Technology of the AU will structure, launch and implement calls for research proposals at the African continent level as a pragmatic vehicle for promoting African collaboration in international research consortia. Several of the lighthouse projects have institution-building objectives, e.g. setting up a Pan-African Intellectual Property Organisation (PAIPO) and an African Institute on Climate Change.

Some uncertainty still surrounds the funding of these projects. The EC is committed to them as a priority of attention under the 8<sup>th</sup> Partnership of the Africa-EU Strategic Partnership umbrella, but not necessarily to their funding. It appears that the required money will be sourced in part from remaining funds under EDF9 and in part from the inter-regional component of EDF10.

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## 7. COUNTRY AND REGIONAL CASE STUDIES

In order to apply the general principles and policies related to S&T and development to reality, it was thought helpful to include case studies of one individual country and a Regional Economic Community (REC). These case studies give pointers regarding the nature of the impediments to greater S&T and development synergies.

### 7.1 The case of Tanzania

As an economically small African country Tanzania has been relatively successful in tapping into FP funds and was, therefore, selected for further investigation. The aim was to learn lessons from Tanzania's relative success in this regard and to assess their applicability elsewhere. Of great interest was also the extent to which Tanzania had been successful in translating research results into development policies and actions.

Based on interviews with researchers and senior management of several science, technology and engineering institutions that had previously benefited from FP participation, it emerged that the access to EU grants by Tanzanian researchers was purely a result of personal initiatives and contacts with EU-based professional peers through international networks and conferences. The institutional mechanisms for disseminating information on research opportunities and for facilitating successful responses by African scientists to the grant opportunities were lacking or weak. The Tanzania Commission for Science and Technology (COSTECH) which has a statutory mandate to support research and development is inadequately financed to effectively coordinate responses to both national and international research funding opportunities. The Commission, though itself a beneficiary of FP7 funding (i.e. through IST Africa), was not fully conversant with the research funding modalities under the EU framework programmes. Information to Tanzanian counterpart researchers about funding opportunities under the FPs was largely provided by the EU-based researchers and institutions.

Likewise, the initiative to prepare and submit research proposals was invariably and appropriately taken at the European end in accordance with the procedures. Tanzanian researchers and institutions became involved only at a late stage in the conceptualisation and design of the projects. As a result, their role in project preparation was as junior partners. The perceived relative success of Tanzania in accessing EU research funds, therefore, can be attributed to increased global networking among scientists and the comparatively free environment for professionals and their associations in Tanzania. It has not resulted from deliberate national efforts to attract research grants for researchers from the EU through such national umbrella organisations as COSTECH.

A number of obstacles still hampers greater participation of Tanzania in the FPs. These include the weak institutional framework for collaboration among Tanzanian researchers and between Africa and the EU. Several senior Tanzanian researchers admit to collaborating more with European and other Western researchers as compared to collaboration with peers in Tanzania or within Africa. This fact reflects the poor state of research and ICT infrastructure within Africa and the relative absence

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of locally financed research opportunities equivalent to the numerous research funding opportunities in the EU and western countries.

Tanzanian researchers also point to the elaborate and somewhat rigid nature of the FP application procedures as impediments to Tanzania's further success in accessing consecutive FP grants. Bureaucratic requirements and competitiveness were pointed out as critical limitations for African researchers to effectively respond to FP calls for proposals jointly with European counterparts, let alone win an FP grant without assistance from EU-based professional consulting firms specialising in the technical and formal aspects of writing applications. This need for assistance, though not formally recognised by the EU, poses a significant financial obstacle to poorly resourced African researchers when defraying the substantial transaction costs of application preparation. This constraint is a major reason for the observed limited involvement of African researchers in applications initiated by EU-based researchers, even in a junior or adjunct capacity.

In addition, the hurdles facing third party co-applicants in taking lead roles in research consortia and the limited ability of African countries to seek out EU-based partners and peers, further limit the extent and status of Africa's participation in the FPs. However experienced and skilled, while formally eligible to play lead roles in FP-funded research consortia, African research institutions are thus severely constrained in doing so when opportunities avail themselves. Acknowledging this state of affairs has spurred efforts to create a research and innovation fund within the EAC, modelled on the FPs, to support regionally initiated research programmes and to nurture local research capacity.\*

In conclusion, Tanzania has indeed been comparatively successful in tapping into FP funding largely due to the personal efforts and resilience of indigenous researchers and a liberal professional environment for global research collaboration. A lot still remains to be done at both national and institutional levels to facilitate researchers' involvement in international research endeavours and to coordinate efforts to that end. The Tanzanian research community currently lacks knowledge and a deeper appreciation of the intricacies of FP application procedures for funding. National authorities, arguably through COSTECH, are facing a major task in this regard. The Tanzanian experience provides useful lessons for other African countries on the need to complement the efforts of individual researchers with more organised and systematic approaches to accessing research funds from domestic and foreign sources, guided by a nationally established strategic framework for research financing.

## **7.2 The case of the East African Community (EAC)**

In addition to the National Indicative Programmes (NIPs) for individual African countries, the 10<sup>th</sup> EDF also comprises Regional Indicative Programmes (RIPs) for eight recognised Regional Economic Communities (RECs) on the African continent—within the context of the African Union: the Community of Sahel and Sahara States (CENSAD); the Common Market for Eastern and Southern Africa (COMESA); the East African Community (EAC); the Economic Community of Central African States (ECCAS); the Economic Community of West African States (ECOWAS); the Inter-Governmental Authority on Development (IGAD); the Southern Africa Development Community (SADC); and the West African Economic and Monetary Union (UEMOA).

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This report takes a closer look at the EAC as a specific case.

The negotiations under the 10<sup>th</sup> EDF regarding a Regional Strategy Paper (RSP) and an attendant Regional Indicative Programme (RIP) for the period 2008–2013 were recently concluded. The resultant ESA-IO RSP/RIP covers not only the EAC but also three other Regional Organisations (ROs), i.e. COMESA, IGAD and the Indian Ocean Commission (IOC) so as to effectively comprise the region of Eastern and Southern Africa and the Indian Ocean (ESA-IO). The overall objective of the 10<sup>th</sup> EDF ESA-IO RSP is poverty reduction in the region's countries and the achievement of the MDGs, as enshrined in the ACP-EC Partnership Agreement, by supporting economic growth and promoting trade. The ESA-IO RSP has two focal areas: (a) regional economic integration and (b) political integration and cooperation. In addition, other, non-focal programmes will receive some attention. Its implementation will be guided by the principles of the Paris Declaration on Aid Effectiveness and the EU Consensus on Development, and overseen by an Inter-Regional Coordination Committee (IRCC).

The RSP sets out the overall context and backdrop of this collaborative venture and presents the challenges facing the region. The attendant RIP provides more detail and specifies the priorities. In terms of indicative programmable financial resources, the envisaged available amount is EUR 645 million over the 2008–2013 period. The RIP suggests the following allocation of the global amount: 85% (EUR 548 million) to regional economic integration; 10% (EUR 64 million) to regional political integration; and 5% (EUR 32 million) to other programmes.

With specific reference to S&T, some notable features of the ESA-IO RSP/RIP warrant highlighting. First, several countries in the region participated actively in the 6<sup>th</sup> Research Framework Programme (2002–2006). The bulk of this research was undertaken in high priority areas for the region: food security; neglected diseases, reproductive health and health systems; and sustainable use of land and coastal ecosystems to rebuild or maintain productivity. Several research projects sought to reconcile multiple demands on coastal zones and fish stocks.

Second, significant lessons learned from this research cooperation are documented in global and thematic reviews, which suggest that the development impact can be increased by building trust and facilitating dialogue between the 'development community' and the 'research community'. For this to occur, however, the research community needs to pay heed to the relevance of the research undertaken to social and economic challenges and opportunities of the region, and to engage more actively in two-way communication with the end-users of research findings.

Third, cooperation is envisaged under the non-focal rubric between the region's higher education and research institutions with special emphasis on fostering cooperation in the fields of economics, science and technology, conflict studies and academic capacity-building. This will be done taking full account of the range of recently completed or ongoing cooperation initiatives in the region. Institutions that may be considered for support under this heading include the Inter-University Council for East Africa and the African Economic Research Consortium.

Fourth, the non-focal areas also include activities supporting the use of results and competencies

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from past and on-going scientific cooperation, as well as programmes supporting the implementation of the 8<sup>th</sup> Partnership, as it pertains to the ESA-IO region. Special attention will be given to human and institutional capacity building and encouragement for participation in European Research Framework Programmes. Development of programmes supporting the implementation of the 8<sup>th</sup> Partnership as it pertains to the ESA-IO region, with special attention to human and institutional capacity building and encouragement for participation in European Research Framework programmes.

The EU-Africa Summit in Lisbon (December 2007) ushered in a new phase in the Africa-EU relationship and established a new strategic partnership between the two continents. The Joint Africa-EU Strategy focuses on four areas: (a) peace and security, (b) democratic governance and human rights, (c) trade and regional integration and (d) key development issues. The companion EU-Africa Action Plan, elaborated to implement the Africa-EU Strategy, includes the 8<sup>th</sup> Partnership on Science, Information Society and Space, in terms of which scientific cooperation is considered one of the fundamental elements for meeting the MDGs and accelerating development in general. The EU-ESA-IO cooperation framework under the EDF seeks to give effect to that ambition by addressing a wide range of regional priorities in human and institutional capacity building and strengthening, with expected positive impact across the region.

The EAC has taken a number of steps to give greater prominence to S&T issues. First, legislation was enacted by the East African Legislative Assembly (EALA) on 23 September 2008 to establish the Inter-University Council for East Africa as a legal entity and a full institution of the EAC. Its functions include, *inter alia*, to encourage collaboration in regional research and to assist member universities to develop centres of advanced study and research, and to help in the establishment of a database on research capacity and ongoing research activities within the EAC. In the same vein, a bill has been tabled in the EALA for the establishment of an East African Commission for Science and Technology but its passage into law is still pending.

\* Substantive corrections to this paragraph were made on 9 March 2010. The corrected version of this report should therefore be referenced henceforth.

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## CONCLUSION

The overall policy and institutional frameworks governing S&T and development are made up of a multiplicity of initiatives at both the European and African sides. The sheer number of documents makes it a challenge to understand their full implications, not least their inter-linkages. The institutional architecture is similarly complex. Consequently, for outsiders it may be difficult to disentangle what roles are being played by which institutions and to determine where decision-making authority rests.

On the face of it, the policies and initiatives in the two spheres—S&T and development—are parallel tracks that do not seem ever to meet. It has been argued that the EU Framework Programmes for S&T live their own lives in splendid isolation from the development policies and interventions of the EU and its member states. This state of affairs seems to persist despite the widespread acknowledgement that S&T has a vital, indeed an indispensable, role to play in development, poverty reduction and food security as overriding goals. The deplorable result is very low take-up in development interventions of the output of research projects funded under the framework programmes. Thus, Africa is missing huge opportunities and if left unattended the continent is likely to remain at a low level of development dependent on foreign aid, or steeped in persistent poverty. Both the 2002 Cape Town Consensus and the 2007 Africa-EU Strategic Partnership take cognizance of this apparent lack of synergy and set the stage for remedying it.

Work Package 2 of the CAAST-Net project is responsible for looking into the possibility of forging better synergies between S&T and development. This report has examined the relationships between various policies and initiatives within Europe and Africa as far as these two spheres are concerned. It was found that there remains a serious lack of synergy and coherence between them. Above all, there is an apparent lack of a forum for interaction and dialogue between the S&T community, on the one hand, and the development community, on the other, with a view to nurturing a mutual understanding of the linkages between S&T and development in Europe and in Africa. While senior officials in the EU and the AU may possess an appreciation of these linkages, the understanding among implementers and practitioners further down the hierarchy leaves much to be desired. The lack of dialogue and interaction between the two main 'communities', in particular at the lower echelons of the relevant institutions, has led to inadequate awareness of the interrelationship between S&T and development and resulted into poor synergy between them. This awareness needs to be raised urgently.

While this report maps the policy environment and provides a bird's eye view of the institutional landscape of the EU and Africa in terms of S&T and development, its companion report ('Towards Better Synergy Between S&T and Development: Proposals and Recommendations') discusses in greater detail the interface between S&T and development, and advances a series of recommendations as to how closer synergies can be forged.