All countries naturally express great interest in the role of science and technology (S&T) in achieving sustainable development. The topic is complex and S&T is relevant to sustainable development for many distinct reasons. This brief note highlights some of the issues involved.

**S&T and Economic Growth.** Technological advances are the key factor in long-term economic growth. Whether the technological advances are homegrown through domestic innovation, or whether they are adapted from abroad, a country’s S&T capacity will help to determine the pace of its technological advances and thereby its long-term economic growth rate.

**S&T and Social Inclusion.** Technological advances, for example in information and communications technology (ICT), are having complex effects on social inclusion. On the one hand, ICTs facilitate low-cost access by the poor to important services, such as e-banking, e-health, e-education, and e-governance. On the other hand, ICTs exacerbate income inequalities by eliminating many lower-skilled jobs through robotics and other forms of automation while increasing the earning potential of the very highly skilled. Countries need long-term strategies to take best advantage of the new technologies, and to adapt to the downsides.

**S&T and Environmental Sustainability.** Technological advances to conserve natural resources and to decouple economic growth from resource use, e.g. by shifting from fossil fuels to low-carbon energy, will play a central role in achieving sustainable development. Technological advances are needed in areas as diverse as solar and wind power, fourth-generation nuclear power, energy storage, new production processes (e.g. direct reduction in steel production), nanotechnology for new materials, improved recycling, and many more.

Let us recognize at the outset that technological advance comes in two main forms: innovation and diffusion. Innovation is the process of developing and adopting a new technology. Diffusion is the process of enlarging the uptake of an existing (perhaps new) technology. All countries must rely on both processes, though the balance differs between highly developed and less-developed economies. In general, highly developed economies have a greater capacity for home-based innovation, while low-developed economies generally depend on the diffusion of technologies from abroad, whether embodied in machinery, know-how, or the production systems of multinational companies. The S&T systems differ depending on whether countries focus on home-grown innovation or technology diffusion. Yet even the diffusion of technology typically requires at least some homegrown innovation in order to adapt the foreign technology to local conditions.
To mobilize S&T for sustainable development, there are important issues of public policy to address. These include the following:

1. **National innovation systems.** For a country to gain capacity in S&T requires a set of supportive institutions, including universities, national laboratories, scientific academies, public science funding, favorable tax treatment of R&D expenditure, and the national capacity to attract R&D facilities from abroad. There are many policy issues involved in establishing and cultivating a productive national innovation system, and experience shows that such systems differ significantly across countries (even countries at a similar development stage) and across sectors. For example, innovation and deployment systems for agriculture, energy systems, life sciences/medicine, or ICT tend to be very different from one another, even within the same country.

2. **Regulation of S&T for public benefit.** Because of the rapid rate of global technological advance, and because of the potential dangers posed by many of the emerging technologies, there are profound ethical, environment, and political issues regarding the oversight and regulation of technologies. Thus, each country is now grappling with difficult decisions on how to regulate genetically modified organisms (GMOs); nuclear power; data transmission on the Internet; food additives and products such as trans-fats and tobacco; and new health technologies such as gene therapy. The capacity of governments to regulate these new technologies is very limited, and calls for new forms of international cooperation in regulation. Indeed, many new technologies (e.g. geo-engineering) must be regulated globally by internationally agreed norms.

3. **Technology innovation roadmaps.** In order to develop new, more advanced technologies needed for inclusive and sustainable growth, the relevant technology communities (including businesses, academia, foundations, and government laboratories organized around specific sectors and technologies) should develop timelines and roadmaps for critical technologies. These might include the transition to sustainable energy; the use of ICT for health; the use of ICT for education; and the development of nanotechnologies for more efficient resource utilization.

4. **Public-private partnerships for R&D.** In many cases, such as healthcare technologies for the poor (e.g. new medicines to fight AIDS or TB), market incentives alone are inadequate to attract the needed R&D resources. In this case public (co-)financing will be needed. Partnerships based on public-sector financing linked with private-sector R&D (e.g. in industrial research laboratories) may then prove to be very fruitful. This has been the case with many PPPs sponsored in recent years by the Bill and Melinda Gates
Foundation and others. Such PPPs are needed across several sectors, including health, education, agronomy, energy, and others.

5. **International technology transfer and diffusion.** Most international environmental and other agreements specify the goal of international technology transfers, especially on behalf of the poorest countries. For example, in the UN Framework Convention on Climate Change, signatories committed to the following (Article 4, paragraph 5):

> The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention.

These transfer provisions have been difficult to implement, not least because much of the valuable intellectual property is owned privately. In such cases, suitable public-private arrangements are needed to facilitate the transfer of privately owned and patent-protected knowledge.

The intellectual trade regime includes strictures on intellectual property that have proven to be enormously contentious and problematic, especially when applied to life-and-death issues in healthcare delivery. The current global patent regime is in general too rigid to meet the needs of poor countries in desperate need of the advanced technologies developed and owned in the high-income countries. New approaches are needed to protect and reward intellectual property without also blocking the access of the poorest countries to these technologies, whether for life-saving medicines or important new tools for resource conservation.

6. **International S&T capacity building.** Developing countries also underscore their strong interest in institutions designed to build global S&T capacity. The Inter-Academy Council, the Scientific Advisory Board of the UN Secretary-General, and Future Earth are important examples. Yet these efforts are often too small and remote to penetrate deeply into national S&T processes and institutions. The new Sustainable Development Solutions Network (SDSN) is an attempt to strengthen the sustainable-development capacity of universities, think tanks, and cutting-edge businesses, by creating global networks of expertise around sustainable-development problem solving.

The importance and complexity of mobilizing S&T for sustainable development raise the general question of how S&T should be incorporated in the new Sustainable Development Goals (SDGs). Should there be a separate S&T goal? Should technology transfer or technology roundtables figure directly in the
statement of the new SDGs? Here is how these issues are being debated within the SDSN.

**Stand-alone goal?** The SDSN strongly recognizes the crucial role of S&T in sustainable-development problem solving. Yet the SDSN did not envision a stand-alone S&T goal since every SDG – on health, poverty, food, energy, biodiversity, cities, and others – will depend on S&T for its achievement. Designing successful national innovation systems is highly complex and context specific. For this reason the SDSN feels that a global goal would provide very limited value to countries. As with the MDGs, which introduce S&T into the global partnership goal (MDG 8), so too the SDGs can include overarching S&T principles into the SDGs for governance and partnership. Note that in general terms, the MDG partnership goal calls on the global partners to “make available benefits of new technologies, especially information and communications technologies.”

**Core infrastructure for S&T.** Successful national systems for innovation and technology diffusion will require a core “infrastructure” comprising *inter alia* well-educated population beyond secondary schooling, ubiquitous access to broadband as well as electricity, and well-managed cities. The corresponding SDGs and their targets should be framed in such a way that they support the key underpinnings of any successful S&T innovation system.

**Funding for technology transfer and capacity building.** Technology transfer and capacity building require funding and other “means of implementation” or else they will be empty letters. Yet, progress on funding, particularly for technology transfer, has been frustratingly slow. The major global funds, such as the Global Alliance for Vaccines and Immunization; Global Fund to Fight AIDS, TB, and Malaria; the Green Climate Fund; and the Global Environment Facility, should include financing mechanisms to ensure adequate resource availability to follow up on promising of tech transfer and capacity building.

**Technology innovation roadmaps.** The world currently lacks the institutions needed to prepare technology roadmaps for key challenges of sustainable development, such as the global transition to a low-carbon energy system by mid-century. This is an area where the UN Secretary-General and the new High-Level Political Forum (HLPF) can work together to help forge global alliances of technology innovators around critical challenges (in addition to deep decarbonization, such technology challenges include climate-resilient food supplies, advanced transport systems, ICT for health and education, among other areas).

**S&T Accountability.** The SDGs will need strong, year-round monitoring, including of the R&D processes that are vitally needed for SDG success. A review of S&T achievements each year can become part of the ECOSOC ministerial deliberations on sustainable development. And between meetings, a standing committee of the General Assembly (or ECOSOC) could meet to oversee the implementation of S&T accords.