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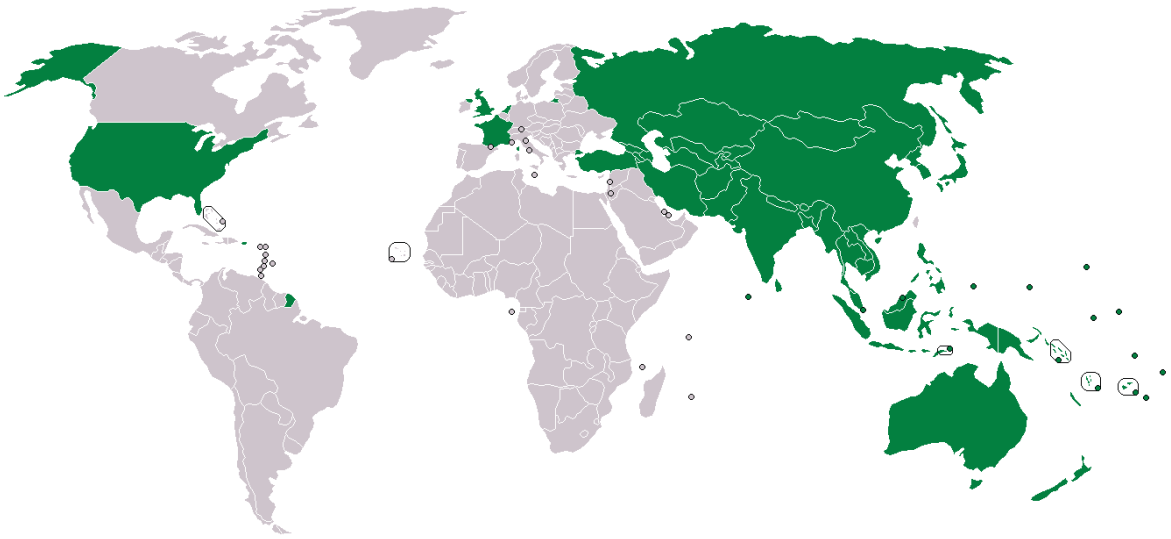
FRONTIER TECHNOLOGIES

for sustainable development in Asia and the Pacific



The shaded areas of the map indicate ESCAP members and associate members.

The Economic and Social Commission for Asia and the Pacific (ESCAP) serves as the United Nations' regional hub promoting cooperation among countries to achieve inclusive and sustainable development. The largest regional intergovernmental platform with 53 member States and 9 associate members, ESCAP has emerged as a strong regional think-tank offering countries sound analytical products that shed insight into the evolving economic, social and environmental dynamics of the region. The Commission's strategic focus is to deliver on the 2030 Agenda for Sustainable Development, which it does by reinforcing and deepening regional cooperation and integration to advance connectivity, financial cooperation and market integration. ESCAP's research and analysis coupled with its policy advisory services, capacity building and technical assistance to governments aims to support countries' sustainable and inclusive development ambitions.

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FOREWORD

Industrial revolutions, from the age of mechanization to mass production to the digital revolution, have spurred economic growth and prosperity. However, this was often at the cost to the environment and society. Carbon dioxide emissions dramatically increased in step with the industrial revolutions, and many people were left behind during the digital revolution fuelling a widening digital divide.

Now, as we enter the Fourth Industrial Revolution, a revolution defined by frontier technological breakthroughs such as AI, robotics, 3D printing, and the Internet of Things amongst others, it will be critical that these technologies work for society and the environment as well as the economy if we are to achieve the ambitions of the 2030 Agenda for Sustainable Development. In this regard we need to listen to historians, not just futurists. The disruptive nature of technology is nothing new. It will be critical to learn from the past as we shape the future of frontier technologies.

Frontier technologies offer a multitude of opportunities to re-imagine how our economies could serve better social and environmental needs. First, the adoption of technologies and innovation in production processes has the potential to enhance productivity. For example, embracing the Internet of Things in China's manufacturing chain could add up to $736 billion to GDP by 2030.

Second, technologies have the potential to lift the sustainable development curve. For instance, improved application of frontier technologies to transportation and logistics could reduce carbon emissions by an estimated 4.5 billion tons by 2020. Image recognition has allowed researchers to scan more than 50,000 images of plants to identify crop diseases using smartphones with a success rate of over 99 per cent.

Third, innovative policy action to utilize technologies in the delivery of public services is gaining ground. E-government services, including in health and education sectors, are a great example of how governments are embracing technology.

Fourth, frontier technologies can help anticipate and respond to the effects of climate hazards and air pollution through the adoption of state-of-the-art technologies to address environmental impacts. In the Republic of Korea, the smart city of Songdo is built around the Internet of Things to reduce traffic pollution, save energy and water, and create a cleaner environment.

However, there are challenges. First, there are uncertainties about the future of work. In the coming decades, the jobs of 785 million workers, that's equivalent to over 50 per cent of total employment in the Asia-Pacific region could be automated.

Second, despite the rapid penetration of the internet the world over, several billion have been left behind. As ICT infrastructure is the backbone of many frontier technologies, there is a risk of its triggering a new frontier technology divide, compounding an already existing digital divide.

Third, frontier technologies pose trust and ethical questions. There are risks of calibrating AI algorithms based on biased data that may yield biased AI learning outcomes. Government-owned satellites, telecommunications multinationals, social media start-ups, all have real-time information at their fingertips. In this information and data revolution age, open and big data movements of varying quality, combined with advancements in computing, machine learning and behavioural economics, fuel the advancement of frontier technologies. Technology per se is not the problem, but there are ethical issues surrounding privacy, ownership and transparency.

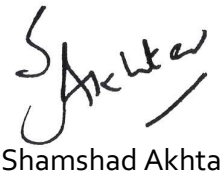
In this context, this report reviews the status of frontier technologies in the Asia-Pacific region. The report stresses that while there are question marks over the scale and pace of the frontier technological transition, it would be prudent for governments to be prepared, and to put effective policies in place.

The policy framework for the next generation of technology and innovation should focus on creating an enabling environment for frontier technologies to positively impact economy, society, and environment; and to reduce inequalities. A few prerequisites for the development and application of frontier technologies are:

1. An inclusive ICT infrastructure.
2. A workforce fit for the emerging scale and speed of the technological revolution. In this context, there is a need to promote lifelong learning, reskilling and entrepreneurship development to develop a cadre of job creators.
3. A responsive and adaptive regulatory framework that doesn't stifle innovation.
4. A private sector that pursues responsible frontier technology development to tackle social and environment concerns; and to strengthen the quality and sustainability of growth by creating "shared value" through a focus on corporate sustainability.
5. A catalysing role of government in frontier technologies' evolution.

Cross-government cooperation; inter-governmental knowledge sharing and consensus building; and honest, open and regular discussion with civil society and the private sector, specifically technology developers; will be critical to ensure that frontier technologies have a positive impact on sustainable development.

The impacts of our technologically-driven future are far from pre-ordained. However, frontier technological breakthroughs require us to think differently about how we have traditionally formulated technology policy. I hope the ideas presented in this report stimulate thinking for the development of a next generation technology policy framework fit for the Fourth Industrial Revolution Future that we face.



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