What is the Future of Frontier Tech for Development?

Frontier technologies continue to have huge potential for changing development work across the world for the better. New technologies create opportunities to approach long-standing development challenges in a different way. They can establish new markets, lay the foundation for novel solutions and underlie better, more efficient ways for development actors to operate. As previous technological developments have shown us, the new functionality of technology also brings significant risks. That's why we (the Frontier Tech Hub) are asking ourselves:

> *Between now and 2030, what are the most exciting frontier technologies from a development perspective and how might the next seven years of technological change impact the way we do development?*

From Existing Technologies to Emerging Technologies

The future is obviously unknowable. But we believe that by imagining and exploring potential futures, we will be better placed to develop strategies and take action to encourage the positive and avoid the negative.

We look at signals and drivers of change in the present, then project forward to speculate on where they might lead.

Frontier technologies are those that have the potential to reshape entire industries and disrupt existing systems. Back in 2016, DFID (Department for International Development), which is now part of FCDO (Foreign, Commonwealth and Development Office), commissioned a report titled *Ten Frontier Technologies for International Development* which identified these technologies as potentially transformative:

> *3D printing, Collaborative economy tools, Solar desalination, Atmospheric water condensers, Alternative internet delivery, IoT, Household-scale batteries, Smog reducing technologies, UAVs, Airships*

During this exploration, we're asking: *What are the emerging technologies that will be most transformational for development over the **next 7 years**?* And we're refining our scope to these areas:

- *Additive Manufacturing (3D printing)*
- *Artificial Intelligence*
- *Biotechnology*
- *Blockchain*
- *Drones (UAVs)*
- *Electronics (new physical technologies)*
- *Extended Reality (AR, VR, MR)*
- *Internet-of-Things (network of physical devices)*
- *Nanotechnology (for materials and devices)*
- *Photonics*
- *Robotics*

(ref. techDetector from GIZ)

Emerging Technologies for Existing Challenges

Development is the lens we use to look at these frontier technologies. As the focus of development shifts and evolves, we'll need to support and work with different technologies to meet our goals. Our primary focus is on existing challenges in development, framed by the current state of progress towards the UN Sustainable Development Goals.

We're particularly interested in the goals and targets that have seen a deteriorating or static trend over the last few years. Our exploration aims to include but isn't limited to these:

Deteriorating Trend

- Ensure access by all people to safe, nutritious and sufficient food all year round (Goal 2)
- End the epidemic of malaria (Goal 3)
- Increase diptheria-tetanus-pertussis vaccine coverage among 1-year-olds (Goal 3)
- Achieve full employment (Goal 8)
- Reduce the proportion of urban populations living in slums (Goal 11)
- Reduce global greenhouse gas emissions (Goal 13)
- Increase the proportion of fish stocks within biologically sustainable levels (Goal 14)
- Protect and prevent the extinction of threatened species (Goal 15)
- Increase the proportion of countries with independent national human rights institutions in compliance with the Paris Principles (Goal 15)

Stagnant Trend

- Eradicate extreme poverty for all people everywhere (Goal 1)
- Achieve universal access to safely managed drinking water services (Goal 6)
- Substantially increase the expenditure for scientific research and development as a proportion of GDP (Goal 9)
- Reduce the domestic material consumption per unit of GDP (Goal 12)
- Rationalise inefficient fossil-fuel subsidies per unit of GDP (Goal 12)
- Increase the coverage of protected areas in relation to marine Key Biodiversity Areas (Goal 14)

- Ensure the conservation, restoration and sustainable use of terrestrial ecosystems (Goal 15)
- Ensure the conservation, restoration and sustainable use of mountain ecosystems (Goal 15)
- Significantly reduce homicide rates (Goal 16)
- Reduce the proportion of unsentenced detainees (Goal 16)
- Increase proportion of countries with a national statistical plan that is fully funded (Goal 17)

In addition to this, we're also curious to explore how the evolving and emerging tech ecosystems will enable or block the work of international development.

Existing and Emerging Technologies for Emerging Challenges

Our secondary focus is on challenges that are emerging right now. We're curious about how both the development landscape and FCDO's priorities are changing in a way that may affect the application and demand for tech, (e.g. urbanisation, demographic changes, climate change, etc.)

Emerging trends that we're seeing are:

- *Geopolitics - the global balance of power shifting*
- *Climate change - increased extreme weather events, more climate refugees, and the need for tech innovation and global cooperation*
- *Demographic changes & Urbanisation - ageing populations in the West, the global shift from rural to urban, and a growing young population across Africa*
- *Stability - civil wars and conflicts increasing across the world*
- *Economics - interest rates and debt rising, and the potential for a 2008-style recession*
- *Poverty - increased during COVID, and is growing in fragile and conflict states*
- *Health and Human Setbacks - direct impacts and long-term effects of COVID*

What existing and emerging technologies do we need to harness to tackle these emerging challenges? And what do these emerging challenges mean for the tech ecosystem?

Over the next few months, we will be exploring and imagining potential futures in answer to these questions. We want to bring **you** into this process to:

- Share your knowledge of tech, development, and tech in development
- Meet new colleagues from across the FCDO and beyond
- Learn how 'futures methods' can help drive a deeper understanding of your work
- Get creative and collaborate with colleagues

- Get up-to-date knowledge on the future of frontier tech in development

About Futures & the Frontier Tech Hub

This initiative is part of Frontier Tech Futures, which in turn, forms part of the Frontier Technology Hub.

At the Hub, we are a team of strategists, technologists, and international development and innovation experts from the UK Foreign, Commonwealth & Development Office (FCDO), Results for Development, DT Global and Brink.

We know that the future is uncertain and technology is bringing about rapid change.

We believe that opening the door to questions about the future and exploring them as a team can foster the mindsets, relationships and knowledge to come up with bolder, more imaginative ideas to tackle the gnarliest problems of our time.

*Through **Futures**, we explore trends in frontier technologies.*

Through this multidisciplinary and cross-sectoral community, Futures fosters intentional networks that facilitate FCDO thought leadership, action and impact in each theme.

Like the rise of mobile technology and advances in AI, cryptography, and distributed systems to understand how they are transforming how we think about big themes.

We believe that these technologies have the potential to change our lives, and the context in which FCDO seeks to meet its objectives.