

What is the Future of Frontier Tech for Development?

Surface Phase • Initial Insights



Our focus

“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?”

we're moving

From Existing Technologies to
Emerging Technologies

and applying those

Emerging Technologies to
Existing Challenges

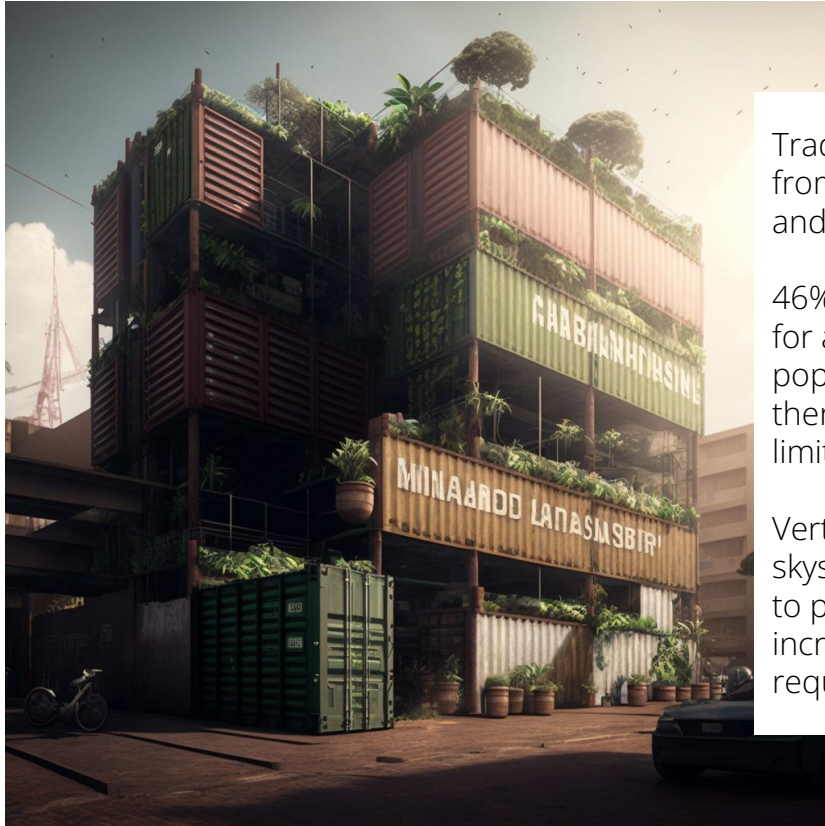
whilst keeping an eye out for how we can apply

Existing and Emerging Technologies to
Emerging Challenges



Initial Research



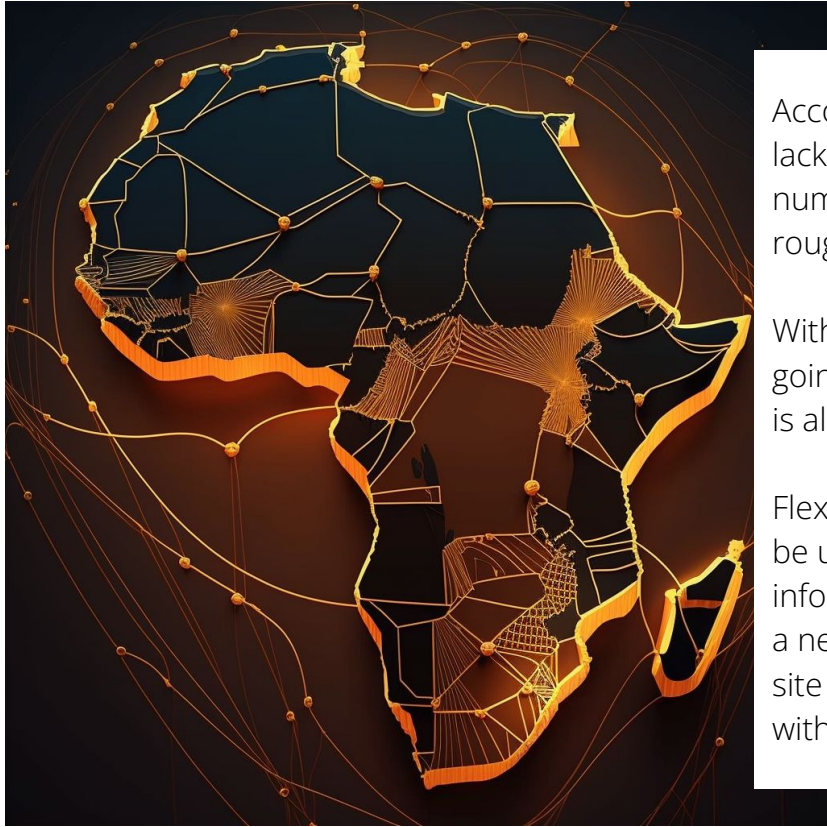


Traditional farming relies on long supply chains from farms to consumers, high volumes of water and significant areas of land.

46% of the world's habitable land is already used for agriculture (Our World in Data, 2019). With populations set to grow to 9.7 billion by 2050, there will be increasing demand for an already limited area of habitable land.

Vertical farms can be fitted into towers, skyscrapers and shipping containers within cities to produce food; using sensors and AI, increasing crop yields, proximity to users and requiring less water and carbon for transport.

Vertical farms

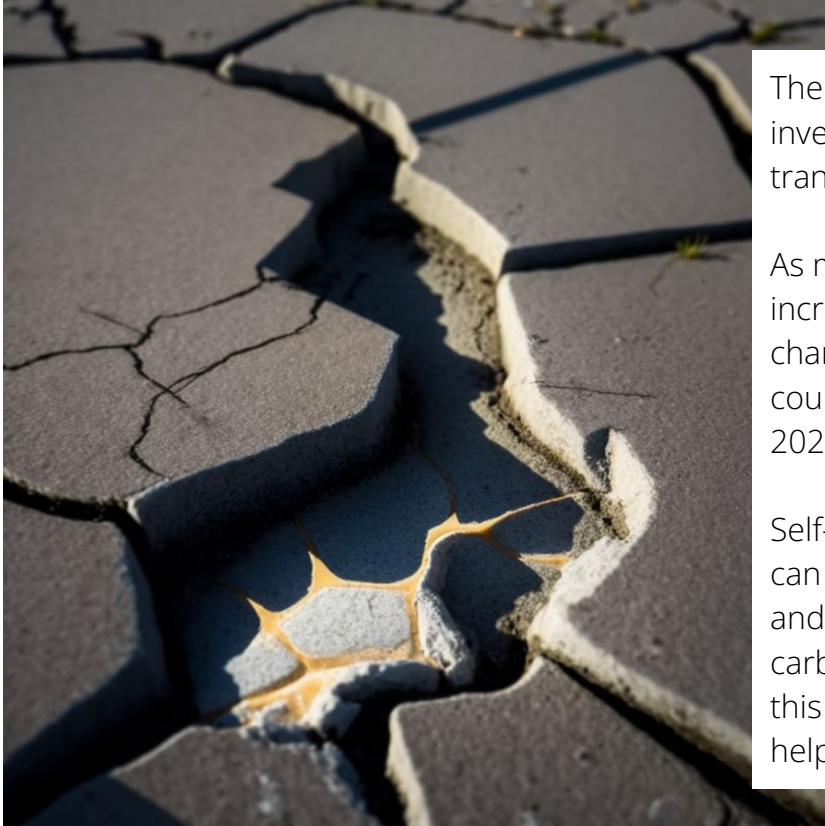


According to the world economic forum at least half the world lacks access to reliable healthcare, within sub-saharan Africa the number of people without access to any kind of healthcare is roughly 408.8 million.

With Africa's population expected to double by 2050, there is going to be increased demand for healthcare infrastructure that is already under significant strain.

Flexible skin patches packed with silicon-based biosensors can be used to gather data on people's vitals in real time, transferring information across wireless sensors to people's smartphones and a network of hospitals. This could greatly reduce the need for on site visits, and allow doctors to better monitor patients wellbeing without the need for point of care interaction.

Wireless skin patch sensors



The world could face a \$15tn infrastructure gap between planned investment in infrastructure and what's needed to support trade, transport and development (WEF, 2019)

As more people move into urban areas, there is going to be increased strain on cities infrastructure to support these changes. The number of people expected to live in urban areas could be 68% of the world population by 2050 (cleantech 100, 2021).

Self-healing concrete contains bacillus spores and starch. These can stay dormant in a concrete mixture until exposed to water and air (a crack appears), then they react to produce calcium carbonate which bonds to the concrete fixing the crack. Could this reduce the cost of infrastructure repair in growing cities, and help close the infrastructure gap?

Self-healing concrete

What trends are we seeing in the development of tech?

- **Exponential development of core technologies:** computing power (edge computing, quantum, decentralised networks), storage and bandwidth are underpinning rapid development of new technologies across multiple sectors (Deloitte, 2013).
- **Convergence of technologies:** increasingly we are seeing different technologies being used in combination. Complementary functions mean that technologies can be combined to overcome limitations associated with each independently.
- **Increased integration of digital life into physical reality:** increasingly tech such as VR/AR, Metaverse, sensors and IoT are being considered as tools to integrate the digital into the physical world.



What are the cross cutting enablers/barriers to the implementation of frontier tech in development?

Focal area	Enabler	Barrier
<i>Accountability</i>	Strong transparency and accountability build trust in technology companies and public institutions, greatly increasing the uptake of new technological solutions.	Without transparency or effective governance of data and information, users fear the potential threat of new technologies, slowing uptake and, in turn, technological progress.
<i>Cooperation</i>	Strong inter-governmental and inter-institutional relationships support an effective network of actors coordinating responses to crosscutting challenges to the implementation of emerging tech solutions.	Poor coordination between governments and institutions, leaves open gaps for bad actors to exploit. Technological bottlenecks remain and emerging solutions fail to achieve their impact.



<i>Systems and structures</i>	There is a high level of adaptive capacity in governments, strong local systems and effective infrastructure, building resilient systems.	A lack of adaptation, weak local systems and poor infrastructure, lead to highly vulnerable systems.
<i>Innovation enabling ecosystems</i>	Innovation ecosystems are enabled through prizes, a wide-range of finance options to support scaling and greater adoption of impact as a goal within the private sector.	Innovation ecosystems are restricted by a lack of coordinated funding to support scaling at different stages, impact isn't taken on as a goal for the private sector.
<i>Inequity</i>	Development of digital and physical infrastructure provides equal access to technologies, supported by strong education systems and an overcoming of structural bias, allowing everyone access to the benefits of new technologies.	Weak infrastructure prevents access to technologies, education systems fail to support people to develop skills needed to benefit from emerging opportunities and structural bias systematically restrict certain groups from accessing technology.
<i>Tech optimism</i>	Optimism about technology's potential impact is grounded in reality, and complemented by a recognition of the need for coordination between different actors.	Optimism about technology's potential impact leads to it being treated as a cure-all, ignoring the important work needed by different ecosystem actors to support its implementation.

Next steps



We'll combine this insight with desk research and publish preliminary findings



Then we'll build future scenarios



And share everything in a closing event & series of articles, graphics, and videos

