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ScienceTalk

From living on earth to living with earth

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About the writers

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Both writers are co-chairs of the SB7.0 Executive Committee.

NATURE'S NATURAL TECHNOLOGY

Living organisms harness energy, process information and make stuff astonishingly well.

Plants, for example, create a wealth of complex chemicals and materials starting from just water, sunlight and the earth's atmosphere.

Life's "smart technology" has been developing naturally for billions of years, and nature's examples are now informing and inspiring researchers and entrepreneurs everywhere. Fully mature biological technologies, at their best, promise to remake how the human race interacts with the rest of our planet, enabling us to transition from living on earth to living with earth. Stated differently, in a world increasingly threatened by environmental crises, energy woes and inequity, biology and biotechnology offer a chance to reinvent how civilisation works and to do so in ways that allow humans and nature to flourish together.

The advent of synthetic biology is chiefly driven by ambitions to confront some of the world's most pressing challenges, using biological solutions. Synthetic biology builds upon many decades of discovery and invention, including biotechnology, microbiology, biochemistry and molecular biology. Today, many products in our everyday lives are made from the chemical or petroleum industries, bringing with them the heavy burden of large environmental footprints. To move towards a greener and more sustainable future, synthetic biology taps into "nature's toolbox" to reprogramme living cells as "bio-factories" to produce valuable products from inexpensive renewable feedstocks, or non-traditional inputs such as food waste and other recyclables.

While excited about the potential for synthetic biology to unravel the scientific unknown and to tackle problems, scientists have acknowledged that, like other emerging technologies such as artificial intelligence, geoengineering or stem cell research, progress in science can spark ethical dilemmas and contribute to unforeseeable outcomes.

Such concerns can include accidental release of organisms into the environment, increased potential of possible deliberate misuse of biotechnology, or creation of commercial monopolies that exacerbate trade or societal injustice. Recognising a need for ethical debate, good governance and safe practices, the synthetic biology research community recurrently brings together individuals with policy, legal, ethical, business and social science expertise to identify areas of concern and to help develop a rational and balanced evaluation of the risks and benefits.

Having learnt lessons from past technological controversies, the research community and society at large must advocate governance and public engagement.

SINGAPORE'S EFFORTS

The Government of Singapore has indicated its desire to position the island as a biological design hub for synthetic biology. The National Research Foundation, together with the Economic Development Board, has seeded a fertile landscape for synthetic biology to take root.

Under the Research, Innovation and Enterprise 2020 plan, where Singapore hopes to "win the Future through Science and Technology", $19 billion has been committed to research, innovation and enterprise, cornerstones of the nation's strategy to develop a sustainable, knowledge-based, innovation-driven economy and society.

Recognising the global importance of sustainable industrial translation in synthetic biology, Singapore formed its national consortium on synthetic biology (SINERGY – SINgaporE consoRtium for synthetic bioloGY) to provide a platform to link the Singapore ecosystem for synthetic biology with the world. Working together, scientists, engineers and clinicians are creating impactful technologies.

It is most appropriate therefore that the next revolution of synthetic biology is addressed by the Seventh International Meeting on Synthetic Biology (SB7.0), to be held from Tuesday to Friday at the National University of Singapore.

As humanity progresses towards the future, societal advancement through sustainable technologies must be balanced with a profound understanding and respect between humans, the world we live in, and the planet's other inhabitants.

Harmony can be attained amid diversity, and in the face of myriad challenges in resource, ethics, intellectual and spiritual freedom, it is clear that synthetic biology represents the next revolution in realising the full utility of Nature's natural technology.