



Notes from the Edge



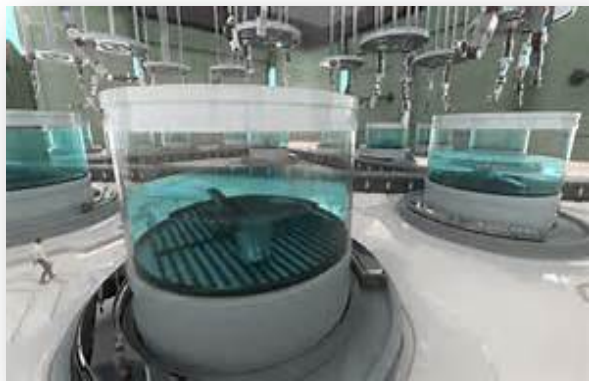
Insights into an Evolving Future

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FORECAST

Why We Need to Pick Up Alvin Toffler’s Torch. More than 40 years ago, Alvin Toffler warned that the accelerating pace of technological change would soon make us all sick. He coined the sickness “future shock”. This wasn’t simply a metaphor for our difficulties in dealing with new things; it was a real psychological malady, the “dizzying disorientation brought on by the premature arrival of the future.” “Unless intelligent steps are taken to combat it,” he warned, “millions of human beings will find themselves increasingly disoriented, progressively incompetent to deal rationally with their environments.” Since the mid-90s, futuring in the US government has ebbed while technological change has only continued to accelerate. The question is: will we continue to “risk rushing into tomorrow headlong without a plan”? ["Future Shock"](#)

What the World Will Look Like after Humans. Not that it would happen this way, or that we would even care (we’d all be gone), but the linked article walks through some of the things that would happen to the planet without human life. [Reclaimed by the Earth](#)

DEMOGRAPHICS AND ECONOMICS

Between now and 2024, the retirement age in the US is expected to creep beyond the age of 65, somewhat due to necessity, but also for pleasure and purpose. Employers are attempting to stay flexible in the workplace and with incentives for this older generation in order to harness their productivity. Studies have shown older workers stay longer, are more productive, and have better health when their work is appreciated. Interestingly enough, the largest of three groups to generate half of all consumer growth in the next 15 years are those over the age of 60 in the developed world. The other two largest groups to contribute are the working populations of China and North America (ages 15-59).

[As the Workforce Ages](#)

[Global Consumers to Watch](#)

ENERGY

The two articles below propose new ideas that could reduce fuel costs, environmental stress, supply line threats, and the Nation's dependency on outside energy suppliers by taking advantage of the environment around us. A new patented process for simultaneously extracting carbon dioxide and hydrogen from seawater could produce synthetic hydrocarbon fuels, reducing future dependency on in-theater fossil fuel availability and vulnerabilities that come with unprotected fuel delivery at sea. Another idea, though still in the proof-of-concept stage, is a 3D microbial fuel cell which shows great promise in producing an electrical current without an outside source demonstrating that microorganisms, instead of rare earth metals, might power future batteries.

[Seawater Carbon Capture](#)

[Microbial Fuel Cell](#)

TECHNOLOGY

Google Looks to Protect Today's Encryption From Future Quantum Computers. Many tech companies like Google, Microsoft, and IBM are working on with quantum computers, and while it comes with many benefits, one of those is also a potential threat - the potential to quickly decrypt current day encryption. In order to prevent this, Google is experimenting with new connections between Chrome (on desktop) and its servers that will use new post-quantum algorithm to prevent decryption of content. Google says that it is looking to test this feature in order to protect user data from not only extant threats, but also future threats posed by quantum computers. [Protecting the Encryption](#)

Artificial Intelligence. The implementation of artificial intelligence continues in the public and defense sectors. In the first link we present an article about an AI air combat simulator that has repeatedly bested human and other AI opponents even when it is deliberately handicapped in terms of speed, turning, missile capability, and sensors. In the second link, we present an article about a professor at Georgia Institute of Technology employing an AI as one of his teaching assistants answering students questions in a forum, reminding students of upcoming important dates over email—and all of this in a way that was so human, students never realized that they were talking to a robot.

[Flight Simulator that will Beat You](#)

[Do You Know the TA? \(if the WSJ won't load, try THIS\)](#)

The US Navy expects to have bomb-sniffing locusts within a year. Insects engineered to detect explosives sound like something out of a sci-fi movie, but they may become a reality for the US military. Last week, the US Office of Naval Research awarded researchers at the Washington University in St. Louis, Missouri \$750,000 over three years to alter locusts to remotely sense bombs and other explosive devices. Although dogs' noses remain the gold-standard for chemical detection technology, the advantage of using bugs is that they have a less complicated neurological system, making them easier to engineer and control. The surgery to modify locusts to be able to transmit sensory data is relatively simple. [The Locust Said What?](#)

Infographic: The Future of Autonomous Underwater Vehicles. While unmanned systems make headway in the air, on land, and on top of the sea, undersea systems still lag behind. Part of the problem is the fact that water absorbs electromagnetic waves which affects radio-based communications like GPS. Check out the infographic to see how autonomous underwater vehicles (AUVs) may overcome these problems in the coming years. [Autonomous Underwater Vehicles](#)

Scientists Look Into "Growing" Drones Using "Chemputer". BAE Systems has proposed "a radical new machine called a *Chemputer* that could enable advanced chemical processes to grow aircraft and some of their complex electronic systems, conceivably from a molecular level upwards." This new technology could allow the military to quickly develop UAVs specifically designed to meet whatever threat they are facing. It's still currently a concept at this point, but BAE Systems is known for bringing their ideas to life. [Growing the Drone](#)

This Swimming Stingray Robot Is Powered by Real, Living Rat Cells. "Roughly speaking, we made this thing with a pinch of rat cardiac cells, a pinch of breast implant, and a pinch of gold. That pretty much sums it up, except for the genetic engineering," says Kit Parker, the bio-engineer at Harvard who led the team that developed the strange robot. The robot is powered by the contraction of 200,000 genetically engineered rat heart-muscle cells grown on the underside of the bot. Even stranger, Parker's team developed the robot to follow bright pulses of light, allowing it to smoothly twist and turn through obstacle courses. Parker believes his robot, a machine built of living animal cells, forces a strange philosophical question: Is it alive? "I think we've got a biological life-form here," he says. "A machine, but a biological life form. I wouldn't call it an organism, because it can't reproduce, but it certainly is alive."

[Living Robot](#)

MEDICAL TECHNOLOGY

A little spark for sharper sight. Stimulating the visual cortex of the brain for 20 minutes with a mild electrical current can improve vision for about two hours, and those with worse vision see the most improvement, according to a Vanderbilt University study recently published in [Current Biology](#). How it works isn't entirely clear (pun intended), but the prevailing belief is that the current might simply be boosting the visual signals so certain neurons can process them more rapidly. It's also possible that the current essentially injects white noise into the visual system, drowning out extraneous information and enabling the brain to capture visual information more easily.

[Sharper Vision](#)

CRISPR: Transformative and Troubling. In the linked article, Notes from the Edge continues the discussion from last month's edition regarding the social, ethical, and political implications of continued work with CRISPR.

[To CRISPR or Not?](#)

ART OF THE FUTURE PROJECT

The Atlantic Council's *Art of the Future Project* (formerly *Art of Future Warfare*) seeks to cultivate a community of interest in works and ideas arising from the intersection of creativity and expectations about how emerging antagonists, disruptive technologies, and novel warfighting concepts may animate tomorrow's conflicts. The Project partnered with the Futures Assessment Division to host a Science Fiction Futures Workshop in which published authors Max Brooks (*World War Z*), Charles E. Gannon (*Caine Riordan* series), and August Cole (*Ghost Fleet*) worked with 18 talented science fiction writers from across the services, with the goal of bringing the [2015 MCSEF](#) future worlds to life. Look for the stories to be published in next month.



[Art of the Future Project](#)

This newsletter is intended to highlight issues and ideas which may prove significant in the evolving future. In keeping with our focus on both alternative futures and analysis, items in this bulletin will generally be of an alternative nature, or drawn from atypical sources.