

Notes from the Edge

Insights into an Evolving Future

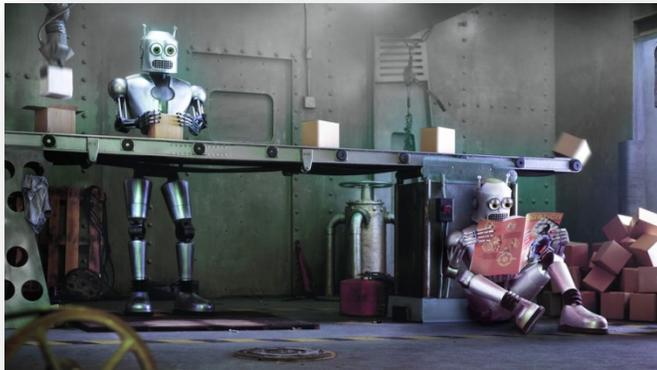


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FUTURE OF WORK

The Age of the Robot Worker Will Be Worse for Men. Two Oxford researchers analyzed skills required for over 700 different jobs to determine how they may be affected by automation. The results showed intelligent machines could take over 47% of today’s occupations; those traditionally performed by men are at a higher risk of being replaced. For instance, 95% of U.S. truck drivers are men whereas 93% of registered nurses are women. The former may be replaced by autonomous vehicles or delivery drones while the latter, with human care and judgment, is likely to be preserved.

Worse For Men

The Future of Work: With Us, or Against Us. The evolving impact of automation has created a Rashomon effect – contradictory interpretations of automation and its effect on society. Some argue that machine intelligence will replace all human labor while others say that automation and robotics will supplement the labor market and even create additional occupations. The construction and mining industries, for example, have paved the way for computerization efficiencies that are displacing human labor. Others however, are focusing on new possibilities. Cynthia Wagner, Managing Editor at *The Futurist*, presents a list of 70 jobs for 2030 including: robotician, space junk recycler, clone rancher, and avatar relationship manager. The Future of Work, a special project by Stanford University addresses such controversial changes in the workplace.

Work: With Us or Against Us Future of Construction

TECHNOLOGY

CERN is Creating the Spaceship Shields of the Future. CERN isn't content with just having the largest particle accelerator in the world. It has other projects on its horizon, like protecting future space travelers from deadly cosmic radiation. Cosmic rays are one of the gravest threats space agencies have to contend with for any future Mars exploration. Using giant superconducting magnets coiled within the body of the craft, the goal is to surround the craft with a magnetic field that prevents radiation exposure.

[Radiation Shields](#)

The Future of Rail Travel – and Why It Doesn't Look Like Hyperloop. As the world's population becomes increasingly urbanized, it is estimated that the number of journeys measured in passenger-kilometers will triple by 2050. Roads simply can't absorb this increase. Railways, with their capacity for carrying more people, quickly and with greater energy efficiency, are the best bet to become our mobility backbone. Of course, engineers' imaginations have created many alternatives to the original steel-on-steel approach to the railway. Maglev and the much-publicized but so far theoretical Hyperloop are often regarded as the ones to watch – but do they really represent the future of rail travel?

[Future of Rail Travel](#)

Ethics in the future of robotics. We present two articles about robotics with ethical programming. The first article addresses self-driving cars and the need to make split-second decisions that may risk occupants' safety over that of pedestrians or wildlife. The second article looks at the recent open letter by over 2,000 prominent science and technology luminaries calling for stopping of a weaponized artificial intelligence (AI) arms race. The third article below, based on an Army study conducted by the Institute for Defense Analysis, considers just how much involvement humans may have in future conflict.

[Ethical Self-Driving Cars](#)

[Ban Killer AI](#)

[War 2050: Robots Call the Shots](#)

How Industrial 3D Printing is Taking Off. The keys to the next generation of industrial additive manufacturing i.e., 3D printing, rely on technological improvements to the 3D printers themselves and the materials they utilize. Some industry participants have already started to produce items that are, in itself, end-use products, and have integrated 3D printing into their production processes. With materials advancing and with faster printing, mass production of customized products is now possible, a development which is likely to have a significant impact on major industries from tooling to aerospace.

[3-D Printing in Mass Production](#)

A World of Proliferated Drones: A Technology Primer. Associate Fellow at the Center for a New American Security, Kelley Saylor, examines the proliferation of drones to states, non-state actors, and individuals. The report, *A World of Proliferated Drones*, also outlines the various types of drones and what capabilities each enables, as well as the security implications – from cross-border operations to overmatch against U.S. forces – of a drone-saturated world. Understanding and anticipating the likely contours of a drone-saturated world will help the U.S. government take steps today to influence, as best it can, a future landscape that is favorable to American interests. In support of this objective, this report examines the challenges arising from this new strategic landscape and seeks to provide policy options that the U.S. and its allies and partners could adopt in the near term to successfully manage these challenges. The report examines and categorizes Unmanned Aerial Vehicles (UAVs) based on two

characteristics: (a) the degree to which they are accessible to any given actor; and (b) the technology base and infrastructure required to produce and/or operate them. Using this taxonomy, the paper identifies four categories of systems:

1. hobbyist drones
2. midsize military and commercial drones
3. large military-specific drones
4. stealth combat drones

Drone Primer

MED-TECH

The Power to Remake a Species. In 2013, some 200 million humans suffered from malaria, and an estimated 584,000 of them died, 90 percent in Africa. The vast majority of those killed were children under age five. Decades of research have fallen short of a vaccine for this scourge. A powerful new technique that allows scientists to selectively edit entire genomes could provide a solution, but it also poses risks—and ethical questions science is only beginning to address.

Genetic Manipulation

First FDA-Approved 3D-Printed Drug. In a move that marks a new milestone for 3D-printed drugs, the U.S. Food and Drug Administration (FDA) has approved the use of a new drug called Spritam - a rapid-dissolving 3D-printed tablet that is designed specifically for the treatment of epileptic seizures. Aprelia Pharmaceuticals Company's ZipDose tablets take quick-dissolve tablets to a whole new level. Rather than disintegrating in minutes like currently available drugs, Spritam dissolves in a matter of seconds - allowing it to enter the bloodstream of the patient much faster. By combining 3D-printing technology with a highly-prescribed epilepsy treatment, Spritam can fill a need for patients who struggle with their current medication experience. Use of innovative 3D printing technique can potentially transform the way patients experience taking medication by allowing pharmaceutical companies to make tablets with specific dosages that are tailored to each individual patient, making them ideal for children and adults who find it difficult to swallow large pills.

3-D Printed Drugs

CYBER

Heartbleed and Beyond: Marine Corps 'Cyber Range' Trains to Fight Off Hackers. To prepare troops for cyber operations which range from preparations for offensive actions to securing networks defensively against hacking threats like the Heartbleed security bug, a virtual training range has been developed for the Marine Corps at a cost of about \$9.1 million. According to Col Gregory T. Breazile, Director of the service's cyber and electronic warfare integration division and long-time *Notes from the Edge* subscriber, the cyber network is now the new battle space where it is critical to fight the enemy's weak points and exploit weak points to defeat your adversary. The range stands as an example of how the Pentagon is re-thinking cyber operations as hacking draws increasing attention as a national security risk. A new Defense Department cyber warfare plan, released in April, explicitly called for the Pentagon to develop the capability to use cyber operations to disrupt an adversary's command and control networks, military-related critical infrastructure and weapons capabilities when directed by the President. The evolution of cyber operations has led to the development of new doctrine for cyber

operations within the Marine Corps, and the establishment of a cyber task force to assess how best to organize and prepare for cyber attacks.

[Heartbleed and Beyond](#)

DefCon is on and your home and your car just became less secure. The 23rd annual [DefCon](#) Hackers conference met over the weekend in Las Vegas and one entrepreneur invented a tiny, \$32 device which captures the rolling security codes used by most automobile and garage door manufacturers and saves them for later use.

[Rolling Codes get Rolled](#)

RESOURCE COMPETITION

ISIS is Waging a 'Water War' in Southern Iraq. ISIS has successfully captured dams along the Euphrates River and cut off water supplies to several provinces in Iraq. The Euphrates River, a major source of water for 27 million people in Iraq, Syria, and Turkey, was already heavily taxed with a burgeoning population, overuse and pollution before the crisis. According to health officials, water shortages may also result in a cholera outbreak among residents due to a lack of drinking water. Another factor contributing to the lack of water in Iraq is Turkey, which draws water from the river, upstream. However, even if Turkey were to take less water, Iraqi officials fear the imminent threat of ISIS contaminating or mismanaging the water supply.

[ISIS Water Wars](#)

China, India and Water Across the Himalayas. The author emphasizes another resource conflict which deserves attention in addition to the South China Sea conflict. In the Himalayas, China and India are competing for hydropower and water resources on the Yarlung Tsangpo-Brahmaputra River which originates in Tibet, China before flowing through India. The conflict began on 11 June 2000, after a natural dam-burst in Tibet caused a flash flood that resulted in 30 fatalities and serious damage to infrastructure in the state of Arunachal Pradesh. The author opines that although a water war is unlikely, Sino-Indian water security issue warrants further. Indeed, the water dispute is an amalgamation of domestic issues of resource scarcity with international challenges of transboundary resource management and bilateral Sino-Indian relations. The author maintains that how these issues intersect will be important for the region and its future.

[China-India and Water](#)

Why Bananas as We Know Them Might Go Extinct. We take the simple banana for granted. The truth of the matter is that it's the world's largest fruit crop and fourth largest product grown overall, behind wheat, rice, and corn (for background, see the book [Banana](#), by Dan Koeppel). A fungus disease called Tropical Race 4 (TR4) is threatening the production of the most globally exported banana cultivar (species) – the Cavendish. A similar situation happened to the Gros Michel fifty years ago, leading to its commercial extinction as a result of the original Panama disease, before which it was also the most widely exported banana. The Cavendish was then chosen for its immunity against the disease, and cloned for mass export. Lacking in genetic diversity, the monoculture cultivar is now highly vulnerable to infection by the new strain of Panama disease – TR4. A small amount of contaminated dirt is enough for it to spread, and it can be transported by wind, cars, and water. TP4 already has a presence in South-east Asia, Australia, Africa and the Middle East. The disease is especially detrimental to Africa and parts of Asia, as bananas are a crucial source of food and income for more than 100 million people. In

addition, local banana varieties are also vulnerable, which greatly affect the local economy. Separately, Koeppel states, "As far as jobs are concerned, the banana industry is a massive employer in Latin America, and even the slightest disruptions in crop output could have major ripple effects (one thing we're almost certain to see as banana disease progresses is the movement of jobs from diseased regions—where industrial-scale banana growing will be increasingly difficult—to non-diseased regions, where uncontaminated soil can be found)." While there are no confirmed alternatives to the Cavendish, hybrids and GMOs are being considered.

[Bananas Might be Going Extinct](#)

The Next Great GMO Debate. Monsanto and other large agricultural biotech companies think they have hit on an alternative to conventional genetically modified organisms, or GMOs. Using a mechanism called RNA interference, these companies can already kill bugs by getting them to eat leaves coated with specially designed RNA. If the companies succeed in developing sprays that penetrate plant cells, as they are attempting to, it could block certain plant genes, too. Imagine a spray that causes tomatoes to taste better or helps plants survive a drought. What's certain is that a way to accomplish the goals of genetic engineering without having to develop a GMO could bring commercial rewards. Sprays might be quickly tailored to do battle with an insect infestation or a new type of virus. Not only could this be faster than creating new GM crops, but the gene-silencing effects of RNA interference last only a few days or weeks. That means you might spray on traits such as drought resistance in times of water shortage without affecting the plant's performance in times of normal rainfall. At Monsanto, the effort to develop an RNA spray to kill potato beetles could reach the market by 2020.

[The Next GMO Debate](#)

MARINE CORPS SECURITY ENVIRONMENT FORECAST

The 2015 ***Marine Corps Security Environment Forecast: Futures 2030-2045*** as announced in [MARADMIN 387/15](#) is open for public release and is available for download at the FAD website below:

[Futures Assessment Division](#)



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.