Notes from the Edge

Insights into an Evolving Future

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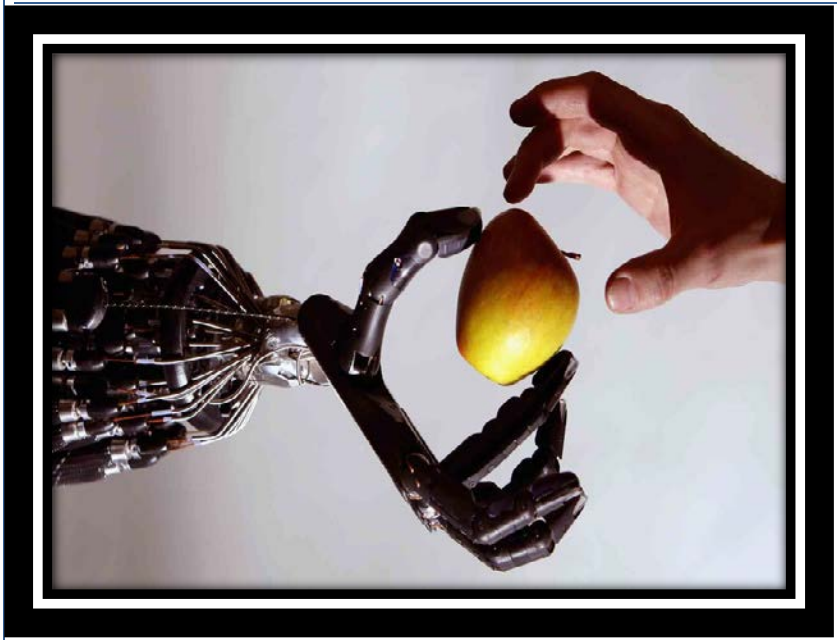

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ARTIFICIAL INTELLIGENCE

Neural Networks: Artificial Intelligence and Our Future. There has been much recent news interest in the future of Artificial Intelligence (AI), including an open letter signed by over 8000 AI researchers aimed at ensuring that AI research priorities are beneficial to society. The first article below discusses the distinctions between AI and Virtual Intelligence (VI), which stops short of learning or abstract thought.

The second article considers the fundamental discourse around AI which implicitly presupposes the superiority of human-evolved intelligence (EI), because human EI is implied to be "natural" and thus superior. Much of the dystopian hysteria around AI reflects the fear that it will act as humans act (violently, selfishly, emotionally, and at times irrationally) - only it will have more capacity. In essence, much of what we fear is a much more competent EI.

Neural Networks **AI and Human Intelligence**

CHANGING CHARACTER OF CONFLICT

How AI-Powered Robots will Protect the Soldier of Tomorrow. DARPA's "Squad X" program integrates several overlapping technologies, rather than a single product, into current systems to make them more effective. For example, the Android Tactical Assault Kit allows soldiers to chat and share video, maps, and other types of information in real-time with pilots and drones in the sky. It also includes a radio, a direction-finder, and a jammer.

DARPA's Squad X

An Infantry Squad for the 21st Century. This article speculates how future Human-Machine Teaming employment options may supplant current infantry tactics.

Infantry Squad for the 21st Century

From Strategy to Execution: Accelerating the Third Offset. Authors Joshua Pavluk and August Cole examine the "Third Offset Strategy" and how the Department of Defense can take steps to maintain the United States' current technological advantage into the future.

Accelerating the Third Offset

RESOURCE SCARCITY

Qatar University professor may have desalination breakthrough. There are two fundamental problems when it comes to turning seawater into potable water: First, desalination is an extremely energy-intensive process, and second, the remaining byproduct is a toxic brine which is usually dumped back into the sea. Professor Faris Benyahia may have a solution for the second problem. He has simplified a process used to produce sodium carbonate for industrial applications, in part, by aiming for sodium bicarbonate (baking soda) rather than sodium carbonate. His process is unusual in that it reduces the need for brine disposal by nearly 100 percent, ending up with sodium bicarbonate, calcium chloride, and an ammonia gas which is captured and re-used in the first step of the process.

Desalination Breakthrough

Scientists Accidentally Create Nanorods that Harvest Water from the Air. Researchers at Pacific Northwest National Laboratory unintentionally created carbon-rich nanorods which behave unusually with water, potentially paving the way to low-energy water harvesting systems and sweat-removing fabrics. Potential applications include a system to take in moisture from the air in a desert and then eject the collected water when a certain humidity level is reached, or as a membrane in clothing to remove sweat, convert it to vapor for expulsion outside.

Water Harvesting

The Future of Agriculture. Farming is extremely water-intensive. Largely driven by hydro-economics, farms that grow high-value, but thirsty, crops like pistachios, walnuts and grapes, are at the leading edge of precision agriculture known as "smart farming". But it is not only fruit and nut farmers who benefit from being precise. So-called row crops—the maize and soybeans that cover much of America's Midwest—are being teched-up, too. Sowing, watering, fertilizing and harvesting are all computer-controlled. Farms, then, are becoming more like factories: tightly controlled operations for turning out reliable products, immune as far as possible from the vagaries of nature. Precise genetic manipulation makes it possible to change a crop or stock animal's genome down to the level of a single genetic "letter", imitating the process of mutation on which crop breeding has always depended, but in a far more controllable way.

Future of Agriculture

ENVIRONMENTAL STRESS

Is The World's Population Very Slowly Backing Away from Dangerous Coasts? A study published in the Environmental Research Letters counters the predominant thinking regarding population growth near coastal areas. Coastal urbanization will continue, but the rate of growth *inland* will be greater as human populations become more evenly distributed away from the coasts.

Away from the Littorals (Article) **Link to the Study**

Measuring What Exactly Will Be Destroyed As New York's Sea Levels Rise. Sea levels along New York's coastline have risen about one foot since 1900. By the end of this century, they're predicted to rise another one to seven feet, according to a 2014 New York State report which echoes some of the findings of the Environmental Research Letters-published study above.
New York City at Risk

Cloud Seeding Drone Makes First Test Flight Over Nevada. Climate change will make some already-dry parts of the globe even drier, and cloud seeding—especially if it is cheap and easy to carry out with drones—could cause or exacerbate conflict in water-scarce areas.
Cloud Seeding

URBANIZATION

The Ideal Digital City. With urban areas continuing to grow at a substantial rate — from 30 percent of the world's population in 1930 to a projected 66 percent by 2050, according to the United Nations — getting the urban experience right has become paramount. To help understand the building blocks to a successful digital city, *The Digital Communities Special Report* looks at five key technologies — broadband, open data, geographic information systems (GIS), consumer relations management (CRM), and analytics — and provides a window into how they are helping city governments cope with economic, educational, and societal demands.
Digital City **Top 25 Cities for the Future**

TECHNOLOGY

35 Interfaces that Rocked the World. File this under "backcasting". Sometimes, it's worthwhile to look to the past to get innovative ideas for the future. The mouse. The ATM. The rotary phone. Throughout history, humans have evolved how they interact with the world, designing smarter ways to make living and working simpler and more efficient. These innovations have changed the world.
35 Human-Machine Interfaces

The Future of Risk. This special report discusses the revolutionary impact of three key emerging technologies (wearable tech, virtual reality, and autonomous vehicles) on the risk management profession of today. Safety officers, take note!
Future of Risk

Gene Editing Technique Could Transform Future. CRISPR - get to know this acronym. It's good to know the name of something that could change your future. Pronounced "crisper", it is a biological system for altering DNA. Known as gene editing, and as discussed the Future or Farming article above, this technology has the potential to change the lives of everyone and everything on the planet. CRISPR was co-discovered in 2012 by molecular biologist Professor Jennifer Doudna whose team at Berkeley, University of California was studying how bacteria defend themselves against viral infection. They are working on the theory that CRISPR might be used to boost the function of the body's T cells so that the immune system is better at recognizing and killing cancer. Further evidence, presented at the world's largest cancer conference in Chicago and discussed in the second linked article below, showed that revolutionary genetic testing of tumors can boost survival rates and avoid unnecessary treatments, shrinking tumors at six times the rate of conventional medicines. People treated with a personalized approach had an average of 5.7 months progression-free survival after treatment, which fell to 2.9 months in patients on standard treatment. Experts believe that thousands more cancer patients each year could be spared intravenous chemotherapy as a result of the advances in personalized medicines modified to suit each patient using simple DNA profiling.
CRISPR **Personalized Medicine**

ECONOMICS

5 Trends That Are Radically Reshaping Shopper Marketing. Technology itself isn't what's remarkable today; it's the speed at which new technologies are brought into daily use. Just a few years ago, things like SciFuture's *Holoroom* for Lowe's home improvement stores, or Neiman-Marcus's touchscreen mirrors would have seemed very much in the realm of science fiction. What could be in the future for the Marine Corps? How about a 3-D dressing room for 3-D printed, custom-fitted uniforms?

Marketing Trends

The Technology is Just a Shiny Shopfront; The Case against the Sharing Economy. At first glance, it's a utopian vision, which bypasses all the nastiness of Big Business. Yet author Tom Slee's book "*What's Yours is Mine: Against the Sharing Economy*" explains how 'sharing economy' companies have used feel-good rhetoric to mask business models which count themselves out of the rules and regulations that other companies are bound by.

Against the Sharing Economy

RECOMMENDED READINGS

Max Brooks on What to Read on Modern War. Author Max Brooks provides a solid, eclectic list of books about conflict. A great resource for expanding your library once you've completed the **2016 Commandant's Professional Reading List.**

Max Brooks Reading List

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. The results will be published in the coming months.

Art of the Future

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.