Notes from the Edge

Insights into an Evolving Future

VOL 5 – ISSUE 12 DECEMBER 2015

A Product of the ***Futures Assessment Division***

TABLE OF CONTENTS

SOCIAL

Is Facebook ruining the military? Does the low cost of impersonal communication mean we are in danger of losing the balance between person-to-person, close-knit verbal communication and the more impersonal type often occurring in social media? The author posits based on John Spencer's recount of an incident as a company commander in Iraq in 2008, interacting with soldiers who had returned from a patrol: "When I went back to talk to the soldiers who had been on the patrol, I was surprised to find them not grouped in conversations about what had happened, as I'd come to expect during my career in the military. Instead, they were sitting silently in front of computer screens, posting about their day on MySpace and Facebook." Combat is important enough to warrant worrying about a development that can reduce combat effectiveness. More broadly, however, this research has implications for a wide range of workplaces. **Social Media and the Military**

RESOURCE SCARCITY

Urban Hives Can Help Safeguard the Future of Food, Says a Scientist and Beekeeper. Nearly 100 fruit and vegetable crops would cease to exist without pollination by bees, yet 30 to 40 percent of hives cease to exist each year and bees continue to die en masse. Urbanization and urban beekeeping may be part of a critical solution since bees are proving to do well in cities. Honey production, an indicator of colony health, is greater among bees in Boston than those in the countryside. Green spaces and farmland on rooftops may be the future of cities to ensure accessible and affordable fruits and vegetables. **Bees Protect Our Food**

Nanoscientists develop safer, faster way to remove pollutants from water. A team of researchers at UCLA have found a new, cost- and energy-efficient way to use enzymes to remove pollutants from water. Enzymes were placed into nanoscale particles called "vaults," then deposited into polluted water. The vaults removed three times as much phenol from the water as the enzymes did when they were dropped in the water without the vaults. This new technique could be scaled up within a few years for commercial use in polluted lakes and rivers. **Removing Pollutants**

URBANIZATION

Can the Military Design a Disaster-Resilient City? The current "system of systems" approach to disaster-response planning piles up management practices for individual events —handling a blackout, managing event traffic, providing mass-casualty medical care, etc. — and generally produces, well, a big mess. The Defense Department wants to improve on that method. DARPA has announced a new research initiative into the ways important things can break at once. Called the Complex Adaptive System Composition and Design Environment, or CASCADE, the project is meant to help planners make cities, towns, bases, power grids, etc. less vulnerable to devastation. "CASCADE could help develop models that would provide civil authorities, first responders and assisting military commanders with the sequence and timing of critical actions they need to take for saving lives and restoring critical infrastructure. In the stress following a major disaster, models that could do that would be invaluable."

Disaster-Resilient City

Fresh Ideas for Future Cities. About half of the world's population lives in cities, rising to an expected three quarters, or 6.3 billion people, by 2050. Most of that growth will come from cities in China, India, the US, and sub-Saharan Africa. While well designed cities can bring economic development and prosperity, poorly developed cities lead to congestion and an overall decline in quality of life. The Shell Scenario team develops insight and ideas to meet future city challenges. The Future Cities website offers new concepts on ways cities can build future infrastructures and transportation systems. Shell has also partnered with several cities to help them explore new approaches to urban development.

Future Cities

TECHNOLOGY

The inventor of light-based 'Li-Fi' Internet has completed the first working prototype. Back in 2011, during a TED Talk in Scotland, professor Harald Haas introduced a revolutionary idea to the world: what if a wireless Internet system could run on nothing but an LED lightbulb? Back then, this "Li-Fi" concept was just a cool idea, but now, roughly four years later, professor Haas is back with a working prototype. If this invention catches on, all you'll need is a lightbulb and a solar cell to get online in the not-so-distant future. Li-Fi is much faster than most standard Wi-Fi connections, and, perhaps most importantly, provides a connection that is significantly more secure. Beyond the widespread Internet access that Li-Fi could help provide around the world, the technology also has applications for reliable systems like smart city networks and Internet of Things connectivity in the smart homes of the future.

Li-Fi Realized

New Substance Is Harder Than Diamond, Scientists Say. Until recently, diamond was the hardest known naturally occurring material. But a new physical process applied to carbon has uncovered a substance that a group of scientists say is even harder. It isn't known whether the substance exists in the natural world, but Jay Narayan, a researcher at North Carolina State University, suggested it could be present in the cores of planets. The discovery could have many applications, notably in the fields of medicine and industry. Mr. Narayan described possible uses for Q-carbon in creating synthetic body parts, improving tools like deep-water drills, and producing brighter, longer lasting screens for televisions and cellphones.

Tougher than Diamonds

The New Race to Dominate Outer Space: All Face 'Serious Growing Foreign Threat'. The author, writing for *Forbes*, postulates that anti-satellite (ASAT) testing in outer space is to be expected given the dual-use nature of space technology. However, the increasing openness of many governments around the world about acquiring such capabilities, albeit disturbing, signals an opportunity for them to avoid the deadly counter-space race that they are creating. Whether or not governments around the world will be able to avoid a counter-space race in the event that each power recognizes the other's efforts, the author ultimately posits that for every space power involved, the counter-space race is serious, growing, foreign, and a threat.
[*Do a Google search of the above title to bypass Forbes log-in requirements*]

Counter-space Race

Japanese Scientists Create Touchable Holograms. A group of Japanese scientists have created touchable holograms, three dimensional virtual objects that can be manipulated by human hand. Using femtosecond laser technology the researchers developed 'Fairy Lights', a system that can fire high frequency laser pulses that last one millionth of one billionth of a second. The pulses respond to human touch, so that - when interrupted - the hologram's pixels can be manipulated in mid-air. One of the leading researchers of the experiment, Dr. Yoichi Ochiai of Tsukuba University, believes this technology could be used for purposes including entertainment, medicine, and architecture. He says that the current state of light technology doesn't allow humans to proactively interact and feel light as matter, but the 'touchable hologram' has the potential to change that.

Hologram Anyone

8 Tech Trends to Watch in 2016. The author Amy Webb, futurist and tech columnist, used a six-part methodology to come up with her eight most important technology trends to note for 2016:

1. Algorithmic personality detection
2. Bots
3. Glitches
4. Backdoors
5. Blockchain
6. Drone lanes
7. Quantum computing
8. Augmented knowledge

2016 Tech Trends

HUMAN-MACHINE TEAMING

How Swarm Intelligence Could Save Us from the Dangers of AI. Artificial Swarm Intelligence is a method for building intelligent systems that keeps humans in the loop, merging the power of computational algorithms with the wisdom, creativity, and intuition of real people. Companies around the world are already studying swarms. "Swarm Intelligence" supports the notion that many minds are better than one. The approach to Artificial Swarm Intelligence is sometimes referred to as "blended intelligence" because it combines the hardware and software technologies used by AI systems with populations of real people, creating human-machine systems that have the potential of outsmarting both humans and pure-software AIs alike. But unlike "crowdsourcing", "swarming" employs real-time feedback loops to enable a unique intelligent system to emerge, allowing the group to think together and draw conclusions based upon their combined knowledge and intuition.

Swarm Intelligence

MEDICAL TECHNOLOGY

Engineered bat virus stirs debate over risky research. Scientists have investigated a virus called SHC014, which is found in horseshoe bats in China, by creating a virus made up of a surface protein of SHC014 and the backbone of a SARS virus. The virus infected human airway cells, proving that the surface protein of SCH014 is capable of binding to key receptors on the cells and infect them. This research has opened up the debate of whether or not to allow lab research involving hazardous pathogens that "grow remarkably well" in human cells and are spread easily. SCH014 was previously

identified as a virus unable to infect human cells; this latest research however, demonstrates that the virus has been able to overcome critical barriers to infect human airway cells.

Bats: The Big Bug Scourge of the Skies

PTSD prediction tool driving new Geisinger study. Genetic factors increase the chances for the development of PTSD. "Generally we've found that individuals with 'at risk' genes are more likely to develop PTSD, depression and substance abuse especially when associated with a higher exposure to traumatic events or greater exposure to childhood adversity," said Joseph Boscarino, senior scientist for Geisinger Center for Health Research. A new Geisinger study seeks to identify the specific genetic factors that place individuals at a higher risk of developing post-discharge conditions.

PTSD Prediction Tool

Learn How to Make Body Parts. The University of Wollongong's Australian Institute for Innovative Materials has launched a month-long online course to educate students on science and material engineering degrees and on the university's newly launched bio-fabrication postgraduate program. The course will include sessions on printing personalized titanium hip implants using laser melting and made-to-fit masks for facial transplants. "This emerging field of bio-fabrication is being made possible through connections between medicine and technology and we are now seeing previously unimaginable developments, such as prosthetic limbs controlled by thought alone, and bionic implants to restore lost senses, and of course, [the] 3D printing of human organs," Professor Wallace says.

Bio-fabrication

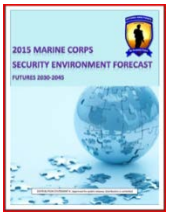
CYBER

The Role of Big Data in Medicine. According to Dr. Eric Schadt, founding director of the Icahn Institute for Genomics and Multiscale Biology at New York's Mount Sinai Health System, big data in medicine has the potential to build better health profiles and better predictive models around individual patients, thereby improving diagnoses and disease treatments. Dr. Schadt estimates that in five to ten years, more accurate information about your health will exist outside the health system than inside, as patients will be partners in the new model of medicine, with data being passively collected. To Dr. Schadt, teaching others how to benefit from that information remains a key challenge to big data and predictive models. **Bright Side of Wearables**

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:

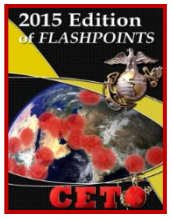
Futures Assessment Division



FLASHPOINTS 2015

The 2015 edition of Flashpoints provides the results of our most recent analysis of factors associated with a nation's risk for conflict. It provides an updated ranking for the 159 nations included in the study based on each nation's potential to experience future conflict or instability. This is the tenth annual edition.

CETO - Flashpoints 2015



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.