

OCTOBER 2013

# TRENDEVENTS

Welcome to the October issue of **TrendEvents**. This month's theme is Healthcare (p. 5). A big thanks to Ron Miller for contributing most of the reviews for this issue while the Editor was preoccupied with US government shutdown issues.

## ECONOMICS—Economy Cooling in Canada, Financial Warfare

- **Canada's Economic Engine Running Out of Gas**

*(Globe and Mail, September 29, 2013)*

The Canadian economy only grew at 0.5 percent in July (most recent data available), potentially leading a weak quarter to an estimated 1% growth. “The broader challenge for the Canadian economy is that there is no clear engine of growth. The once-hot resource sector has cooled, the housing boom is stalling and record high debt levels are likely to hold back consumers in the months ahead.”

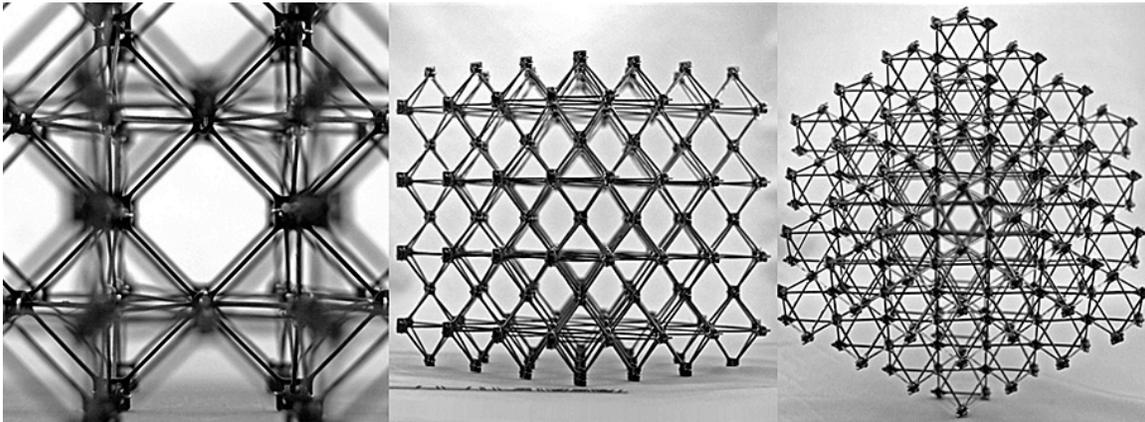
- **Financial Warfare**

*(New York Times Business Book Review by Bryan Burrough as reprinted in the Oregonian: “Treasury turns ‘weapon’ on U.S. foes”)*

A portion of the Patriot Act passed under the Bush Administration under section 311 allows the Treasury Department to designate any bank in the world as a “primary money-laundering concern.” In today's financial world every bank wants to deal with every other bank and with all other countries. New York and the U.S. dollar remain of paramount importance. In Zarate's book (*Treasury's War*) he gave examples of the genius of how hitting a bank with a 311 financial “scarlet letter” can turn the bank into an overnight pariah. Several banks have been all but destroyed. Nations have been forced to strengthen their money laundering laws just by the threat of the 311.

The new geopolitics game may be different when played with commercial weapons but it is no less ruthless.

## SCIENCE & TECHNOLOGY—New Materials and Capabilities



Assemblies of the cellular composite material are seen from different perspectives, showing the repeating "cuboct" lattice structure, made from many identical flat cross-shaped pieces. Photo courtesy of Kenneth Cheung via MIT News

- **New Material**

(*MIT News*, August 15, 2013, see also *Science News*, Sept. 21, 2013)

A carbon-fiber skeleton of Tinkertoy-like building blocks is ten times as stiff as structures of similar densities. And because the framework is made of mostly identical pieces, broken parts can be swapped out for new ones, its inventors report in the August 16 *Science*. The new design could one day form light, stiff, easy-to-repair frameworks for airplanes, bicycles, bridges and even buildings.

For years, fancy bicycles and luxury cars have used glued-together carbon fibers, called composites, to trim weight from their frames without compromising strength. Now, manufacturers are starting to craft huge sections of airplanes in single swaths of the lightweight materials. Fewer parts means fewer joints, which tend to be heavy and tricky to fix. MIT materials engineer Kenneth Cheung and his lab leader, Neil Gershenfeld, came up with a wild idea: What if they could 3-D print an entire airplane in one gigantic piece.

Though a giant piece of composite has fewer joints, it can be hard to repair, Cheung says. When composites break, they break big-time. A wallop violent enough to crack a composite part in one place has a domino effect. The energy of the crash rebounds through the part, busting it in multiple places.

The structures don't come close to rivaling the strength and stiffness of denser materials, says James Tour, a materials chemist at Rice University in Houston. But they're incredibly light-weight, and for cars, planes and spacecraft, he says, "weight is a huge, huge concern."

In an airplane, this type of design could let pilots maneuver their crafts by flexing the wings instead of lifting and lowering flaps. In September, Cheung will join NASA in a project to craft lattices for structures in space.

- **3-D Printer Capabilities**

(*MIT Technology Review*; September-October 2013 pg. 24, pg. 104)

Manufacturing capabilities of 3-D printers are reaching areas that are unattainable by any other method. At Princeton University Michael McAlpine and members of his lab recently reported that a 3-D printer could build a bionic ear capable of detecting frequencies a million times higher than the normal range of hearing, showing how seamlessly electronics and biological tissues can be constructed in the same part.

This could show the way to the production of human organs with built in electronics that could monitor the body's functions. The ear was built layer-by-layer alternating between three "inks": a mix of bovine cartilage-forming cells suspended in a thick goo of hydrogel; silicone, to encase the cochlea-shaped electrodes; and a suspension of silver nanoparticles. The silver nanoparticles are packed tightly so that the cochlea-shaped coil can conduct electricity.

Harvard researchers have unveiled what they say is the first 3-D printed battery made from different electrode "inks". The "inks" contained nanoparticles of lithium titanium dioxide and lithium titanium phosphate, respectively. The specialized equipment uses nozzles that can print features as small as a micrometer.

3-D printers are now capable of printing parts out of completely different materials in different areas of the same part depending on what that area is required to do. Parts can be made completely hollow with the thickness only needed to carry the specific stresses required of that area of the part. 3-D printing also produces no waste.

## GOVERNMENT DYSFUNCTION!

### FROM THE FRONT LINES OF THE SHUTDOWN

By Mark Ciotola

On October 1, 2013 the U.S. Federal Government shut down due to a protest by conservative "Tea Party" congressional members over implementation of the Affordable Healthcare Act (also known as Obamacare). I had a front row seat to the Federal shutdown, since I work and live at the NASA Research Park in California.

Republican leaders, including "Tea Party" Senator Ted Cruz, assured the American public that there would not be a government shutdown, literally right until that last

minute. So when the order came to shutdown on the morning of October 1<sup>st</sup>, we only had a few hours to react.

It was extremely difficult to turn “off” a complex technical and scientific establishment on such short notice. There are experiments, many of which run for months. There are enormous arcjets that take days to cool. NASA barely kept the space station and a few space missions in survival mode. A launch window was nearly missed and a lunar craft nearly lost. Only 3% of NASA workers were considered to be necessary for the immediate protection of life and government property.

Many of us were temporarily homeless. Interns, soldiers, police, clerical workers and scientists were all kicked out of base housing (which is run-down surplus military housing for which we pay roughly market rent but which allows us to be close by for late night lab work and during those 100 hour work weeks). Intern supervisors were literally running refugee camps. I myself had to move from motel to motel. NASA lost a fortune in rent. The government ended up paying workers for over two weeks that they were stuck sitting at home. It is estimated that the entire US government lost \$24 billion (a loss of about \$100 per US resident, or about \$350/family of four). I think the real costs will be higher. People will demand more interest when purchasing US bonds and will charge more for doing business with the USA in the future. When the Tea Party claims that the US government is broken, they are correct, because they themselves broke it.

Technocracy, Inc. has predicted these sorts of crises. The rapidly increasing Federal debt is a result of the Price System phenomena rigorously documented in Technocracy’s *Manhours and Distribution* report. While Republican leaders once again assure us that there will not be another shutdown, do you really believe them when the Price System maintains its largely unrestrained death grip on the US government?

Disclaimer: the author neither speaks for nor represents National Aeronautics and Space Administration (NASA).

## EDUCATION

- **Common Core Education**

(Betsy Hammond, “A new school year, and a higher bar”, *The Oregonian*, Sept. 1, 2013)

Common Core Standards were generated at the behest of the State Governors Association by the Council of Chief State School Officers. Studies have shown that states had completely different curricula, with most of them rather low performing. Forty five U.S. states have now adopted this standard for their school systems. The standards were developed by researchers and academic experts then vetted by teachers, college professors and curriculum officials. The intent was to give students

the necessary background to perform well when moving into college or going to work in any chosen field.

Oregon, as have other states, has instituted a policy of grading students strictly to demonstrate their ability to do the required work. It was felt that both students and parents needed to know just where they stood. Common core standards have been established for most subjects in all grades and the bar has been raised. Teachers required instruction in implementation of the new standards. Instructional materials have run into financial roadblocks but most states are doing their best with what they have. As an example, students are going to be required to write a great deal more non-fiction, taking positions and defending them with logic supported by data backed up with the source of the data.

Most teachers appear enthusiastic, but many parents had never heard of common core and confusions had to be cleared up. At first the program was attacked by both the right and left. The Tea Party said it was a plot by the Federal Government to take control of the schools from local school boards. Such objections now appear to be fading into the background.

Some of the first results are in for Oregon and the grade levels of students are dropping. Every state has its own plan for implementation so some rough patches are no surprise. A great deal more is being required of students. The amount of testing is less than under the “no child left behind” plan. With this plan a student moving from one state to another will find it much easier to pick up where he left off.

## ECONOMICS, ENERGY & RESOURCE DATA DASHBOARD

- **US Federal Spending, Debt Rising**

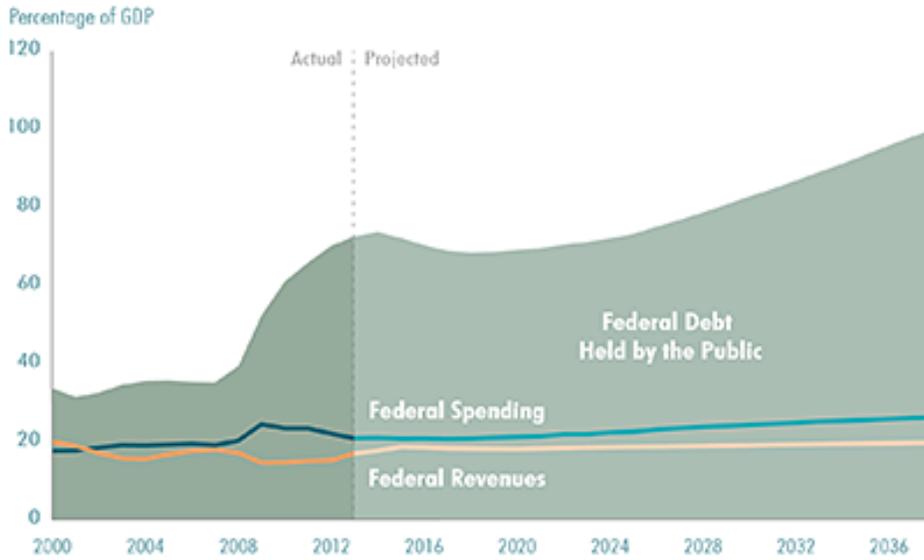
(U.S. Congressional Budget Office, *2013 Longterm Budget Outlook*)

Federal debt held by the public is now about 73 percent of the economy’s annual output, or gross domestic product (GDP), a higher percentage than at any other point in U.S. history except a brief period around World War II. That is twice the percentage it was at the end of 2007.

CBO projects that by 2038, “federal spending would increase to 26 percent of GDP under the assumptions of the extended baseline, compared with 22 percent in 2012 and an average of 20 ½ percent over the past 40 years.” Not surprisingly, this deficit spending will lead to a tremendous and unsustainable growth of government debt, which will provide a drag on the economy and eventually lead to economic crisis.

(Please see charts on next page.)

### Federal Debt, Spending, and Revenues Under CBO's Extended Baseline



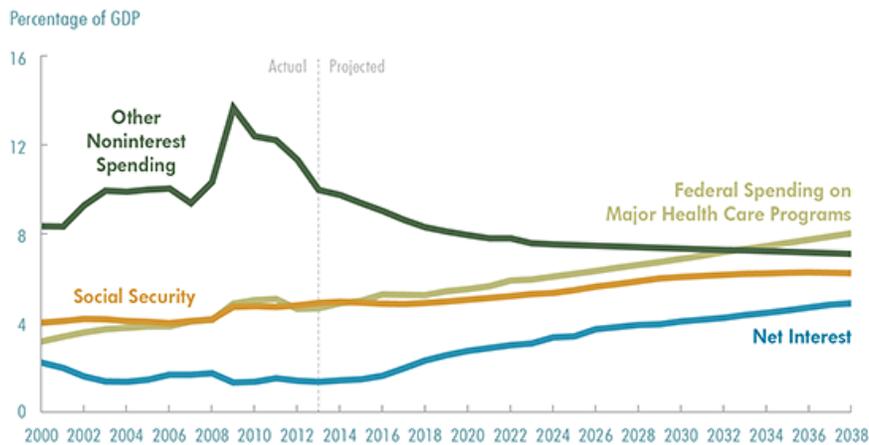
Source: U.S. Congressional Budget Office

- Federal Healthcare Spending Increasing**

(U.S. Congressional Budget Office, 2013 Longterm Budget Outlook)

Federal spending for the major health care programs and Social Security will increase to a total of 14 percent of GDP by 2038. This will be twice the 7 percent average of the past 40 years.

### Components of Total Spending Under CBO's Extended Baseline



Source: Congressional Budget Office

# FOCUS ON HEALTHCARE

## SKYROCKETING HEALTHCARE COSTS DESTROYING ECONOMY AND QUALITY OF LIFE

In a Technate, “Health-care would be unhindered instead of in the hands of people who would like to help you, but who must remember their role of predator along with their professional role.” (John Darvill, “Let’s Talk About Solutions”, *The Northwest Technocrat*, 4th quarter 1990, No. 321.)

Unfortunately, we do not yet live in a Technate, and regarding healthcare, the USA is even further from a technate than Canada. The US Federal government was shutdown most of October due to disagreements over how healthcare should be financed and distributed. In recent years, health insurance costs for individuals have been doubling about every 30 months, and growing nearly as quickly for employees. Due to such high costs, many people go without healthcare.

- **Using Canada's Health System as a Model Might Cut U.S. Costs; But Canadian cost-control measures won't translate to U.S., expert says**  
(*Healthday*, October 30, 2012)

According to a 2012 study, “Since 1980, health care costs in the United States could have been about \$2.15 trillion less if Canadian cost-saving measures had been used.” In fact, “over the same period, health care spending in the United States grew nearly three times faster than in Canada's Medicare program.” Yet you get what you pay for, right? Not necessarily. “Canadians' life expectancy is longer than in the United State...Access to care is better in Canada.”

Why are costs higher in the USA? The article cites many reasons. “In the U.S. administrative costs are about 31 percent of health care costs and it's about 16 percent in Canada...Also, the Canadian government negotiates drug prices to get the lowest cost, while the U.S. government is prohibited by law from negotiating drug costs for Medicare patients.” Also, “Health care in other countries is a social service.” While “in the United States, it's big business.”

Things are not perfect in Canada either. “One criticism of the Canadian system is that people have to wait for care.” And although “after adjusting for inflation, U.S. Medicare spending rose almost 200 percent from 1980 to 2009, Canada's still rose 73 percent,” a still very substantial amount.

Editor’s Note: While the Price system profits from illness and poor health, and thus has an incentive to distort healthcare, a Technate would have an incentive to keep people healthy and avoid unnecessary medical work. A technate would reduce medical “costs” by using the best practices and technologies. The following articles give an example of what the future might bring.

- **Healthy Diet**

(*Today.com*, Healthy Diet May Reverse Aging Study Finds, September 17, 2013.)

A program of healthy eating, exercise and stress reduction can not only reverse some diseases—it may actually slow down the aging process at the genetic level, researchers reported.

The lifestyle changes affected the telomeres—little caps on the end of the chromosomes that carry the DNA, the team at the University of California, San Francisco report.

The report is based on just a few prostate cancer patients. The men who switched to a vegan diet, added exercise and stress reduction had longer telomeres. Dr. Dean Ornish, who has long researched the role of a very low fat, vegetarian diet in improving health worked with telomere expert Dr. Elizabeth Blackburn who won the Nobel Prize for her work in 2009.

“Taken as a whole, this is really the first study showing that any intervention may reduce cellular aging.” Ornish told NBC news. “I think these findings are not restricted to men with prostate cancer.” Ornish’s diet plan has been shown to reverse heart disease, diabetes and may help keep early prostate cancer in check.

“We found that telomerase increased by 30 percent in just three months,” Ornish said. Telomerase is an enzyme that affects telomeres. “Gene expression on 500 genes changed, in every case in a beneficial way.”

- **New Organs**

(*New Scientist*, “Rebuild your body”, September 14, 2013)

In the body it is known as the extracellular matrix—the stuff that remains if you strip away the living cells from, say, a blood vessel, an organ or a bit of skin. This scaffolding gives the various parts of our body their detailed shape and solidity. And that’s all we used to think it did. “Everyone thought the matrix just holds things together”, says Steven Badylak, a regenerative medicine researcher at the University of Pittsburgh in Pennsylvania who has been one of the early pioneers of matrix-based therapies. Researchers had long tried to enlist it to regrow organs, believing only that it was a useful scaffold.

But a few years ago, it became clear that the matrix does a lot more than it appears. “Now we recognize that its structure is secondary,” says Badylak. “It’s got loads of functional roles.” While it consists mainly of inanimate structural proteins such as collagen and elastin, it also contains proteins that coax the right cells to be in the right place at the right time.

With the right cells, the matrix coaxes them to turn into bone, muscle or fat cells according to the tension they are held. Finally the matrix also has what is required to nourish them.

Harald Ott of Massachusetts General Hospital in Boston built the world's first functioning artificial kidney. Ott was astonished to find that although he fed only two types of cells into a decellularised kidney matrix—blood-like stem cells into the blood vessels, and endothelial cells into the plumbing that filters the blood – all the different kinds of cells formed in the sites where they were supposed to.

The kidneys worked so well in rats that Ott is now using similar techniques to develop hearts, lungs and pancreases. “We are working on livers, hearts, kidneys, oesophaguses, larynxes and small intestines,” says Sumitrsan-Holgersson.

- **Superbugs**

(*New Scientist*, “Rebuild your body”, September 14, 2013)

More than two million people are infected by drug-resistant germs every year, and 23,000 die of their infections, federal health officials reported Monday. Doctors have been warning about the problem for decades, yet up to half of the prescriptions for antibiotics are unnecessary. The heavy use of antibiotics has produced diseases that are immune to antibiotics.

The most immediate problem is in hospitals, Dr. Tom Frieden says, but there are also problems when people don't finish taking their prescribed course of antibiotics and the heavy use of antibiotics in farm animals that aren't sick.

“We are trying to sound the alarm on these bugs that we call urgent,” Dr. Steve Solomon told NBC news. “These are particularly frightening.” “If we are not careful, the medicine chest will be empty when we go there to look for a lifesaving antibiotic for somebody who has a deadly infection,” CDC director Dr. Tom Frieden told reporters in a telephone briefing.

Bacteria develop resistance to drugs quickly. Even before penicillin was introduced in 1943, staphylococcus germs were identified that were resistant to its effects. Just nine years after tetracycline was introduced in 1950, a resistant strain of Shigella evolved. Methicillin resistant Staphylococcus aureas (MRSA) evolved just two years later in 1960. The last new antibiotic to be introduced was ceftaroline, in 2010. It took just a year for the first staph germ to emerge that resisted its effects.

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