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The Former USSR

By Daniel Burrus

I'm writing this month's article as I fly back after presenting a speech in Moscow, and then traveling on to St. Petersburg. If you have not traveled to either of these cities, you might think that, because they were part of the communist "evil empire" as former president Ronald Reagan once called them, they would be far behind the United States in just about everything. Think again!

First, it is good to understand that the Russian education system is very good, the population has a very high literacy rate, and it is well known that they are exceptionally good in science and math education. Second, they are getting very good at understanding and speaking English. Ninety percent of the audience I spoke to – CEOs from all over the country who ran both large, medium and small companies – spoke English. In addition, I was very impressed with the number of street vendors and lay people who also spoke English. I found the same to be true in both Moscow and St. Petersburg.

The English Advantage

This fact is important because English is the universal, global language of business. We are outsourcing jobs to India because they speak English, although some people are much better at it than others. The Chinese government knows the importance of English and has taken major private initiatives to help train its people quickly. The fastest ticket out of the rice paddies is to speak English. As English becomes more prevalent in Russian society, the combination of a solid K-12 educational system and a good comprehension of both math and science will make Russia a very attractive place for American companies to outsource a much wider variety of technical work.

The Oil Bonanza

Since the price of oil has been high, Russia has been bringing in billions of additional dollars, and now the government has the opportunity of deciding where best to spend or invest this new wealth. The Russian economy is very dependent on oil. The key to their prosperous future is to diversify its economy and not put "all of its eggs in one basket." In addition to planned diversification, it would be wise for Russia to spend some of its newfound wealth on infrastructure (roads and bridges) and infostructure (broadband Internet connections). This would lay the foundation for a new, diversified economy.

Infostructure

While I was in both Moscow and St. Petersburg, I had access to a broadband Internet connection at both hotels. I was also told that cafes and restaurants are starting to offer WiFi Internet connections. One of the ways Russia can spread broadband connectivity quickly will be to use wireless technology, bypassing the time and expense of laying cable and fiber. A new technology I have written about in the past, WiMax, will most likely help them accomplish this task. The wireless technology is similar to WiFi except that it has a much larger range (30 miles), which makes it ideal for quickly setting up broadband networks that cover large areas.

Popular Culture

In Moscow and St. Petersburg, both live and recorded music outlets played many classic U.S. rock, blues and jazz favorites. All the big brand names, such as Nike and Rolex, were everywhere, and in many cases they had models that we haven't seen yet. In general, I would say that fashion was a step ahead of the U.S. Everyone I talked with was up on the latest "global" news, including the U.S. presidential race. Not just general information. They knew the issues and the details. Even when I would walk into a small store, the shopkeeper knew the latest news. **(Continued on page 2)**

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When I asked how they kept up, they would either show me a television set in the back room that had “global” news broadcasts, or show me a computer hooked up to the Internet. It might have been a slow connection, but they were connected. Is the former USSR behind? In many ways, yes; in terms of infrastructure, infostructure and needed reforms, such as the right for individuals to own their own land. However, in some important ways, such as science and technology education, they are ahead of us.

There is a global economic race taking place, but I’m not sure if we’ve heard the starting gun! India, China, South Korea, Singapore, Russia and many others are hoping we don’t notice that the race is on. How can you profit from this global economic race? If you expand your reading to publications like *The Asian Wall Street Journal*, *The London Financial Times*, and *The South China News*, all available in English, you will discover amazing new opportunities.

TECHNOLOGY NEWS HIGHLIGHTS**LANGUAGE TRANSLATION ON YOUR CELL PHONE OR PDA**

In today's global economy, the ability to break through language barriers is key to effective collaboration. Now a new system that combines wireless text messaging and email with state-of-the-art machine translation offers real-time multilingual communications in sixteen languages. For a monthly fee, software can be installed on PDAs, smart phones, or computers allowing you to upload international emails and/or text messages to a server. The information is automatically translated using dictionaries that are tailored to your line of business, such as financial, legal, health care, or government. In just a few seconds, you receive the translated text.

For information: Transclick Inc., Dag Hammarskjold Tower, 240 East 47th Street, Suite 15-C, New York, NY 10017; phone: 212-751-5150; Web site: www.transclick.com

POCKET-SIZED PROJECTOR

Sometime soon, consumers will be able to purchase a new product that combines the convenience of a handheld device with a display as big as a laptop. The key is to use projection to expand an image to be larger than the device itself. But how can you amplify an image to several times its actual size while maintaining adequate brightness and sharpness? The secret is in the LEDs, and several companies are currently working on miniaturizing their components to achieve just that. One such prototype is about the size of a pocket camera and is capable of projecting an image onto any white surface that is the same size and brightness as a typical laptop screen. The first pocket projectors to become commercially available will likely be stand-alone accessories and are due to hit the market in the next three years. Ultimately, however, you will see projection capabilities built right into handheld devices such as camera phones.

For information: Lumileds Lighting, LLC, 370 West Trimble Rd., San Jose, CA 95131; phone: 408-435-6111; Web site: www.lumileds.com

ROBOT ROAMS FOR FIVE DAYS, AFTER EATING EIGHT FLIES

Robotics experts at the University of West England have made great strides toward developing "release and forget" robots for remote and industrial monitoring. The trick has been finding a way for the robot to generate its own power, without human intervention. Their solution? The EcoBotII, a robot that derives its energy by digesting flies. An array of eight microbial fuel cells (MFCs) breaks down sugars in the flies' exoskeletons using bacteria from sewage. The sugars release electrons, producing a current, which powers the drive mechanism as well as on-board sensors and transmitters. Although, in its present form, EcoBotII is somewhat slow (with a top speed of 10 cm/hr) it is very efficient, traveling up to five days on only eight flies. The next step will be to make EcoBotII predatory by devising a trap to lure the flies into the MFC chambers using (you guessed it) more sewage. So, while it may be the first autonomous robot to use totally unrefined fuel, you may want to keep your distance.

For information: Chris Melhuish, University of West England, Coldharbour Lane, Bristol, UK BS16 1QY; phone: +44-117-965-6261; fax: +44-117-976-3806; Web site: www.uwe.ac.uk

COST-EFFECTIVE PLASTICS FROM PLANTS

For years, scientists have been using plants as a sustainable source for ethanol fuel. Now a revolutionary new technology makes it cost-effective to create highly versatile and environmentally friendly plastics and other petroleum-like products from plants as well. A patented fermentation process produces biologically-derived polyesters (PHAs) from plant sugars and oils. The resulting plastics have been shown to be extremely versatile and adaptable — ranging from tough, moldable thermoplastics to soft, sticky materials. In addition to being biodegradable, they can also be recycled or safely incinerated. The developers are also looking at ways to "grow" PHAs directly in the plants using a genetically engineered strain of switch grass. The plastics and other petrochemical substitutes would eventually be extracted from the harvested grass at a "bio-refinery." Researchers hope to open the first of such refineries in the next three years as part of a pilot program.

For information: Metabolix, Inc., 21 Erie Street, Cambridge, MA 02139-4260; phone: 617-492-0505; fax: 617-492-1996; Web site: www.metabolix.com

THE NEXT "WAVE" IN ELECTRICAL POWER

When it comes to producing clean energy, the wave of the future may be just that - waves. In August, Scotland began supplementing their power grid with a 750-kilowatt power plant located off the coast of the Orkney Islands. Consisting of four floating cylinders about 150 meters long, it derives its energy from ocean waves, using the motion to drive a turbine. Another plant, near Sydney, Australia, is expected to be operational in December. This design consists of a single vertical cylinder that is partially submerged. As the water level changes, air in the cylinder is pushed through a turbine to generate power. The same company recently announced plans for a similar project to be constructed about one mile off the coast of Rhode Island. If these plants prove to be viable and cost-effective, they will represent a major breakthrough in meeting growing energy demands worldwide.

For information: Ocean Power Delivery Ltd., 104 Commercial Street, Edinburgh, UK EH6 6NF; phone: +44-141-554-8444; fax: +44-131-554-8544; Web site: oceanpd.com Energetech Australia Pty. Ltd. Randwick, Australia; phone: +61-612-9326-4237; fax: +61-612-9326-6277; Web site: www.energetech.com.au

ROBOTIC EMTs

Engineers and clinicians at the University of Nebraska are working on developing a whole new generation of robots that could literally save lives. The devices are being designed to carry a lighted camera, radio and video transceivers, and an array of medical instruments, in a package that is small enough to be inserted directly into the abdomen of an accident victim or injured soldier. The robots would transmit images from inside the patient to a remote location, enabling a surgeon to determine the source of potential internal bleeding, the leading cause of death among trauma victims. The clinician could then clamp or cauterize the wound to prevent further blood loss. Prototypes are scheduled for completion within two years.

For information: Shane Farritor, University of Nebraska, N118 Walter Scott Engineering Center, Lincoln, NE 68588-0656; phone: 402-472-5805; fax: 402-472-1465; email: sfarritor@unl.edu

HOW TINY CAN AN IMAGE BE AND STILL BE SEEN?

Researchers at Oak Ridge National Laboratories recently set a new record for how small they can see. Using a 300-kilowatt Z-contrast scanning transmission electron microscope (STEM) with a new technology called aberration correction, they were able to achieve an image resolution of .6 angstrom. One angstrom (one ten-billionth of a meter) is about 500,000 times smaller than the thickness of a human hair, and approximately equal to the diameter of an atom. So at sub-angstrom resolutions, scientists are now able to capture direct images at the atomic level. Aberration correction uses advanced computational techniques and image analysis to correct for imperfections in the electron lenses. Using this technology, researchers will be able to study how atoms bond together and more accurately predict the properties of new materials, reducing the need for expensive, time-consuming bench tests.

For information: Stephen Pennycook, Oak Ridge National Laboratory, P. O. Box 2008, One Bethel Valley Rd., Oak Ridge, TN 37831; phone: 865-574-5504; email: pennycooks@ornl.gov

“SPAM” (NOT THE CANNED MEAT) OF THE FUTURE

Voice over Internet Protocol (VoIP) is a rapidly growing technology that permits users to place phone calls over the Internet. Although it is primarily used by businesses, the number of consumer subscribers is growing, and it's projected that by 2008, more than 17 million households will have VoIP capability. It's easy to predict that spammers are already viewing this explosive growth as an opportunity for telemarketing to make a comeback. Already dubbed as Spam over Internet telephony (SPIT) this marketing tool would permit a single "caller" to send out thousands of voice message at once, potentially overloading servers and compromising overall system reliability. (Note that the do-not-call registry doesn't apply to Internet calls.) At least one company has taken the approach of solving tomorrow's predictable problems today by developing a software package that will block up to 95 percent of SPIT by monitoring the rate and length of calls being made from a particular Internet address. Hopefully, proactive approaches such as this will stop SPIT before it becomes a widespread problem.

For information: Qovia, Inc., 7470 New Technology Way, Suite E, Frederick, MD 21703; phone: 301-846-0020; fax: 301-846-0065; Web site: www.qovia.com

RIBBONS OF LIGHT

For years, scientists have dreamed about optical computers that could take problems which now require months of years to solve, and solve them in a matter of seconds. Unlike electrons, which must transmit information sequentially, with optical circuits, there is virtually no limit to the amount of information that can be transmitted simultaneously, so processing speeds could exceed today's capabilities by thousands of times. One of the challenges to realizing such a dream, however, has been finding a way to route packets of light (photons) through optical circuits the way electrons are manipulated in electronic circuits. Recently, researchers at Berkeley Labs reported that they have found a way to channel the movement of light through a circuit using semiconductor "nanoribbons." These optical wave guides are similar to nanotubes except that they are solid instead of hollow. A few hundred nanometers thick and about 1500 microns long, the tin-oxide, single crystalline structures transmit visible and ultraviolet light with minimal loss. They are strong enough to be shaped and twisted, and can even be coupled together with other optical components to form a miniature photonic circuit.

For information: Peidong Yang; Lawrence Berkeley National Laboratory, One Cyclotron Road, Mail Stop HILDEBRAND; Berkeley, CA 94720; phone: 510-643-1545; fax: 510-642-7336; email: pdyang@lbl.gov; Web site: www.lbl.gov

“COOL” ROOFS

The color of your roof can have a big impact on your air conditioning bills, and the difference is due to how much of the sun's radiation is reflected. For example, a white roof (which reflects about 55 percent of solar rays) can reduce cooling costs by 20 percent as compared to a dark grey roof (which only reflects about 20 percent of radiant energy). But U.S. homeowners typically prefer darker colors for residential roofs, so scientists at Berkeley Labs have teamed up with several roofing manufacturers to develop non-white "cool" roofs that use specialized pigments to increase their reflective properties. Research has shown that the potential energy savings in the U.S. alone is more than \$750 million annually. In addition, cooler roofs will reduce ambient temperatures, smog formation, and peak electrical demand in urban areas, while prolonging the life of the roof. Consumers will soon see products bearing the EPA's cool roof certification.

For information: Hashem Akbari, Berkeley Lab, Heat Island Group, Building 90, Room 2000, Berkeley, CA 94720; phone: 510-486-4287; email: h_akbari@lbl.gov; Web site: www.eetd.lbl.gov/HeatIsland/