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Trends for the New Millennium

By Marvin J. Cetron and Owen Davies

Here are some highlights of possible trends as viewed by some of the most accurate forecasters writing in the January-February, 2000 issue of *The Futurist*.

- Japanese banks will finally write off their bad debts and set the stage for an economic recovery in 2002, making them a better trading partner with the west. The three largest banks are combining into a \$1.23 trillion institution and expect to save \$50 billion per year.
- American cars should continue to regain market share, because the mean time before failure is virtually the same for all cars now being sold.
- In the long term, India will be the single fastest-growing market in the world.
- The world's population will double in the next 40 years.
- The greatest growth will occur in those countries least able to support their existing population. Pakistan will have a growth rate of 2.68% per year through 2030; its population will grow from 141 million in 2000 to nearly 199 million in 2020. Ethiopia's growth rate of 3.17% per year will push the population from just under 61 million in 2000 to 90 million within 20 years. India's population will grow by more than 220 million over this same time period.
- To meet the human nutritional needs over the next 40 years, global agriculture will have to supply as much food as has been produced during all of human history.
- Barring enactment of strict immigration controls, rapid migration will continue from the Southern Hemisphere to the North. A growing percentage of

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Executive Trivia Question...

What was Little Red Riding Hood's first name?

- job applicants in the US and Europe will be recent immigrants from developing countries.
- Russia is unlikely to attract new workers from the rest of the world. Without radical reform of its economic and social policies, it is doomed to growing poverty and social unrest, which its leaders will blame on the west.
 - Healthier diets, more exercise, the decline of smoking in the US, and the trend toward preventative medicine will extend life spans. Life expectancies in Japan are entering into the 90's, and those in parts of Europe are not far behind.
 - The elderly population is growing fastest throughout the developed world.
 - Global demand for services aimed at the elderly will grow quickly in the coming decades and medical care will prosper.
 - With above average wealth and relatively few demands on their time, the elderly will make up an ever-larger part of the tourist and hospitality market. Hotels will offer easy-to-read shop signs and brighter public areas suited to the needs of these older visitors.
 - Those over the age of 65 made up 12.4% of the American population in 2000. By 2010, they will 13%; by 2020, more than 16%.
 - In Germany, the retirement-age population will climb from 15% in 2000 to nearly 19% in 2010 and 20% a decade later.
 - Japan's over-65 population made up 17% of their total in 2000, rising to 22% in 2010 and nearly 27% in 2020.
 - India's over 65 population is rising from 56 million in 1991 to 137 million in 2021 and 340 million in 2051.
 - The number of centenarians in the world will grow from 135,000 in 2000 to 2.2 million in 2050.
 - By 2005, 83% of American management personnel will be knowledge workers. Europe and Japan are not far behind.
 - By 2005, half of all knowledge workers (22% of the labor force) will opt for "Flextime, Flexplace" arrangements which allow them to work at home, communicating with the office via computer networks.
 - Company-owned and industry - wide television networks will bring programming to thousands of locations. Business TV will become a big business.
 - Computer competence will approach 100% in the U.S. urban areas by 2005.
 - Anyone with access to the internet will be able to achieve the education needed to build a productive life in an increasingly high tech world.
 - Computer learning may even reduce the recidivism rate of the growing American prison population.
 - Eighty percent of U.S. homes will have computers in 2005.
 - English will continue to be the common language of the global business and technology communities.
 - Five of the ten fastest growing careers between now and 2005 will be computer related.
 - New modes of transportation, automated traffic-management systems and other highway technologies, more and better accommodations, more leisure time, and greater affluence will encourage more frequent travel.
 - Within the U.S. and Europe, regional differences, attitudes, incomes, and lifestyles will blur as business carries people from one area to another.
 - Intermarriage will continue to mix cultures geographically, ethnically, socially, and economically.
 - The growing number of Blacks, Hispanics, and Asians in the U.S. will be matched by the expanding population of refugees and former "guest workers" throughout Europe.
 - Companies will hire more minority workers and will be expected to adapt to their values and needs.
 - Culture conflicts will become more common, and dealing with them will require more education, awareness, and sensitivity.
 - Western corporations will have to adapt to Asian priorities. Where the west emphasizes "resource capital" - money and equipment - Eastern societies are more concerned with "human capital" - education, cooperation, and other practices that make the best use of people.

- New industrial standards - for building materials, fasteners, even factory machines - will allow buyers to order from almost any supplier, rather than only from those with whom they have established relationships.
- Many suppliers will give customers direct online access to their computerized ordering and inventory systems. Increasingly we will see the order going directly from the customer to the factory floor, and even into the supplier's automated production equipment.
- Demand for personnel in far-off lands will increase the need for foreign language training and documentation, employee incentives suited for the cultures, aid to executives going overseas, and the many other aspects of doing business in other countries.
- Eastern Europe will likely require a major investment in personnel development over the next 10 years.
- In the future, both self-reliance and cooperation will be valued - self reliance because we will no longer be able to fall back on social security, pensions, and other benefits; cooperation because group action often is the best way to optimize the use of scarce resources, such as retirement savings.
- Narrow, extremist views of either left or the right will be unpopular. Moderate Republicans and conservative Democrats will lead their respective parties.
- Drugs eventually will be decriminalized. Funds saved from the criminal justice system will be used for anti-drug education and for the treatment of drug users.
- Young people will continue to place growing importance on economic success, which they have come to expect and a growing number of them will choose to become entrepreneurs. Their stress will keep stride with their desires.
- If younger-generation workers in developing countries find their ambitions thwarted by local conditions, they will create growing pressure for economic reform and deregulation.
- Entrepreneurialism will represent another challenge to Japan, where the recent loss of lifetime jobs security still has not been fully absorbed.
- Disappointed expectations could drive underemployed young men into fringe political and religious movements and cause a new wave of terrorism and instability in the years after 2005 or so.
- Through 2002, depressed Asian currencies will make it cheaper to visit the Far East.
- Tourism will benefit as Internet video replaces printed brochures in promoting vacation destinations.
- Multiple, shorter vacations spread throughout the year will continue to replace the traditional two-week vacation.
- More retirees will travel off-season, tending to equalize travel throughout the year and eliminate the cyclical peaks and valleys typical of the industry.
- By 2001, 90% of insurance carriers in the U.S. will expand coverage or reduce premiums for policyholders with healthy lifestyles.
- Interest in participant sports, exercise equipment, home gyms, and employee fitness programs will create mini-boom industries.
- Consumption of distilled liquors will continue to decline while beer and wine account for a growing market.
- Smoking is still on a general decline in the U.S. Only 29% of American men smoke, down from a peak of 50%; 23% of women smoke, down from 32%.
- Smoking in Europe is increasing and smoking is rapidly spreading in all of Asia.
- People will be more inclined to control stress in the future as they realize that 80 to 90% of all diseases are stress related.
- Asia will face an epidemic of cancer, heart disease, and fatal illnesses related to health habits.
- Since the 20th century, every generation has lived three years longer than the last. The average child born in 1986 will live to be 74.9 years old - 71.5 for males, 78.5 for females.
- Discount stores such as Home Depot and Wal-Mart, factory outlets, and food clubs will continue to grow in the U.S., a trend that has just begun to spread in Europe and Japan.

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The Idea Incubator

by Frank Helton

How can improve bone marrow transplants?

Chunks of bone can be grown from a patient's own bone marrow and used to replace bone lost because of an accident, arthritis or the removal of a tumor, says the consortium of European companies developing the technique.

At the moment, if bone is lost, doctors usually insert metal replacements. But metal doesn't bond well to bones, nor does it flex as bones should. Grafts of a patient's own bone are possible, but only small pieces can be taken, and the excision site can remain painful for up to a year. And grafts obtained from bone banks may be rejected by the patient's immune system.

But *Joost de Bruijn* of IsoTis, a company based in Bilthoven in the Netherlands, says it makes more sense to grow new bone. His team has worked out how to culture bone marrow cells from animals, then seed them onto chunks or particles of the mineral component of bone, hydroxyapatite, along with bone growth factors. After four to six weeks, the cells secrete a layer of normal bone, coating the chunks or bonding the particles into a mass.

This can then be grafted into the animal that supplied the marrow. The growth factors encourage the surrounding bone to grow and promote bonding with the implant. The team has successfully replaced 2-centimeter long segments of the radius bone in rab-

bits, and will attempt 5-centimeter segments of a goat's femur next. They have also grown bone from human cells.

Other groups have tried hydroxyapatite grafts seeded with marrow cells, which secrete bone after they are implanted, but that takes a while.

A major use for the new grafts would be to replace bone that has crumbled around a failed metal implant. These must bond quickly or the metal will move and cause more damage. The IsoTis bone bonds immediately. But hydroxyapatite is brittle, and is not absorbed and replaced with normal bone. Bone is more flexible than hydroxyapatite alone, due to its protein content. So in collaboration with polymer researchers funded by the European Commission, IsoTis is now growing bone on other porous scaffolds.

One, made of starch, is as strong and flexible as normal bone. The other is a plastic called Polyactive, used in implants but not yet in tissue grafts. Thin layers of it can be shaped with a scalpel to replace delicate bones. Both polymers are slowly absorbed, allowing bone to replace them.

It should work, but in practice, surgeons don't like to perform two procedures, extracting the marrow cells, keeping them uninfected while they grow, then re-implanting them later. However, De Bruijn notes that marrow cells can be extracted in an outpatient department.

Ultimately, he says, a new hip joint might be grown on a shaped

scaffold. The polymer could release growth factors that make marrow cells secrete cartilage at the tip, where the joint forms, while releasing bone growth factors along its length. One problem would be getting blood vessels to grow in, but they could put channels in the polymer, and perhaps even engineer blood vessels.

Why is the earth under strain?

The world's major ecosystems are buckling under the strain of human activity. So says an exhaustive, two-year study by 175 scientists from the World Resources Institute and several UN agencies. They say half the world's wetlands disappeared in the past century; forestry and agriculture have gobbled up half the world's original forests; and fishing fleets are 40 per cent larger than the ocean can sustain. World Resources 2000-2001 warns that "halting the decline of the planet's life-support systems may be the most difficult challenge humanity has ever faced".

How can we speed up roller coaster rides?

Jinx, a new roller coaster at the Six Flags America theme park in Largo, Md., will make its debut this coming May. And its trick piece of technology, the linear induction motor (LIM), is helping redefine the way roller coasters roll. The new beasts are faster, smoother, and scarier than their wooden predecessors.

So far, Premier Rides of Maryland, the roller coaster man-

ufacturer that helped develop the technology, has launched seven LIM coasters. Three more, including The Joker's Jinx, will follow this year.

Conventional roller coasters are dragged by chains or cables—clank, clank, clank—to the top of the first hill. Then gravity causes the cars to accelerate. In contrast, Premier Rides' coasters slingshot passengers out of the loading station, accelerating from zero to 70 miles per hour in less than four seconds. The secret is the high-tech motors, about 200 of which are used in each coaster. When juiced with an alternating current, the motors create an electromagnetic force that accelerates the coaster over the first 200 feet of the ride.

Not daring enough? Lookout for linear induction water rides, which could turn paddleboats into speed demons. To dry out, take a spin in another new coaster: the Ultra Twister.

How can we use “Smart Concrete” in road construction?

“Smart Concrete,” developed by State University of New York at Buffalo, could eliminate the need for truck-weighing stations on highways. Developed and patented by *Deborah D. L. Chung*, a professor of mechanical and aerospace engineering, smart concrete is similar to the normal material—with one exception. It's reinforced with short carbon fibers whose electrical resistance changes in response to strain and stress. Because shifts in resistance are directly proportional to

changes in the concrete's load, these fibers allow the concrete to act as a sensor. According to Chung, the location, weight, and speed of any vehicle can be monitored as it travels down the highway.

Just 0.5% carbon per volume of concrete is sufficient to transform the material into a highly sensitive detector. Laboratory tests show that the smart concrete can measure loads as light as 29 pounds per square inch. Chung's concrete isn't just smarter, it's stronger, too. She estimates that her smart concrete would cost about 30% more than the conventional variety. Still, that's significantly cheaper than the cost of embedding free-standing sensors into roads, a procedure that's already in use on some highways.

Why do women sleep better than men?

The same female hormones that drive reproduction may help sleeping women rest easier than men, say sleep scientists at the University of Colorado.

Researchers have long noted that more men than women have frequent bouts of sleep apnea, short periods when breathing stops. A healthy middle-aged woman averages one or two bouts per night; a healthy man of the same age typically has from ten to 40. Most such pauses last only ten or 20 seconds, and are usually harmless. Lengthier and more frequent episodes - numbering in the hundreds in some people - can deprive the body of oxygen, and prompt health problems that include chronic sleepiness, high

blood pressure, or a slowed heart rate.

Suspecting that at least part of the difference between men and women's breathing might be hormonal, *Cheryl Pickett* and her colleagues monitored the sleep of nine healthy women, aged 46 to 57, who had had the chief source of female hormones - their ovaries - removed. For one week, five of the women took daily doses of the hormones estrogen and progesterin; the rest got sugar pills. In the second week, the two groups switched regimens.

When they got the placebo treatment, the women averaged about nine episodes of disrupted breathing per night; the hormone treatment cut that number to three bouts that didn't last as long.

For now, the findings are more interesting than practical, says Pickett. But the study does indicate that women taking replacement hormones to ease other aspects of menopause may, as a bonus, get a better night's sleep.

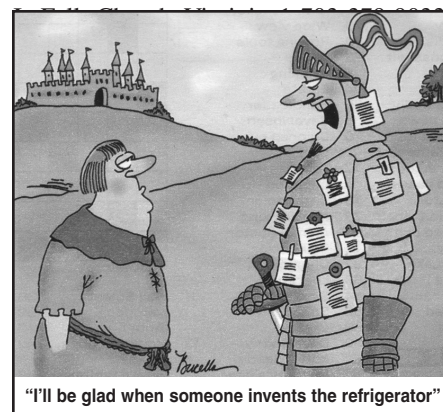
How can we help blindness resulting from diabetes?

Deteriorating vision related to diabetes is the most common cause of blindness in young adults. Blood vessels in the eye grow rampantly, interfering with the retina's ability to discern images. Now, researchers at Johns Hopkins University and Ciba Vision Corp. have found some promising drugs that appear to shut down this abnormal growth. The most effective candidate is PKC 412, and it could be tested with people as soon as this spring.

- The women's equality movement will become less strident, but more effective.
- Demand for child care and other family-oriented services will continue to grow, particularly in the U.S., where national services have yet to develop.
- Children and grandchildren will move back with parents and grandparents to save on living expenses. Now, one-third of Generation X returns home at some point in their early years. Yet the nuclear family is also rebounding as baby-boom parents adopt "family values" and grandparents retain more independence and mobility.
- Prefabricated (manufactured) housing will be cheaper than conventional construction, enabling older persons to afford housing in the suburbs or wherever they want to live.
- In the U.S., the debates over homosexuality and the "decline of the family" will remain hot-button political issues for at least two more election cycles.
- In 1999, the world used 73 million barrels of oil per day. Consumption is expected to reach 110 million barrels per day by 2020. OPEC oil production will grow by 24 million barrels of oil per day by 2020, to about 55 million barrels per day.
- Existing wells and refineries are operating below capacity and by 2010, China, Russia, and Kazakhstan will become major suppliers - if political uncertainties in Russia and Kazakhstan do not block investment by western oil companies.
- It costs \$10,000 to increase oil production by one barrel per day in most of the world, but only \$5,500 for the OPEC countries. The recent surge in the price of oil - which hit a 10-year high of \$37.80 per barrel in September, 2000, could offer an incentive to develop new fields.
- Contrary to popular belief, the world is not about to run out of oil. The world's proven oil reserves climbed from 700 billion barrels in 1990 and has stayed there ever since. Discoveries in the Caspian Sea area, China, and the Indian Ocean are likely to add significantly to this total.
- Oil prices are likely to fall again and remain generally around \$20 per barrel for the next 10 years.
- The cost of oil production in the Persian Gulf countries is less than \$1.75 per barrel. The attack on Kuwait more than doubled oil prices for a few weeks; they fell back to pre-conflict levels long before the war ended.
- The 20 most industrialized countries all have at least three-months supplies of oil in tankers and underground storage. Most have another three months worth in "strategic reserves". In times of high oil prices, customer nations can afford to stop buying until the costs come down.
- EPA regulations are mandating the production of low-sulfur fuel and this is expected to add about 4 cents per gallon to the cost of filling up. Similar regulations will add 6 cents per gallon to the price of diesel fuel.
- There is enough natural gas available to supply the world's total energy demand for the next 200 years. Nuclear plants will supply 16% of the energy in Russia and Eastern Europe by 2010.
- Solar, geothermal, wind, and wave energy will ease power problems where these sources are most readily available. Worldwide wind-power generating capacity grew 39% in 1999 alone.
- Soot and other particulates are more dangerous to human health than sulfur dioxide and other gaseous pollutants and will come under regulation in 2001.
- 64,000 People die each year from cardiopulmonary disease as a direct result of breathing particulates.
- "Acid rain" appears whenever designers of new power plants and factories neglect emission controls. Look for it to cover China, India, and most other industrialized countries.
- EPA has mandated cutting automobile tailpipe emissions 70% by 2004. This will add \$100 to \$150 to the sticker price of a new car and probably more for SUV's, trucks, and vans.

- Irrigation water evaporates, leaving minerals in the soil. By 2020, 30% of the world's arable land will be salty; by 2050, 50%. Salinization is already cutting crop yields in India, Pakistan, Egypt, Mexico, Australia, and parts of the U.S.
- Most of the major cities in the developing world will face water shortages. So will one-third of the population of Africa.
- Pollution continues to further reduce the supply of safe drinking water. 75% of Europe's drinking water contains dangerous concentrations of nitrate pollution. And it will take 25 to 50 years for nitrates to reach levels considered safe.
- Contaminated water is implicated in 80% of the world's health problems. An estimated 40,000 people die around the world each day - that's more than 14 million people per year.
- By 2040, at least 3.5 billion people will run short of water, almost 10 times as many in 1995.
- By 2050, fully two-thirds of the world's population could be living in regions with chronic, widespread shortages of water. Much of Pakistan's water supply comes from areas of Kashmir now controlled by India. Such problems as periodic famine and desertification can also be expected to grow more frequent and severe in the coming decades. This may give us some insight into the volatile eruptions concerning nuclear bomb blasts in that region in 1999 and 2000.
- The U.S. waste stream has tripled since 1970. Americans now produce 4.3 pounds of trash per person per day, twice as much as we did a generation ago.
- Seventy percent of U.S. landfills will be full by 2025; half the counties in California, home to 70% of the state's population, expect to run out of space by 2005. In London and the surrounding region, landfills will run out of space by 2012. For household trash, landfill space will be exhausted by 2007.
- Brazil produces 240,000 tons of garbage per day, but only 70% reaches landfills. The rest accumulates in city streets, where it helps to spread disease.
- Some 70% of the energy used in China comes from coal-burning power plants, few of which are equipped with pollution controls. By 2025 China will emit more carbon dioxide than the U.S., Japan, and Canada combined.
- China and India will soon produce enough greenhouse gases to prove that human activities are heating the atmosphere to destructive levels.
- An estimated 50,000 species disappear each year, up to 1000 times the natural rate of extinction.
- Eleven percent of birds, 25% of mammals, and 20% - 30% of all plants are estimated to be nearing extinction. The chief cause of species loss is the destruction of natural habitats by logging, agriculture, and urbanization.
- The Amazon rain forests are disappearing at a rate of 25,000 square kilometers per year, twice as fast as formerly believed. Worldwide, 100,000 square kilometers of rain forest are burnt each year to create farmland. Another 50,000 square kilometers are destroyed by logging. Less than .1% of the world's rain forests are under sustainable management.
- Half of all drugs used in medicine are derived from natural sources, including 55 of the top 100 drugs prescribed in the U.S. So far, less than .5% of flowering plants have been assayed for potential pharmaceuticals.
- In Indonesia, home of one-eighth of the world's coral reefs, more than 70% of the reefs are dead or dying. Net losses to the Indonesian economy is between \$500,000 and \$800,000 per square mile of dead or damaged reefs annually.

This article is excerpted from "50 Trends Now Changing the World" published by the World Future Society. The authors, Marvin J. Cetron and Owen Davies can be contacted at Forecasting International Ltd.



Famous Dog Quotes

From Ed Kronholm

Animal Whys?

by Jocelyn Little

Sled dogs don't scratch because there are no fleas in the arctic.

Horned toads like to be petted.

There are more creatures in your mouth than there are humans on earth.

Beaver's teeth are so sharp that Native Americans used them for knife blades.

Oysters have 20 times as much cholesterol as eggs.

A squirrel can fall as much as 600 feet to the ground without injuring itself.

Dolphins sleep with one eye open.

The female flea can drink 15x her weight in blood every day.

The arctic tern flies as far as 10,500 miles when it migrates.

Twenty million bats live in Texas's Bracken cave and they eat 100 tons of insects every night.

New Zealand sheep outnumber New Zealanders 13 to 1.

Dogs are mentioned in the bible 14 times but cats are not mentioned once.

Hummingbirds hold their nests together with spider webs.

Only 3% of mammals practice monogamy.

Jellyfish are 99% water.

"Some days you're the dog; some days you're the hydrant." - Unknown

"In dog years, I'm dead." - Unknown

"Dogs feel very strongly that they should always go with you in the car; in case the need should arise for them to bark violently at nothing right in your ear." - Dave Barry

"Outside of a dog, a book is probably man's best friend; inside of a dog, it's too dark to read." - Groucho Marx

"A dog teaches a boy fidelity, perseverance, and to turn around three times before lying down." - Robert Benchley

"Did you ever walk into a room and forget why you walked in? I think that's how dogs spend their lives." - Sue Murphy

"I wonder if other dogs think poodles are member of a weird religious cult." - Rita Rudner

"My dog is worried about the economy because Alpo is up to 99 cents a can. That's almost \$7.00 in dog money." - Joe Weinstein

"When a man's best friend is his dog, that dog has a problem." - Edward Abbey

"Money will buy you a pretty good dog, but it won't buy the wag of his tail." - Unknown

"Man is a dog's idea of what God should be." - Holbrook Jackson

"If you pick up a starving dog and make him prosperous, he will not bite you; that is the principal difference between a dog and a man." - Mark Twain

"I've seen a look in dogs' eyes, a quickly vanishing look of amazed contempt, and I am convinced that basically dogs think humans are nuts." - John Steinbeck

"The average dog is a nicer person than the average person." - Andrew A. Rooney

Executive Trivia Answer...

Blanchette.

Thought to Ponder...

In 1555, Nostradamus wrote: Come the millennium, month 12 in the home of greatest power, the village idiot will come forth to be acclaimed the leader.