A Timeline for Technology: To the Year 2030 and Beyond
Ian Pearson; Ian Neild
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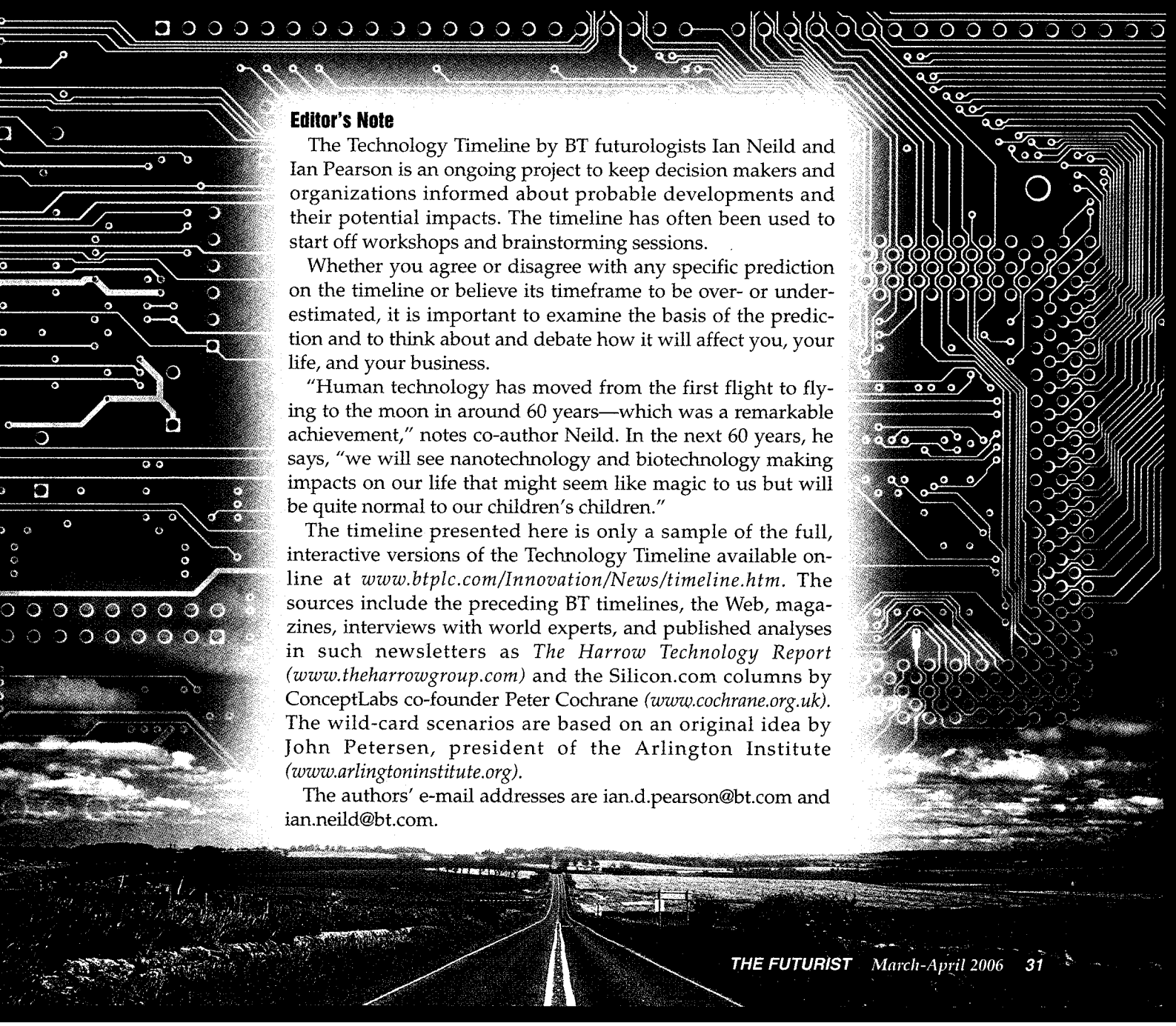
pg. 31

By Ian Pearson and Ian Neild

A Timeline for Technology: To the Year 2030 and Beyond

What's ahead in technology, and what will it mean? This new timeline offers a glimpse of likely developments —and of how they may change our lives.



Editor's Note

The Technology Timeline by BT futurologists Ian Neild and Ian Pearson is an ongoing project to keep decision makers and organizations informed about probable developments and their potential impacts. The timeline has often been used to start off workshops and brainstorming sessions.

Whether you agree or disagree with any specific prediction on the timeline or believe its timeframe to be over- or underestimated, it is important to examine the basis of the prediction and to think about and debate how it will affect you, your life, and your business.

"Human technology has moved from the first flight to flying to the moon in around 60 years—which was a remarkable achievement," notes co-author Neild. In the next 60 years, he says, "we will see nanotechnology and biotechnology making impacts on our life that might seem like magic to us but will be quite normal to our children's children."

The timeline presented here is only a sample of the full, interactive versions of the Technology Timeline available online at *www.btplc.com/Innovation/News/timeline.htm.* The sources include the preceding BT timelines, the Web, magazines, interviews with world experts, and published analyses in such newsletters as *The Harrow Technology Report (www.theharrowgroup.com)* and the Silicon.com columns by ConceptLabs co-founder Peter Cochrane *(www.cochrane.org.uk).* The wild-card scenarios are based on an original idea by John Petersen, president of the Arlington Institute *(www.arlingtoninstitute.org).*

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2010

Artificial Intelligence and Artificial Life

AI is used for classroom assistants *2008-2012*
People have some virtual friends but don't know which ones *2008-2012*
Mood-sensitive home décor *2008-2012*
First divorce due to virtual affair with computer game character *2008-2012*
Addiction to online games seen as a national problem *2008-2012*

Biotechnology, Health, and Medicine

Smart skin for intelligent clothing and direct human repair *2008-2012*
Hand-held scanner to detect tumors using tissue resonance interferometer *2008-2012*
Diabetes cure via stem-cell research *2008-2012*

Wild Card: Fetal sex selection becomes the norm

Business and Consumption

Most advertising is personalized to viewer *2008-2012*
Virtual companies and virtual co-operatives dominate *2008-2012*
Immersive VR shopping booths *2008-2012*

Computing and Communicating

60% of Internet accesses from mobile devices *2008-2012*
Personal memory sticks replace hard drives for everyday files (HD used as archive) *2008-2012*
Voice synthesis quality up to human standard *2008-2012*

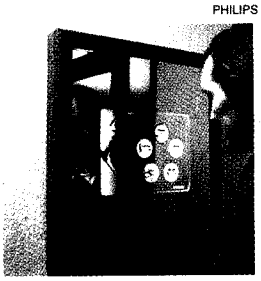
Environment and Resources

First species brought back from extinction *2006-2010*
Remote sensing used extensively in environmental management *2008-2012*
Poor countries charge for bio-prospecting *2008-2012*
Solar chimney power station (1.5km tall) *2008-2012*
Multilayer solar cells with efficiency over 50% *2008-2012*
Solar reflector satellites bringing sunlight to major Northern Hemisphere cities *2008-2012*

Home and Leisure

Digital bathroom mirror *2008-2012*
Consumer electronics devices of all types will be networked *2008-2012*
Virtual windows enable homeowners to offset rainy-day blues *2008-2012*
Frequent use of multiple Net identities causes personality disorders *2008-2012*
Loneliness in aged population greatly reduced by network communities *2008-2012*
Cybercommunity reaches 100 million in population *2008-2012*
Ability to digitally replace or enhance people in your field of view *2008-2012*

PHILIPS



Digital bathroom mirror. Personal health monitoring and care may be incorporated into networked information systems at home, with electronic mirrors that double as displays.

Robotics

Security, Military, and Law

Autonomous weapons authorized to fire at own discretion *2008-2012*
Bacteria used to break down explosives in mine fields *2008-2012*
Criminal tagging augmented with video and audio sensors *2008-2012*

Space

Wild Card: Global civil war erupts between cybernations

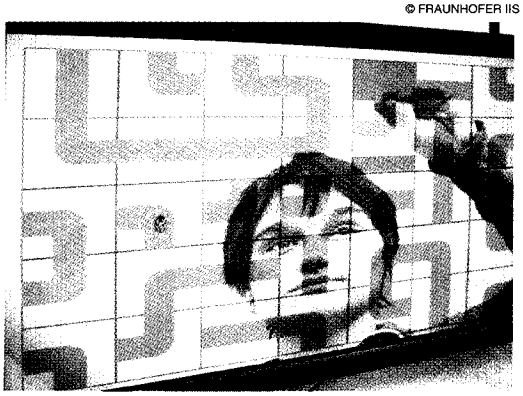
Dolls with personality chip and full sensory input *2011-2015*
Computer agents start being thought of as colleagues instead of tools *2011-2015*
AI teachers get better results than most human teachers (i.e., on standardized tests, students of AI teachers outperform students of human teachers) *2013-2017*

Wild Card: Computers and robots think like humans

Drugs delivered in carbon buckyballs (burst open at destination under laser light) *2011-2015*
Use of individuals' own tissues to grow replacement organs *2011-2015*
Electronic stimulation of brain sensations as recreational substitute for drugs *2011-2015*
Self-certification for prescriptions using electronic diagnostics *2011-2015*
Genetic links of 90% of all diseases identified *2013-2017*
Individuals' genome part of their medical record *2013-2017*
Use of stem cells in brain after strokes or accidents *2013-2017*

Paper money replaced by smart media *2011-2015*
RFID (radio-frequency identification) replaces most bar codes *2011-2015*
Reverse auctions in personal shopping devices (nearby stores bid to provide items on shopping list) *2013-2017*

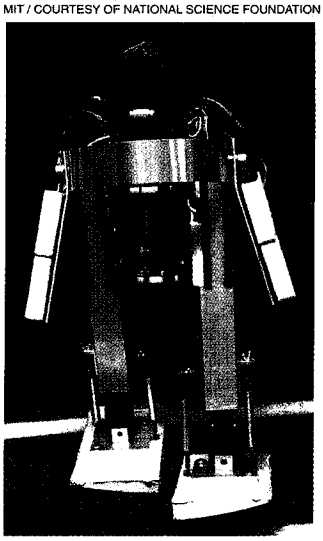
Active contact lens interfaces begin replacing VR headsets *2011-2015*
Computer link to biological sensory organs *2013-2017*
Bacterial supercomputer *2013-2017*



Living area use of virtual-reality scenes. Video wall enhances excitement in computer gaming as well as enjoyment for movie lovers.

Large areas of countryside used for biomass production *2011-2015*
Waste sludge used to create energy using bacteria in fuel cells *2011-2015*
Commercial magma power stations *2011-2015*
Increased use of GM crops on saline-contaminated soils *2013-2017*
Seabed gas hydrate crystals used as fuel source *2013-2017*

Antinoise technology built into homes *2011-2015*
Active wallpaper responds to inhabitants' moods *2011-2015*
Smart washing machine with sensors are "aware" of contents, select appropriate cycle and settings *2011-2015*
Living area use of virtual-reality scenes *2011-2015*
Replacement of people leads to antitechnology subculture *2011-2015*



Robot dance tutors. A bipedal, passive-dynamic powered robot developed at Massachusetts Institute of Technology takes a step into the future.

Robot dance tutors *2011-2015*
Fleet of garden robots for plant and lawn care and tidying *2011-2015*
Robots for cleaning, washing, and fetching in offices *2011-2015*
Robots for guiding blind people *2013-2017*

Major utility brought down by hackers *2011-2015*
Most weapons attack systems rather than injure people *2011-2015*
Most fighters and bombers flown remotely *2013-2017*
Ambient intelligence detection of minor crimes and antisocial behavior *2013-2017*

Private space mission to examine asteroid with a view to space mining *2011-2015*

Artificial Intelligence and Artificial Life

AI entity earns master's degree *2016-2020*
Electronic pets outnumber organic pets *2016-2020*
AI entity becomes Member of Parliament *2016-2020*
Smart bacteria, containing electronics and linked to Net *2016-2020*

Biotechnology, Health, and Medicine

Wild Card:
Global epidemic kills 100 million people, due to high-speed travel and high population density

Business and Consumption

More people use telework centers than work at home *2016-2020*
Telework centers double as community resources *2016-2020*
Autonomous production plants make everything; unemployment increases in Asia *2016-2020*

Computing and Communicating

Thought recognition as everyday input means *2016-2020*

Environment and Resources

Home and Leisure

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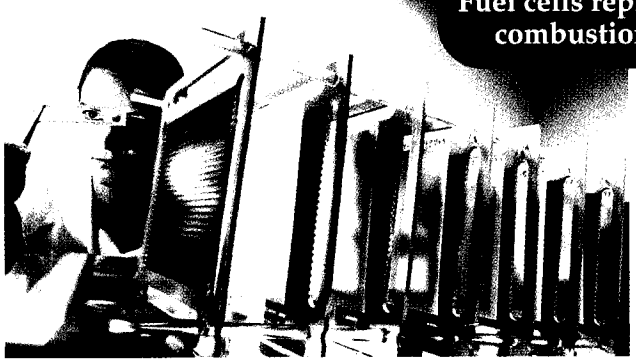
Wild Card:
Fuel cells replace internal combustion engines



Fuel cells replace internal combustion engines. Stacks of ceramic plates that transform natural gas into electricity are studied for use in future fuel cells. This research is being conducted by the Fraunhofer Institute for Ceramic Technologies with Bayer AG.

Robotics

Actuators resembling human muscles *2016-2020*

Security, Military, and Law

War caused by global warming forces mass migration from coastal areas *2016-2020*

Space

Helium-3 mining on moon *2016-2020*
Orbital space junk cleared up by sweeper craft *2016-2020*

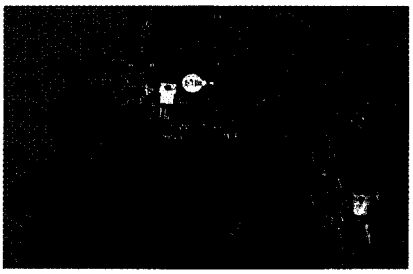
NASA

First manned mission to Mars. Artist's rendering of Mars explorer collecting samples.

2025

AI entity earns Ph.D. *2020s*
AI entity awarded Nobel Prize *2020s*
Remote-control devices built into pets *2020s*
Virus wipes out half of the electronic pet population *2020s*

OFFICE OF NAVAL RESEARCH



AI entity earns Ph.D. Artist's illustration of brain-mimicking software, SENTRI, developed by the U.S. Office of Naval Research.

Many new forms of plants and animals from genetic engineering *2020s*
Genetic, chemical and physiological bases of human behavior understood *2020s*
Fully functioning artificial eyes, *2020s*
First bionic Olympics, *2020s*
Synthetic immune system *2020s*

Wild Card: Hybrid nanotech-organic creatures

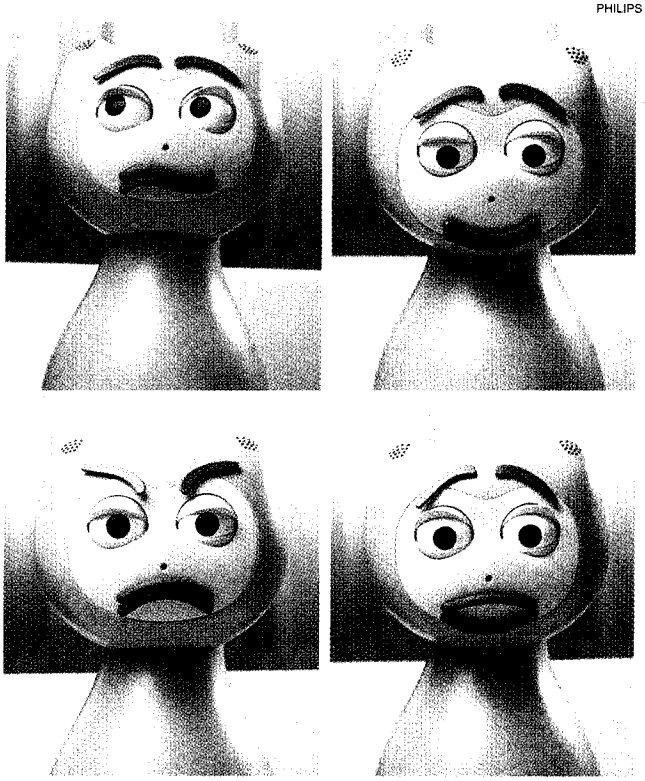
Holographic TV *2020s*
Full direct brain link *2020s*
"Smart yogurt" developed: electronic circuits inside bacteria assembled by cells, linked to form sophisticated computers *2020s*

Wild Card: Nanotechnology accident

Use of micro CHP (combined heat and power) stations in 50% of premises *2020s*

Films where viewers can choose who acts in each role *2016-2020*
Emotion synthesis, transmission, and conversion (remotely express love or anger, or alter feeling received) *2020s*
Patio display panels and slabs to simulate beach *2020s*
Antinoise technology in gardens *2020s*
3-D home printers *2020s*

PHILIPS



More robots than people in developed countries *2020s*
Genetic modification and robotics converge, creating organic robots *2020s*

Robots outnumber soldiers on battlefield *2020s*
Smart-bacteria weapons used in warfare to alter behavior of enemy *2020s*
Attacks based on facilitating natural disasters *2020s*

First manned mission to Mars *2020s*
Production, storage, and use of antimatter *2020s*

More robots than people in developed countries. Robots with a human face? Prototype assistant robot, "iCat."

2030s AND BEYOND

Artificial Intelligence and Artificial Life

Artificial-intelligence entity sets up higher-level prize *2030s*
Learning superseded by transparent interface to smart computer *2030s*
Living, genetically engineered teddy bear *2040s*
Primate given brain implant to increase intelligence to human level *2040s*
Humanoid robots beat England football team *2050s*

Wild Card: Human genetic engineering creates hostile super race

Biotechnology, Health, and Medicine

Artificial peripheral nerves *2030s*
"e-Baybies" (virtual offspring created through online trading of genetic information) achieved through digital emulation of conception *2030s*
Artificial brain *2040s*
Brain in jar *2040s*

PHILIPS

3-D virtual displays replace most two-dimensional display technologies. Milk seems to spill from Philips 3-D Solution display.

Business and Consumption

Computer literacy in advanced nations reaches 95% *2030s*

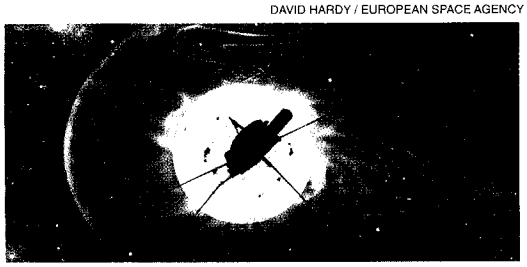
Computing and Communicating

3-D virtual displays replace most two-dimensional display technologies *2030s*

Environment and Resources

Carbon-dioxide-fixation technologies for environmental protection *2030s*
Artificial precipitation induction and control *2030s*
Space solar-power stations *2030s*
Wave energy providing up to 50% of British requirements *2040s*
Use of nuclear fusion as power source *2040s*

DAVID HARDY / EUROPEAN SPACE AGENCY



Space solar-power stations. Artist's impression of the ESA/NASA sun-orbiting spacecraft Ulysses.

Home and Leisure

Virtual reality extensively used in retirement homes *2030s*
Restricted-capability home genetic engineering kits *2030s*

Robotics

Micro-mechano fractal construction kit *2030s*
Robots with polymer muscles and strong AI *2040s*

Security, Military, and Law

Use of solar wind deflectors to set fire to cities *2030s*
Nanotech-based virus, communicable between machines and people, sent over Internet *2030s*
Asteroid diversion used as weapon *2040s*

Wild Card: Use of asteroid as weapon of mass destruction

Space

Regular manned missions to Mars *2030s*
Space elevator based on carbon-nanotube cable *2030s*
Asteroid mining *2040s*
Mining of water on Mars *2040s*
Self-sustaining Mars colony *2040s*

Wild Card: Faster-than-light travel is demonstrated

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