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 under-
estimated, it is important to examine the basis of the predic-
tion 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 fly-
ing 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 on-
line at www.btplc.com/Innovation/News/timeline.htm. The
sources include the preceding BT timelines, the Web, maga-
zines, 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

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

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

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

Wild Card: Fetal sex selection becomes the norm

Wild Card: Global civil war erupts between cybernations

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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

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
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

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 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

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

Wild Card:
Fuel cells replace internal combustion engines

Environment and Resources

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.

Home and Leisure

- Actuators resembling human muscles 2016-2020

Robotics

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

Security, Military, and Law

Space

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

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

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

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

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, “Cat.”
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-Baby"s (virtual offspring created through online trading of genetic information) achieved through digital emulation of conception 2030s
Artificial brain 2040s
Brain in jar 2040s

Wild Card:
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

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:
Use of asteroid as weapon of mass destruction

Wild Card:
Faster-than-light travel is demonstrated

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

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