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Worshipping God with technology

by Denis R. Alexander

Technology brings you great gifts with one hand, and it stabs you in the back with the other.
                                                                    C.P. Snow

They are not skilful considerers of human things who imagine to remove sin by removing the matter of sin.
                                                                    John Milton

Summary

Technology is rooted in the creative nature of God and its appropriate use is a moral obligation in our stewardship of the earth. Technologies facilitate human actions, thereby shaping societies, and act like amplifiers of human aspirations, both good and bad. We worship God with sustainable and appropriate technologies that work well; that heal, not harm; that are concerned for the poor and for the environment; and that nurture relational values.

Introduction

The Internet, mobile phones, genetic engineering, artificial intelligence, nanotechnology, therapeutic cloning – the pace of technological change is leaving us breathless. Technophiles love their mobiles and their gadgets. Between 1998 and 2003 British ownership of mobile phones rose from 27 per cent to more than 75 per cent, including 90 per cent of young people.[1] Around half of young adults have very strong feelings about their mobiles, describing their theft as similar to a bereavement.[2] The technophobes meanwhile bemoan the loss of a simpler age when life was less cluttered with the fruits of technology. But Christian technophiles and technophobes often share something in common: they are reacting to trends in society without thinking biblically about technology.

The word 'technology' derives from the Greek *techne*, meaning 'art', which in ancient Greece covered the making of laws as well as virtually any skill.[3] Its modern use to refer to the manipulation of materials for human wants and needs did not appear until the late seventeenth century, and to describe applied science not until the nineteenth century.[4] When the Harvard professor Jacob Bigelow addressed the newly founded Massachusetts Institute of Technology in 1865 he explained that the novel term 'technology' that he had used in his book, *Elements of Technology* (1829), 'was not [then] in use nor was it widely understood'.[5]

But the practice of what we now call technology is as old as humankind and preceded the development of science by thousands of years. Prehistoric people developed impressive technologies for obtaining the necessities of life. They learned how to make tools, start fires, build shelter, and use weapons for hunting. Settled agriculture after about 8000 BC was associated with the development of crafts such as pottery, weaving, boat-building and metalwork. By 3500 BC the wheel was invented. People have always been clever at making things.

The idea that science could be used for the benefit of humankind was a specifically Christian vision and was first mapped out in the seventeenth century by Francis Bacon in books like *The New Atlantis*. Scientific knowledge should be sought, said Bacon, not 'for superiority [over] others, or for profit, or fame, or power…but for the benefit and use of life'.[6] However, only in the nineteenth century did science begin to impact on technology, a trend that has been gathering strength ever since, until today science and technology are thoroughly intertwined.

The biblical mandate for technology

By studying the nature of God through both his Word and his works, we may conclude that God is himself the arch-technophile and the ultimate enabler of human technology.

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1   *The Guardian*, 3 April 2003, p.29.
2   *The Times*, 10 May 2003.
3   R. Hooykaas, *Religion and the Rise of Modern Science*, Edinburgh: Scottish Academic Press, 1973, p.54.
4   V. Ferkiss, *Nature, Technology, and Society*, London: Adamatine Press, 1993, p.49.
5   V. Ferkiss, op. cit., p.80.
6   Cited in V. Ferkiss, op. cit., p.34.

God has brought into being out of nothing a material universe, which he repeatedly declared 'good' (Genesis 1), in which he has majestically displayed his *techne* by shaping its materials into all the wonders, both inert and living, that we now observe. The Wisdom that was with God at the beginning is likened by the Bible to a craftsman 'filled with delight day after day' by his creative actions (Proverbs 8:30). The Anthropic Principle has highlighted the mathematical elegance and finely-tuned physical properties of the universe without which such divine *techne* would be impossible.[7] God is not a God lost in silent and passive contemplation but a God who speaks and acts. In creating humankind in his image (Genesis 1:27) God has likewise endowed us with creative gifts and inclinations and given us the mandate to steward his created order using all the earth's abundant resources. Technology is a moral obligation, implicit in the created order, without which we have no chance of subduing the earth.

Three great technical projects described in the Old Testament – the building of the ark, the tabernacle and the temple – illustrate God's vision for technology. *First*, these human creations were specifically for worship, by obeying God (Genesis 6:22; Exodus 35:10) and by providing a sanctuary for his glory (Exodus 40:34–35; 2 Chronicles 6:12–7:10). *Second*, they provided an opportunity for God's creative gifts to be recognised and used in technical ways. Bezalel was filled with the Spirit and with 'skill, ability and knowledge in all kinds of crafts – to make artistic designs for work in gold, silver and bronze, to cut and set stones, to work in wood…' (Exodus 31:3–5). *Third*, these projects were relational community enterprises in which teamwork was vital (Exodus 31:6–11; 35:30–35). *Fourth*, the technical contributions of skills were to come from the heart as freewill offerings (Exodus 35:21–29). *Fifth*, the instructions given had to be followed precisely if the product was to be worthy of God's glory (Exodus 25–38). There was no room for shoddy workmanship. Worship involved the full and accurate use of God's gifts and of God's materials.

Many other biblical passages highlight the enormous value that the Bible gives to human creative gifts used well in technology for God's glory. The Son of God himself was a carpenter (Mark 6:3). Paul asked the Thessalonians to work with their own hands (1 Thessalonians 4:11), giving an example by his own tent-making (2 Thessalonians 3:8–10; Acts 18:3). Occupation with material things is consistently viewed as praiseworthy in the biblical literature. And then as a final challenge to an overly romanticised view of nature, the new heaven and the new earth are represented not by a restored garden but by a Holy City (Revelation 21). The city is the place of human community and creativity and the 'glory and honour of the nations will be brought into it' (Revelation 21:26). Given God's passion for *techne*, it is difficult not to believe that the most beautiful and God-honouring technical creations will comprise at least part of that great transformed wealth that finds its continuity in the new earth.

The high value placed by the Bible on manual labour and technical creativity has had a major impact on the history of technology and science.[8] The ancient Greeks and Romans tended to despise manual activity, partly due to its association with slavery. In contrast, monasteries from the twelfth century onwards increasingly became centres of technical development in which the monks laboured to produce all their practical needs.[9] The Puritan movement of the sixteenth century promoted projects, such as Gresham College in London and Isaac Beeckman's Mechanical College in Rotterdam, in which the theoretical and practical aspects of the new 'experimental philosophy' were fused.

Along with its mandate for technology, the Bible also gives some dire warnings of what can go wrong when our God-given creative gifts are abused. When the Israelites so quickly turned to idolatry, impatient at Moses' prolonged absence, they used precisely the same technology to create a golden calf as they used to make the golden objects in the tabernacle (Exodus 32:14). The Bible often highlights the terrible irony, not to speak stupidity, of idolatry: worshipping material things, beautifully made using God-given gifts, in place of God (Isaiah 44:12–20; Revelation 9:20).

Technology in contemporary society

Current debates about technology continue to echo the kinds of issues raised by the Old Testament writers: Is technology our servant or are we its slave? Does technology shape society or is it shaped by society? What power groups are served in society by which technologies for what ends?

Technology as shaper of society

The Industrial Revolution provides vivid examples of the ways in which new technologies can be integral to the shaping of societies. The eighteenth-century textile industry in Britain was transformed by a series of technical developments that greatly increased the efficiency of production. Previously a cottage industry, the introduction of steam-driven machines caused progressive centralisation of labour; the massing of people in great urban centres and the increased mobility of labour contributed to the break-up of families and local community structures.[10] There was nothing inevitable in these developments: each stage was made by human choice, based on economic pressures. But new technologies were a catalyst, reflecting the existing distribution of power within society, facilitating decisions in one direction (mass labour) rather than another (smaller workforce). At the same time, countries excluded from the new technologies altogether suffered poverty and unemployment.

Today technology often promotes smaller-scale working communities. High-tech computer-based industries can be located in quiet rural settings and require relatively few employees. The computer continues to facilitate the restoration of 'cottage industries' such as desktop publishing, editing and consultancy work. The scale of the burgeoning biotech industry is often family rather than factory (at least in new start-ups).

The continuing ambiguity of technology as a shaper of society is also well-illustrated by the communications revolution. Samuel Morse was a Christian, a fine portrait artist and a gifted inventor. With his artistic creativity he conceived the idea of using the newly discovered electricity and principles of magnetism to transmit messages. On 24 May 1844, he tapped out his very first message, taken from Numbers 23:23: 'What hath God wrought!' 'What Samuel Morse had wrought…with God's help was the Information Age. Almost overnight the whole world became wired.'[11] But did we want to be? The Internet, e-mails, mobile phones, texting and paging have powerful upsides and equally potent downsides. On the positive side they facilitate cheap, rapid, worldwide communications; they provide wonderful opportunities for sharing the Gospel; they nurture open rather than closed societies; they promote global networking and business opportunities; they open up a cornucopia of informational and educational possibilities; and they allow poorer countries without landlines to leap-frog straight to mobiles.

On the downside the Internet is like a sewer, pumping vast volumes of pornography round the globe, facilitating paedophilia; subversives fill the bandwidth with spam and viruses; the information volume becomes so high that discriminating between the useful, the reliable and the deceptive becomes problematic; face-to-face communication can become replaced by impersonal e-mails, with increased possibility for miscommunication and angry exchanges copied to ever-expanding circles of unwilling electronic voyeurs;[12] meanwhile busy professionals find their personal interactions increasingly hectic and transient, with less time left for deep personal friendships.

Our technologies are like loudspeakers, broadcasting our human needs, wants and aspirations, both the good and the ugly. They also shape our environments and our daily lives, facilitating our actions in one direction rather than another. Technologies provide powerful

7   D.R. Alexander, *Rebuilding the Matrix – Science & Faith in the 21st Century*, Oxford: Lion, 2001, ch.12.
8   D.R. Alexander, op. cit., pp.92–94.
9   L. Mumford, *The City in History*, Penguin, 1961, p.299

10   J. Forge, 'The Industrial Revolution in Great Britain', in M. Bridgstock et al., *Science, Technology and Society*, CUP, 1998, pp.111–131; L. Mumford op. cit. pp.518–519.
11   G.E. Veith and C.L. Stamper, *Christians in a .Com World*, Crossway Books, 2000, p.30.
12   E.M. Hallowell, 'The Human Moment at Work', *Harvard Business Review*, Jan–Feb 1999, pp.58–66.

opportunities for sets of human decisions that may be exerted at the individual, corporate or state level.

Technology as healer and destroyer
Technology is nowhere more ambiguous than in its potential to either heal or to destroy: sometimes the same technology is used for both, highlighting the role of human choice. Lasers can be used for surgery, in cancer diagnosis, or to guide bombs to their targets. Even technophobes are grateful for the high-tech kit at their local dentist or hospital. Technology has transformed the health status of billions of people by ensuring clean water supplies, adequate sewage disposal and immunisation programmes. Vaccination has defeated the scourge of smallpox, but every day in low-income countries 46,000 people still die of preventable infectious and parasitic diseases.[13] Every 40 seconds a child dies of malaria.[14] But there is no reason why malaria cannot be eliminated: technologies for prevention and treatment already exist. Increased international spending up to £2.5 billion per year by 2015 would effectively control the disease.[15] Such a figure appears large, but may be contrasted with the cost of applying technology in warfare. The cost of the war in Iraq to the US up to the end of 2003 is estimated at around $93 billion.[16] President Dwight Eisenhower made the point succinctly (on 16 April 1953): 'Every gun that is made, every warship launched, every rocket fired, signifies in the final sense a theft from those who hunger and are not fed, those who are cold and are not clothed.' It is ultimately human choice as to whether technology is used to heal or destroy. There is no room for fatalism.

Technology as humanising and dehumanising
Technology is often portrayed as 'dehumanising', but what does this mean? If the only possible purpose for the development of a particular technology is to do harm, then the term is well justified. But, as we have noted, technology is more often ambiguous: wheels can be used on wheelbarrows or on warplanes; electricity can be used for lighting homes or for torture. Predicting the possible risks and misuses of technology is difficult. All human decisions are tinged with risk and the public's demand for risk-free technologies is impossible to fulfil. Also, the psychology of risk can be remarkably imbalanced. Would we still proceed with a new technology in the sure knowledge that it would kill 800,000 people worldwide during the coming year and injure a further 23 million? Probably not, yet these are the figures for the ubiquitous motor car.[17]

For technologies where the deleterious consequences are already well-established, the biblical command to 'love our neighbour as ourselves' (Matthew 22:39) challenges Christians to look beyond their own backyards. In reality the biggest technological impacts are often remote from us in time and space, environmental damage that will harm others, not ourselves. Cars produce 20 per cent of the greenhouse gas emissions from richer countries and the cheap short-haul flights that we love so much are environmentally the most damaging.[18] One quarter of the habitable land of Bangladesh is less than three metres above sea level and 30 million people live in that area. If global warming is not reversed then such low-lying areas of the world face the prospect of devastating flooding later this century. Such an outcome would definitely be dehumanising. Arguably, therefore, it is not technologies *per se* which dehumanise, but the inappropriate use of particular technologies that have destructive consequences for others. Even more dehumanising is the failure to create and use technologies to meet human needs.

Worshipping God with technology
How can we worship God in our creation and use of technologies? In practice 'creation' and 'use' can be closely linked, for by using new technologies (or not) we seal their fate. Those who chose to use

petrol for their car in 1900 rather than steam or electricity (equally popular at the time) ensured the eventual triumph of the internal combustion engine. We are all consumers, tax-payers, voters, and potential political campaigners, so technology creation is not so distant from our influence as we might think.

The relational perspective on technology
Worship involves aligning our actions with the will of the triune God who exists in eternal relationship and in whose image we are made. It is a startling fact that virtually every decision we make about technology has a relational perspective.[19] Even purchasing a dishwasher has social implications: less communal washing-up round the kitchen sink, but (perhaps) more time at table together; less money to give to famine victims; increased power consumption with longer-term implications for global warming and suffering for people far away. The point is not that weighing up such factors is straightforward, but rather that the social perspective should be central in our thinking about technology.

In some contexts the relational issues are fairly obvious. Face-to-face contact is critical for effective human communications. According to Professor Paul Ekman, the human face is capable of producing more than ten thousand distinct expressions; we spend up to 75 per cent of conversational time looking at the person with whom we're speaking.[20] So the boss who continually sends e-mails round the people in his/her corridor should plan on creating times for personal interactions. Those who interact with their families only by phone and e-mail should schedule meals and visits whenever feasible. Communication technologies can be a wonderful tool to keep in touch, but they can never substitute for face-to-face encounters. We should be critical of the secular claim that for every social dilemma: 'technology will fix it'. No it won't – deepest human needs are never solved by technology alone.

Creating beautiful technologies that work well
Those who have the privilege and responsibility of creating new technologies place themselves in a special kind of relationship with a vast cohort of consumers whom they will never meet. A particularly clear message from the OT technology projects is that God is glorified by diligence in both form and function. When God told Noah to make the ark 300 cubits long, he didn't mean 315 cubits (Genesis 6:15). There is nothing more frustrating than technology that doesn't work well or, more disastrously, that results in human death or injury. Christians involved in creating technologies should, of all people, have a passion for accuracy, for making sure that it functions properly. Likewise we should be at the forefront of efforts to test new technologies and assess their potential impacts. Christians involved in testing GM crops for safety and possible environmental impact are not helped by those who trash their experiments.[21] Hopefully Christians will not be amongst the contemporary Luddites who instinctively attack new technologies without being willing to undertake the hard slog necessary to assess their possible benefits. We worship God by our actions and are condemned for our failure to act (James 4:17).

As far as form is concerned, Christians should reflect something of the beauty of their Creator by what they create. The Victorian engineers who built Nottingham's water pumping station in 1881 supplied it with two giant, gleaming and glorious steam-driven engines and gave the building stained-glass windows and statues protruding from the pillars.[22] In its long working life these were seen by only a handful of people who looked after the pumps, but that was not the point: the beauty was intrinsic to the enterprise. Sir Joseph Bazalgette took 18 years to create London's sewer system, but 140 years later it is still in use (albeit over-stretched) and a work of beauty that incorporated several new technologies. As with all technical creations, the beauty is in no way divorced from function: the thousands who were dying from cholera – 14,000 in the 1848

13 P. Saunders, *Triple Helix*, Christian Medical Fellowship, Autumn 2003, p.3.
14 J. Sachs and P. Malaney, 'The economic and social burden of malaria', *Nature* 415, 2002, 680–685.
15 Op. cit. p.685.
16 www.costofwar.com
17 L. Peek, *The Times*, 3 April 2001.
18 'Energy – The Changing Climate', Royal Commission on Environmental Pollution, 2000.
19 M. Schluter and D.J. Lee, *The R Option*, The Relationships Foundation, 2003.
20 Cited in Schluter and Lee, op. cit., p.42.
21 J.N. Perry, 'Genetically modified crops', *Science & Christian Belief*, 15, pp.141–164, 2003.
22 'The Age of Steam', BBC2, 29 July 2003.

epidemic alone – were now protected. The first digital computer was built in 1944, weighed five tons and made a terrible racket. David Gelernter, a Yale computer scientist, has proposed that just as people seek elegance in art, architecture and music, so they should seek Machine Beauty (the name of his book) in hardware and software, suggesting that 'great technology is beautiful technology'.[23] Apple's development of eye-catching Macintosh computers in different colours, and now elegant screens on mobile rods, are all attempts to render technology pleasing to the eye. There is beauty in function and looks, and as Christians we should be concerned for both, although sometimes utility may have to take precedence for cost or environmental reasons.

Creating appropriate technologies
Appropriate technology means that which is relevant in scale and goals to the cultural context and economic needs of its intended users (Leviticus 25:18–28). The economist E.F. Schumacher was a pioneer of 'intermediate technology' as an alternative to advanced Western technology.[24] Why build an enormous brick factory making a million bricks when smaller-scale alternatives were available? More recently the emphasis has been more on 'blending technologies' in which new and old technologies can be fused to accomplish goals on an appropriate scale.[25] In Pakistan and Afghanistan Christians have been active in promoting solar-cookers and heaters. Bread ovens, bag sealers and briquettes are a few of the myriad 'lo-tech' appropriate technologies recently generated for low-income countries.[26]

The use of GM crops is proving, for some crops at least, to be an appropriate technology for caring for God's world – increasing yields and decreasing dependence on environmentally-damaging fertilisers in low-income countries. In one detailed study 395 small-scale low-income farmers who grew pest-resistant GM cotton in seven different Indian states found that the technology reduced damage by pests and increased yields by an average 80 per cent.[27] This contrasts with a yield advantage of less than 10 per cent on average for comparable crops grown in the United States and China. The Indian study showed that insecticide use was reduced on average by almost 70 per cent. Those who express hostility to GM foods should therefore reflect on the implications of their actions for feeding hungry people. In 1997–99 there were 815 million under-nourished people in the world.[28] Since the mid-1960s there has been a dramatic cut in the number of undernourished people, largely due to huge reductions in poverty in China. But world population is now 6 billion and is projected to grow to 8.3 billion by 2030. This would require a 40–45 per cent increase in food production, so the scope for GM technologies in preventing worldwide hunger is significant.[29]

Closely allied to 'appropriate technology' is the idea of 'sustainable development': technologies should be created and developed that do not exhaust the earth's resources but leave enough for succeeding generations. Every day we spin invisible webs that link us to future generations. John Calvin made the point powerfully in his 1554 commentary on Genesis 2:15: 'Let him who possesses a field, so partake of its yearly fruits, that he may not suffer the ground to be injured by his negligence, but let him endeavour to hand it down to posterity as he received it, or even better cultivated…let everyone regard himself as the steward of God in all things which he possesses.'[30] Christians should be interested in wind power for the national grid; passionate about alternative energy sources for cars; willing to pay more for short-haul flights to contribute a 'tax' on environmental damage; and committed to not purchasing energy-hungry luxury goods but rather learning how to reduce consumption. These are all aspects of our worship.

Living between the tower of Babel and the new Jerusalem
We live in eschatological tension, the choppy water as the values of God's future kingdom continue to break into this present evil age via the medium of God's subversive new community, the Church. On one hand the world seems hell-bent in its technological pretensions in building towers up to heaven (Genesis 11:4), technology as master rather than servant. On the other hand the new Jerusalem beckons, a reminder that the right use of technologies is part of our Christian discipleship and that the best of human creations are going to find in that city a permanent home. This eschatological tension is reflected in every aspect of technology that we have considered: in its dramatically opposing good and evil uses; in its social and anti-social implications; in its immediate impact contrasted with its distant consequences; and in its capacity to be functional, beautiful and appropriate rather than ugly and rapacious.

Liberated from slavery to technology, we bring glory to God as we subdue the earth, practising wise stewardship of all the good materials that he has made. This is worship at the coalface. On the road from Babel to Jerusalem we need to be very practical: are we using technologies optimally for God's kingdom in our families, our churches and our communities? This means: are we caring for the poor by going by bike (whenever feasible) rather than in a petrol-guzzling car that contributes to global warming? – and a thousand other tiny practical steps. God values his world of materials that he has crafted with such wisdom and our Christian worship includes using those materials wisely for his glory, with careful precision and an eye to beauty, remembering his relational priorities for a needy world.

Acknowledgements

23 D. Gelernter, *Machine Beauty*, New York: Basic Books, 1998, p.132.

24 E.F. Schumacher, *Small is Beautiful*, London: Blond & Briggs, 1973.

25 A. Bhalla, 'Technology Choice and Diffusion', in J. Salomon et al. (eds.), *The Uncertain Quest: Science, Technology and Development*, Tokyo: United Nations University Press, 1994.

26 www.nottingham.ac.uk/~eaxhtv/ATR/

27 M. Qaim and D. Zilberman, 'Yield effects of genetically modified crops in developing countries', *Science* 299, pp.900–902, 2003.

28 *New Internationalist*, 353, p.20, 2003.

29 'The use of genetically modified crops in developing countries', The Nuffield Council on Bioethics, 2003, www.nuffieldfoundation.org

30 J. Calvin, *Commentary on Genesis*, (first Latin edn. 1554; first English edn. 1578, present translation 1847), repr. Banner of Truth, 1965.

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