Theological Issues in a Computerized World
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Thomas Wm. Madron, Ph.D.
Email: tmadron@ewc-inc.com
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Introduction

Although I possess a Ph.D. in political science (with a major area in traditional political theory), and an M.Div., I make my living doing consulting in computer networking. This has always seemed to friends and colleagues as a background somewhat fraught with inconsistencies. People in both traditional political theory and in theology tend to be highly suspicious of computers and related automation even as they are using word processors and email. This essay, while not, unfortunately, placed in a systematic theoretical or theological context, is an effort to survey and comment on the relationship of computer and communications technologies with theology.

There is considerable confusion evident in what should be an appropriate response of theology to technological change as well as confusion concerning an appropriate response of technology to theology. In this context I am using the word "technology" to mean the application of "scientific method and material to achieve a commercial or industrial objective" as well as in the anthropological sense of that "body of knowledge available to a civilization that is of use in fashioning implements, practicing manual arts and skills, and extracting or collecting materials." Only a small period of thought concerning these two definitions will suffice to see where some of the confusions may arise.

Writers on ethics and technology often exhibit a wariness of technology that may not be justified. Or perhaps the problem lies not with technology but with ethics and theology. In times past it was thought that "most people most of the time have known–or have believed that they knew–what is good and right. The moral problem was the will to do the right" (Roger Shinn, *Forced Options: Social Decisions for the 21st Century* [New York: The Pilgrim Press, 1985], p. 11). Shinn further notes (pp. 11-12), however, that "In our time there has been an increase in the number of issues on which people are genuinely perplexed about the right answer." This means that technologies of all kinds offer new possibilities for action "and some of the possibilities are loaded with both peril and promise." Jacques Ellul has asserted that in a technological age we tend to lose sight of ends–everything becomes means. Optimists, Ellul claims, see the new technologies as the basis for a "new humanism," but, he says, this is merely a "pious hope with no chance whatsoever of influencing technical evolution. The further we advance, the more the purpose of our techniques fades out of sight." (Jacques Ellul, *The Technological Society* [New York: Vintage Books, 1964], p. 430.)

The somewhat academic concerns evidenced by Shinn and Ellul are reflections of more popular distrust of technology. For example, Martin Van Buren, then Governor of New York, on January 31, 1829, wrote to President Andrew Jackson that the "canal system of this country is being threatened by the spread of a new form of transportation known as 'railroads.'" Van Buren went on to say that "carriages are pulled at the enormous speed of fifteen miles per hour by 'engines' which, in addition to endangering life and limb of passengers, roar and snort their way through the countryside, setting fire to crops, scaring the livestock, and frightening women and children. The Almighty certainly never intended that people should travel at such breakneck speed."

When we are pessimistic about something we too often dream up a theological "reason" for not pursuing a course of action. I must confess, I place myself among those "optimists" that see in technology the tools for pursuing Wesley's admonition to do all the good we can.

As a Methodist and at least something of a Wesleyan scholar (my dissertation was entitled, *The Political Thought of John Wesley*), my reading of Wesley never suggested anything that might imply a problem for Christians regarding technological development. After all, Wesley's first book was a textbook on logic which he later followed up with his *A Compendium of Logic* (1750). Throughout his ministry Wesley became interested in many technologies, often with a desire to provide useful and inexpensive medical treatments for the poor. The obvious examples include *The Desideratum: or, Electricity made Plain and Useful. By a Lover of Mankind, and of Common Sense* (1760) and *Primitive Physic: or, an Easy and Natural Method of Curing most Diseases* (1791, first published, 1747). Like most upper-class English persons of his time he had a wide-ranging interest in a variety of developing issues and his "practical theology" rarely gave way to some of the introspection in which we engage today.

Wesley popularized many things, including some elements of technology. He was, for example, concerned about getting information out to people concerning potential applications of technology. For Wesley these things were important for ethical and moral reasons because he saw helping others as one means for fulfilling ministry. He expressed it himself in the preface to the *Desideratum*, for he hoped that someone "who has more leisure and ability than me would consider it more deeply, and write a full practical treatise on electricity, which might be a blessing to many generations." (*Works*, Vol. XIV, p. 244.) The point of all this is that Wesley was not afraid of technology. Rather, he was concerned about how technology could be used to help people.

On the theological side, we can probably deal with technology when we view theology in the context of a "rational inquiry into religious questions," but are likely to have serious problems if we understand theology to mean a "system or school of *opinions* [emphasis mine] concerning God and religious questions." On the one hand questions arise such as "will a sentient computer have a soul?," or "are we usurping God's creation by cloning (either humans or at all)?" Then when we see rampant overpopulation taking place we might wish to ask "which is more to blame, theology or technology?" On the other hand the questions also include such things as "are technological solutions available for identifiable and solvable problems for which there is widespread agreement on the moral/ethical issues involved?" Or, "will theology allow technological solutions only for trivial problems?"

Because my primary technological expertise is with computers and networking, I will focus on that aspect of technology. The theological relevance of and relationship to computer technology tends to fall in areas of moral and ethical concerns regarding the use of the technology although there are also traditional issues that might be addressed, such as, "what is the church?" or "can we have a virtual liturgy?". There are, however, both more trivial and more important long-term ethical, theological, social, and political issues. Networking, for example, relates to some of the

other issues of the Institute, such as globalization.

As I noted above, there are also some issues that relate to the church as an institution. Can there be such a thing as a "virtual congregation?" In an evangelical context, can we establish virtual congregations that have all the authority and impact of physical congregations? Would it still be the church? If there can be a virtual congregation, can there be "virtual sacraments?" These questions arise out of experiences I have had as a long-term consultant with the General Board of Global Ministries of the United Methodist Church where the use of computing has had a varied history. How can local churches assist people in using computer and networking technology? One of the rather vexing issues regarding computer technology is that it is unequally distributed between poorer and more well-to-do segments of U.S. and other societies. This "digital divide," the discrepancy between rich and poor regarding access to computers and the Internet, does seem to be decreasing in the United States but continues to be a problem among the poorer nations of the world (see http://www.ntia.doc.gov/ntiahome/dn/index.html). Even in the U.S., however, not all problems have been resolved (see http://www.ntia.doc.gov/ntiahome/net2/falling.html).

Several of these issues will be evaluated more extensively below. While I would like to answer all these questions definitively, this paper is likely to raise more questions than it answers, but perhaps the raising of questions will be the most useful outcome.

The Issues: How does Computing and Networking Technology Interact with Theology?

First, many of the issues I am about to raise are not new. Some, in fact, go back well into the middle ages and before. Second, there tends to be overlap between computer technologies and other technologies from the standpoint of impact on other aspects of society. Third, some of the issues raised by computer technology concern ethics, which I take to be a subset of theology in general. These are not questions unique to the 21st or even the 20th Centuries. The first thing I would like to do is to identify the theologically and ethically relevant components of computer technologies.

Computers (hardware and software) *per se*

The earliest definition of *computer* seems to date from about 1646 and that term was defined as "one that computes." In fact, Grace Murray Hopper's (the originator of the programming language, COBOL) job title when she became a programmer in the 1950s was "computer." Today, of course, we define *computer* as "a programmable electronic device that can store, retrieve, and process data." A computer is distinguished from a calculating machine, such as an electronic calculator, by being able to store a computer program (so that it can repeat its operations and make logical decisions), by the number and complexity of the operations it can perform, and by its ability to process, store, and retrieve data without human intervention. While the older definition referred to the behavior of a human being, and the latest definition refers to a

machine, with a little imagination we can see that there might be overlap and perhaps uncertainty in these definitions. So too with our understanding of the way in which computers are programmed with software, where *software* is defined as "the entire set of programs, procedures, and related documentation associated with a system and especially a computer system." Yet, today, we routinely refer to some behaviors of humans as being a function of the software of the brain.

In one sense we can trace the beginnings of computer technology back to the invention of the Abacus in fourth century B.C.E. Babylonia. There was probably someone back then that raised questions about the use of mechanical devices to do what some god had endowed humans to perform. More recently were inventions by Wilhelm Schickard, who built the first mechanical calculator in 1623 and Blaise Pascal who built a mechanical calculator in 1642. These devices, which had limited capabilities, could do the basic arithmetic functions of addition, subtraction, division, and multiplication. Modern notions of computers, however, were first set forth in mid-19th Century England by Charles Babbage and Ada Augusta Byron King, the Countess of Lovelace. Although sometimes called the "Father of Computing," there is some doubt about applying such a title to Babbage since most of the modern developers of computers in the 1940s and 1950s had never heard of him. Another point of debate is whether Babbage was really talking about a computer at all since it is unclear whether he had designed a system with stored program capabilities (a requirement for a modern computer). There is no doubt from the writings of Ada, however, that she thought the system would have such a capability.

Charles Babbage was born the same year John Wesley died, 1792. An English mathematician and inventor, he devoted most of his life and expended much of his private fortune and a government subsidy in an attempt to perfect a mechanical calculating machine, called the Analytical Engine, that foreshadowed present-day computers. His chief collaborator, and the person sometimes called the first programmer, was Ada King, daughter of George Gordon Noel Byron, 6th Baron, 1788-1824, English poet and satirist. Ada, as the wife of William King, the Earl of Lovelace, held the title of Countess of Lovelace. Ada was not only Babbage's chief programmer, she was also his chief interpreter. Ada, perhaps as well as anyone, and better than most, once stated the issue that often makes theological conservatives the most nervous: "... those who thus think on mathematical truth as the instrument through which the weak mind of man can most effectually read his Creator's works, will regard with especial interest all that can tend to facilitate the translation of its principles into explicit practical forms." (As quoted in Betty Alexandra Toole, *Ada: The Enchantress of Numbers* (Mill Valley, CA: Strawberry Press, 1992), p. 181.)

Ada's comment was an excerpt from an extensive set of notes explaining aspects of Babbage's Analytical Engine and its differences from earlier calculating machines. From Ada's comment we can draw the following summary:

1. God's creation can be correctly interpreted and explained by mathematics [i.e., science] assuming we obtain sufficient information.

2. Computers can facilitate the translation of the mathematical explanatory terms into practical applications.

Thus computers can be a means for interpreting the creation perhaps more compelling (or as compelling) as the *Bible*.

What was merely speculation for Ada has, in our own day, become a reality. Computers have and are helping science to understand the universe. Ada's point-of-view is at odds with Creationism, for example, since Ada's perspective posits a natural explanation for the existence of the universe.

Faith does not have to be seen as being incompatible with science. *Science*, after all, is concerned with *explaining* the way in which the world or the universe works. People who lived in biblical times, or before, also wanted explanations about how the universe works but they did not have the tools or the knowledge to provide detailed explanations. It has taken thousands of years for humankind to develop those tools and we're not finished yet. Folks in earlier times, however, did the best with what they had. Whatever the tools we have available, however, what we now call science, merely fills in the blanks concerning the details of the way God created all things. Rather than being afraid of science, people of faith should embrace science.

Many religious people, and virtually all detractors of religion, tend to focus on the "wrong" meaning of "faith." They often assume that "faith" means "a strong belief in a supernatural power or powers that control human destiny", whereas the "correct" meaning for our purposes is faith as a "great trust or confidence in something or someone." Another way of stating the meaning of "faith" as "trust," is to look at it as another "way of knowing" things. John Wesley tended to interpret the word "faith" this way. The "scientific method" requires that we know things through the ability to observe them through measurement of some kind. This is sometimes interpreted to mean that facts are what we can see and touch, but that is not quite right. One reason why science seems to change (or scientific explanations change) from time-to-time is that our measurement abilities tend to improve over time. We develop new instruments and new understandings of what we are measuring with our instruments. This ability to measure phenomena is called "empiricism." That is one way of "knowing things." Wesley contended that "faith" is analogous to "empiricism" in that "faith" is also a way of "knowing things." In the case of Christianity it is a way of knowing God and knowing what God demands of us.

Regardless of the issues raised by technology generally--and computer technology in particular--regarding the relationship between the Creation of faith and the Creation of science, computers are a reality today and will not be going away very quickly. As we come to rely ever more heavily on computer technology in our information oriented world, we must confront other, less abstruse problems related to theology and ethics. Perhaps the most important issue that has come along is that as we depend more heavily on computers the distinction between the "haves" and the "have nots" of the world will become ever more pronounced. The use and deployment of

computers is limited to a large extent by socio-economic class. As the distance increases between rich and poor, and as the proportion of poor increases in the world's population, distribution of computers will increasingly be disproportionately high among the wealthier segments of the population. That is not, please take note, an argument for restricting computers. It is an argument for doing something about poverty, and more globally, the fundamental cause of poverty, over-population.

Other issues that raise potential moral, ethical, and theological issues include the claims that computers can produce greater productivity and enhancements to our leisure time. The productivity issue is particularly seductive because it sounds good without necessarily being good. In nations with rampant over population such as China and India, if a task that currently requires three people can be accomplished by one "more productive" person using a computer, is this at all helpful? What is needed in such a society is work for three people. Not a technological improvement that will allow one person to do the work of three while pauperizing the other two. This is in contrast to the situation in the developed world where a small minority of the world's population generates the wealth necessary for the production of the vast majority of the goods and services used by the entire world. In that kind of situation it is often necessary to improve individual productivity or the goods and services could not be manufactured.

There are undoubtedly other issues relating to computers *per se* I could raise, or that you can raise with me, but these will suffice to start us all thinking.

Data Communications and Networking

The development of computers was the fundamental breakthrough that was necessary for any of the remaining issues to have any meaning. The reason why practical computers were not developed earlier than World War II is that computing issues were not perceived to be problematic enough to require the expenditures necessary for their development. The reason Charles Babbage never completed his Analytical Engine was, in part, that he lost the funding he had from the British government. That funding was lost because there was no perceived need for computers at the time.

Of course, another reason why Babbage did not complete his Analytical Engine is that he, like most English upper-class inventors of the 19th century was a dilettante. Unlike people in the United States like Alexander Graham Bell and Thomas Edison, who both operated invention factories, Babbage tended to work on the Analytical Engine when he had time and interest. And time was part of the issue. Babbage was an inveterate party-goer. I t was not unusual for him to attend three or four major parties a week. This is in contrast to Bell and Edison who often worked around the clock. And Babbage must have had a more-or-less constant hangover. He also had a host of other interests.

In any event, Babbage's Analytical Engine was somewhat different than modern-day digital machines because it was all mechanical. Babbage knew about digital issues, however. At a

party he was attending in mid-century he met George Boole. Boole had only recently developed what we now call boolean algebra (or logic). Babbage was somewhat familiar with Boole's work and commented later that if Boole's work had been available earlier it would have revolutionized his own (Babbage's) thinking about the design of the Analytical Engine. Babbage discarded this fleeting notion, however, because he was too deeply invested in what he was already doing.

What boolean algebra can do is to allow the calculation of digital paths or switching circuits. This use of boolean algebra was not put to use until 1938 when Claude E. Shannon, an engineer at Bell Labs, published a paper on the application of boolean algebra to design and trace telephone relay (switching) circuits. Before that time such circuits were produced "by guess and by golly." This was important for the development of modern digital computers since they are essentially comprised of a set of switching circuits where each individual switch (bit) has either an "off" or "on" mode. This is essentially what Babbage seemed to understand about the utility of boolean algebra.

Babbage was also a friend of Michael Faraday (1791-1867, English scientist), the discoverer of electromagnetic induction (1831). From this stemmed a vast development of electrical machinery for industry, including the solenoid, and its close relative, the electro-mechanical relay switch. A solenoid is a coil of wire, usually in cylindrical form, that when carrying a current acts like a magnet so that a movable core is drawn into the coil when a current flows and that is used especially as a switch (a relay). In the United States Samuel Morse was busy developing a practical telegraph based on this technology. Had Babbage had the interest he could have pulled all this together and put together a "true" digital computer in the 1840s or 1850s. An electro-mechanical computer similar to that just described was actually produced during World War II, although it was quickly superceded by vacuum tube technology for the digital circuitry.

All of this is precursor to saying that *data communications* and *networking* could not (and did not) come about in their present form without working computers. *Data communications* is the transmission and reception of data, often including operations such as coding, decoding, and validation. This is, of course, closely related to *networking*. *Networking* may be defined as the exchange of information or services among individuals, groups, or institutions, and *computer networking* as the exchange of information through an electronic network among computers. The most famous computer network is the *Internet*, an electronic communications network that connects computer networks and organizational computer facilities around the world.

Not only was the development of the computer basic to information networking, so was the development of the telegraph and telephone networks which provided a fundamental means for computers to communicate with one another. Information networking, like everything else, has both positive and negative implications:

Positive aspects of information networking:

- Increases access to information.

- Supports globalization (assuming globalization is "good").
- Enhances the ability to communicate (such as email).
- Provides new opportunities for enhancing life.

Negative aspects of information networking:

- Increases the opportunities to get bad information.
- Decreases privacy.
- Provides new opportunities to for bad people to do damage.
- Increases discrepancies between rich and poor likely decreasing the opportunities of the poor even further.

Although some worry about the problems with pornography, the exploitation of children, and other issues in a highly connected civilization, I suspect that Wesley and most of the other enthusiastic pamphleteers of the eighteenth century would probably have been overjoyed by the Internet and the Web. The downside of all this is that as the economies of the world become ever more dependent on the very fast exchange of information, those left out of the information loop will become further alienated. This again has the capacity to increase the distance between rich and poor around the world.

Artificial Intelligence (AI)

There is no doubt that the existence of computers and networks have had an enormous impact on modern society. Other technologies have had, in their own times, significant social impact as well. What is different about computers, however, is that their capabilities continue to be expanded at a very rapid rate. One aspect of that expanding technology could have the potential for creating ethical and theological dilemmas as great as cloning or other aspects of biological technology. *Artificial intelligence* is a subset of software development and the term did not even exist until about 1956. It is a term that refers to the capability of a machine to imitate intelligent human behavior. Put a somewhat different way, it is a branch of computer science dealing with the simulation of intelligent behavior in computers.

If there is a "father" of artificial intelligence, it is Alan Turing (1912-54), British mathematician and computer theorist. During World War II, he was instrumental in deciphering German messages encrypted by the Enigma cipher machine. After the war, he helped design computers, first for the British government (1945-48) and then for the University of Manchester (1948-54). During this period, he produced a body of work that helped form the basis of the newly emerging field of artificial intelligence.

Turing developed a procedure (1950) to test (the *Turing test*) whether a computer is capable of humanlike thought. As proposed, a person (the interrogator) sits with a teletype machine isolated from two correspondents; one is another person, one is a computer. By asking questions through the teletype and studying the responses, the interrogator tries to determine which

correspondent is human and which is the computer. If it proves impossible for the interrogator to discriminate between the human and the computer, the computer is credited with having passed the test.

Unfortunately, the "if it looks like a duck, walks like a duck, and talks like a duck, then it is a duck" test is not necessarily definitive when it comes to the "intelligence" part of "artificial intelligence." *Intelligence* may be defined as the ability to learn or understand or to deal with new or trying situations. Another way of stating this is to view *intelligence* as the ability to apply knowledge to manipulate one's environment or to think abstractly as measured by objective criteria (such as tests). While it is pretty clear that there are presently no computers that can meet more rigorous tests of intelligence, the betting of significant numbers of people in the computer industry is that there will be computers with such capabilities within the next twenty to fifty years. This raises some interesting potential questions for theology, some of which will be taken up further in the next section on robotics.

The negative side of this issue is that intelligent software systems are most likely to have first use in weapons systems than anywhere else. In fact, some of the existing AI is already being used in that fashion. The use of truly smart machines, however, can also be of great potential use to the human race. Such machines would be able to navigate to places where human beings may never be able to go, to provide services to everyone that can now only be acquired by the rich and powerful. There are a few additional questions we might also wish to consider: Can computers get smarter than human beings (it depends on what is meant by "smart")? Can computers (or more accurately, computer software) become self-aware (a la HAL in *2001*)? If computers can become self-aware, will they have a soul?

Robotics

Generically, *robotics* is the technology dealing with the design, construction, and operation of robots in automation or the science and technology of general purpose, programmable machine systems. The term is derived from *robot*, a device that automatically performs complicated often repetitive tasks or a mechanism guided by automatic controls. Especially in science fiction a *robot* is a machine that looks like a human being and performs various complex acts (as walking or talking) of a human being; a similar but fictional machine whose lack of capacity for human emotions is often emphasized; an efficient insensitive person who functions automatically. We might say that contemporary robotics is the combination of automatons with artificial intelligence.

Another way of thinking about what a robot is, is to define it as a mechanical automaton designed to perform the work generally done by a human being. The Czech dramatist Karel Capek popularized the expression [from Czech,=compulsory labor] in his play *R. U. R.* (Rossum's Universal Robots), produced in Prague in 1921. Modern robotics has produced innumerable devices that replace human personnel and the term robot is used to designate much of this machinery. It is used frequently in fiction, referring to a self-controlling machine shaped

like a human being. While the concept has been the subject of stories since the *golem* of medieval times, it reached its greatest exposure in popular culture with the work of Isaac Asimov in the 1950s and the motion picture robots Robby in *Forbidden Planet* (1956) and C-3PO in *Star Wars* (1977).

Contrary to the image of robots in popular fiction as ambulatory machines of human appearance capable of performing almost any task, most contemporary robotic systems are anchored to fixed positions in factories where they perform a flexible, but restricted, number of operations in computer-aided manufacturing. Such a system minimally contains a computer to control operations and effecters, devices that perform the desired work. (See H. Moravec, *Mind Children* (1988); R. C. Dorf, *Concise International Encyclopedia of Robotics* (1990); J. T. Black, "The Design of the Factory with a Future" (1991).) Robots are widely used in manufacturing processes today and are finding increasing use in various forms of exploration.

The idea of an intelligent automaton is not new. In medieval Jewish legend, for example, an automaton like servant, called a *golem*, was made of clay and given life by means of a charm, or shem [Heb.,=name, or the name of God]. *Golems* were attributed in Jewish legend to several rabbis in different European countries. The most famous legend centered around Rabbi Loew, of 16th-century Prague. In one version, after molding the *golem* and endowing it with life, Rabbi Loew was forced to destroy the clay creature after it ran amok. (See J. Trachtenberg, *Jewish Magic and Superstition* (1939, repr.1961); M. Idel, *Golem* (1989). An updated version of the story has the *Golem* alive and well and living in cyberspace. See for example:

http://www.ced.appstate.edu/projects/fifthd/aboutgolem.html

The *golem* stories, as with the fictional treatment of robots today, may have a variety metaphorical implications that have theological significance. As Rachel Strasser (see *An anomalous Genesis: metaphor and implication in the creation of the golem* (1999)) has noted, by "examining the incomplete mappings from the Creation of Man by God to the creation of the golem by Man and the variant implications and independent metaphors within the opposed cases, a deeper, mythic description or re-description of reality emerges from the chains of literal language." If you wish to build your own *golem* you can find the instructions at:

http://golem.plush.org/instructions/index.html#clay

In one sense robotics is an extension of automated processes that were part of the foundation of the industrial revolution. The difference between early automation and contemporary automation is the intelligence of the machine. One emendation of the idea of a robot is the notion of a *cyborg*. A *cyborg* is a bionic human. However, the issue for theology is similar to the issue of cloning human beings: that is, does the creation of a self-aware, mobile, possibly self-reproducing intelligent machine usurp the prerogatives of God? If we determine that the answer to that question is a resounding "No!", then the question becomes, can that same machine have a soul?

The issues raised in this section are obviously not new, although I have yet to see them addressed coherently from a *theological* perspective. The father of cybernetics, Norbert Weiner, in *God & Golem, Inc - a comment on certain points where Cybernetics Impinges on Religion* (Cambridge MA: MIT Press, 1964) noted in his final chapter, "I have now run through a number of essays that are united by covering the entire theme of creative activity, from God to the machine, under one set of concepts. The machine, as I have already said is the modern counterpart of the Golem of the Rabbi of Prague." This identity of machine and *golem* is not widely recognized in theology (and, I have found, opposed by some), but it is nevertheless an important issue with theological implications. Perhaps, after all, it is still a matter of how we regard our faith, or as Weiner suggested in *The human use of human beings* (London: Sphere, 1968 (1954)), "A faith which we follow upon orders imposed from the outside is no faith, and a community which puts its dependence upon such a pseudo-faith is ultimately bound to ruin itself because of the paralysis which the lack of a healthily growing science imposes upon it".

Nano-Technology

A more recent technological development from all those already discussed (dating from about 1987) is that of *nano-technology*. *Nano-technology* is the art of manipulating materials on an atomic or molecular scale especially to build microscopic devices (as robots). NASA has an active nano-technology program and sees great payoffs for the technology over the next fifty years. Nano-technology is the creation of functional materials, devices and systems through control of matter on the nanometer length scale (1-100 nanometers), and exploitation of novel phenomena and properties (physical, chemical, biological) at that length scale. According to NASA, for comparison, “10 nanometers is 1000 times smaller than the diameter of a human hair. A scientific and technical revolution has just begun based upon the ability to systematically organize and manipulate matter at nanoscale. Payoff is anticipated within the next 10-15 years.” (See http://www.ipt.arc.nasa.gov/nanotechnology.html).

Why Nano-technology at NASA? The following is a list NASA believes answers this question:

- Advanced miniaturization is a key thrust area to enable new science and exploration missions
- Ultra-small sensors, power sources, communication, navigation, and propulsion systems with very low mass, volume and power consumption are needed
- Revolutions in electronics and computing will allow reconfigurable, autonomous, "thinking" spacecraft
- Nano-technology presents a whole new spectrum of opportunities to build device components and systems for entirely new space architectures
- Networks of ultra-small probes on planetary surfaces
- Micro-rovers that drive, hop, fly, and burrow
- Collection of micro-spacecraft making a variety of measurements

The difference between nano-technology and the others is that while nano-technology may generally flow from computer technology, nano-technology devices may also be generated from

biological entities and therefore become a kind of "designer virus" engineered to perform specific functions in an animal or human bodies.

I'm not very certain what the ethical and theological questions might be relating to nano-technology. If it proves feasible, as some think, then doing engineering to enhance the human body will inevitably have all the problems of the other technologies. The poor of the world will likely not have access to whatever good such technology can bring. On the plus side, this technology may be useful in eradicating selected diseases, increasing longevity, and in altering or improving selected brain functions. If this happens, however, it must be against the backdrop of an over-populated world and this leads to its own set of issues.

Applications

All of the foregoing is a kind of extended preface to the consideration of how, when, where, and why to use modern computer technologies and when do these technologies generate ethical, moral, and theological issues or problems. In this section I will try to briefly outline what I see as some of the answers to the "how, when, where, and why" questions.

Computer Technology and its Output

With computer technology, and probably with all technologies, there are various categories of ethical and moral concern. Ada King, as the "first programmer," was concerned about ensuring accuracy from a programming perspective and regarded that a moral imperative. It is today what we call "quality control" in system design and implementation. Otherwise, the "programmer" will foist inadequate products, and more importantly, incorrect data and analysis, on the public. Today, at least in the United States, there is a major concern about the impact of other kinds of information being distributed electronically that goes beyond the merely incorrect. Such concerns center on issues of pornography, security, hate crimes, and other obviously moral issues. The problem here, of course, is that when it comes to the information produced by computer technology and other electronic means, then it often conflicts with other ethical and moral concerns, most notably in a free society, the issues of free speech and freedom of religion. Theocracies, for example, can never be free or democratic for they never honor the rights of the minority.

What about Intelligent Computers?

Closely related to the issues about how we deal with the output of computer technology is the question, how do we deal with truly intelligent computer technology? Foregoing for the moment the problem of whether it is even theoretically possible to produce an independent, self-aware, learning, automaton (an intelligent computer or robot), it is of some serious concern. Again, this issue is not new. I have already mentioned the myth of the *golem*, that comes from the middle ages. Even more famous is the tale of Frankenstein, published in 1818. It is the story of a German student who learns the secret of infusing life into inanimate matter and creates a monster

that ultimately destroys him. So far, the themes of the *golem* and Frankenstein are similar: when humans ape God by trying to create life, then it is a self-destroying activity. Similar themes have been sounded regarding robots in modern science fiction. On the other hand, in the robot novels of Isaac Asimov and as robots are depicted in *Star Wars* films, robots tend to be benevolent. And therein lies the moral dilemma: is technology, even intelligent technology, inherently destructive for humankind or does it simply assist humankind to fulfill the missions God has commissioned us to undertake?

Computers in the Church

In the developed world virtually all institutions, including the Church, make use of computer technology largely as an extension of the printing press. In Methodism this certainly is a direct extension of Wesley's interest in printing and in Methodist involvement in printing for its entire history. In Wesley's day the printing press was often used to produce not only useful and entertaining literature, but also vitriolic diatribes (of which Wesley was sometimes the object), salacious materials, and materials designed to promote various causes. All of this is consistent with the use of the World Wide Web in our own day. Perhaps the major difference between traditional printing and electronic publishing is that with publishing information on the web it is theoretically possible to reach more people in a shorter period of time at a considerably lower cost. Churches, of course, are not unaware of this capability even though this is a development that has taken place largely since about 1990. Suffice it to say that the same freedom that allows religious organizations to disseminate their messages also allows the dissemination of anti-religious, scurrilous, salacious, incorrect, and other negative publications as well. With respect to the use of computers in the church, however, there are some interesting avenues that we might pursue that are somewhat out of the ordinary.

A Virtual Congregation?

Can there be a "virtual congregation?" If so, then we should probably consider the possibility of "virtual sacraments" delivered via the Internet. In March, 1991, I (as a consultant to GBGM) was asked to put together a proposal for a "bulletin board" service called the *Computerized AIDS Ministries Network* (CAM). In 1991 the Internet was still not widely available and was expensive to access. The alternative was a "bulletin board system," which was (and is) a computer, and associated software, which typically provides electronic messaging services, archives of files, and any other services or activities of interest to the bulletin board system's operator. They became popular among hobbyists in the late 1970s and early 1980s. They originally were accessed directly through dial-up telephone lines and later they were connected to the Internet. In June 1993 the basic CAM system became operational and shortly thereafter Dr. Nancy Carter was brought in, as another consultant, to do the day-to-day work of providing content for and oversight of the system. Web technology, as it progressed, ultimately superceded the concept of bulletin boards, although the idea still exists in such services as AOL and in email-based discussion groups and chat rooms. While CAM in its original format no longer exists, it does continue on the Web as an email-based discussion group at

http://list.gbgm-umc.org/scripts/lyris.pl?enter=cam.

CAM was originally conceived as a service for getting information out to AIDS counselors in a timely fashion from GBGM's Health and Welfare Ministries unit. Very quickly, however, the most frequently used section of CAM became the discussion groups that included not only AIDS counselors, but also persons with AIDS and family members of persons with AIDS. Dr. Carter (an ordained United Methodist pastor) became very active in overseeing those discussions and over time came to exercise pastoral functions regarding members of CAM. This became particularly apparent when Dr. Carter was asked to conduct at least one funeral service for a member of CAM who had died from AIDS. Dr. Carter has written up a detailed account of this particular episode, "Welcoming Angels Through Computerized AIDS Ministries" (see http://gbgm-umc.org/cam/camangel.html).

At its height, in the mid-1990s, CAM had a membership of about 1,500 more-or-less regular users. CAM, for a time, functioned essentially as a congregation, particularly for those with AIDS who were home-bound and the members of the CAM discussion groups functioned as an extended support group for those people. As the AIDS crisis diminished in the United States the various AIDS bulletin board systems that were established during the late 1980s and early 1990s all disappeared, with CAM being about the last to go. I might point out that on the Web a number of web sites are now pushing the concept of building virtual "communities" which is something a revitalization of some of the bulletin board activities, and this has potential for development of church Web services. A "community" can be defined as a body of persons having a common history or common social, economic, political or religious interests. But can there be a "virtual congregation?" The experience with CAM suggests the answer is "yes."

Along the way with CAM Dr. Carter and I, along with others involved in the project, discussed the possibility of delivering the Eucharist electronically. There were serious differences of opinion among us on this issue and we never seriously tried it, although the possibility for a church to do so is, it seems to me, still on the table, particularly for those denominations with relatively weak theologies of what the Eucharist is all about. From a theological perspective the major issue would seem to be the consecration of the elements of the Eucharist. If recipients were asked to provide the bread and wine (grape juice), a procedure could be developed for an appropriate person to deliver (electronically) a prayer of consecration. The other elements of a Eucharistic liturgy would be relatively easy to develop for administration through a web site. To be true to standard, historical liturgies, however, the process would have to be interactive. A vexing question with all this is, could the process, including the prayer of consecration, be delivered entirely by a computer system (without a live clergy person)? In the United Methodist Church we already allow lay people to take previously consecrated elements of communion to shut-ins and to administer communion to those people. Is the administration of communion by a computer and communication system any different?

The reason I raise the question of the Sacraments via electronic means is that it is clear that we can build virtual communities. CAM was clearly a *community*. A "community" is not

necessarily a "church" (or congregation), however. One way of defining a "church" is to suggest that it is a community with common worship and administration of the Sacraments. Of course this is not a universally accepted notion of what constitutes a church (or "the church"). Nancy Carter has pointed out (personal communication, July 28, 2002) that in her view what makes a "congregation is that the Presence of Christ is among the people, that it is the Body of Christ, and that it is a community." My own view, which is one I believe I share with John Wesley (and probably both the Anglicans and Roman Catholics), leans toward the necessity for the administration of the sacraments. In any event, the issue of the nature of the church is obviously a theological issue that interacts with how we might regard a virtual community. Carter's perspective, by the way, is that "CAM was a church congregation." At least one of the members of CAM joined the UMC and received a call to the ministry as a byproduct of his membership in CAM.

Whatever our views might be regarding the nature of the church, however, I am convinced that the ability to deliver the sacraments to a virtual community would enhance the character and quality of that community. If we can overcome inherited "prejudices" regarding the administration of Communion and Baptism we might be able to develop liturgies that can be administered electronically and perhaps even entirely by a computer system. Suffice it to say that this presents some interesting, and probably for some, formidable, theological issues. It should be remembered, however, that in Methodist history some of Wesley's activities were considered at the time to be outside the norms of what the church then represented (or the way it represented itself). The same could be said of the new churches formed during the Reformation and certainly the early church in its early relationship with Judaism faced the same sort of problem. Although these examples do not represent intrusions of technology, they do represent doing traditional things a different way and that, perhaps, is the constant problem facing those who would use technology in a creative manner.

The Church's Role in Computer Literacy

The Sunday School movement of the 19th Century, while centered in the churches, was to a large extent an effort to improve literacy. Something similar exists today with those who know nothing about the technology being in a state of computer illiteracy. In the developing world this may be almost entirely economic. In the developed world the effort to improve "computer literacy" may be as much generational as it is economic. Whichever the case, generational or economic or both, the Church may have a role in taking computers and networking to people who cannot otherwise connect with the technology. In the church where I am a pastor we have, for example, set up what we call an "Internet Café," where we make networked computers available to anyone who would like to use them, and provide instruction for those who need it. Because we have an aging congregation we were particularly concerned about those older folks who would like to communicate with distant family and friends.

In the United States, and perhaps in other places, this may be a short-lived experiment since not only is the technology being deployed every more widely in schools, but also in public places like

public libraries. Today most public libraries in the United States have public use computers connected to the Internet and in other places commercial Internet Cafes provide public access. The problem with the public libraries is that they have limited resources and this may become more of a problem as populations increase. In the developing world, the problem is more severe because electronic communication is often very expensive compared with availability in the United States and Europe. Sometimes it may not even be available at all. Perhaps as part of missionary activities denominations could look at the possibility of underwriting access to computers and to the Internet through subsidizing such activities *in local churches*.

On a somewhat more mundane issue, the church could also help as an educational resource regarding email etiquette or "netiquette." Unfortunately church people are often the worst when it comes to using common sense and good manners on the Internet (there are other candidates for this honor, of course). There is already a good body of literature on the Internet providing guidance to people concerning what might be termed the "manners and morals" of network communication. A quick and partial list is the following:

http://www.iwillfollow.com/email.htm
http://www.emailaddresses.com/guide_etiquette.htm
http://www.emailreplies.com
http://www.dynamoo.com/technical/etiquette.htm
http://www.lepak.com/emailet.html
http://www.onlinenetiquette.com/
http://songweaver.com/netiquette.html
http://www.fau.edu/netiquette/net/elec.html
http://www.imaginarylandscape.com/helpweb/mail/polite.html
http://www.fau.edu/netiquette/net/netiquette.html

It is not difficult to find out what is appropriate, legal, and by implication, moral in the use of email on the Internet. It is just that people do not bother to find out. Good manners are always a good thing, but sometimes good manners appear to be going the way of the dinosaur.

Concluding Observations

What I have tried to do in this paper is to raise what I see as some of the relevant issues regarding the use and abuse of computer technology and how those issues relate to issues of theology and ethics. In a short paper I have not been able to cover everything nor have I been able to provide many answers. Fundamentally I would argue that we should not be afraid of technology. Rather, we should embrace it and use it as a way of increasing our ability to take the Gospel to the world. On the other hand, we may need to help overcome issues of technological injustice where people are prevented from having access to the technology because of economics or political oppression. Computer technology, in particular, has the promise for helping us resolve some of these issues even as it may help us raise issues that need to be raised. Fundamentally, if our theology is good, our use of *technology* will be good: we will follow the laws of God in using computers and other

high-tech devices.

In particular, it is important that we not become latter-day Luddites. Luddites, you may recall, were bands of workingmen in the industrial centers of England who rioted between 1811 and 1816. The uprisings began in Nottinghamshire, where groups of textile workers, in the name of a mythical figure called Ned Ludd, or King Ludd, destroyed knitting machines, to which they attributed the prevailing unemployment and low wages. In 1812 workers in Lancashire, Cheshire, and the West Riding of Yorkshire began to wreck cotton power looms and wool shearing machines. Rather, we need to focus (as Ellul reminded us) on ends as well as means. Both the ends and means of technology can have ethical and theological implications. We need to apply ourselves to understanding how we can use technology in ethically and theologically appropriate ways rather than trying to suppress technology.

Online Resources for Computers and Social Justice

http://cyberethics.cbi.msstate.edu/biblio/part9.htm
http://cyberethics.cbi.msstate.edu/biblio/sec4.htm
http://www.centerx.gseis.ucla.edu/x/projects/xtech/dd.htm
http://www.ncf.carleton.ca/~at571/page10.html
http://dmoz.org/Computers/Ethics/
http://www.ccs.neu.edu/home/perrolle/book/chapter10.html
http://www.scotland.gov.uk/library3/social/sjan-00.asp
http://www.si.umich.edu/~pne/impact.htm