JUSTICE HORIZONS

"NU HOU KANAWAI"

TRENDS, RESEARCH FINDINGS AND EMERGING ISSUES

The Judiciary

Feature Emerging Issue:

THE RIGHTS OF ROBOTS: Technology, Culture and Law in the 21st Century

In the coming decades, and perhaps even years, sophisticated thinking devices will be developed and installed in self-propelled casings called *"robots."* Typically, robots are viewed as machines; as inanimate objects; and, therefore, devoid of rights. Since robots have restricted mobility, must be artificially programmed for *"thought,"* lack senses as well as the emotions associated with them, and most importantly cannot experience suffering or fear, it is argued that they lack the essential attributes to be considered *"alive."* However, the robot of tomorrow will undoubtedly have many of these characteristics and may perhaps become an intimate companion to its human counterpart.

We believe that robots will one day have rights. This will be an unprecedented historical event. Such an extension of rights obviously creates a future that will be fundamentally different from the present and the past. Moreover, the expansion of rights to robots may promote a new appreciation for the interrelated rights and responsibilities of humans, machines and nature.

CULTURAL PERSPECTIVES

The definition of rights has been historically problematic. In part, it is an unresolved problem because there are numerous disparate definitions of what constitutes *"rights."* These fundamentally different views are largely politically, institutionally and culturally-based. Those in or with power tend to define rights differently from those out of or without power. In addition, cultures from alternative cosmologies define natural, human and individual rights quite differently.

Historically, humanity has developed ethnocentric and egocentric views of rights. Many notions of *"rights"* reflect the 16th century view of Newton's clockwork universe and Descartes' rationality as well as the emerging Protestant ethic. The impact of such views upon thinkers of the Enlightenment such as John Locke, Jean Jacques Rousseau and Thomas Hobbes was profound. In **Leviathan**, Hobbes vividly illustrated the problem of existence. For Hobbes, life without legal rights (as provided by governing institutions) was one of *"continual fear, of violent death; with the life of man, solitary, poor, nasty, brutish and short."*[1] With the development of Western capitalism and rationality, man suddenly assumed dominance over nature and replaced God as the center of the universe. Thus, natural rights of man became institutionalized, bureaucratized and formalized and like legal systems developed along rational lines to provide the necessary stability and predictability for the growth of market capitalism.

Other cultures, however, provide a different if not fresh perception of the meaning and purpose of rights that is in marked contrast to the historical and present Western position. For example, American Indian Jamake Highwater states in **The Primal Mind**, *"whites are extremely devoted to limiting the rights of individuals and preventing anarchy, which is greatly feared in individualized cultures...by contrast the Indian, generally speaking, does not recognize the individual and therefore has not formulated strict regulations for its control."*[2]

The American Indian recognizes the collective. This collective is more than the aggregate of individuals in his tribe. It is rocks, trees, sacred grounds, animals—the universe itself. Thus, for the Indian there exists a harmony between Nature and the individual; a relationship characterized by sharing, caring and gratitude, not dominance.

Social philosopher, activist and mystic P.R. Sarkar states in **Neo-Humanism: The Liberation of the Intellect**[3] that we must develop a new humanism that transcends the narrow outlooks of the ego. We must transcend our attachments to our nation, to our religion and to our class. In addition, humans must include animals and plants and all of life in definitions of what constitutes the *"real"* and, thus, *"significant."* We cannot neglect the life of animals and plants. Of course, this is not to say that there should not be hierarchy among species especially as human life is rare and precious; still, our economic development decisions, our food decisions must take into consideration plants and animals as participants. The rights of technology is a legitimate concern from the Eastern perspective because all-that-is is alive. The universe is alive.

Sarkar also predicts the day when technology will have *"mind"* in it. While this may seem foreign to the Western notion of mind, for Sarkar *"mind"* is in all things. Evolution is the reflection, the development of this mind towards total awareness, towards

Continued on page 2

ROBOTS *from page 1*

Godhood, self-realization. Humans in general have the most developed mind, animals less, plants even less and rocks the least. Once technology can develop and become more subtle, then it, like the brain, can become a better carrier of the mind. Mind is constantly *"looking"* for vehicles to express itself. Nothing is soulless, although there are gradations of awareness.[4]

NATURE AND ROBOTS

Of course, at present the notion of robots with rights is unthinkable, whether one argues from an *"everything is alive"* Eastern perspective or *"only man is alive"* Western perspective. In **Should Trees Have Standing?—Toward Legal Rights for Natural Objects,** Christopher Stone argues,*"throughout legal history, each successive extension of rights to some new entity has been, theretofore, a bit unthinkable. We are inclined to suppose the rightlessness of rightless "things" to be a decree of Nature, not a legal convention acting in support of some status quo."*[5]

Stone reminds us of the obvious but easily forgotten. Human history is the history of exclusion and power. Humans have defined numerous groups as less than human: slaves, woman, the *"other races,"* children and foreigners. These are the wretched who have been defined as stateless, personless, rightless, or suspect. This is the present realm of robotic rights.

We are not arguing that robots should have the same rights as humans, rather, that they should be seen as an integral part of the known universe. Though we are not advocating the worship of technology, however, with *" the genie of technology having been let out the bottle [it] cannot be force(d) back in."*[6] *"There are 222,000 robots now working in the world. Japan has taken the lead with sixty five percent of the total. The U.S, second in robotics, has approximately thirteen percent."*[7] The U.S. lags in numbers as it emphasizes long-term capabilities and research versus Japan which emphasizes immediate applications. The sophistication of these robots varies from assembly line welding to fire fighting yet the numbers are growing and social, cultural and legal planning for robots must be attempted.

ARE ROBOTS ALIVE?

Robots presently are construed as dead, inanimate. However, an argument can be made that with advances in artificial intelligence, robots will be considered *"alive."* Sam N. Lehman-Wilzig in his essay titled *"Frankenstein Unbound: Towards a Legal Definition of Artificial Intelligence"*[8] presents evidence that Artificial Intelligence (AI) machines already created or theoretically possible will be, by most definitions, alive.

By any definition, the present powers of AI machines are both impressive and worrisome. Cyberneticists have already created or proven that AI constructs can do the following:[9]

(1) *"Imitate the behavior of any other machine."* [10]
(2) Exhibit curiosity (i.e., are always moving to investigate their environment); display self-recognition (i.e., react to the sight of themselves); and manifest mutual recognition of members of their own machine species.[11]
(3) Learn from their own mistakes.[12]
(4) Be as *"creative"* and *"purposive"* as are humans, even to the extent of look[ing] for purposes which they can fulfill. [13]
(5) Reproduce themselves, in five fundamentally different modes, of which the fifth—the *"probabilistic mode of self-reproduction"*—closely parallels biological evolution through mutations (which in the case of [machines] means random changes of elements), so that *"highly efficient, complex, powerful automata can evolve from inefficient, simple, weak automata."*[14]
(6) *"Can have an unbounded life span through self-repairing mechanisms."*[15]

In short, *"a generation of robots is rapidly evolving, a breed that can see, read, talk, learn, and even feel [emotions]."*[16]

However compelling the arguments against robots-as-humans, they may lose some of their instinctive credibility once computers and robots increasingly become a part of our life, as we slowly renegotiate the boundaries between *"us"* and *"them."* These boundaries will be significantly reduced as robots in human form (voice, smell, sight, shape, texture, color)—androids—are developed.

Hans Moravec, director of The Robotics Institute at Carnegie Mellon University, notes a particularly novel progression of robotics to a *"**Post-Biological** future stating that eventually intelligent machines could carry on our cultural evolution...our DNA will find itself out of a job having lost the evolutionary race to a new kind of competition."*[17]

SOCIAL/ECONOMIC ISSUES

Eventually, AI technology may reach a genesis stage which will bring robots to a new level of awareness that can be considered alive, wherein they will be perceived as rational actors. At this stage, we can expect robot creators, human companions and robots themselves to demand some form of recognized rights as well as responsibilities. What types of rights will be demanded? Basic human rights of life, friendship and caring? The right to reproduce? The right to self-programming (self-expression)? The right to be wrong? The right to intermarry with humans? The right to an income? The right to time off from the job? The right to a trial by its peers (computers)? The right to be recognized as victims of crimes? The right to protection of unwarranted search and seizure of its memory bank? The right to protection from cruel and unusual punishments such as the termination of its power supply?

Obviously, in the discussion of robot rights, questions concerning labor value are difficult to answer. Yet robots continue to replace their human counterparts on the assembly line at a rapidly increasing pace. They are replacing humans because of their high productivity and low cost. For example: though faster, robots do not tire; more reliable robots do not have family problems, drink or do drugs; robots are cheaper to maintain; and robots do not strike for wages and fringe benefits. *"Thus, the next industrial revolution will be based upon robot labor."*[18]

As robot technology develops, and as robots are utilized to increase humanity's collective wealth, their future will be inextricably tied to our future. Soon the initial question that will be raised is: how are robotic generated goods and services to be distributed in the community? The distribu-

tion of this wealth requires a new conception of ownership, production, and consumption. In a potential world without human toil some form of redistribution of wealth will be necessary. *"In Sweden employers pay the same taxes for robots that they do for human employees. In Japan some companies pay union dues for robots."*[19] Supporters of robotic rights might say that computers are paying these taxes and dues from their labor and should derive rights for such labor.

After questions of distribution of wealth come questions of ownership. In the very near future it is expected that computers will begin to design their own software programs. Considering the fact that, *"the Copyright Act limits copyright protection to the author's lifetime, which is clearly inappropriate for a computer, it would then seem that a change in the law may be needed to provide proper* ***protection for programs with non-human authors.***"[20]

Legal rights and responsibilities will then be needed to protect humans and robots alike. This need should give rise to a new legal specialty, robotic law. With this new specialty we may find lawyers defending the civil rights of self-aware robots which could take the following form: *"to protect the super-robot from total and irreversible loss of power (LIFE); to free the robot from slave labor (LIBERTY); and allow it to choose how it spends its time (THE PURSUIT OF HAPPINESS)."*[21]

NEW CASES

We will then see an avalanche of cases: we will have robots that have killed humans, robots that have been killed by humans, robots who have stolen state secrets, robots who have been stolen, robots who have taken hostages, robots who have been held hostage, robots who carry illegal drugs across borders, and robots themselves who illegally cross national borders. Cases will occur in general when robots damage something or someone or a robot itself is damaged or terminated. In addition, robots will soon enter our homes as machines to save labor, and as machines to provide child care and protection. Eventually these entities will become companions to be loved, defended and protected.

Robots that are themselves damaged or do damage or break human laws will raise various complex issues. Of course, at present, robot damage will be simply a tort case, just as if one's car were damaged. But an attorney will one day argue that the robot has priceless worth. It is not a car. It talks, it is loved and it *"loves."* Then the robot, like a human, has been injured. Its program and wires hurt. In this scenario, we will then need to have special tort laws for robots.

The legal system is today unprepared for the development of robotic crimes. Recently, the **Morbidity and Mortality Weekly Report** cited the first death caused by a robot. *"This accident occurred when a machinist at a Michigan company entered a robot's work envelope. Apparently not programmed to take human frailty into account the robot used its arm to pin the man to a safety pole killing him with the force."*[22] This case is considered an industrial accident and could have been possibly avoided if the robot had an improved sense of sight and more careful programing. In the future, robotic legislation may require laws similar to Isaac Asimov's *"First Law of Robotics "* that forbid the injury of humans by robots. These laws could be coded into the robots' memory such that robots will have to terminate themselves if a conflict arises. [23] However, we can easily imagine scenarios where a robot will have to choose between the life of one and many humans or situations wherein its own termination may cause further injury to humans. These issues and conflicts will tax programmers, the legal system and robots themselves.

Once robots begin to program themselves according to external stimuli, the robot may begin to commit crimes completely independent of earlier human programming. If a robot can commit a crime, then a number of problematic questions will arise. *"Can a robot intend to commit a crime? How is a robot to be punished? Is it sufficient to reprogram it? To take it apart? To penalize its owner? Its designer? Its manufacturer? Its programmer?"*[24]

Such questions also raise problems concerning criminal trials that involve robots. Many court procedures will need to be adapted to accommodate the needs of such cases. This situation will be exacerbated by the development of robots whoserve as witnesses or robots who provide expert testimony. Certainly, *"a trial by a jury of peers seems inappropriate and certainly the 6th and 14th amendments guarantee to such a trial do not apply to robots."*[25] Or do they?

"The development of robots and their emerging rights will have a significant impact on judicial and criminal systems and on the philosophical and political world views of our social institutions. ...*'[T]he question of rights'* in this new dimension presents the unique possibility to reconceptualize our very notion of *'rights'*."

The problem of punishment is also problematic. Robots in themselves have neither money nor property. One way would be to give the robot to the injured party for his economic use. Another would be to eliminate the robot or to reprogram the robot. This may be analogous to the present debate on the right of the fetus: is it alive? Do we have the right to terminate it? Also, who has the right to terminate a robot who has taken a human life, or a robot who is no longer economically useful? We would not be surprised if in the 21st century we have right to life groups for robots!

Another perspective and useful heuristic in understanding the rights of robots involves developing two continuums at right angles to each other. At one end of the x-axis would be life as

Continued on page 7

Social Theory:

"Crime Problems of the Future"
Richard A. Ball
World Futures
Vol. 21, 1985

Summary and Comments:

Ball argues that the future of criminality can be best understood through a historical analysis of the changing nature of the **self.** He defines self as a system of functions operating toward the integration of experience.

For Ball, there is a direct relationship between crime and individuation. Early woman and man lived in a condition where the group was more **real** than self. In 18th century Europe the self became differentiated from society as individualistic concepts such as private property, and other *"natural"* rights arose. During that time, the self was integrated and criminality was thought of as largely biological (*"the dark organic urges of the Freudian Id"*). Law as a tool of social constraint was largely then concerned with sexually deviant behavior.

However, at present, because of rapid economic and political innovations, changes in the nature of the family, and the decline of religion, the individual or essential self is suffering a breakdown, such that incidental or fragmented selves—*"combinations of belief and emotional involvement, each of which could readily be abandoned for another"*—are being created.

This process is related to the movement towards a mass capitalistic society; a society where individual selves have little input into the collective. This is dissimilar to tribal society where there was a more balanced receiver/communicator ratio. These societal changes have led to alienation: powerlessness, meaninglessness, social isolation and self-estrangement. Thus, the *"real"* self of antiquity has been displaced by the *"temporary"* selves of modernity.

For individuals to survive in a society based on economic exchange relationships, communications become *"impression management"* where one manipulates through a variety of cultivated incidental selves deemed appropriate for the moment.

Given the breakdown of the *"real"* self into incidental or fragmented selves, *"we may expect an increasing search for experiences which can validate personal existence by permitting the individual to feel 'fulfilled' or at least 'alive'."*

Given the rigidity of the legal structure and the loss of a *"permanent self,"* we should then expect the categories of violence, sexual behavior, and psychoactive substances to increase in activity. In addition, we should expect to see an increase in dramatic criminality—terrorism, for example. With the self breaking down, we will see the development of experimental selves or temporary states of awareness. This development counters the commitment of law and the essential, integrated self which is *"more or less committed to the defense of one general mode of [awareness]."*

"...the real self of antiquity has been displaced by the temporary selves of modernity...how [then] can the law deal with individuals who have no concrete self?"

The courts' problems will increase as *"respectable people who suddenly and inexplicably assume other identities—the results of which range from family desertion to fraud and political insurrection. How are the courts to deal with those who have taken on such identities for a brief period only to experience another abrupt transformation and a return to middle class values; that is, how can the law deal with individuals who have no concrete self? The recourse to pleas of 'temporary insanity' illustrate the absurdity of this situation,"* according to Ball.

Will law, then, become increasingly relativistic so as to support the breakdown of the self by radically changing the nature of what constitutes criminality? Or will law become increasingly rigid, so as to punish these new behaviors in the hope of controlling these incidental selves? By noticing how, in other historical periods, the transformation of the self led to an upsurge in criminality, Ball concludes that *"the problem of future criminality may prove more serious than anyone can now conceive."*❖

Law & Society:

"Psychic Lawyers"
Glen Craney
Omni
January 1987

Summary:

This article presents evidence that lawyers use psychic abilities to read the minds of jurors, witnesses, and other attorneys; wage mental war with opposing counsel; *"program"* jurors to return favorable verdicts; as well as, ferret out undisclosed evidence, withheld documents, or even missing evidence.

Although psychics have aided police in locating criminals, this is the first article that associates parapsychology with law. Among others, attorney Jack McManus claims that he has *"psychic abilities with witnesses."*

Geoffrey Hazard, director of the American Law Institute, believes that *"if these phenomena are ever substantiated there will be definite ethical implications. If the claims begin to get too much publicity and notoriety, an investigation will occur."*

Comments:

Although psychic abilities are largely discounted in the present modern knowledge paradigm, the acceptance of these abilities will force us to rethink how we shape the world. Certainly, their acceptance would change the rules that govern institutions such as the judiciary by challenging the bureaucratic rationality embedded in judicial decision-making and administrative policy-making.

How would the acceptance of psychic phenomena and techniques impact lawmaking? Courtroom behavior? Would the use of psychic techniques be seen as tampering with the

juror's or judge's mind? Moreover, if psychic abilities are perceived as a natural development in human evolution, we should expect the courts to be deluged with new types of cases and problems hitherto never thought of since our very regime of rationality, our image of the real, would be forever transformed! ❖

"Privatizing Government"
The Futurist
March/April 1989

Summary:

Privatization is gaining increased support as a favorable alternative to a number of publicly-operated enterprises. This article proposes that the public generally prefers private services to the cumbersome, inefficient bureaucracy and red tape that is endemic to most state and federal agencies.

At the center of future privatization efforts is the judiciary which is rapidly losing its monopoly in dispute resolution. Neighborhood dispute resolution centers have emerged which quickly and inexpensively resolve civil conflicts that might otherwise take years in the overburdened judicial system. Furthermore, entrepreneurs seeking to exploit this trend are luring judges out of retirement to work for **private for-profit courts** such as Civicourt, Inc., in Phoenix and Judicate in Philadelphia.

Another example of this privatization trend in government is the Postal Service which continues to lose money and business to alternative private carriers such as UPS and Federal Express. The author maintains that corporate entrepreneurs are eyeing the Postal Service for takeover in much the same fashion they would an undervalued corporation with poor operational focus but good product lines. The attitude of *"private is better holds"* true of air traffic controllers, prison management, public sanitation, and mass transit.

Proponents of privatization argue that privately-managed services are better able to meet the needs of the public through market forces. Private enterprise is simply better able to respond to the changing needs of the social environment.

Comments:

While greater efficiency, lower costs, and improved services are all recognized attributes of privatization, the question remains can privatization provide equitable services to all segments of society? Or will it pursue its guiding motive of profit at the expense of the poor?

The trend toward privatization began when former President Reagan pledged a smaller federal government and sent programs back to the states. Most states were unprepared to administer or bear the costs of these added programs. Recognizing profitable opportunities, progressive entrepreneurs have stepped in and offered the services of the private sector to lessen the states' burden.

State courts are already feeling the impact of this policy as non-traditional methods of dispute resolution grow in popularity. In response, the courts have attempted to bring mediation and arbitration programs under court direction. Yet these programs portend an underlying theme concerning public discontent and dissatisfaction with government in private affairs.

If the trend towards privatization continues, the judiciary may begin to contract out ancillary programs developed during the liberal courts of the 1960s and 1970s. Family courts, for instance, may have some functions spun off to the private sector. In time, judges might begin to see their position threatened and may be less supportive of alternatives to adjudication. This may initiate a period of confrontation between traditional dispute settlers (judges) and future situation resolvers (private settlement professionals). **The courts might, therefore, be forced to consolidate those key functions which they do best and to face radically reduced functions, facilities, and budgets in the future.** ❖

See: Randal Fitzgerald, When Government Goes Private: Successful Alternatives To Public Services, (New York: Universe Books, 1988).

Law & Technology:

"Genetic Engineering and the Right of Privacy"
Ralph D. Clark
Law/Technology
2nd Quarter, 1988

Summary:

"Imagine that at some time during the decade of the 1990s, it becomes possible to genetically alter cells in order to influence the physical characteristics of offspring. A couple go to a special medical service that performs such alterations in order to have their offspring genetically altered." Although such a hypothetical situation has not yet occurred, Ralph D. Clark poses a serious inquiry into law and technological innovation. The key question suggested is: is society prepared both socially and legally for the repercussions of their progressive attitudes?

According to Clark, *"the great possibility is that gene splicing or some form of direct genetic engineering may be applied directly to humans to alter genetic conditions in somatic cells and germ cells."* Clark questions whether it is constitutional for people to influence the genetic makeup of their offspring. Central to the constitutional question is the right of privacy issue. Clark asserts that the dimension to be considered here *" involves the independence to make certain kinds of decisions."*

He explores this argument on two levels: the protection of genetic engineering under the right of privacy; and, genetic engineering as not being protected under the right of privacy.

On the one hand, Clark contends that decisions concerning marriage (Loving v. Virginia), abortion (Roe v. Wade), contraception, and procreation (Skinner v. Oklahoma) have all been given recognition under the right of privacy. The existence of these rights is deemed fundamental to the *"continued well being of the human race and its ideas of liberty, and therefore a compelling governmental purpose is required in order to interfere with it."* Clark states that genetic alteration is very closely re-

GENETIC *from page 5*

lated to the concept of procreation (the right to prevent or allow reproduction) for it is a *"decision that is procreative by definition and private in nature."* If genetic engineering is not protected under the right of privacy, Clark argues that other recognized rights such as abortion will come under harsh scrutiny.

However, Clark also argues that the right of privacy is a fundamental one; one that is *"implicit in the concept of ordered liberty."* According to Clark, genetic engineering just cannot be afforded the same status as procreation, abortion, and contraception, for the latter is seen as necessary in order for liberty and justice to exist. However, *"it is just not true that 'neither liberty nor justice would exist if [the right to genetically alter] were sacrificed,' because such a capability had not existed until now."* Consequently, genetic engineering, unlike abortion or procreation, has no history or tradition in this nation.

Clark further argues that while genetic alteration is related to the rights of procreation, abortion, and contraception, the primary issue is quite different. The concepts of abortion, contraception, and procreation deal with the issue of whether or not to have a baby. Genetic engineering already assumes that a child is desired and that the only question remaining is what kind of child. Therefore, the fundamental issue at hand *"is what kind of life, rather than having life."*

Clark continues that development in genetic engineering poses more than a legal dilemma. In the eyes of some, genetic alteration is seen no less than the playing of God. According to Clark, humankind is still trying to cope with the power of the atom. By embarking upon genetic research, society may be releasing a greater power that may yield unforeseeable consequences. Clark comments that *"the issue is simply whether human beings possess the wisdom to handle the consequences of the powers they now possess."*

By tampering with the genetic makeup of human beings, Clark asserts that scientists are tampering with an evolutionary process that has taken millions of years to perfect. Humankind normally sees the benefits of a new discovery but fail (or refuse) to see the shortcomings of their hastiness. Therefore, Clark questions whether humankind should be so *"willing to directly interfere with something we know controls species survival when we do not know how it controls?"*

Clark further classifies the applications of genetic engineering to the human condition to two basic distinctions; therapeutic uses and enhancement of human characteristics.

According to Clark, genetic engineering has potential benefits for humanity. Genetic research could not only create products to prolong human health, but also protect future generations from genetic disorders that have plagued past and present generations.

"In the final analysis genetic alteration will be protected under the right of privacy due to its relationship to already existing protected rights."

While therapeutic uses of genetic engineering have potential social good, enhancing human characteristics do not. Clark feels that mental or physical enhancement through genetic engineering poses some very perplexing issues. Clark's primary argument against upgrading human characteristics is that such alterations would reduce individuality from human life. If genetic alterations are allowed then individuality will come to mean nothing in a society of similarities. Life as a sacred value will be greatly reduced when esoteric goals *"such as the improvement of appearance or mental abilities"* can be so easily acquired. The reduction of individuality and the rise of a hybrid race may lead to racial tensions of a new variety; one bordering on the memories of the Nazi atrocities.

However, Clark states that the human life which genetic engineering will impact greatest, but which has the least amount of say, is the unborn fetus. It is the children that will have to live with the alterations that overzealous parents authorize. According to Clark, children should have the right *"to receive their own genetic inheritance, in order to be free of stigmatization by society and by themselves due to the fact that they were genetically altered."* This is to say, that children should have an opportunity to be individuals that possess their own special qualities and flaws; for once genetic alterations are performed, the right to be an individual, to privacy, is destroyed forever.

Clark concludes that although the right of privacy allows an individual to make certain decisions that will affect only that individual, genetic alteration *"has the primary effect of molding the society of the future."* Such a responsibility is a heavy burden to bear for a species not accustomed to taking responsibility for its actions. ❖

"Can You Count on Computers?"
Peter Mellor
New Scientist
11 February 1989

Summary:

While engineers have managed to develop safeguards against hardware failure as well as quantitative measures of system reliability, safeguards and measures for software remain undeveloped. Reliability in a system is defined as the probability that it will not fail during a given period of operation under given conditions. However, this measure is rarely taken into account when assessing complex software systems. Yet as software increasingly becomes embedded in hardware, from computers to digital automated braking systems, their failure rate will have a significant impact on the lives of humans. Recently, a court case was brought against the manufacturers of a gamma-ray scanning equipment. *"The unusual feature of this case was that a fault in the software that controlled the scanner caused the fatal malfunction; the software failed to perform a simple check, resulting in the patients receiving a lethal dose of radiation."*

Where loss of life may occur, engineers describe these systems as

safety critical. Should the strategic defense initiative occur, safety critical software will play an important role in all aspects of this project. For these systems, the reliability of the software must obviously be very high. However, *"if the assumptions about the real world are incorrectly defined, the software may fail to detect and respond to a potentially dangerous state of the system."* In addition, when an operator is involved, the software may present inaccurate information to the operator, potentially leading to a wrong and, thus, dangerous decision. Finally, *"software is subject to 'wild' failures, when a fault in the software corrupts the code or data."*

Software has increasingly become ubiquitous in our lives, yet even the codes of safety developed software give no assurance of reliability. According to Mellor, *"this state of affairs should cause us to question the wisdom of continuing to increase our dependence on software when life is at stake."*

Comments:

While it is true that medical equipment, aircraft, robots and spacecraft, not to mention automobiles, all contain software whose reliability remains contentious, the manufacturers--given the competitiveness of the world market and the concomitant needs for increased efficiency—cannot be expected to question increased software dependence. Most likely, there will be a landslide of software failures and resultant court cases before the economic and political costs imposed by the Justice System cause an increased commitment to the technicalities and the policy implications of software reliability. ❖

"Tomorrow's Thieves"
Jay S. Albanese
The Futurist
September-October 1988

Summary :

Since the creation of private property, the oldest form of criminal behavior has been theft. Albanese asserts that the high rate of theft has remained stable over time. Furthermore, while tracing the history of theft and efforts to combat theft by various authorities, Albanese posits that there is a relationship between the technology of crime and the technology of prevention; that is, the more sophisticated the prevention technology to stop theft, the more sophisticated the criminal technology to succeed.

While this might be obvious, what is useful is his comparison of the automobile and the computer. *"The invention of the automobile during the twentieth century has been said to have doubled the number of offenses in the criminal codes of most countries; the invention of the computer will probably have the same impact in the twenty-first century."*

Codified offense will be added to eliminate opportunities for misuse such as untrained operators, manufacturing shortcuts, unauthorized usage, registration violations, repair frauds, information-storage problems, and theft. Larceny by deception, or fraud, will most likely become the most prevalent form of theft in the computer age. Fraud rates have already jumped 264% from 1965 to 1985. Much of the opportunities in computer crime will come from the automated teller machines (ATM). From 1975 to 1982, the number of ATMs jumped from 4,000 to 36,000 and the value of transactions increased by more than 400% to $2.07 billion per year. Every effort to develop a new enforcement technology has lagged behind developments in new criminal technology. Moreover, shifts in demographics indicate that there will be fewer young people and thus, fewer crimes of stealth. Fraud, however, typically commited by those between the ages of 25 and 44, should proportionately increase as the population ages.

Law, presently, lags behind changes in technology and demography. According to Albanese, *"typical larceny statutes require 'taking of property.' The application of these statutes to computer crime is not clear, where the electronic signal or sequence is generated to alter an account (and no 'property' is actually 'taken'). In a similar way, fraud statutes usually require a willful 'misrepresentation to a person.' A computer is not a person under the law; statutes are thus needed to correct these loopholes."* ❖

ROBOTS *from page 3*

presently defined: flesh and bones, reflective consciousness and soul. At the other end would be robots in much the way that many see them today—a mechanical-electronic gadget that runs programs designed by humans. Along this continuum we can imagine humans with a majority of robotic parts (artificial limbs, heart, eyes) and robots with human-like responses and reactions (creativity, ability to learn). We would also have robots that look like humans and humans that increasingly look like robots.

On the y-axis we can also develop a rights dimension. At one end of this continuum would be a condition of total *"human rights"* and at the other end, a state of rightlessness. Along this continuum, we can visualize robots representing themselves and robots represented by guardians. Finally, we can develop a moving-stationary dimension as well as various economic dimensions (household robots to military robots). By juxtaposing these dimensions (flesh-mechanical; rights-rightless; moving-stationary) and visualizing them across time, we can develop various alternative scenarios of the future of robots.

CONCLUSION

Technological change is growing at an exponential rate. Genetic engineering, lasers, space settlement, telecommunications, computers, and robotics are bringing economic, social and political changes found in no other period of human history. Unfortunately, it is difficult for individuals and institutions to keep pace with such change. In order to minimize the stress caused by the expanding role of robotics, it is vital that we, the public, and our institutions of governance-- the judiciary, legislature, and executive-- proactively educate ourselves for the eventual development of robotic rights.

We believe the issue of robotic rights and responsibilities to be an inevitable one. Considering the *"question of rights"* in this new dimension offers the unique possibility of reconceptualizing our very notion of *"rights."* This issue generates a larger question of our relationship with our world. As a

quantum change in our perception of ourselves, it might signal a new understanding and appreciation for the concerns of everything, as well as a realization of the way in which rights are constructed in our linguistic and social practices. ❖

NOTES

1.Thomas Hobbes, *"Leviathan,"* Social and Political Philosophy, John Somerville and Ronald Santoni, eds., (New York: Double Day & Co., Inc., 1963), p. 143.

2.Jamake Highwater, The Primal Mind, (New York: Harpers and Row Ins., 1981), p.180.

3.P.R. Sarkar, Neo-Humanism: The Liberation of Intellect, (Ananda Nagar, Ananda Press, 1984).

4. See: Michael Towsey, Eternal Dance of Macrocosm, (Copenhagan, Denmark: PROUT Publications, 1986).

5. Christopher D. Stone, Should Trees Have Standing: Towards Legal Rights for Natural Objects, (Los Altos, California: William A. Kaufman, 1974), p. 6.

6. Francis Allan, *"1984: The End of Intimacy,"* Human Rights, (Winter 1984), p.55.

7. *"The Robotic Revolution,"* Asiaweek, (1/6/89), p. 6.

8. Sam N. Lehman Wilzeg, *"Frankenstein Unbound: Towards a Legal Definition of Artificial Intelligence,"* Futures, (December 1981), pp. 442-457.

9. Ibid, p. 443.

10. J. von Neumann, The Computer and the Brain, (New Haven: Yale University Press, 1974) in Wilzeg.

11. W.G. Walter, The Living Brain, (New York: W.W. Norton and Co, 1953) in Wilzeg.

12. N. Wiener, God and Golem, Inc ,(Cambridge, MA: MIT Press, 1966) in Wilzeg.

13. N. Wiener, The Human Use of Human Beings, (Garden City, NY: Doubleday, 1954) in Wilzeg.

14. J. von Neumann, Theory of Self-Reproducing Automata, (Urbana: University of Illinois Press, 1966) in Wilzeg.

15. M. Arbib, Brains, Machines and Mathematics, (New York: McGraw-Hill, 1964) in Wilzeg.

16. D. Rorvik, As Man Becomes Machine,(New York: Pocket Books, 1971) in Wilzeg.

17. *"Robots With Human Intelligence,"* The Futurist, (March/April 1989), pp.52-53.

18. James Albus, *"Robots and The Economy,"* The Futurist, (December 1984), p. 110.

19. Edith Weiner and Arnold Brown, *"Issues For The 1990's,"* The Futurist, (March/April 1986), p. 10.

20. Robert Anderson, *"Piracy and New Technologies: The Protection of Computer Software Against Piracy,"* (London: American Bar Association Conference Paper, 7/17/85), p. 176.

21. Mike Higgins, *"The Future of Personal Robots,"* The Futurist, (May/June 1986), p. 46.

22. *"Death by Robot,"* Science Digest, (Aug. 1985), p. 67.

23. See: Isaac Azimov, I Robot, *"The Second Law of Robotics: A robot must obey the orders given it by human beings except where such orders would conflict with the First Law; The Third Law of Robotics: A robot must protect its own existence as long as such protection does not conflict with either the First or Second Law."*

24. Ramond August, *"Turning The Computer Into A Criminal,"* Barrister, (Fall 1983), p. 53.

25. Ibid., p. 54.

This is a summary of Phil McNally and Sohail Inayatullah, *"Rights of Robots: Technology, Culture and Law in the 21st Century,"* Law/Technology: World Peace Through Law Center (Winter 1987) reprinted in Futures (April 1988) and Whole Earth Review (Summer 1988).

"I think that the species (robots) is just a step in evolution. I'm sure the chimpanzees thought people were a bad thing."

Marvin Minsky
MIT Artificial Intelligence Pioneer

The purpose of this newsletter is to keep you abreast of the latest trends, research findings and emerging issues that may impact the Hawaii Judiciary. If you find any of the issues selected of particular interest and would like more information (for example, a copy of the original article or other references) or if you would like to pass on issues and comments to us, please contact James Monma of the futures group at (808) 548-8589.

JUSTICE HORIZONS

"Nu Hou Kanawai"

Published By:
The Office of the Administrative Director of the Courts
Planning and Statistics Office
The Judiciary, State of Hawaii
P. O. Box 2560
Honolulu, Hawaii 96804

Chief Justice, Herman T. F. Lum
Interim Administrative Director, Toshimi Sodetani
Deputy Administrative Director, Tom Okuda

Contributors:
Sohail Inayatullah
Joy Labez
Philip McNally
James Monma
Kerri Nishimura
Julie Schoen
Greg Sugimoto
Anna Wilson-Yue