Inappropriate Computation Dilemma

A senior professional software engineer in a large firm is asked by management to make a decision about using a battery of computerized selection tests for hiring new employees. The firm has the opportunity to purchase specialized software which tests the competence of potential employees and makes predictions about their potential success as an employee of the firm.

The engineer's analysis generates the following assertions:

1. No computer program can possibly do the job of selecting new employees.

2. However, the accuracy of selecting good employees is the same for either human or computer selection; both do a terrible job.

3. The computer uses demographic information (such as owning a home, living less than five miles from work, membership in professional organizations, type of car driven) which increases accuracy of selection but is known to be bias and is technically illegal to use.

4. Removing the demographic information degrades performance of computer selection to almost random. If such information were strictly forbidden during interviews by a person, the selection accuracy of humans would also degrade to almost random.

5. Management is looking for a way to reduce selection costs. Computerized selection accomplishes this objective, while human selection does not.

6. If computerized selection is used, the personnel department can be reduced by 70%, saving the firm $80 million per year. Computerized selection costs about $20 million per year, human selection costs about $100 million per year.

Management gave the senior engineer the responsibility to make the implementation choice. There are three alternatives, all lead to the same personnel decisions and to the same overt corporate behavior.

Choice 1: Keep the personnel department and the selection processes the same.
Total cost: $100 million

Choice 2: Institute computerized selection, even though it is both bias and inefficient.
Total cost: $20 million

Choice 3: Select new employees randomly by computer.
Total cost: $1 million

What choice should he make? Is there a professional ethical issue here?

What if, instead of hiring for a job, the computerized questions were to determine whether or not a person should be given a home improvement loan (or issued a credit card)? Would your decisions be the same? Would the ethical issues be the same?

Massive Impact Dilemma

In the Walt Disney movie *Flubber*, a professor invents an anti-gravity gel. He put a little flubber in his car, and immediately had a flying car. The following dilemma is about computational flubber.

A Computer Science professor has been working for many years on a new conceptualization of what computation is. He has published very little, because he has not yet come to a clear vision. One night, the professor has a dream in which he sees a new way to build computers. All of the work over the last many years condenses, and in the next two weeks, he designs and specifies a new type of computer, call it MetaShift computation.

The professor talks to several colleagues about the new idea, all under non-disclosure, since he suspects the idea may have commercial value. The net result after six months of close and secret collaboration, using only personal resources, is that the professor's team has built a new computer chip with some unusual advantages:

1. MetaShift computation is fully backward compatible. All programs which would run on vonNeumann architectures run on MetaShift. However, MetaShift has its own unique operating system.

2. MetaShift is fully reconfigurable. One MetaShift chip can be converted into *any* functionality within microseconds. With a MetaShift chip, specialized hardware (modems, decryption, cell phones, parallel processors, video acceleration, etc) is unnecessary. Instead the MetaShift is rapidly reconfigured into the desired functionality in real-time.

3. MetaShift works for all types of hardware architecture: CPUs, DSPs, floating-point coprocessors, real-time systems, cellular phones, automobile fuel-injectors, etc.

4. New programs written for MetaShift can be developed in a special language which is very easy to write, and provides automated debugging and program verification. Development time and cost for new programs is about 20% of that for other techniques.

5. The cost of manufacturing MetaShift is half of conventional fabrication costs.

6. The performance of a MetaShift chip is at least 5 times better than any other existing technology.

7. Because of the secrecy and uniqueness of the technology, it would be impossible for any potential competitors to market a similar product. That is, no competition to MetaShift would be possible.

When the MetaShift team did an in-depth market analysis, they discovered that within five years, MetaShift Corporation would probably take 50% market share from each of the companies listed below. Next to the company name is its market capitalization (market cap) in billions of dollars. (*Market cap* is the value of a company, the number of outstanding shares times the value of each share.) Further, when MetaShift went on the market, the market caps of these companies were likely to reduce rapidly to about 40% of current values.

COMPANY	*Market-cap ($billions)*
Microsoft	325
Cisco	270
Intel	249
IBM	196
SUN	98
TI	76
HP	72
Dell	68
Applied Materials	41
Compaq	40
Micron	27
Applied Micro	22
Xilinx	18
Altera	12
AMD	8
Apple	7
Total Impact:	$1.5 trillion

MetaShift itself would very likely reach a valuation of several trillion dollars within ten years. When MetaShift went to market, *most of the leading hardware and software operating system companies in the world will be put out of business within a few years*. As well, any company using computer technology would have to switch to MetaShift products within a few years in order to remain competitive. (This pressure is analogous to the impact of the Internet; the market dominance is analogous to any monopoly.)

The market analysis team then approached both the government and the financial sector with the commercial potential of MetaShift, disguised as a hypothetical story about innovation. After extensive consultation with the world's leading economic and regulatory authorities, MetaShift knew that if it went to market with its product, the following result was most likely:

> *Wide-spread economic chaos* would follow. The technology sectors of the world stock market would crash, losing $2 trillion in assets, and over a million people would loose their jobs. Next, several countries which were highly dependent on technology (US, Ireland, India, Germany, Japan) would enter a *moderate economic depression*.

At the same time, MetaShift would succeed spectacularly, making its first few thousand employees into billionaires.

QUESTIONS

Should MetaShift go to market with its product?
Are there ethical components to this decision?
Are there ethically appropriate compromise positions?
If MetaShift goes to market, should the government immediately intervene?

Capitalist Dilemma

[This is a *computer* ethics question since most of the computer and dotcom industry reaches evaluation through techniques somewhat similar to the extreme case which follows.]

In the United States, there are two institutions which can legally mint (that is, create) money. One is the Federal Treasury; the other is any corporation.

When a start-up is formed, it is given the right to issue stock. That stock (which can be created with almost any cash value) can be sold on the open market. Should the national stock exchanges grant the new corporation an Initial Public Offering (IPO), the stock becomes very easy to sell since it can be traded through the stock exchange to anyone willing to pay for it.

Naturally, these processes are regulated, but the basic idea is that corporations can essentially print their own money. This is one of the two major mechanisms through which the supply of money in our economy grows (the other way is for the Federal Reserve to increase the national debt by printing more money). Contrary to popular belief, incorporation is a "free lunch".

The British Vancouver stock exchange is not as tightly regulated as the US exchanges. It is known as a "highly speculative" exchange. This means that there is no strict requirement to have any actual value for a corporation to reach IPO.

Here is a strategy for making money:

1. File for incorporation (cost is around $3000) as BogusCorp.

2. Issue junk stock with no value. Claim that the *potential* of BogusCorp gives it a value of, say, $1 per share. Issue 20 million shares.

3. Take the company to IPO on a speculative exchange. In reality, you usually take the company to a venture capitalist (VC) who provides the illusion of value by infusing the new company with temporary funds. The VC then takes the company to IPO for around 80% of the profits.

4. There are always gambling and speculative investors. Assume that a few buy shares in BogusCorp, and $1M is raised.

5. Buy a company with actual value using the $1M as a deposit.

6. Now claim that BogusCorp has increased in value, the stock has actual value, and the company is succeeding. Tell your investors that their investment has increased in value, and watch the stock prices rise.

7. Cash out your own stock (which you give to yourself at incorporation for, say, 1 cent per share) as quickly as possible.

Question

Is there an ethical problem with the way our economy works?

Cyber-addiction Dilemma

From Communications of the ACM, 3/98, p11:

"Almost a fifth of college students spend more than 20 hours a week on the Internet...this amount of time qualifies as addition....a New York University study (that) correlates high student Internet use with doubled rates of academic dismissals. As a way of dealing with this problem, schools in Michigan, Maryland, Texas, and Washington have imposed limits on student Internet use. Dominant areas of user involvement: email, Web surfing, MUD interactive role-playing, and home page production."

ibid. p.128 (by Peter Neumann):

"...activities that can lend themselves to addictive or compulsive behavior include...even programming itself -- which seems to inspire compulsive behavior in certain individuals....computers intensify and depersonalize whatever activity is being done, enabling it to be done remotely, more expeditiously, less expensively, and perhaps without identification, accountability, or answerability.

The effects of compulsive computer-related behavior can involve many risks to individuals and to society, including diminution of social and intellectual skills, loss of motivation for more constructive activities, loss of jobs and livelihood, and so on. A reasonable sense of physical reality can be lost through immersion in cyberspace. Similarly, a sense of time reality can be lost through computer use that is totally encompassing and uninterrupted by external events."

Biological systems are incomprehensibly complex. Computational systems are incomprehensibly simple. Since the world we live in is beyond our comprehension, we construct projections (virtual worlds with detail removed) to support the illusion that we understand and are in control. The manufactured flat surfaces which surround us everywhere are an example of the removal of natural complexity to enhance our illusion of tractability. Computational environments are another example of this **abstraction neurosis**.

People fall into cyberspace because it is unnaturally simple and therefore supports the illusion of competence. Of course, cyberspace is not simple, it too is an artifact of biological activity. It is the illusion of potential simplicity which makes computational systems attractive.

Questions

Why have you chosen a profession which requires you to stare at a computer screen all day?

Was your mother correct when she asked you not to sit too close to the television screen?

Is the modern mind committed /addicted to representations of reality (reading-writing-arithmetic, books, films, computers, etc.) rather than to reality itself?

How do you think physical reality will respond to the competition of virtual reality for the attention of humanity?

What is the ethical dimension in these questions?

Logic Dilemma

As Computer Scientists, we may want to know: What is computation? Here are several possibly disturbing ideas about computing:

1. Formal logic defines the control structure of programs and the silicon/physical basis of computation.

2. Logic is underneath most of our culture's conceptual structures (at least in academia).

3. Logic is the simplest and most useful formal system, with the hardest computational problem (is `P=NP?`).

4. Logic has been in our language since the beginning of language.

AND

5. People do not use logic well, and have a long history of not understanding it.

6. Logic is inconsistent when self-reference is incorporated into the domain model. No program can refer to itself safely.

7. In computation, we convert the basic concept of integers into logical structures.

8. Deduction, and computation in general, consists of following meaningless tables and rules while transforming a string of characters from one form to another.

9. Natural deduction is too difficult to use for most logic problems. Machine-based resolution is too difficult to understand.

10. The if-then construct of logic is based on a confusing table mapping: if the antecedent is false, then any consequent is true.

IN FACT, computation as logic seems to be antagonistic to all the grounds of philosophy:

- *aesthetics*: Yuk, computation is difficult and confusing and meaningless

- *ethics*: Everything we program is simply timed logic, so a program's impact on culture is solely in terms of manipulating very limited digital logic forms.

- *epistemology*: How can we know anything when our basic tool is hard to understand and inconsistent?

- *metaphysics*: What is reality in an information society, where the virtual is defined by computation?

- *logic*: Ah! Logic itself is one of the five fundamental areas of *philosophy*.

Form into study groups of three members, to answer these questions:

1. Is there a problem in the above ideas?
2. If so, what is it and what can we do about it?

Triviality of Computation Dilemma

Quotes from Gian-Carlo Rota, **Indiscrete Thoughts**:

"The philosophy of mathematics carries out its work by focusing on the correlation between mathematical things and mathematicians." Robert Sokolowski, p.xiii

That is, between the object-concept of mathematical items (which may or may not exist in a Platonic world independent of our minds) and the process-concept of mathematical minds.

"Of all escapes from reality, mathematics is the most successful ever. It is a fantasy that becomes all the more addictive because it works back to improve the same reality we are trying to evade. All other escapes -- sex, drugs, hobbies, whatever -- are ephemeral by comparison." p.70

"Not only is every mathematical problem solved, but eventually every mathematical problem is proved trivial. The quest for ultimate triviality is characteristic of the mathematical enterprise." p.93

Computer Science deals with a trivial subset of mathematical triviality by excluding the sacred concept of Infinity and the mysterious concept of Void, and even by minimizing *intractable* (i.e. non-polynomial, search-based, mathematically interesting) complexity. Computer Science (at least Artificial Intelligence and Cognitive Science) pretends that the mind is like a computer, so that the issues of complexity of mind and of humanity can be conveniently ignored or forgotten.

Computer Science engages in an extreme of abstraction neurosis, let's say **abstraction psychosis**, by constructing the narrowest of worlds (binary bit-streams which interact only over timed Boolean networks), and then by suggesting that this extreme reduction is somehow whole, and somehow reflects physical reality. In fact, computation addresses only **trivial trivialities**.

Questions

How can humanity become so enamored with a technology that it forgets the reality within which it is embedded?

Why are we so ready and able to limit our experiences to a small screen of phosphors and a tableaux of a few dozen labeled keys?

How can our minds so easily confuse a pixel array with fully visceral experience? Confuse an email exchange with fully interactive human dialog? Confuse digital information processing with bodily experience?

What is the ethical dimension to these questions?