STV newsletter
Centre for Society, Technology and Values
Number 23 March 1993

Milner Receives Wiegand Award

Roger Downer, Vice-President, University Development, presents 1992 Wiegand Award for Canadian Excellence to Dr. Mickey Milner

On October 22 Dr. Mickey Milner, PhD, PEng, CCE was awarded the 1992 Wiegand Award for Canadian Excellence by the Centre. The $2500 Award is given in recognition of "outstanding contributions to humanizing science, technology or engineering" by Canadians or permanent residents.

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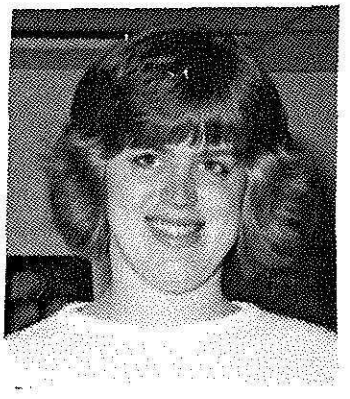
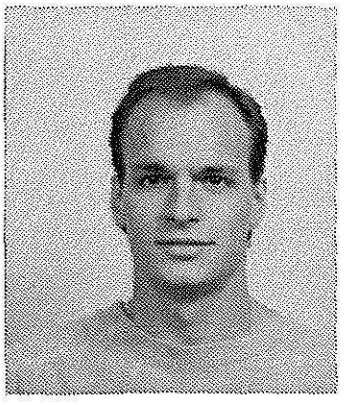
Beynon Research Assistantship Tradition Starts with Students Amy Alfred, Trevor Garrett, Sarah Arulanandam



Amy Alfred



Trevor Garrett

Sarah Arulanandam

Amy Alfred: Deepened commitment, increased awareness

UW undergraduate engineering student Amy Alfred, the first recipient of the Beynon Memorial Research Assistantship in Spring '92--see *Newsletter 22*--became a veritable one-woman speakers bureau last Fall as she presented her results to UW engineering students.

She was a guest speaker in seven different UW engineering classes, talking to 600 students altogether about opportunities in rehabilitation and biotechnical engineering.

Students had a choice of hearing her talk or watching a video on Skydome. Those attending her session showed genuine interest, she reports. For several students, the proverbial lightbulb really did switch on. Some, hearing about the field for the first time, responded enthusiastically to the challenge. Others were simply glad to find their own interest was shared by their peers.

"The Beynon Assistantship gave me a chance not only to gather information but to organize it for my use and for the use of students," Amy says. "I don't know if I would have gone as far with my interest if it hadn't been for the Assistantship."

She cites her trips to the High MacMillan Centre in Toronto as an instance. There she sharpened her focus on issues she wanted to communicate to her audience. The Assistantship also gave her an opportunity to meet people such as Dr. Mickey Milner, a distinguished biomedical engineer who won the 1992 Wiegand Award *(see pages 1 and 4)*.

"It deepened my commitment and increased my awareness of what is happening in the field," she says. "It also gave me an opportunity to talk to practising engineers in this community."

Her network of resources now includes an engineer in Kitchener who has offered his professional support. And not only that. Even her parents attended one of the presentation sessions, finally achieving, Amy laughs, "a better understanding of what I'm doing at Waterloo!"

Amy's perspective evolved over the term. With an academic background in materials engineering, she began to develop a greater interest in what can be employed in manufacturing prosthetic devices to assist disabled people.

At the end of the Fall term she deposited with the Faculty of Engineering a script of her talk and other materials for future use. A videotape of her talk is now available, and she plans to assemble a deluxe version that will include the many visuals she used in the classroom.

Amy headed into her 3B term in mechanical engineering in Winter '93. She is looking forward to choosing from a wide range of electives in fourth year. Indeed, one spinoff from her Beynon experience is that an engineering professor she met while doing research has agreed to let her continue her work in his project course next year.

Amy Alfred's advice to future Beynon recipients? "Pick something you're interested in, and your message will come through loud and clear. And be sure to talk to lots of people!"

Trevor Garrett: Engineering education has lost ground

Trevor Garrett isn't afraid to say engineering education needs help. A lot of help.

Recipient of the Beynon Memorial Research Assistantship for the Fall '92 term, Trevor worries about engineering at UW turning out mere products "on an assembly line" rather than true professionals capable of personal growth and genuine social concern.

The first year graduate student in Systems Design Engineering says he got his real education not in Waterloo classrooms but off campus--by teaching mathematics in the West Indies, touring the US midwest on a mission to the needy, and working on an Indian reservation.

"Engineers are not technicians," he says, perhaps blurring the distinction between what is the case and what ought to be the case.

The Beynon Assistantship recognized interests he has been nurturing for some time, says Trevor. He sees it as far more valuable than industry awards, which he feels a company typically gives its employees for "putting out fires" rather than for asking hard questions about the firm's direction.

Trevor spent the five hours a week required by the terms of the Assistantship in "finding out about engineering education." He balanced Beynon tasks with other duties: as well as continuing his graduate studies, he was a don at St. Paul's United College and a teaching assistant for STV.

Trevor sees the engineering education dilemma in terms of Marshall McLuhan's figure-and-ground distinction. "We have lost our ground," he says, explaining that an over-concentration on technical specializations sacrifices other vitally important areas. It isno surprise that *Maclean's* magazine notwithstanding, he wonders if UW is where Canada's future technological leaders will assuredly spring from.

Okay, he is not afraid of controversy. But what does he really want to do? Revolutionize engineering? "Yes, I'd do it," he wastes no time in replying. "Let me see what I can do!" It's not that the problem-solving tools and the technical skills dominating the present curriculum are totally faulty or useless. After all, Trevor employs them himself. It is the way these tools and skills are presented and packaged--as if they're all an engineer needs to know.

The "This-is-it, this-is-how-we-do-things" attitude is, in his view, the real weakness. The assumption that the present system already has all the answers he regards as flawed, even hubristic.

On the positive side, Trevor says he wants to overhaul the system using a broadly-based interdisciplinary approach. But not one that just tacks extra "modules" of, say, traditional liberal arts subjects onto the present curriculum. Genuine knowledge doesn't come in packages.

He realizes not every student, let alone every faculty member, will hear him gladly. He has already encountered among his peers some who prefer the system just the way it is. "They are the ones saying, 'I just want to do the math,'" he says. And that, for Trevor Garrett, is a symptom of the very problem he wants to examine.

Sarah Arulanandam: Comprehensive and accessible catalogue

Sarah Arulanandam, a 4B Mechanical Engineering Student, is the third recipient of the Assistantship. She was also a TA in STV 100 in the Fall 1992 and Winter 1993 terms.

Sarah says she was surprised to find, during her undergraduate program, that many engineering students are avid readers and even use their work terms to indulge their interest in various kinds of literature. An equally enthusiastic reader herself, she found the book review assigned when she was a student in Tim Topper's STV 100 course several years ago to be "really illuminating."

She began to see that "STV-type ideas," which can be quite abstract when considered on their own, can have real impact if encountered in appealing novels and other literary forms.

Creating "a comprehensive cataloguing of novels and books focusing on the interface between society and technology through the engineer" has thus become the defining task of her Beynon project. "When that is done, the project will be complete," she explains. "If I can pull it all together, I'll be quite proud!"

Sarah's investigations so far have brought her into contact not only with the Centre but with UW professors in Engineering and English, UW Library staff and others. Some of the literary works she's considering for the catalogue are Willa Cather, *Alexander's Bridge;* Johan Bojer, *The Great Hunger;* and J.B. Priestley, *The Magicians.*

Since she wants to make the material an "easily accessible teaching tool," her second task is to set up "a dynamic interface for students to access this listing and encourage them to read these [works]." She desires the database to be "manageably

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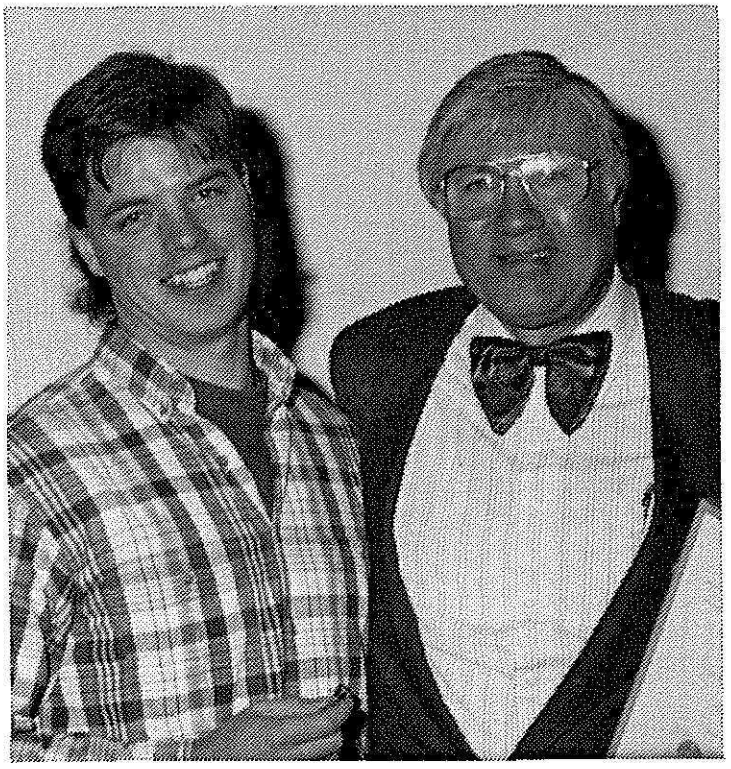
Dr. Milner, 56, is a biomedical research engineer and is vice-president of research and development for the Hugh MacMillan Rehabilitation Centre in Toronto. He was nominated for his work on "postural support and seating systems, mobility systems, powered upper limb prosthetics, and applications of computer based technology in areas such as communications, functional assessments and education." Although his work centres mainly on assistive devices for children with cerebral palsy, it has wider applications.

After accepting the award Dr. Milner gave a fascinating and moving lecture on his efforts to improve the quality of life of the physically disabled. He stressed that all people required and were entitled to dignity, understanding, compassion, mobility, freedom of choice and respect. People with physical disabilities are no different in their needs, but their ability to enjoy life more fully can be greatly improved through technological assistance.

Milner discussed innovative engineering solutions to a variety of problems: constructing postural support systems that are both comfortable for the user and easy to maintain for care-givers; designing modular systems that can be easily and inexpensively modified to suit individual needs; designing mobility devices to allow disabled children greater freedom of movement.



STV 202 student Craig McQueen presents Milner with a framed poster of his talk

He discussed his efforts to bring industry, clinical and educational institutions and consumers together in the common cause of making better, more imaginative use of resources.

Dr. Milner's lecture was attended by four members of the Wiegand Foundation--John, Philip, Frederick and Tom Wiegand--and by the STV 202: Design and Society class and other members of the university community. The lecture aptly illustrated some of the social and moral implications of design.

Milner is an example of a practising engineer who has dedicated his career to providing dignity and increasing the lifestyle options of physically disabled people. Students were asked to consider the ramifications of designing this way and how they might apply this approach to their own areas of professional interest. Based on feedback in Professor Ball's Design and Society class, Dr. Milner and the Wiegands made an excellent and productive combination.

New Terms of Reference for Wiegand Award

New terms of reference have been agreed upon for the Wiegand Award for Canadian Excellence. Effective immediately, the Award will be open only to graduates of the University of Waterloo who at the date of closing of nominations are 45 years of age or under and residents of Canada. Current UW faculty members are excluded.

The Award will continue to recognize Canadians or permanent residents "whose outstanding work advances society's interaction with technology." It is open to all areas of endeavour and may, for example, include an invention, original critique or interpretation, business venture, organizing a group to effect change, uncovering a need or responsibility, preserving a value or aspect of life. Works of art such as a play, poetry, prose or performance fall within the broad interpretation of the terms of reference.

Nominees will be assessed by a panel of judges representing the Wiegand Foundation, the Director of the Centre for Society, Technology and Values and each of the six UW faculties.

Deadline for nominations for the 1993 Wiegand Award for Canadian Excellence is September 15, 1993. For more information, contact the Centre for Society, Technology and Values (519) 885-1211, ext. 6215 or FAX (519) 746-4791.

Guest Speakers Bring Real Life to STV Courses

Guest lecturers from on campus and elsewhere visited STV courses last Fall, sharing a variety of perspectives with students.

In STV 100: *Society, Technology and Values: Introduction*, **Andrew Young** of Northern Telecom discussed how introducing specific technologies into the workplace will affect people. Their response will determine whether a technological innovation succeeds or fails. Mr. Young had the class take an actual case situation where a Northern Telecom facility had to be upgraded. The class analyzed the changes that had to be made and suggested how they could be made in the most efficient manner. Students discovered that it is easy to ignore or downplay human factors despite their best intentions.

Seven guest lecturers visited STV 202: *Design and Society*.

Mary Kotler, Senior Management Consultant, Corporate Logistics, with Siemens Corporation in New Jersey, discussed the communications problems that professionals such as engineers can encounter working in industry. She discussed the importance of good communication skills for a professional to work effectively and successfully. Management in North American firms is rapidly changing, and Ms. Kotler discussed a number of management strategies that are being implemented to help firms remain successful and competitive in a global economic market.

Dr. **Mickey Milner** of the Hugh MacMillan Rehabilitation Centre, who was the recipient of this year's Wiegand Award for Canadian Excellence, talked to the students about his work in engineering design for people with disabilities. His talk focused on how technology could improve the quality and dignity of life for people with a variety of disabilities. He discussed engineering solutions for problems of postural support, mobility and communication. Dr. Milner works extensively with industry, clinical and educational institutions and consumers to make assistive devices available to as many people as possible. Many students in the course found his talk a stimulating and enlightening introduction to a field of engineering of which they were previously unaware.

Trevor Garrett, recipient of the Beynon Memorial Research Assistantship for the fall term, spoke to the class about his experiences on an Indian reservation. See page 7 for details.

A presentation by **Anne Adams** and **Kristi Harrison** from the Barrier-Free Design Centre discussed the importance of "Universal Design". This is the idea of designing for as broad a spectrum of society as possible rather than creating separate designs for able-bodied and disabled people. They stressed that a disability is a limitation specific to an individual while a handicap is a limitation imposed by the environment. Although we cannot always remove disabilities, through good design we can often remove handicaps. Universal Design strives to do this by incorporating barrier-free design concepts at an early stage in the design process. We are all part of a minority with specialized needs at some point in our lives, even if it is a temporary injury or the effects of aging. Universal Design can meet the needs of the majority by incorporating the needs of many minorities.

Professor **Mary-Ellen Tyler** from the School of Urban and Regional Planning on campus talked about the some of the work she has done with information technology. She discussed the concept of "cognitive ergonomics", that is, examining the ways information is perceived and communicated, the thinking style and methods of interaction used by different cultural groups. She stressed the importance of presenting information in a way that is meaningful to the user. In this way the members of specific cultures, in this case a Native group in British Columbia, can be equal partners with the members of other cultures in decision-making processes.

Steve Jones, a staff member of Habitat Canada, spoke to students in late November about the approach to housing design employed by the non-profit housing organization. Habitat's aim is to build simple, decent homes for people who couldn't otherwise afford them. Houses are constructed by skilled, semi-skilled and unskilled volunteers, with members of the homeowner's family investing "sweat equity" in the building to fulfill a condition of their Habitat partnership agreement.

The Centre for Society, Technology and Values appreciates the contribution of these speakers and hopes to continue providing new perspectives to students through their involvement in future classes.

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updated" for maximum student benefit, and is considering the use of E-mail, which has great potential for both disseminating information and getting feedback.

Her overall aim is to help students develop a fuller awareness of the extent of technology's impact on society, including "the positive benefits and the pride of creation" that engineers often experience.

In a procedure for getting the word out somewhat similar to Amy Alfred's, Sarah plans to make short presentations to first year students in the engineering graphics lab--her main target audience--and to other engineering and STV classes. "At the beginning of the term I want to let them know that this material exists," she explains. A reminder to students later in the term and a continuing display of materials in the graphics lab are part of her strategy.

The idea of students informing students, helping each other extend and enhance their education beyond classroom walls is clearly one of her key interests. The Beynon Assistantship allows her to express it in a way that can "really reach the students." She wants them to understand that they don't have to take just their required courses. "You can still appreciate literature and other areas."

Sarah herself exemplifies such a perspective; in her all-female high school in Whitby, Ontario, she was attracted equally to English and mathematics. Mathematics, as applied in engineering, ultimately won out, but traditional humanities areas, especially literature, continue to mould her viewpoint--and her desire to reach out to other students.

Following this Spring's convocation at which she has been chosen valedictorian of her graduating class, Sarah will continue at UW for a master's degree in solar thermal engineering.

The Beynon Memorial Research Assistantship, which is administered by CSTV, honours chemical engineer William John Beynon (1911-88), an Imperial Oil refinery manager and noted humanitarian. It was established by the Beynon family.

Students wishing to apply for the Assistantship should contact the Centre for Society, Technology and Values (519) 885-1211, ext. 6215, Davis Centre room 2608. Deadline for applications for Spring term is Thursday, May 13, 1993.

Interdisciplinarity: A Key to CSTV's Success

Commitment to interdisciplinarity is one of the key elements of CSTV's success--and one of the most difficult to accomplish in practice.

The Centre strives to attract students from all six UW faculties to its courses, and STV teaching teams are drawn from a variety of disciplines.

The past terms are no exception. In Fall '92, *Society, Technology and Values: Introduction*, the Centre's most established and successful course to date, was taught by Dr. Daryl Pullman of the department of Philosophy. He was assisted by Sarah Arulanandam, an undergraduate student in Mechanical Engineering, Calvin Lantz, a Philosophy graduate student, Trevor Garrett, a graduate student in Systems Design Engineering and Annabel Cathrall, a practising professional engineer.

CSTV Director Dr. Norman R. Ball developed and taught *Design and Society* for the first time in the Fall term--see *Newsletter 22* for details. He was assisted by Gail MacCrimmon, a graduate student from the School of Urban and Regional Planning.

Daryl Pullman, Calvin Lantz and Sarah Arulanandam formed the STV 100 teaching team for Winter '93, while Trevor Garrett moved to STV 202 to assist Norman Ball.

Gail MacCrimmon became the teaching assistant for Professor Ball's second new course, *Technology and Canadian Society*, making its debut in Winter '93.

STV 400, an independent project course for students completing their STV Option requirements, was supervised by a number of faculty members across campus, including Professor Sally Lerner (Environment and Resource Studies), Professor Mary-Ellen Tyler (School of Urban and Regional Planning) and Professor Augie Fleras (Sociology).

"Students from all faculties have consistently identified working with students from other faculties and learning how they view and analyze problems as a major plus and an eye opener," stated Ball in a recent position paper. "We attribute much of our success to the commitment and dedication of our teaching team, and we will continue to recruit instructors and teaching assistants from across campus."

What Do You Do When You Graduate and Find Out You're Not Ready?

We are entering a world where the old rules no longer apply.
- Phillip Sanders, mythical engineering professor from Michael Crichton's *Rising Sun*

About a year ago I sat robed in black, one in the sea of black robes: we were the engineering class of '92. I knelt before President Wright, and he awarded me with a first class honours degree in engineering from Waterloo, purportedly the foremost technical school in Canada. I had finally finished school, and I opened my eyes wide.

Was I ever surprised.

Some of my friends took off for their consulting careers, some took off for Europe, and a few even took off in brand-new Honda Preludes. But before I went charging ahead, I needed a break. So I went to live on an Indian reserve for awhile.

Did I ever learn a lot about engineering.

On the reserve, it soon became clear to me that I didn't have much to contribute, so I volunteered as a maintenance man and cook at the Lodge. All day I would help and watch and see all the problems on the reserve, and at night I read the story of the Stoney Indians, and watched videos from the archives. The Chief and his sons were very hospitable. Hank, the Chief's nephew, took me up into the mountains and we collected willow saplings for the sweat lodges. They let me be the doorman for their sweat; I sat outside the sweat lodge, listening to their prayers and passing in water when they called. As best as I could, I tried to understand what they were all about.

So what did I learn about engineering? I learned that hundreds of years ago my European ancestors came to a new world with their old world technologies: old world agriculture, old world government, old world weapons, and old world thinking. They brought the old world into a new context and found that it didn't work the same. They tried to "give" land to a nomadic people in the form of reserves. Only now are we seeing the consequences and costs of not properly perceiving that situation; how that old world idea helped lead to the slow extinction of Canadian native peoples.

I imagine it was also somebody bright and well-educated who thought that they could bring their new, high-tech, eighteenth century agricultural technology and bestow it upon a nation of hunters. The natives didn't go for it. Go figure.

The design methodology of problem definition-criteria-brainstorm-implement is one viewpoint and it has relevance for problem-solving outside the realm of the technical, but make sure you have enough humility to know there are other ways to go at it. If the other way is better, then that humility is worth its weight in time and money.

And so why is this important to a young engineer here in Waterloo? Because I find myself in the same shoes as my ancestors: we stand on the brink of a brave new world. But this time it's not the physical frontier, it's the fact that everything is changing--government, trade, the way we do business, religion, values, technology--everything. We live on the frontier of change, and it's changing fast. In the new world the old rules do not apply and there are no formula answers or guarantees.

The new world is coming to Canada, just like it did before, but in a different form. We will either learn to see this new world or it will pass us by--or run us over. And part of perception is learning from our mistakes. That includes mistakes we made with our technology. We need to learn how to see.

The bad news is that what we need to learn cannot be learned at school. This has always been true, but moreso now. Especially in engineering. The technology is changing too quickly to get into the curriculum let alone into a textbook. At best they can teach us the fundamentals. The content of an engineering degree will remain mostly the same; more of the same is not going to help.

The good news is that knowing the content (the technology and methodologies for an engineer) although it is assumed that you do know it, is not what is going to be important in the new world. What we need to understand is *context*. Our ancestors knew their technologies; what they didn't know was the new world, the new context, and that a change of context changed the whole meaning of the situation.

If we as engineers are to fully understand the meaning of what we do, we must understand the

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STV Courses -- Winter and Spring '93

In the Winter 1993 term, students had more courses to choose from than ever, most of them with no pre-requisite.

The Centre now offers two courses at the introductory level: STV 100 and STV 202. Either can serve as a beginning course to fulfill STV Option requirements. *Society, Technology and Values: Introduction* (STV 100) again proved to be a very popular course, with 85 students enrolled in Winter term.

Design and Society (STV 202) was offered for the second time in the Winter '93 term to 70 students. Its inaugural term was Fall 1992.

New to the Winter lineup was *Technology and Canadian Society* (STV 402). It, like STV 202, was taught by CSTV Director Dr. Norman R. Ball. The course examines some principles, patterns, factors, choices and consequences of the mutual interaction between technology, engineering and society. Although this course has no pre-requisite, it is intended for third- and fourth-year students.

STV 100 will be offered once again in the Spring--the course reached its enrolment limit several months ago.

All three courses mentioned above are designed to meet the CEAB (Canadian Engineering Accreditation Board) requirement for instruction on the Impact of Technology on Society. The Centre attempts to decrease the possibility of course conflicts by offering its courses in the evening. This also allows more time to explore issues in greater depth, more discussion and interaction while issues and opinions are fresh and is more attractive to busy guest speakers from industry.

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context in which we do it. This is the art of perception. This is how we will learn to see.

Macleans magazine said that the Canadian leaders of today think the Canadian leaders of tomorrow are going to come from Waterloo. They think that because they believe high tech will be Canada's salvation. Economically, it just might, but only if we understand the context of that technology. Only then will we understand its whole meaning; only then will we see.

The challenge to raise a generation of young leaders in a new world is before us. We know that the fate of our society, and indeed our world, is entwined in the forces of technological change. We do not know what the new world order will hold, and we will have little besides our wits to help us. Consequently, we need to keep our eyes open and learn how to see, to know our world and not just our math.

I returned to Waterloo a little broader, better educated, and confident that what textbook engineering did not provide could be found in other places. I also came home with the conviction that as the domain and importance of engineering changes, so also must its identity and responsibilities change, if we are to build a better world to live in, and not just an advanced one.

Trevor Garrett
Graduate Student
Systems Design Engineering

The *CSTV Newsletter* is published three times a year by the Centre for Society, Technology and Values, University of Waterloo.

This issue was produced by K. Sharpe with the help of S. Jones and G. MacCrimmon.

Your letters and comments are welcome. Contact Kathy Sharpe, Centre for Society, Technology and Values, University of Waterloo, Waterloo, Ontario Canada N2L 3G1. (519) 885-1211, ext. 6215; FAX (519) 746-4791.