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**Vice Chancellor:** Chancellor, ladies and gentlemen may I welcome you to the inaugural Keith Roby lecture in Community Science. It is the first of what we expect to be a long series of lectures devoted to celebrating the memory of Keith Roby and to promoting one of his central concerns.

It's a great pleasure to see so many of Keith's colleagues and friends here this evening and we're especially glad that Catherine, Cathy Roby is with us.

Keith Roby was a highly capable scientist and a man of deep religious convictions. Perhaps as a result of that rather unusual combination of qualities he was also something of a visionary. The core of his vision was what he's passed on to us; the idea of Community Science.

Keith had that special power of the fiercely moral person; the ability to attract loyalty and to lead without any of the orthodox trappings of authority.

It was totally natural that after his untimely death his colleagues should organize an appeal to establish lectures and other ventures to safeguard his contribution to society and to ensure its further development.

We are indeed most grateful to all those who have already helped to establish these lectures. Many contributors are present this evening.

I must say though, and sorrowfully, that organising these lectures in the future is likely to cost more than the fund so far subscribed will produce.

The university and all of Keith Roby's colleagues and friends hope most fervently that many more gifts will be forthcoming so as to make sure that a celebratory lecture can be held each year.

It's peculiarly fitting that Professor Birch is to give this inaugural lecture. As a teacher he inspired Keith Roby; as a friend and colleague he supported Keith's intellectual progress.

Professor Birch is a distinguished biologist. He holds the Challis chair at the University of Sydney.

His academic specialism is animal ecology but he is known to a wide and international audience as a philosopher of science and religion and he is a profound thinker about the problems which the advance of science and technology poses for human society now and in the future.

No one is better qualified to assess and encourage the idea of community science. I'm most happy to invite Professor Birch to deliver the first Keith Roby lecture on his chosen theme, born again science. Professor Birch.

**CB:** Mr. Chancellor, Mr. Vice Chancellor, ladies and gentlemen.

The famous American Hungarian Atomic Scientist Leo Szilard, who was involved in the first nuclear chain reaction in Chicago.

When he appealed for research grants, he always proposed to do experiments that in fact he already had done so that he could use the money for research whose outcome he could not predict.

The system worked perfectly until one year his application was rejected on the grounds that the proposed experiment was impossible.

I try to think of that when people say to me you can't change the direction of science and technology and the directions which people call human progress today. We are on a sort of escalator and you can't get off.

I want to enlist Murdoch University in a program to help to change the direction of the dominant trend of science and technology at this time that's really want to want to talk about and it's very appropriate that I should do this and I think in a lecture which is commemorating Keith Roby because I think Keith's dominant interest was in that direction.

As the Vice Chancellor remarked I had known Keith Roby since his undergraduate days in Sydney, he was a student in the College of which I was the vice master and we belonged together to many student organizations, the student Christian movement and the science association in that university and we worked together.

I saw him less after he graduated but we kept in touch.

But we came together again for a ten-year program with the World Council of Churches on the future of man in a world of science-based technology, a program that was initiated by Margaret Mead.

And we worked together also in planning a world conference on that subject in 1979 and when we were there Keith and I both visited Professor Everett Mendelsohn in the Department of History of Science at Harvard and it was on that occasion that Keith tried to persuade him to come and give the Murdoch lecture together with me in 1979.

And that was the last time that I was together with Keith though I corresponded with him well after that and what I remember most and always it's a constant memory is Keith's smile and there was something about his smile and it was very beckoning and anticipatory and I think this was part of his great appeal to students. It was always welcoming and it seemed to me always confident as if to say yes, we can do something about that and that was very often the most incredibly difficult problems which many people would shun to try and do

anything about that he instilled enthusiasm.

And what was its source?

You can find it in some of Keith's writings for students, you can find some of the clues.

He had a passionate conviction about the meaning of life and it was both an intellectual and an emotional commitment which was articulated best for him in the writings of Paul Tillich and A.N. Whitehead to whose writings both of us were introduced as members of the student Christian movement at the University of Sydney.

When I returned to Sydney after that Murdoch lecture with Everett Mendelsohn Everett Mendelsohn said to me on the plane.

And we've been to many things together – we'd been - Murdoch really keeps its visitors pretty busy and we've been involved in many things but it was an unusual academic experience.

Mendelson said to me "Charles these people", and he was talking about the people involved in this program of science and environment in this university, said "These people really enjoy each other's company. That's really something." That's what Everett Mendelsohn said to me and yes, it is. It's an unusual experience in the modern university, I think, to have groups of people who are so involved together in a project that they really enjoy doing the thing together,

and that is a very very notable feature of the group that was around Keith and that still exists in this university.

They were going places together. Now the commitment of this university to community science as part of an ongoing program together with this lectureship is a commitment to carry out the work that Keith was instrumental in promoting in this place.

And he was a live spirit. He was a Christian, a scientist, an inter-disciplinarian scholar, a fine chemist, international ecumenical, friend to many, father and husband and his spirit lives on today amongst us in this university which nurtured it and for that we greatly rejoice.

Now an implication of the title, the curious title of my lecture, is that there is not just one sort of science and technology; we have a choice.

And what kind of science and technology a society practices is a product of ideology, of politics, of economics, and we can choose.

The modern industrialized world has made its choice.

The choice that every one of every two scientists and technologists in the modern world is engaged in - perfecting the instruments of war. I mean that is a deliberate, deliberate choice, a tragic choice which in fact brands scientists and technologists amongst as amongst the most destructive people in the world

today.

And that is one reason for the public disenchantment with science lest, to use Churchill's words, the Dark Ages return on the gleaming wings of science.

But there is no scientific or technological imperative that determines the directive of science direction of science and technology it's a matter of public policy.

Human progress has never been on the wings of inevitability.

And I think the proposals for the program in Community Science is a proposal to change the direction of science and I think that a lamp has been lit in this university which could become a beacon for the rest of the world. Science had its birth in ancient times, it was reborn in the sixteenth century, it could be reborn again.

And I want to elaborate what I mean by that.

The definition I like best about Community Science was given to me by one of Keith Roby's students Chris Ledger and she said when I was cross-questioning her "Community Science is science and technology for a sustainable society."

But what's a sustainable society?

Let me say first what it is not.

Many of us believe that the world as present organized politically and economically and socially is not conducive to long term survival.

Nor to short term survival of particular parts of it and the reasons have to do with the impossibility theorem. A theorem which says that if all the world's people did consume resources and pollute the environment at the rate of the developed world we would run out of [these] resources and destroy the life support systems of the planet within the foreseeable future.

A conclusion in fact which was reached by the official report of the Leontief report of the United Nations investigation into the future. It's the argument of course of limits to growth.

And the word 'limits' refers to growth in, limits to growth in numbers of people, in the consumption of resources, in the growth in the industrialization of the planet.

Hence the arguments for zero population growth and reduction eventually to zero of the growth of the production of material, material goods, and the argument is familiar to most of us and when it was first propounded in its elaborated form just over ten years ago, the rich world saw in this a great threat to what it regarded as its progress and the poor world seeming also saw it as a great threat to the possibility of it ever getting anywhere near the rich world in terms of a standard of living that it was looking to.

So there was great opposition all round to the so-called equilibrium state in which we try to have a future which was more commensurate with the capacities of the planet to support industrialized society.

Now it should not be surprising that both the developed and the developing countries were distressed and concerned with this new movement, because every single country in the world, be it capitalist or socialist or developed or undeveloped, has as it's the economic policy increased economic growth. That's the one thing on which all the nations agree.

I was at a conference of the World Council of Churches in Bucharest in 1974 to discuss these matters and to try and work out a program of investigation within the framework of the World Council of Churches and I was working on a group on the limits to growth problem and we were getting absolutely nowhere with the third world delegates on this particular working group.

But one of the authors of limits to growth, the young man called Jørgen Randers, and I who had to write the report said to me you know the whole concept of limits gives the something a very negative sort of impression, we've got to get a positive phrase, and he suggested science and technology for a sustainable society, in other words one that could be sustained indefinitely in the way in which it used resources of the planet.

And we put that into our report and interestingly enough the sustainable society - and I think that was the first time as far as I know that it was actually written down - the sustainable society has become a phrase which is on the lips of

virtually everybody who talks about environment and the future of our planet.

So the idea was to get a program that would sustain the sources of life instead of destroying it.

Now if Community Science, in other words science for a sort of society that can be sustained indefinitely on this planet, if Community Science is to get off the ground, it will find itself challenging and being challenged by the proponents of the dominant model of science and technology in the western world.

Now let me say what I mean by that by saying that there is a crisis of knowledge in the world today and it's not a crisis of the quantity of knowledge, we can overcome any problems arising from that, I think. It's another more serious crisis, it's a crisis of experts and it's a crisis that was alluded to when Everett Mendelsohn addressed a meeting in this theatre in seventy-nine and I want to take some threads and develop it.

The dominant model of knowledge is the jigsaw puzzle knowledge. We think of knowledge as being able to be divided up into little bits and that if we get enough of the jigsaw together then we'll see the whole picture.

It is as though knowledge is substances or knowledge of bits of bricks that can be built together and that'll build the cathedral of learning.

Consider what is done in our traditional universities - I'm not thinking about Murdoch now because I think it's an exception in many aspects at any rate. We

divide knowledge into compartments and we call them disciplines.

Physics, chemistry and so on. And when you get a discipline then you get, your job is to train experts in that discipline, and the idea of a discipline is that it deals with information which is relatively independent of the information in other disciplines.

Koestler, in his last book which was entitled Bricks to Babel, wrote this: "We seem to be compelled to shape facts and data as we know them into hard bricks and stick them together with the slime of our theories and beliefs." The result - a Tower of Babel.

As though each one of us is very meticulous about shaping that brick and putting it in its right place but we have no concept of the total structure which is being built, let alone its purpose.

Now I say this is a picture of the traditional University.

I asked the Vice-Chancellor of a traditional university 'What is the purpose of your institution?' Be interesting to find the answers.

Knowledge is treated like substances and people who are trained in these disciplines are called experts. Sometimes they cross boundaries but usually they don't.

And generally the idea was, that if you have enough people in that community which who are trained as experts, then they would guide us in the truth and to right action but it hasn't worked out that way.

It hasn't worked out that way because knowledge can't be divided into that [inaudible].

It follows that the experts must always be wrong because they have tunnel vision rather than the panoramic outlook.

A French prime minister is reported to have said that there are three common ways for a man to ruin his career - chasing women, gambling and trusting experts. Of these he said chasing women is the most pleasant, gambling is the quickest but trusting experts is the most certain.

Disciplines and specialization no doubt are necessary but we need something about the training of experts that will enable them to cross the barriers. We need new sorts of experts.

There is a difference between an expert on the thinker. A thinker sets no boundaries to his thinking, and that's why the philosopher Heidegger said science doesn't think. Science doesn't think.

Scientists are not taught to cross boundaries and those who try are labelled by their colleagues as dilettantes or less politely as nuts. I have profound personal

experience in this matter.

Partly because my, the former Vice Chancellor of my university in Sydney was a distinguished economist and he noted that on many occasions I, an ecologist, was quite prepared to make statements about economics. He did call me in one day and said "I think you need to have a lecture on economics."

Community Science calls for scientists who will be different from those turned out by traditional faculties of science in traditional universities.

Now the advance statement which I read about the proposed diploma which is going to be a real thing in the Community Science in this University says its students, in assessing a project or policy, must be able to consider social, political, environmental, philosophical and ethical issues.

And that's what I call crossing boundaries I mean if you are successful in doing that you are turning out a new sort of person who is crossing boundaries but it won't happen without an alternative model of knowledge to that which is dominant in our society.

And I call this dominant model the substance model because it treats knowledge like bits of substances or bricks or a sort of mechanical model. The alternative I call an ecological model because it emphasizes relationships rather than substances.

As a biologist I really can't understand much about a living creature if I regard that living creature, be it a frog or a chimpanzee or a human being, as a substance.

The living creature, and the higher you get the more true this is, can only be understood in terms of the relationships it has to its total environment. I mean we all realize this is psychologically true of ourselves; we are what we are by virtue of our relationships to our parents, our husbands, our wives and our children and the people around us and our colleagues in the university.

And this is part of us. This is part of what we are. I don't think you can define, I don't think you can talk about a human being without talking about the relationships.

And the profound relationships or sometimes called the internal relationships; not just the pushing around but the inside things that are going on which are fundamentally changing us.

So that I'm not the same person today as I was yesterday, I don't need to wake up the same, wake up and say here's the same person every morning.

Now ecological thinking is relational thinking. Simply says to understand the situation or understand an entity I've got to think in other terms and the interesting thing is that physics has discovered the impossibility of thinking profoundly simply in terms of the building blocks, the jigsaw puzzle way.

They've come to the understanding the ecological way of thinking before the biologists.

That's to say the theoretical physics and the fundamental physicists. We've given up mechanics as the fundamental model to understanding the nature of the fundamental particles.

Now.

Let me say something about the implications of this crisis in knowledge and the fact that we have opted in our society for a sort of substance doctrine of understanding and we put so much emphasis on the expert's opinion and the sort of the tunnelled vision.

By opting for that substantialist prejudice - we could call it that - the whole of western society operates out of a profound error that is destroying much that is worthwhile in ourselves and in the world. When I say that really with great conviction, but by opting for this way of looking at and understanding the world around us we are destroying a great deal that could be creative.

And I say, I say it with conviction I feel like the secretary of the football club who said that some people say that football is a life and death matter. It's much more serious than that.

Victorian Football Club.

Bernard Shaw in *The Doctor's Dilemma* said the professions are all a conspiracy against the laity. The effects are far reaching.

It's the crisis of knowledge that has helped to plunge the world into its present global crisis of management - helped to plunge.

The Club of Rome talks about the world 'problematique', by which it means to convey the idea that we're confronted with a lot of problems simultaneously and that we cannot solve any one of them one at a time, all are interconnected.

And the Club of Rome was essentially set up by a group of people who said we have to look at some way of looking at the world global problematique, in a synoptic fashion.

For hundreds of years we could, as a human society, grow, in each part of the production system, more food, more petroleum, more tractors, all separately pursued.

But in this transition period in which we find ourselves now, the goals have become intertwined and interdependent, concerned with pollution we design motor cars that use more gasoline.

We raise chimney stacks in England and we produce acid rain in Europe.

Consider the complex relationships between advances in hygiene and medicine, for example, in a developing country.

Population growth and food shortage.

And some people who say that it was a terrible mistake, the World Health Organization to go into the developed developing countries with one main objective, namely to get rid of malaria, without tackling all the other things that were going to happen as a result getting rid of malaria. Hasn't got rid of malaria yet.

No important question can be answered at the level of which it is asked.

You cannot do only one thing - good ecological principle.

Yet the way of the world has been to go to experts - help me to get a solution to this particular problem. And what do we find?

The economist says I can help you with inflation but I can't help you with unemployment.

It's a case of jobs or environment, how often have we heard that? And the whole conservation battle. When actually if you don't look after the environment there will be no jobs.

My friend Paul Ehrlich says that economists are the most dangerous of the experts because they're listened to.

The experts and particularly the economical experts are fond of regarding life as a zero-sum game. You win, I lose. We can't all win together.

What about possible symbioses of desirable goals? What about environments and jobs, or do we have, forever, to live with trade-offs?

That is a very important question.

Economically Australia has not got anywhere near a solution to this problem.

Our task is to find a new approach in which we can think synoptically about the fundamental problems of our society and about the world, in politics, in economics, in science and technology, in industry, in ethics, in another model I call the ecological model.

We cannot forever go backwards into the future.

And the ecological model has as its objective the sustainable society of the future.

Or to put it more simply, healthy people with healthy relations to a healthy environment.

People say it can't be done. Well let's at least have a go at it, and let's try.

Like the sixty-five-year-old man who stood in front of the judge and the judge said "You are found guilty and I convict you to prison for fifteen years. Have you anything to say?".

And the convicted man said "I'm afraid I won't live that long." And the judge said "Well just do the best you can."

But what do we really know about the future that we're planning for?

Says Kenneth Boulding, the enlightened economist, "precious little but that little is precious".

Now various attitudes to the unknown are captured in that century old story of the [lader] lady or the tiger.

The story is a very simple one of the young man who could open either door he pleased. If he opened the one there came out of it a hungry tiger, the fiercest and the most cruel in the land, that would tear him to pieces. If he opened the other door there came forth from it a lady, the most suitable to his years and station that His Majesty could select from amongst all his fair subjects.

Which door to open?

The first man refused to take a chance. He lived safe and died chaste.

The second man hired risk assessment consultants. He collected all the available data on the lady and tiger populations.

He brought in sophisticated technology to listen for growling and to detect the faintest whiff of perfume.

He completed checklists. He developed a utility function and assessed his risk aversiveness, averseness. Finally sensing that in a few more years he would be in no condition to enjoy the lady anyway, he opened the optimal door and was eaten by a low probability tiger.

Now the third man took a course in tiger taming. He opened a door at random and was eaten by the lady.

Now to interpret this story.

We respond to the unknown by trying to retreat from it, by trying to comprehend it or by trying to control it.

The retreat from the future is the Arcadian approach. It's directed backwards to a mythical golden age or to a state of innocence in a pastoral world where peace of mind is not threatened.

Where intellectual aspiration is not called for and virtue is not at risk.

Arcadia is a world without strife, without ambition and without material accomplishment.

The approach is evident in longings for a return to a simpler risk-free life that never was. But a world without science and technology is not a choice possible for us.

Four billion people, now, cannot possibly survive without some form of science and technology. We can choose between sciences and technology but apart from that there is no option open to us. As the case of Henry Ford's offer to prospective buyers of the first Ford motor car, you can have any colour you like as long as it's black.

The second approach was to attempt to comprehend the future and make a risk benefit analysis of various alternatives. Measure the probabilities and the trade-offs, calculate the social risk-benefit ratio. Then the common good will be defined.

But it isn't.

A risk benefit analysis was made of a project to remove crossing lights in front of an old folks home. The analysis resulted in the crossing lights being removed.

What value are old people in an old folks home?

The choices of risk assessment methods are themselves biased by underlying cultural assumptions or those of the analyst.

We've got plenty of examples of that in modern society.

And yet the assessment and the management and the adjustment of risk in industry is estimated to cost in the region of three hundred billion dollars a year in the United States. That's fifteen per cent of the GNP.

The underlying question is how safe is safe enough and that involves subjective judgments which vary with the analyst.

And we have always to remember that we could be eaten by a low probability tiger. I mean more specifically the possibility, for example, that in nuclear power an atom plant could have a meltdown; very improbable. But nevertheless, a possibility.

Now the third approach was to control the future. It's the approach of the tiger trainer, tamer.

Historically I suppose it could be said to be represented by the utopian vision that began to be taken seriously from the seventeenth century onwards. It's interesting that one of the writers at the time in the seventeenth century who was a man called Foigny, who like Francis Bacon placed his Utopia in the South

Seas on an island, called his island, Terra Australis. And he called the inhabitants Australians.

In Utopia a man creates a world anew and improves it through his own exertions. He begins as a tenant or a lodger and ends up as the landlord.

And as his environment improves so, it alleges, will he.

Men look forward, never backwards, seldom upwards, in Utopia.

That's the dominant tradition of professional engineers, scientists and technologists. It serves us well up to a point.

But as some engineers have been the first to point out, it has met its match and more in the complex unmanageable world it is called upon to address in the twentieth century.

There is, despite its benefits, one long recognised weakness in Utopian speculation.

The inadequacies of human beings and the unlikelihood that they can live up to their own ambitions. And it's for this reason that Utopian thinking has led some of its modern practitioners such as Arthur Koestler and Carl Sagan to consider ways of improving man through genetic engineering or by some other sort of biological manipulation and those of you who know the writings of these two people, know that they consider that there's some real defect in human beings

that they can't get this Utopia and we'd better engineer human beings in some sort of way.

Sir MacFarlane Burnet in our own land is of this view - he's going to do it by genetic improvement.

The utopian vision leads to a paradox well-put by Karl Jaspers when he said "Today we are conscious of standing at a turning point of history. It's the age of technology; we ourselves in our technological ability as creators of salvation on earth without parallel, we see ourselves that way sometimes, or we see ourselves as equally without parallel in our spiritual perplexity".

The man who was trained to become a tiger tamer finds himself confronted with the carnivorous lady.

Why?

The unknown is not a wrinkle to be ironed out of the social fabric.

Not only do we face the inadequacy of human beings but the unknown grows as we grow in knowledge and our ability to control.

The First Law I learned as a graduate student was that as knowledge increases arithmetically, ignorance increases geometrically.

There's always something for a university to do in its research [practice].

There is an alternative to these traditional approaches to the future.

It accepts the inevitability of incomplete knowledge, it accepts the challenge of the surprising world around us and it accepts the imperfections of human beings. The fundamental question is not how to calculate, control and even reduce risk, important as they are in certain situations. It's how to increase our risk-taking abilities. How can we attain the intellectual and moral maturity to live fully and safely in a complex world full of risk.

How brave is our new world going to be?

Every creative step forward in human civilization involved enormous risk taking.

A.N. Whitehead, and I quote, says "The major advances of civilization are processes that all but wreck the societies in which they occur".

It's the business of the future to be dangerous

Advances in civilisation were never throwbacks to some Garden of Eden.

They have always brought a maturer fulfilment of human life in another sort of novel environment.

With every new advance there is a cost. With every new liberation in technology, politics, education, sex, what have you, there are new forms of enslavement created at the same time. That's the risk.

The price paid for Neolithic culture and for urban civilisation was enormous.

The price paid for the agricultural revolution was enormous.

The price paid for the industrial revolution with its dark satanic mills was enormous, but in every case the new brought as well new creative possibilities, new hopes and new experiences along with new evil and new suffering that didn't exist before.

As a biologist I would say willingness to take risks as a condition of biological progress.

Life could have stayed in the slime of a shallow tropical sea where we think it was originated. But it didn't, it ventured up rivers, eventually onto dry land, into the air, it conquered every habitat on Earth from the highest mountains to the deepest depths of the oceans, from the poles to the equator.

Remember the dinosaurs?

They became extinct.

Was it because they were unadapted? No.

They were perfectly adapted to the world they happened to find themselves in.  
But that world changed.

Success at any point means being completely adapted to the circumstances that are passing from us.

Evolution always, in biology, has, there's a sort of [a] alternate strategies. You can be a specialist today, perfected today's environment and do the best possible thing in this world or you can have adaptations which will enable you to face a new world which is going to come along next year, two years later, a century later and so on. You can be a specialist or a more generalist, less perfected today but with possibilities for tomorrow.

And life certainly ventured forth, to every corner. I mean just consider the marsupials; they could have arrived in Australia perhaps from the south and taken up residence in Tasmania and said this is a nice sort of place to stay, we'll stay there. They didn't, they diversified into every conceivable form of marsupial mammal you could possibly imagine over the whole continent.

How did life increase its risk-taking abilities?

By changing, or in technical terms by mutating. Changing to meet a future.

Some of you may have read that little book called *The Life of the Cell*, in which the author says that it is possible that human beings occupying some planet out there looking down on Earth which had never been populated might have said "Well let's go about inventing life to put it on that planet down there that does have no life" and in the course of time they may have had the ingenuity to invent a DNA molecule which we think is the beginning molecule of life.

They would have made a terrible mistake. They would have made the perfect molecule that was incapable of change, incapable of mutating, and there could have been no evolution of life on that planet.

But it had built into it the incredible capacity for change.

It can come in billions of different forms and that's the basis of being able to cope with a changing world and to fill every corner of it with some form of life.

Well what's the sort of change that's going to [compress] increase our capacity for living more fully in any future that's before us?

Not changing our biology, surely.

But changing our culture, our politics, our economics, our science and our technology.

The sustainable and just global society of the [full] future will be full of risks.

Not foolhardy risks that could lead to extinction.

I'm not thinking of the future just as a continuation of the present but a future which is going to be very different from the present.

Unless we want to be dinosaurs we simply will go along as we are with a changing environment and that's extinction.

Because the interesting question in retrospect, if you look back in history; we're standing at the edge of history, say at the brink of the Industrial Revolution.

How would you, with hindsight, have steered its course?

Would you have feared the risks involved in forging ahead?

Would you have been prepared to take all the risks and challenges if you knew them in advance?

And if you knew the enormous cost that history was going to claim?

And I think we could ask ourselves at this turning point in history.

Perhaps in the past we could have said we could have skipped some of the histories as suggested in a cartoon I saw recently depicting a group of tribesmen way back who are consulting the future together and the caption of the cartoon read "So by a vote of eight to two we've decided to skip the industrial revolution

and go straight into the electronic age”.

A nice idea but not very possible.

What are the cultural mutations that will help to ensure a future on Earth that sustainable and which promises a full life to all who live on this Earth?

Let me mention a few.

I believe it will be informed by an ecological model not only of organisms but of institutions and of knowledge in general, and of the importance of understanding relationships, as opposed to the exclusively mechanical model that's the dominant model in our understanding today.

So it won't be substance thinking, it will be ecological thinking.

Society is more than the economy. It's incredible how in Australia the problem of Australia is always spoken of in terms of the economy, the health of the economy. If only we could get the economy healthy and that means make it grow faster.

That's a substance way of looking at problems.

Secondly, it will be less manipulative of nature. Medicine will emphasize preventive medicine. Industry will be concerned with preventing poisons from

getting into the environment instead of cleaning it up afterwards

And all manipulation will be done in the context of respectful attention to the strategies of life and to ecological interdependencies.

Technology will opt for soft landings, not hard landings, not superstar technology.

Not everything that could be done will be done. Our faith in technology will be tempered.

As Leontief the economist who made the report to the United Nations said, "It's the people who don't know anything who think that everything is possible on this Earth."

Thirdly it will write the person and all living creatures into the equation in the way in which risk benefit analysis ignores at the moment, in a way that this ignores.

Nature will be valued not just for its instrumental value, its usefulness to us, but in terms of the value of its creatures to themselves and to God.

A new ecological ethic will have to weigh up the value of the creatures to themselves [and] – their intrinsic value - and their value to us in assessing any merit, relative merit, of any action.

Next it will measure life in terms of richness of experience. The focus of the dominant model is on possession and consumption of goods and services.

Patrick White recently wrote a very interesting letter to the Labor Party in Australia when they were meeting in Canberra. It was published in the main newspapers, I read just a little bit. "If we don't search our conscience in the months to come and realise that there is more to life than money, minerals and missiles, we run the risk of offering ourselves for destruction as well as helping to destroy the world."

Next it will be accessible to, let's say the science and understanding, will be accessible to non-specialists. It will be participatory and I think it'll be non-elitist.

One of the authors of Limits to Growth, when asked ten years later - that's last year - how he would have changed the book were he to write it now, he said "We didn't tell people that the power to change things rests with them."

But that of course makes the assumption that people will take the trouble to understand the issues.

And the temptation we face when we recognise the urgency of issues is to become [ex] activists in an immediate way and I feel about them as much as I feel about experts. The problem of the activists is that they're too likely to assume what the problem is and then to get an expert to tell them how to solve

it.

But as science and technology become more participatory, there will be a growing awareness that whole classes of science technology may be incompatible with democratic forms of government. I think nuclear power may come into that category. Some forms of genetic engineering will come to that category.

Next it will promote community in contrast to breaking up community, such as happened in the Green Revolution; the breaking up of community. Such is happening in the development of Brazil today.

How can communities be saved by empowering ordinary people to take their own development into their own hands? That's called self-reliance. "The meek shall inherit the Earth", that's what the graffiti writer put up on the wall. Somebody wrote underneath "If that's all right with the rest of you."

Then I notice that someone has added a third line, "The meek won't want it."

It will emphasize the possible symbiosis of desirable goals that I talked about.

It will put an emphasis on creative transcending of the present situation.

To be alive is to rise above the present experience of life, is to enter into novel situations. In a healthy society, members will be encouraged to do new and

different things. It will be planetary rather than local and national or state.

Science and technology will be science and technology conducive to a sustainable global society - Western Australia, Australia, the globe. It will transcend national boundaries. It'll be non-violent. Swords will literally be beaten into ploughshares. The one million dollars spent every minute on military activities and weapons will be seen to be the suicide that it is.

But when a new kind of man and a new kind of culture is emerging and I do believe there are grassroots signs of this today.

The old man will be not willing to [in] disinherit himself. He will try to make a new life out of a dying culture through desperate simplification. He will insist on the old records being played and replayed. The return to simple basics which we hear so much about here and hear an awful lot in the United States is a return to the worn-out ways of the past but Mr. Reagan and Mrs. Thatcher and I believe Mr. Fraser are not the way of the future.

They're part of our economic and political malaise.

There's is a rear vision view of the world.

Be it in politics or economics or religion or morality, the present plea to return to old fashioned basics is a call to reinforce the status quo and prevent change; it's to prevent anything novel happening in this wonderful world of ours.

Remember the interesting statement of H.L. Mencken which I like quoting: "For every human problem there is a solution that is simple, neat and wrong."

I believe that to proceed on this path we will have to have hope and faith and love and I think Reinhold Niebuhr put it rather wonderfully when he said "Nothing worth doing is completed in our lifetime therefore we must be saved by hope. Nothing too or beautiful or good makes complete sense in any immediate context of history therefore we must be saved by faith. Nothing we do however virtuous can be accomplished alone therefore we are saved by love. No virtuous act is quite as virtuous from the standpoint of our friend or foe as from our own standpoint therefore we must be saved by the final form of love which is forgiveness."

And if you say that's impossible, I reply in the way the students replied in France some years ago: Be realistic, plan for a miracle. Thank you.

[Applause.]

**VC:** Professor Birch would be happy to answer questions for a little while. There are two roving microphones and if you indicate that you'd like to ask a question one of the microphones will be brought to you. On this side please.

**Audience Member 1:** You posed a lot of problems or not a lot of problems, a lot of questions. And problems.

If you had the answers to these how would you implement them?

**CB:** If we had the answers how would we implement them? Well I think you've got to be quite specific about this.

You see, we were, I was talking really primarily about science and technology, and how can we have a different sort of scientist and technologist, and I think one of the answers to that is to something, to do something, which is extremely difficult to do in the traditional universities and therefore do it in a university - the new universities where it seems to be able to be done - and that is create interdisciplinary, cross-disciplinary activities and I think this is why I am interested in Community Science. I think that is a deliberate step to try and do something about a sort of science that is not going on in the, in the major, in the traditional universities.

And I think, I think one has to be very specific about these things and I think for, if you are thinking in terms of a fundamental change in the society over a broad spectrum then it's

I don't think there's going to be any advance except through grassroots movements and I think they are very important.

I think every individual can belong to some sort of grassroots movement which is implementing a sort of different outlook on development and growth and the future of Australia.

And we can all belong to some group.

I believe in the, you know, in the mustard seed really, that you don't have to see the whole thing being executed once but little mustard seeds planted here and there will grow into great trees which will have their little influence and spread. I, otherwise I wouldn't have, you know, very much hope but I put a lot of hope in the must-see

**VC:** Another question.

Professor Hill.

**H:** Professor I'm drawn very deeply to the view that you promote of a sustainable society with my heart. With my head I'm looking for stronger justifications, particularly when I look for the, the ground on which you recommend that the participatory community science approach is the one that is justified. The justification that seemed to be coming across was that the condition of biological progress is a willingness to take risks. Now, this is two-edged because to me it doesn't necessarily lead to the participatory scientific and technological society. It could be said that greater risks are taken by some of the large leaps that scientists are attempting in relation to genetic engineering and nuclear development and so on. I want justifications, I don't find that one helping me very much.

**CB:** Well you see I'll make sure that I've got your question. You don't find the various criteria I suggested is helping you in terms of making judgments about

genetic engineering and other forms of technology. Was that the question?

**H:** No, not quite, it was more that I want to have answers to the people who say that the route that is being recommended by alternative technology is not as efficient, not as effective, as the route taken by high technology. Now the justification you were advancing as a defence of alternative technology tended to be that appeal to the biological fact that willingness to take risks is a condition of biological progress. It's a kind of naturalistic fallacy which I can't carry on with. It doesn't get me there.

**CB:** Yes, yes, no well I would agree with entirely. I would only that as analogy and say that this is an analogy in the biological world but I wouldn't want to draw my ethics or my behaviour from that. I would agree with, in time that would be a false way of arguing.

But, so I would only put that forward as an analogy.

I'm totally opposed to supposing that one can draw ethical principles out of studying frogs and geese and so on.

**VC:** Please

**Audience Member 2:** Professor Birch, you speak of Community Science as one approach to solving some of the aspects of the problematique of which you spoke. Why Community Science? Why not better science or more perfect science

or more humane science? What's so special about community?

**CB:** Because it's better and more humane.

**VC:** Another question.

**CB:** I mean your question is a serious one and I agree with you, better science, I think it's very difficult for us to know. I think we're babes in the wilderness. I mean I've taught biology virtually all my life, and I find it exceedingly difficult to teach biology in a framework other than the substance mechanistic model, so that students come out with a picture that a mouse or a human being is a primary collection of pumps and computers up here and so on because that's what the textbook says.

And how am I to get another sort of, convey another sort of picture whilst retaining the accuracy of that particular aspect I mean one aspect of what the human being or a mouse is, and I find this very difficult to do and I think it's something we haven't thought enough about but I'd like to be able to do it better.

I was too conditioned by the sort of training I had I think, in many ways.

[Inaudible]

Fine, well that's great I mean I'm happy, I find a lot of, I find a lot of sort of conviviality of spirit here. I think it happens you see in small universities, new

universities I should say, because you are willing to look at the future in a different way from the traditional university. I mean to sit on a Faculty of Science at a university as old as Sydney is a most debilitating experience.

**VC:** Is there a microphone anywhere for you?

**CB:** There is a gentleman way up the back there.

**Audience Member 3:** Professor Birch you assume that the people, with God's help, have a fair chance of changing things, of changing the dominant model, mechanistic model, the brick model of technological society. So that assumes a liberal model of free debate where one can get rid of these blind spots in society.

I'm a bit more sceptical than that, perhaps this is a bit of an outdated model. Shouldn't we be able to dress ourselves at the same time to the power structures which are interested in keeping the bricks model [of growth] (1:02:19) and I think as far as that is concerned, your talk hasn't given us many directions.

**CB:** Now I'd agree entirely the day I said nothing about that and the only thing I said about that was that I thought that grassroots movements did have a very important to play, part to play, in changing the power structures but other forms of change in power structures I said nothing about, I agree with you, that's a whole important area, yeah.

But I only had, was supposed to talk for forty five minutes.

**VC:** On that far side.

**Audience Member 4:** Professor Birch you're a man of religious conviction. You didn't mention anything about the part that religion might play in this ordered society you talk about. Would you care to comment on the importance of religion in man's sort of general philosophy and progress forward?

**CB:** Yes, I have a very strong conviction that the, If we just, if I just restrict myself to the, the Christian churches that I know more about, I have a strong conviction that they have failed in this area because they have done exactly what everybody else does, and have gone to experts and have not brought to these problems their own particular insight which I think they do have basically and fundamentally to the human issues that face us.

Now, ff you have a church group that becomes interested in the problem of nuclear energy and so on, what are they do? On the whole they get a group of experts together to consult together these things and think that it's from the experts that they're going to get the guidance, whereas I think the individual Christian should have a particular insight to contribute, quite independent of whatever expert judgments are made, and so I see the community of Christians as a group of people who could be contributing to this discussion in a much more fundamental way than they are if they could take it seriously.

But the present trend, to me, is away from taking issues of the world seriously. It's this sort of back to basics and basics hasn't got to do with politics and economics and science and technology. It's got to do with some other things in religion, and that's a very broad statement but I can tell you this, that the World Council of Churches program with which I've been involved for ten years has had a terribly difficult task and getting this into the individual church congregations throughout the world, to get them to feel they have some responsibility and have something to contribute in this total area.

And I believe that there is something fundamentally important to be contributed there.

**VC:** There must surely be some outraged experts here.

Dr. [Hallan] can we, can we get the microphone down please?

**CB:** She's not an outraged expert.

**Audience Member 5:** No I'm not indeed. Professor Birch, as you mentioned, engineering humans surely will be very scientifically exciting and therefore a very tempting option. By what power will we resist this seductive route?

**CB:** The immediate answer I give to that is that no one will agree on what, in what way a human being is to be re-engineered.

Well you know that lists have been made of the qualities that one would look for in a, an improved human being and every geneticist has a different list. The person who first made such a list was Hermann Muller, Hermann J. Muller, and in his first list included qualities which were represented by various people and he had Stalin in it but in his second list he left Stalin out. I mean even the course of life, whose life he changed. I think that's one one of the issues. Why do you think it's a tempting thing?

**AM5:** [Because it's so scientifically exciting. And because it seems like a last-ditched effort to do something about it.]

**CB:** I see.

There are all sorts of reasons why it wouldn't work in terms of a breeding program but that we needn't go into that, I mean in other words it's scientifically unexciting.

In terms of genetic engineering, terms of genetic engineering, it it might be but I don't think you find the genetic engineers are very excited about that prospect.

**End of Transcription**