Mahathir on Science and Technology

A commemorative volume
in conjunction with the award of
Honorary Degree of Doctor of Science

Compiled by
Universiti Sains Malaysia

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Preface

In the world of academe, there is no better way to recognise a legacy than to publish it for public record. This is exactly the reason why this compilation is undertaken, namely to place on public record the legacy of a statesman and his passion for science and technology. Trained as a medical doctor, his perspective on science and technology is both clinical and compassionate. For him, science and technology must serve public interest as a way for society to better itself, indeed the world as well. This is clearly spelt out in one of the challenges outlined in his brainchild, the nation's blueprint, Vision 2020.

The launching of this compilation as a commemorative volume in conjunction with the 33rd Convocation Ceremony of Universiti Sains Malaysia (USM), as well as the 35th anniversary of the establishment of USM makes it even more auspicious. It is intended to mark and celebrate the conferment of the Honorary Degree of Doctor of Science to Tun Dr Mahathir Mohamad from whom the university has benefited significantly.

For this purpose, we have selected some twenty seminal addresses related to science and technology by the former Prime Minister of Malaysia, including a few articles that he wrote for the media in the 1960s. This is to demonstrate not only his keen interest on the wide-ranging topics of science and technology, but also his command and competency on a complex discipline, evident from the critical comments and innovative suggestions inherent in all of his addresses and writings. Indeed, USM is inspired by his thought-leadership.

Moreover, while there are many compilations and books written on Tun Dr Mahathir in relation to politics and economy, unfortunately this is rarely so when it comes to science and technology. As such, apart from fulfilling our academic obligations, it is also our hope that this compilation will in some ways help to fill in the gap on an equally important subject matter as a tribute to the Tun. Still, this is a modest and humble effort for a statesman of a stature like that of Tun Dr Mahathir Mohamad, Malaysia's Father of Modern Development; a development which is firmly anchored on science and technology.

Professor Dato' Dzulkifli Abdul Razak
Vice-Chancellor
Universiti Sains Malaysia
July 2004

Abbreviations

AIDS	Acquired immune deficiency syndrome
ASEAN	Association of South-East Asian Nations
ATCM	Antarctic Treaty Consultative Meeting
ATCP	Antarctic Treaty Consultative Parties
ATS	Antarctic Treaty System
CABG	Coronary artery bypass grafting
CFC	Chlorofluorocarbon
CHOGM	Commonwealth Heads of Government Meeting
COMNET-IT	Commonwealth Network for IT Development
COPD	Chronic obstructive airways disease
CTO	Commonwealth Telecommunications Organisation
DNA	Deoxyribonucleic acid
GNP	Gross National Product
HIV	Human immunodeficiency virus
ICS	International College of Surgeons
IJN	Institut Jantung Negara (National Heart Institute)
IRPA	Intensification of Research in Priority Area
IT	Information technology
ITA	Investment Tax Allowance
IVF	In vitro fertilisation
MARDI	Malaysian Agricultural Research and Development Institute
MDC	Multimedia Development Corporation
MESITA	Malaysian Electrical Supply Industry Trust Account
MIDCAB	Minimally invasive direct coronary artery bypass

MIGHT	Malaysian Industry-Government Group for High Technology
MIMOS	Malaysian Institute of Microelectronic Systems
MINDS	Malaysian Invention and Design Society
MOSAK	Modelling and Observation of Antarctic Katabatics
MOSTE	Ministry of Science, Technology and Environment
MP	Member of Parliament
MSC	Multimedia Super Corridor
MTDC	Malaysian Technology Development Corporation
NASA	National Aeronautics and Space Administration
NGO	Non-governmental organisation
PC	Personal computer
PDT	Programme for Development and Training
PROSTAR	Program Sihat Tanpa AIDS untuk Remaja (Staying Healthy without AIDS for Youths Programme)
PTM	Pusat Tenaga Malaysia
R&D	Research and development
RFP	Request for Proposal
S&T	Science and technology
SCAR	Scientific Committee on Antarctic Research
SET	Science, engineering and technology
STD	Sexually transmitted disease
UKM	Universiti Kebangsaan Malaysia
UPM	Universiti Putra Malaysia
USM	Universiti Sains Malaysia
WTO	World Trade Organization

The 2nd Malaysian International Seminar on Antarctica

3 May 2004
Park Royal Hotel, Penang

"The initial thrust of Malaysia's foray into Antarctica affairs, that is the demand that it be made a Global Common may not have succeeded fully. But today the countries which initially claimed chunks of Antarctica for themselves are less vehement about their territorial sovereignty. There is also general agreement that the resources of Antarctica should not be exploited. But this has not been embodied in international agreements, and there are countries which have indicated their opposition to such a treaty. Rogue nations may yet try to extract the oil and other mineral resources in which Antarctica is rich."

Antarctica is the perfect example of 'Terra Nullis' or uninhabited land, a land without indigenous people, a land owned by no one. As such everybody can occupy it and claim it as his territory. Indeed many countries appeared to have carved up Antarctica and claimed ownership of their area as their territory. To substantiate their claim they even arranged to have their people give birth to children there. It was a case of first come first serve. Naturally countries like Malaysia, which came into being long after Antarctica was discovered was not in a position to lay claim to any part of Antarctica.

Antarctica is uninhabitable. Settlements of people cannot be successfully established without support from outside. But there is every likelihood that under the ice there are rich deposits of oil and minerals. Unchecked, the countries which lay claim to Antarctica may just try to extract these resources and destroy forever the pristine condition of this icy continent.

Antarctica is not like the Arctic which is a sea covered permanently with ice. Antarctica is a huge land mass with mountains and valleys hidden under permanent ice. It helps to keep the world cool and to take up much of the water which would have raised the level of the sea.

There is a great deal of worry now that if the ice of Antarctica were to melt for whatever reason then the level of the sea would rise so high that many island nations would just disappear beneath the sea, and much of the countries bordering the sea would shrink as the sea floods the low lying areas and the river basins. This would be a catastrophe of untold magnitude.

This fear is very real. Already we are experiencing global warming due to the shrinking of the ozone layer. This phenomenon is said to be due, partly at least, to the release of

the gas hydrofluorocarbon which we use for air conditioning and refrigeration. We were happily releasing this gas without knowing its effect on global warming. This is an example of our lack of knowledge of the effects of the things we do, especially the very long term effect. We may be doing other things which are harmful to us or to the environment without knowing it until much-much later. We used X-rays for decades without realising that it could cause cancer to those exposed to it. Really our knowledge of things is far from complete.

Now if Antarctica is exploited for its great mineral resources, we cannot really know what effect it would have on the ice of that continent and what effect it would have on the environment throughout the world. If the ice were to melt then the catastrophe I had mentioned might occur. It is because of this that Malaysia decided to oppose claims of ownership of Antarctica. Malaysia wants it to be a Global Common, owned by all the world's countries, rich and poor, by all the world's people. And so Malaysia brought up the question of Antarctica in the United Nations, supported by Antigua.

The Malaysian position in the United Nations caught the attention of the member countries of the Antarctica Treaty System Consultation Meeting. In 1985 two Malaysian representatives were invited to attend a workshop on the Antarctic Treaty System in South Beardmore Station, Antarctica. The late Tan Sri Zain Azrai, our then permanent representative to the United Nations and Tan Sri Datuk Dr Omar Abdul Rahman, the then Scientific Advisor to the then Prime Minister participated in this workshop. Following that Tan Sri Datuk Dr Omar Abdul Rahman wrote a proposal to encourage Malaysia to establish a research programme in Antarctica. However, the proposal was not taken up then due to many factors. Among the factors involved were the high cost of research and the lack of logistic support for Malaysian scientists to undertake research in

Antarctica. Hence, this suggestion was not implemented until a decade later.

In 1996 the New Zealand government under a bilateral scientific cooperation programme between New Zealand and Malaysia, offered the use of Scott Base, Antarctica to Malaysian scientists. An official visit headed by YAB Dato' Seri Dr Ling Liong Sik was made to Scott Base Antarctica. Following this offer and visit, the Malaysian Cabinet approved the setting up of a Malaysian Antarctic research programme in the areas of climate change and biodiversity in November 1997. The Academy of Sciences Malaysia was given the responsibility to develop and manage the programme, under a task force chaired by Dato' Dr Salleh Mohd Nor.

There was at first some resistance to Malaysia's involvement in Antarctica among members of the research community in Malaysia. Some critics argued that the limited research money should be spent on solving and understanding scientific problems and issues within our national borders. They argued that there is very little benefit to be achieved in sending our scientists to undertake research in Antarctica.

Nevertheless, the Task Force approved four research projects, and the first scientific expedition working on transboundary air pollution was undertaken in October 1999. In May 2000 after the success of the first scientific expedition, a small national seminar was held entitled 'Antarctica Research: Challenges and Experiences', in which the President of SCAR (Scientific Committee on Antarctic Research) was invited to give a talk at the seminar. At this meeting the Australian Antarctic Division invited two Malaysian scientists to participate in their programme. The President of SCAR invited Malaysia to send a delegate to the 26th biennial SCAR meeting in Tokyo.

Since the first scientific expedition, the Malaysian Antarctic Research Programme has grown into 12 projects with an initial budget of RM5 million in the 8th Malaysia Plan. The good response of local scientists led Malaysia to apply to be an Associate member of SCAR. This application shall be considered at the coming 28th SCAR meeting in October 2004 in Bremmerhaven, Germany.

Currently, the Malaysian Antarctic researchers cooperate with the following national programs:

- Antarctica New Zealand
- Australian Antarctic Division
- Instituto Argentino Antarctico
- South Africa National Antarctic Programme

In SCAR, a Malaysian scientist is heading a four-year Action Group on Modelling and Observation of Antarctic Katabatics (MOSAK) working closely with atmospheric scientists from the British Antarctic Survey. In the coming SCAR open science meeting in Bremmen, Germany in July 2004, the Malaysian scientists from the programme will be presenting 7 academic papers. This compares well to New Zealand's scientists presenting 19 academic papers at the same conference.

As an acknowledgement of Malaysia's significant and active involvement in scientific research in Antarctica, the Antarctic Treaty Consultative Parties (ATCP) broke tradition by inviting Malaysia to attend the Antarctic Treaty Consultative Meeting (ATCM) to 'observe' their meeting. Malaysia attended the 25th ATCM in Warsaw, Poland in 2002 and the 26th ATCM in Madrid, Spain in 2003. Malaysia is not an official 'observer' but has been invited 'to observe' the meeting. It is expected that Malaysia will also be invited to observe the 27th ATCM meeting in Cape Town this year.

It is now clear that Malaysia has gained recognition for its interest in Antarctica and the research work that it is doing there.

The initial thrust of Malaysia's foray into Antarctica affairs, that is the demand that it be made a Global Common may not have succeeded fully. But today the countries which initially claimed chunks of Antarctica for themselves are less vehement about their territorial sovereignty. There is also general agreement that the resources of Antarctica should not be exploited. But this has not been embodied in international agreements, and there are countries which have indicated their opposition to such a treaty. Rogue nations may yet try to extract the oil and other mineral resources in which Antarctica is rich.

One of the understandings regarding maintaining the pristine environment and nature of Antarctica is with regard to importing animals from other regions to the continent. Even the animals indigenous to the Arctic region and those used there for transport, such as horses and dogs are now banned from Antarctica. I understand that those which were brought there by the early explorers have been taken away from Antarctica.

The capture and export of Antarctic animals such as penguins and seals are now controlled. Waste resulting from people involved in research in the continent are expected to be removed.

It is now possible to fly into Antarctica where the hard icy surface is suitable for specially fitted aircraft. Otherwise researchers have to go there by boat.

There is now a thriving tourist industry with ships taking various tourists into the navigable parts of the continent during the summer months. I have gone to the Argentinian part of

Antarctica on an ice-breaker. From Ushuaia in the southern tip of Tierra del Fuego (land of flames) the ship crosses Drake's Passage to reach the ice-bergs which borders the icecovered land. These ice-bergs break off and float away every now and again. The size of ice-bergs is amazing – measuring more than a hundred miles long and tens of miles wide. They pose a dangerous threat to ships sailing in the southern seas.

Our intrepid sailor, Azhar, sailed through Drake's Passage, and it was here that his boat keeled over to one side suddenly and forcefully so that the mast broke. I can understand how this happened and how perilous was Azhar's solo sailing because when we were crossing Drake's Passage in our well-built Russian ice-breaker, the waves were 50 feet high and the winds 90 knots. Although the ship's cabins were ten stories high, the waves went over them. In the ship everything was thrown with considerable force in all directions. Walking was only possible by hanging on to the hand rails and the balustrade. It seems that Drake's Passage which is where the Atlantic meets the Pacific is always extremely rough. What it must have done to Azhar's '*Jalur Gemilang*' tiny sailing boat must have been terrible. It is amazing that he managed to sail on with a jerry-rigged half mast all the way through Drake's Passage and on to Falkland Island.

Despite all these discomfort our journey was very rewarding. In the waters of the numerous bays surrounding Antarctica, the sea was calm and the ship sailed steadily, frequently through ice. It was not plain sailing as the ice-breaker had to draw back and then rush forward at the floating ice to break it. Still we were able to eat meals properly at the tables and to listen to lectures on Antarctica by experts who accompanied us. Antarctica became more real to us and we feel that Malaysia's interest in it is justified. Some Malaysian scientists who had participated in the Antarctic research programme accompanied us and were able to give talks on their experiences.

Not many Malaysians will be able to take this tour. As a result of our visit, the owners of the Aquarium in Langkawi are building a penguinarium so people can see what animal life is like in Antarctica. This is one of the positive results of the trip. The other is to approve and encourage Malaysian research in Antarctica.

As a developing country, Malaysia has taken a diplomatic position on The Question of Antarctica in the United Nations. Malaysia has now, through bilateral relationships established an active Malaysian Antarctic Research Programme. It is expected that Malaysia will also be an Associate Member of SCAR soon. Malaysia has also shown that through bilateral cooperation with ATS member countries, a developing country can participate in research in Antarctica. We have introduced a new precedent for the ATCM member countries to consider the participation of a non-treaty member country that has shown interest in Antarctica.

A stage has been reached where the Malaysian government must make a decision whether to join the Antarctic Treaty System (ATS) or not. The current arrangement is not satisfactory for the continued participation of Malaysia in Antarctica research, especially if the programme were to be expanded in the 9th Malaysia Plan. However, we should insist that all countries give an understanding not to exploit the mineral resources of Antarctica.

The Opening of the 10th Session of the Islamic Summit Conference

16 October 2003 (20 Shaaban 1424H)
Putrajaya Malaysia

"We must build up our strength in every field, not just in armed might. Our countries must be stable and well administered, must be economically and financially strong, industrially competent and technologically advanced. This will take time, but it can be done and it will be time well spent."

The whole world is looking at us. Certainly 1.3 billion Muslims, one-sixth of the world's population are placing their hopes in us, in this meeting, even though they may be cynical about our will and capacity to even decide to restore the honour of Islam and the Muslims, much less to free their brothers and sisters from the oppression and humiliation from which they suffer today.

I will not enumerate the instances of our humiliation and oppression, nor will I once again condemn our detractors and oppressors. It would be an exercise in futility because they are not going to change their attitudes just because we condemn them. If we are to recover our dignity and that of Islam, our religion, it is we who must decide, it is we who must act.

To begin with, the governments of all the Muslim countries can close ranks and have a common stand if not on all issues, at least on some major ones, such as on Palestine. We are all Muslims. We are all oppressed. We are all being humiliated. But we who have been raised by Allah above our fellow Muslims to rule our countries have never really tried to act in concert in order to exhibit at our level the brotherhood and unity that Islam enjoins upon us.

But not only are our governments divided, the Muslim *ummah* is also divided, and divided again and again. Over the last 1,400 years the interpreters of Islam, the learned ones, the *ulamas* have interpreted and reinterpreted the single Islamic religion brought by Prophet Muhammad (SAW), so differently that now we have a thousand religions which are often so much at odds with one another that we often fight and kill each other.

From being a single *ummah* we have allowed ourselves to be divided into numerous sects, *mazhabs* and *tarekats*, each more concerned with claiming to be the true Islam than our oneness

as the Islamic *ummah*. We fail to notice that our detractors and enemies do not care whether we are true Muslims or not. To them we are all Muslims, followers of a religion and a Prophet whom they declare promotes terrorism, and we are all their sworn enemies. They will attack and kill us, invade our lands, bring down our governments whether we are Sunnis or Syiahs, Alawait or Druze or whatever. And we aid and abet them by attacking and weakening each other, and sometimes by doing their bidding, acting as their proxies to attack fellow Muslims. We try to bring down our governments through violence, succeeding to weaken and impoverish our countries.

We ignore entirely and we continue to ignore the Islamic injunction to unite and to be brothers to each other, we the governments of the Islamic countries and the *ummah*.

But this is not all that we ignore about the teachings of Islam. We are enjoined to Read, *Iqraq'* that is to acquire knowledge. The early Muslims took this to mean translating and studying the works of the Greeks and other scholars before Islam. And these Muslim scholars added to the body of knowledge through their own studies.

The early Muslims produced great mathematicians and scientists, scholars, physicians and astronomers, et cetera; they excelled in all the fields of knowledge of their times, besides studying and practising their own religion of Islam. As a result the Muslims were able to develop and extract wealth from their lands and through their world trade, able to strengthen their defences, protect their people and give them the Islamic way of life, *ad-din*, as prescribed by Islam. At the time the Europeans of the Middle Ages were still superstitious and backward, the enlightened Muslims had already built a great Muslim civilisation, respected and powerful, more than able to compete with the rest of the world and able to protect the *ummah* from

foreign aggression. The Europeans had to kneel at the feet of Muslim scholars in order to access their own scholastic heritage.

The Muslims were lead by great leaders like Abdul Rahman III, Al-Mansur, Salah el-Din al-Ayubi and others who took to the battlefields at the head of their forces to protect Muslim land and the *ummah*.

But halfway through the building of the great Islamic civilisation came new interpreters of Islam who taught that acquisition of knowledge by Muslims meant only the study of Islamic theology. The study of science, medicine et cetera was discouraged.

Intellectually the Muslims began to regress. With intellectual regression the great Muslim civilisation began to falter and wither. But for the emergence of the Ottoman warriors, Muslim civilisation would have disappeared with the fall of Granada in 1492.

The early successes of the Ottomans were not accompanied by an intellectual renaissance. Instead they became more and more preoccupied with minor issues such as whether tight trousers and peak caps were Islamic, whether printing machines should be allowed or electricity used to light mosques. The Industrial Revolution was totally missed by the Muslims. And the regression continued until the British and French instigated rebellion against Turkish rule brought about the downfall of the Ottomans, the last Muslim world power and replaced it with European colonies and not independent states as promised. It was only after World War II that these colonies became independent.

Apart from the new nation-states we also accepted the Western democratic system. This also divided us because of the

political parties and groups that we form, some of which claim Islam for themselves, reject the Islam of other parties and refuse to accept the results of the practice of democracy if they fail to gain power for themselves. They resort to violence, thus destabilising and weakening Muslim countries.

With all these developments over the centuries the *ummah* and the Muslim civilisation became so weak that at one time there was not a single Muslim country which was not colonised or hegemonised by the Europeans. But regaining independence did not help to strengthen the Muslims. Their states were weak and badly administered, constantly in a state of turmoil. The Europeans could do what they liked with Muslim territories. It is not surprising that they should excise Muslim land to create the state of Israel to solve their Jewish problem. Divided, the Muslims could do nothing effective to stop the Balfour and Zionist transgression.

Some would have us believe that, despite all these, our life is better than that of our detractors. Some believe that poverty is Islamic, sufferings and being oppressed are Islamic. This world is not for us. Ours are the joys of heaven in the afterlife. All that we have to do is to perform certain rituals, wear certain garments and put up a certain appearance. Our weakness, our backwardness and our inability to help our brothers and sisters who are being oppressed are part of the will of Allah, the sufferings that we must endure before enjoying heaven in the hereafter. We must accept this fate that befalls us. We need not do anything. We can do nothing against the will of Allah.

But is it true that it is the will of Allah and that we can and should do nothing? Allah has said in *surah ar-Ra'd* verse 11 that He will not change the fate of a community until the community has tried to change its fate itself.

The early Muslims were as oppressed as we are presently. But after their sincere and determined efforts to help themselves in accordance with the teachings of Islam, Allah had helped them to defeat their enemies and to create a great and powerful Muslim civilisation. But what effort have we made especially with the resources that He has endowed us with.

We are now 1.3 billion strong. We have the biggest oil reserve in the world. We have great wealth. We are not as ignorant as the *Jahilliah* who embraced Islam. We are familiar with the workings of the world's economy and finances. We control 57 out of the 180 countries in the world. Our votes can make or break international organisations. Yet we seem more helpless than the small number of *Jahilliah* converts who accepted the Prophet as their leader. Why? Is it because of Allah's will or is it because we have interpreted our religion wrongly, or failed to abide by the correct teachings of our religion, or done the wrong things?

We are enjoined by our religion to prepare for the defence of the *ummah*. Unfortunately we stress not defence but the weapons of the time of the Prophet. Those weapons and horses cannot help to defend us any more. We need guns and rockets, bombs and warplanes, tanks and warships for our defence. But because we discouraged the learning of science and mathematics et cetera as giving no merit for the *akhirat*, today we have no capacity to produce our own weapons for our defence. We have to buy our weapons from our detractors and enemies. This is what comes from the superficial interpretation of the Quran, stressing not the substance of the Prophet's *sunnah* and the Quran's injunctions but rather the form, the manner and the means used in the 1st century of the Hijrah. And it is the same with the other teachings of Islam. We

are more concerned with the forms rather than the substance of the words of Allah and adhering only to the literal interpretation of the traditions of the Prophet.

We may want to recreate the 1st century of the Hijrah, the way of life in those times, in order to practise what we think to be the true Islamic way of life. But we will not be allowed to do so. Our detractors and enemies will take advantage of the resulting backwardness and weakness in order to dominate us. Islam is not just for the 7th century AD Islam is for all times. And times have changed. Whether we like it or not we have to change, not by changing our religion but by applying its teachings in the context of a world that is radically different from that of the 1st century of the Hijrah. Islam is not wrong but the interpretations by our scholars, who are not prophets even though they may be very learned, can be wrong. We have a need to go back to the fundamental teachings of Islam to find out whether we are indeed believing in and practising the Islam that the Prophet preached. It cannot be that we are all practising the correct and true Islam when our beliefs are so different from one another.

Today we, the whole Muslim *ummah* are treated with contempt and dishonour. Our religion is denigrated. Our holy places desecrated. Our countries are occupied. Our people starved and killed.

None of our countries are truly independent. We are under pressure to conform to our oppressors' wishes about how we should behave, how we should govern our lands, how we should think even.

Today if they want to raid our country, kill our people, destroy our villages and towns, there is nothing substantial that

we can do. Is it Islam which has caused all these? Or is it that we have failed to do our duty according to our religion?

Our only reaction is to become more and more angry. Angry people cannot think properly. And so we find some of our people reacting irrationally. They launch their own attacks, killing just about anybody including fellow Muslims to vent their anger and frustration. Their governments can do nothing to stop them. The enemy retaliates and puts more pressure on the governments. And the governments have no choice but to give in, to accept the directions of the enemy, literally to give up their independence of action.

With this their people and the *ummah* become angrier and turn against their own governments. Every attempt at a peaceful solution is sabotaged by more indiscriminate attacks calculated to anger the enemy and prevent any peaceful settlement. But the attacks solve nothing. The Muslims simply get more oppressed.

There is a feeling of hopelessness among the Muslim countries and their people. They feel that they can do nothing right. They believe that things can only get worse. The Muslims will forever be oppressed and dominated by the Europeans and the Jews. They will forever be poor, backward and weak. Some believe, as I have said, this is the will of Allah that the proper state of the Muslims is to be poor and oppressed in this world.

But is it true that we should do and can do nothing for ourselves? Is it true that 1.3 billion people can exert no power to save themselves from the humiliation and oppression inflicted upon them by a much smaller enemy? Can they only lash back blindly in anger? Is there no other way than to ask our young people to blow themselves up and kill people and invite the massacre of more of our own people?

It cannot be that there is no other way – 1.3 billion Muslims cannot be defeated by a few million Jews – there must be a way. And we can only find a way if we stop to think, to assess our weaknesses and our strength, to plan, to strategise and then to counter attack. As Muslims we must seek guidance from the al-Quran and the *sunnah* of the Prophet. Surely the 23 years' struggle of the Prophet can provide us with some guidance as to what we can and should do.

We know he and his early followers were oppressed by the Qhuraish. Did he launch retaliatory strikes? No. He was prepared to make strategic retreats. He sent his early followers to a Christian country and he himself later migrated to Madinah. There he gathered followers, built up his defence capability and ensured the security of his people. At Hudaibiyah he was prepared to accept an unfair treaty, against the wishes of his companions and followers. During the peace that followed he consolidated his strength and eventually he was able to enter Mecca and claim it for Islam. Even then he did not seek revenge. And the peoples of Mecca accepted Islam and many became his most powerful supporters, defending the Muslims against all their enemies.

That briefly is the story of the struggle of the Prophet. We talk so much about following the *sunnah* of the Prophet. We quote the instances and the traditions profusely. But we actually ignore all of them.

If we use the faculty to think that Allah has given us then we should know that we are acting irrationally. We fight without any objective, without any goal other than to hurt the enemy because they hurt us. Naively we expect them to surrender. We sacrifice lives unnecessarily, achieving nothing other than to attract more massive retaliation and humiliation.

It is surely time that we pause to think. But will this be wasting time? For well over half a century we have fought over Palestine. What have we achieved? Nothing. We are worse off than before. If we had paused to think then we could have devised a plan, a strategy that can win us final victory. Pausing and thinking calmly is not a waste of time. We have a need to make a strategic retreat and to calmly assess our situation.

We are actually very strong; 1.3 billion people cannot be simply wiped out. The Europeans killed 6 million Jews out of 12 million. But today the Jews rule this world by proxy. They get others to fight and die for them.

We may not be able to do that. We may not be able to unite all the 1.3 billion Muslims. We may not be able to get all the Muslim governments to act in concert. But even if we can get a third of the *ummah* and a third of the Muslim states to act together, we can already do something. Remember that the Prophet did not have many followers when he went to Madinah. But he united the Ansars and the Muhajirins and eventually he became strong enough to defend Islam.

Apart from the partial unity that we need, we must take stock of our assets. I have already mentioned our numbers and our oil wealth. In today's world we wield a lot of political, economic and financial clout, enough to make up for our weakness in military terms.

We also know that not all non-Muslims are against us. Some are well disposed towards us. Some even see our enemies as their enemies. Even among the Jews there are many who do not approve of what the Israelis are doing.

We must not antagonise everyone. We must win their hearts and minds. We must win them to our side not by

begging for help from them but by the honourable way that we struggle to help ourselves. We must not strengthen the enemy by pushing everyone into their camps through irresponsible and un-Islamic acts. Remember Salah el-Din and the way he fought against the so-called Crusaders, King Richard of England in particular. Remember the considerateness of the Prophet to the enemies of Islam. We must do the same. It is winning the struggle that is important, not angry retaliation, not revenge.

We must build up our strength in every field, not just in armed might. Our countries must be stable and well administered, must be economically and financially strong, industrially competent and technologically advanced. This will take time, but it can be done and it will be time well spent. We are enjoined by our religion to be patient. *Innallahamaasabirin.* Obviously there is virtue in being patient.

But the defence of the *ummah*, the counter attack need not start only after we have put our houses in order. Even today we have sufficient assets to deploy against our detractors. It remains for us to identify them and to work out how to make use of them to stop the carnage caused by the enemy. This is entirely possible if we stop to think, to plan, to strategise and to take the first few critical steps. Even these few steps can yield positive results.

We know that the Jahilliah Arabs were given to feuding, to killing each other simply because they were from different tribes. The Prophet preached the brotherhood of Islam to them and they were able to overcome their hatred for each other, become united and helped towards the establishment of the great Muslim civilisation. Can we say that what the *Jahilliah* (the ignorant) could do we the modern Muslims cannot do? If not all at least some of us can do. If not the renaissance of our great civilisation, at least ensuring the security of the *ummah*.

To do the things that are suggested will not even require all of us to give up our differences with each other. We need only to call a truce so we can act together in tackling only certain problems of common interests, the Palestine problem for example.

In any struggle, in any war, nothing is more important than concerted and coordinated action. A degree of discipline is all that is needed. The Prophet lost in Jabal Uhud because his forces broke rank. We know that, yet we are unwilling to discipline ourselves and to give up our irregular and uncoordinated actions. We need to be brave but not foolhardy. We need to think not just of our reward in the afterlife but also of the worldly results of our mission.

The Quran tells us that when the enemy sues for peace we must react positively. True the treaty offered is not favourable to us. But we can negotiate. The Prophet did, at Hudaibiyah. And in the end he triumphed.

I am aware that all these ideas will not be popular. Those who are angry would want to reject it out of hand. They would even want to silence anyone who makes or supports this line of action. They would want to send more young men and women to make the supreme sacrifice. But where will all these lead to? Certainly not victory! Over the past 50 years of fighting in Palestine we have not achieved any result. We have in fact worsened our situation.

The enemy will probably welcome these proposals and we will conclude that the promoters are working for the enemy. But think. We are up against a people who think. They survived 2,000 years of pogroms not by hitting back, but by thinking. They invented and successfully promoted Socialism, Communism, human rights and democracy so that persecuting

them would appear to be wrong, so they may enjoy equal rights with others. With these they have now gained control of the most powerful countries and they, this tiny community, have become a world power. We cannot fight them through brawn alone. We must use our brains also.

Of late because of their power and their apparent success they have become arrogant. And arrogant people, like angry people will make mistakes, will forget to think.

They are already beginning to make mistakes. And they will make more mistakes. There may be windows of opportunity for us now and in the future. We must seize these opportunities.

But to do so we must get our acts right. Rhetoric is good. It helps us to expose the wrongs perpetrated against us, perhaps win us some sympathy and support. It may strengthen our spirit, our will and resolve, to face the enemy.

We can and we should pray to Allah (SWT) for in the end it is He who will determine whether we succeed or fail. We need His blessings and His help in our endeavours.

But it is how we act and what we do which will determine whether He would help us and give us victory or not. He has already said so in the Quran. Again *surah ar-Ra'd* verse 11.

As I said at the beginning, the whole world is looking at us; the whole Muslim *ummah* is placing their hopes in this conference of the leaders of Islamic nations. They expect us not just to vent our frustrations and anger, through word and gestures; not just to pray for Allah's blessings. They expect us to do something, to act. We cannot say we cannot do anything,

we the leaders of the Muslim nations. We cannot say we cannot unite even when faced with the destruction of our religion and the *ummah*.

We know we can. There are many things that we can do. There are many resources that we have at our disposal. What is needed is merely the will to do it. As Muslims, we must be grateful for the guidance of our religion, we must do what needs to be done, willingly and with determination. Allah has not raised us, the leaders, above the others so we may enjoy power for ourselves only. The power we wield is for our people, for the *ummah,* for Islam. We must have the will to make use of this power judiciously, prudently, concertedly. *Insya-Allah* we will triumph in the end.

The 11th Annual Meeting of the Asian Society for Cardiovascular Surgery

13 February 2003
Shangri-La Hotel, Kuala Lumpur

"We seem to prefer spending huge sums in developing new ways to kill people rather than saving them. We shall not wipe out AIDS, tuberculosis, malaria, or any of the other infectious diseases that plague the developing world because too little money is being spent on research to cure or prevent these diseases. These are diseases of the poor who will not be able to pay for the cost of research through high prices. But research on impotency and its cure promises more returns. So vast amounts are dedicated to the problems of the rich who are the people keen on restoring their virility. The poor are resigned to eventually lose their drive and to fade away."

Conferences of this kind, in my opinion, should not only discuss techniques and developments but should help us re-focus on the broader concerns of health, both in our own communities and in the world as a whole. The health of humanity is not as it should be considering the advancement in our knowledge of the human body and the state of modern medical science and technology. And this is because for most people the cost is too high. We seem to prefer spending huge sums in developing new ways to kill people rather than saving them. We shall not wipe out acquired immune deficiency syndrome (AIDS), tuberculosis, malaria, or any of the other infectious diseases that plague the developing world because too little money is being spent on research to cure or prevent these diseases. These are diseases of the poor who will not be able to pay for the cost of research through high prices. But research on impotency and its cure promises more returns. So vast amounts are dedicated to the problems of the rich who are the people keen on restoring their virility. The poor are resigned to eventually lose their drive and to fade away.

Cardiac surgery in Malaysia has certainly come of age. In less than 20 years since the first open heart operation was performed in this country, I understand there are now 4,000 cases yearly nationwide of which 2,500 heart operations are done at tertiary referral centres, such as the National Heart Institute (Institut Jantung Negara, IJN). From arterial switches in the neonate to coronary bypass in the octogenarian, the spectrum of services provided is very comprehensive.

There are many milestones that have been achieved in cardiac surgery in Malaysia, in particular at the IJN. Soon after IJN was operational in 1992, mitral valve repair was introduced in 1993. In 1995 it saw the introduction of Ross procedure, REV procedure in complex congenital heart condition and use of the radial artery as a coronary artery bypass conduit. IJN

mirrored closely the current trend of doing bypass surgery Coronary Artery Bypass Grafting (CABG) on the beating heart; the first minimally invasive direct coronary artery bypass (MIDCAB) was done in 1996 followed by Beating Heart Multivessel CABG the following year (1997).

This institute has the biggest experience for thoracic aortic aneurysm surgery in this region. From surgery to the ascending aorta to the most complex surgeries of the arch of the aorta and descending aorta; these operations have become routine surgeries at this Institute which makes it the leading centre in this region for the treatment of this devastating ailment. Heart transplantation has been a reality since 1997 and I believe that lung transplantation will soon no longer be a dream.

The government has gone to great lengths to assure every individual equal access to cardiac care, and today no Malaysian needs to leave our shores to obtain treatment for heart diseases.

I speak now as a heart patient who had undergone surgery. Cardiac surgery is, as we all now, a highly complex operation, combining the best of technology and human skill. Both cannot be undervalued. But surgery is not just a matter of applying skill and knowledge to cure a patient, in particular the heart patient. The surgeon has to empathise with the patient. He must understand the worries of the patient and the family. He or she has to be there and figuratively to hold his hand as he goes through the operation and to be there, when he wakes up with an assurance that everything is going to be all right. The human touch on the part of the surgeon is all-important.

As for medical science, we are fortunate that there exist the design of surgical apparatus and the operating theatre. The

sophistication of all these will come to nought if the surgeon and his team are not adept at using them. We can buy all these equipments and drugs but producing the surgeons and the ancillary staff is far more challenging. It is more so for government owned hospitals which cannot pay the high salaries which the private sector can afford. We are building a large number of ultra modern fully equipped paperless hospitals costing billions of dollars. But we may see them as White Elephants because we cannot staff them. As one who resigned from government service to set up my own clinic, I know that government can never match the attractive remunerations in the private sector. Should the government increase the pay, the private sector can more than match it. That is the dilemma of the government. I see no end to the dilemma because the more doctors that we produce and train, the bigger is the demand for their services as the standard of living rises. The problem is aggravated by richer countries offering better compensation.

However, we are happy that on the whole the medical services in Malaysia have improved tremendously, and in the field of cardiovascular surgery we can be quite independent and relatively we are less costly.

The International Convention on Biotechnology 2002

1 October 2002
Putra World Trade Centre, Kuala Lumpur

It seems that we can now produce any number of Einsteins and also numerous Hitlers. The ethical scientist may not want to do this but there will be crooked scientists working under crooked regimes who may flood the earth with uncontrollable monsters. It seems like the stuff of science fictions but it can become a reality if we do not keep a tight grip on the direction that biotechnology takes. It is fine to produce specific organs for transplanting in human bodies but we should not try to play God and think of populating this earth with creatures which may destroy us in the end.

Like most of the sciences, biotechnology is not new. Even as far back as 500 B.C. the Chinese used molds from fermented soybean curd as an antibiotic to treat boils. The complete sequencing of the human genome under the Human Genome Project was an international effort to map all human genes. This was launched in 1990. When the first draft of the human genome sequence was completed and announced in February 2000 by Celera Genomics, the Biotechnology Revolution truly began. The complete sequencing of the human genome has opened the door to many new fields of studies including interaction of genes with genes, genes with proteins, protein with protein, et cetera. This has facilitated rapid advances in genomic medicine, personalised medicine and gene therapy, and consequently in introducing vast economic opportunities and potentials.

Modern advances in Biotechnology have been made possible by the tremendous advances in information technology (IT) of which the powerful super computers are the most significant. The millions of calculations required to work out the structure of the Deoxyribonucleic acid (DNA) would have taken decades without the powerful computative capacity of the ever more powerful computers. We have now advanced to the stage where we can simulate the movements and the reactions of the molecules as they interact chemically. With this we are set to design, study and simulate the various properties of new chemical structures which can play a role in overcoming the diseases and ensuring the health of living creatures including we humans.

Truly we are living in a very exciting age. Already animals are being cloned and some are trying to clone humans. It seems that we can now produce any number of Einsteins and also numerous Hitlers. The ethical scientist may not want to do this but there will be crooked scientists working under crooked

regimes who may flood the earth with uncontrollable monsters. It seems like the stuff of science fictions but it can become a reality if we do not keep a tight grip on the direction that biotechnology takes. It is fine to produce specific organs for transplanting in human bodies but we should not try to play God and think of populating this earth with creatures which may destroy us in the end.

And so before we go further the ethics of the life sciences must be spelt out by the international community and enforcement agencies set up. Admittedly, we have not been too successful in controlling nuclear science. But imagine how many countries would be having nuclear weapons today if there had been no control at all.

Today we live in fear because we suspect that some people have the capacity to produce biological weapons of mass destruction. We may have a war on our hands because this fear may lead us to react unwisely and actually precipitate the war which we want to avoid. There is no guarantee that those who wish to stop the use of biological weapons may not unleash the same. We must remember that the atomic bombs were dropped seemingly in defence by those who wish to stop a war.

I do not mean to dampen the enthusiasm of the participants at this convention. All I want to do is to point out the need for us to understand the need for some control if these new sciences are going to benefit us.

Malaysia has a lot to offer to the biotechnology industry. We are one of the twelve countries in the world with mega-diverse bio-resource. Our flora is estimated to contain about 12,500 species of flowering plants and more than 1,100 species of ferns. Our marine ecosystem is rich in a variety of life forms while the coral community is considered to be the most diverse

in the world. One can view Malaysia as having a large reservoir of assets that has yet to be tapped. These assets require exploration and intensive studies in terms of research and development in order to make available to the rest of the world the benefits of biotechnology, such as cheaper and more efficacious drugs derived from natural resources, better therapies and higher crop production with improved nutrients, taste and quality.

Malaysia's foray into biotechnology is not new. We have been involved in biotechnology research and development primarily in the agricultural sector. Our research activities at the Malaysian Agricultural Research and Development Institute (MARDI), Universiti Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM), USM et cetera have yielded some positive results. However, it is quite clear that these efforts are insufficient relative to the vast potential and opportunities available in biotechnology. We need to establish biotechnology as another pillar in the development of our knowledge-based economy. Comparatively speaking, our research and development (R&D) has not resulted in many new patents being registered, much less new enterprise being launched. This situation reflects the inadequacies within the country which has not matched the resources and potential of Malaysia. As much as we would like to keep our resources to ourselves, we have to admit that we need collaboration with foreign scientists and enterprises even, in order to exploit and benefit from what we have.

We have of course started to train the necessary manpower but it is unlikely that we will have enough. Researchers are a special breed of people. They need a lot of patience and deep interest in their studies and work. While they can probably make a lot of money from their research, it remains for others to believe in the potential of their results and to be willing to invest large sums of money over a prolonged

period before any return can be expected. Researchers must therefore accept the need to share their discoveries with entrepreneurs and investors. A formula for sharing must be institutionalised so that the researchers get a fair return on their work.

In the Eastern tradition knowledge is not usually shared. We know how various herbs are used in the treatment of diseases but there is hardly any record of the formula or the recipe. Frequently the recipe dies with the practitioner. At best the children of the practitioner inherit the recipe with the injunction not to reveal to anyone but their children and children's children.

The testing of the efficacy of the concoction is also not done, certainly not systematically and scientifically. No attempt is made to identify the actual active ingredient, the dosage, the side effects and the contraindication.

Although we are now trained in science, some of the old culture of secrecy and belief in magic even remains. This is unfortunate because there is sufficient evidence that the old medicaments are often effective. As a trained practitioner of modern medicine I should not be saying this but I used to suffer from chronic intractable cough accompanied by running nose and lung infection. What we call modern medication took a long time to stop the cough. But persuaded by a Chinese friend, I took Chinese medicine and the cough stopped. When I had another attack I tried the medicine again, and again it worked. I tried to find out what the medicine is made of and I was told that it was tiger's milk. Obviously there is no willingness to divulge the secret.

So far no attempt has been made to analyse it, to identify the active ingredient, to test and to produce on a truly

commercial scale. In fact it was hinted that it would be given only to deserving people free of charge. One should appreciate being selected but one cannot help feeling that so many people are being deprived of this effective treatment.

Some of these quaint ideas about what is proper and what is not still remain within the culture of Asian people. We have a need to discard most of them if we want to see the world benefit from our scientific researches and the enormous biological resources we have been endowed with.

But we also do not want to see the kind of avarice as shown by the big drug companies. Admittedly, they spend huge sums of money on research and development. Not all that they discover at great expense are worth anything at all. Once in a while they would come across a fantastic cure. They would try not only to recover the cost but to make huge profits for themselves by pricing their drugs beyond the reach of those most in need of treatment.

The treatment of human immunodeficiency virus (HIV)/AIDS is a case in point. Clinging rigidly to their proprietary rights they refuse to let others produce the drug unless huge royalties are paid. Governments of the poor countries are forced to protect these rights, maintain the high prices and see their own people suffer and die for lack of treatment. Millions of sufferers will die as the drug companies make billions for their healthy owners and shareholders. Lives apparently are not so important as intellectual property and the returns on investments.

We agree that large sums of money are needed for research and developments. But surely there must be more transparency as to the cost and the recovery. How long should a copyright be protected and what percentage of profit should be legitimate and morally right?

Clearly neither the Asian model nor the Western model is ideal. With so much that can be done in the field of biotechnology, it is again important that the question of ethics be given serious consideration. The whole world must benefit from the researches that can be done in the life sciences. The promise is great. While we should ensure a fair return, we should not be so profit oriented that we forget our social obligations.

There is now a huge outcry over genetically-modified agricultural food products. There may be some basis for this fear of genetically-modified products. But genetically-modified food holds great promise for the starving people in this world. While we should not test the genetically-modified products on these hapless people, we must expend a lot of money on verifying the harmful effects as quickly as science will allow us. It would be unfortunate indeed if millions must die because the rich have decided to reject genetically-modified food in favour of the more costly normal products.

Malaysia is conscious of its wealth of resources in the field of biotechnology. We are not so selfish that we will deprive the world of the wonders that can be developed from these resources. But we must benefit fairly from the assets that God has bestowed on us. This is an opportunity for Malaysia to develop to become a developed country. We should welcome collaboration in research under conditions which will allow us a fair share of the benefits.

In the 8th Malaysia Plan, biotechnology has been identified as a major initiative in the promotion of science and technology, research and development and technological innovation to support Malaysia's overall strategy for sustainable growth in the knowledge-based economy.

The main implementation vehicle for the biotechnology development programme is BioValley Malaysia. This project is intended to be a catalyst and testbed for the development of Malaysia's biotechnology industry.

BioValley Malaysia will have world-class facilities and infrastructure. It will be designed to enable the co-location of a critical mass of researchers, industry workers and entrepreneurs in an environment created to facilitate networking, sharing of information and ideas and the development of commercial activities pertaining to biotech. It will incorporate research, commercial, educational, recreational and residential facilities including a zone catering specifically for manufacturing. Moreover, with the project location in the Multimedia Super Corridor (MSC), we envisage this will foster closer and greater interactions between industries involving IT and biotechnology.

We are embarking on a long journey and have taken the first few steps on that journey. We invite all of you to join us in this journey and help us in achieving our aspiration to make Malaysia one of the key biotechnology hubs in the world while reaping the great potential benefits from our greatly diversified bio-resources. This, in short, is Malaysia's Biotechnology Agenda.

The Opening of the 40th Meeting of the Commonwealth Telecommunications Council

6 November 2000
Mandarin Oriental Hotel, KLCC

"The digital divide is synonymous with the knowledge divide. When countries develop they move into a higher level of knowledge. Today prosperous economies are essentially knowledge-based economies. When we talk about the knowledge economy, we are really talking about information sharing. Technology should not be a privilege of those in the urban areas only, or in the rich countries only. Everyone, whether urban or rural, rich or poor must be able to share in this knowledge. The use of information technology must be democratised."

There is no industry which is as furiously as science and technology driven as the telecommunications industry. So fast has technology grown up and expanded that both the telecommunication's people and people in related and unrelated industries are quite breathless in trying to apply the technological capabilities and potentials of the newer and newer technology. And now wireless is everything. It is going to replace cables, outdo cables and out-price cables. And we have not even begun to fully use cable telecommunication. Technology is really pushing us faster than we can utilise it. And it seems that we are only at the beginning.

Because of the speed of technological improvements, today's application may become out of date a few months later; thus the iridium. It sounded so logical when it was being promoted. To be able to phone anywhere in the world with a portable handset even if you are in the Arctic or Antarctic or in the middle of the Sahara Desert sounded fantastic. It meant that you can go anywhere and everywhere in the world and still can phone home.

And so the sixty or so low-orbit satellites were launched at tremendous cost. In the meanwhile wireless cellular technology was improving all the time. Roaming capacities extended enormously the area which can be reached by cellular phones. More new technologies were being introduced all the time and everyone can phone anyone anywhere except from the North or South Poles or the vast deserts. It suddenly dawned on everyone that they would hardly ever be phoning from these out-of-the-way places. They would be phoning from where cellular antennas are within reach and then on by satellite, or ground lines. Why do they need to have a relatively heavy expensive portable phone (too big for the pocket) when small, cheap cellular phones can do about everything the iridium can do and more?

And so billions of dollars worth of investments were lost because technology had moved faster than application. The same can be said of optic fibre. As an enormously increasing number of signals are made to travel along each fibre at practically the same time, the myriad of fibre to cater for the expected increase in the number of calls in a given time becomes redundant. It is of course possible that new technology will make fibre optics useful again. And so we go on.

The rapid advance of technology also creates difficulties for governments and politicians. They do not understand the technology and suspect that they are being taken for a ride. They feel that government must control and license telecommunication companies and limit their numbers. The investments involved are very big and it is likely that many would fail, with serious consequences for investors, employees and also the government.

But telecommunication companies dislike licensing unless of course they have already been licensed and newcomers are excluded. However, the earlier ones may be stuck with expensive old technology which they plan to use and get a return on their investments. New technologies, we are told are cheaper and more efficient as well as lending to wider applications. Not to use them would make a country backward in terms of communication and business. And so new companies come up with proposals for state-of-the-art application since the old companies are not too keen.

The government will then be faced with a dilemma. To reject new technology will be bad, to accept can cause a lot of losses for large old companies.

New technologies offer faster speed and a variety of new application, which can increase the productivity of a

country. Rejecting or even delaying new technologies will reduce the competitiveness of a country's economy. With E-commerce and the K-economy demanding ever-faster communication, the country cannot afford to delay or reject the new technologies. Besides there is the problem of convergence. It is no longer practical to separate communication from broadcasting, even less between telephony, faxing and Internet transmission. And so different licenses cannot be given for different services. One license would cover all. Obviously new technologies cannot be licensed separately from old technologies. The obvious answer is to have one license for everything. Still the convergence game goes on. There is no way of knowing where one begins and the other ends. Wherever the licensee begins he can expand to cover all areas.

The quality of the transmission has improved tremendously. I remember the days of having to shout into the mouthpiece when telephoning long distance. Today the reception is so clear that one does not know the speaker is 12,000 miles away. This poses a special problem for the user. He might think that he is calling someone in the same town when actually the person is on the other side of the world. The cost of his casual call would be very high. I still cannot figure how the callers are billed. It is no wonder that off and on someone gets a huge bill for calls he did not make. Maybe his foreign maid made it.

Suddenly all these marvels and more have become everyday things. The whole scenario has changed. Many people seem to be talking and gesturing, laughing and screwing up their faces all by themselves. They seem to me to be slightly mad. But of course they are all communicating as they have never communicated before. Maybe Mr Soros was selling a billion dollars of Malaysian ringgit and causing its exchange rate to plunge and impoverishing millions of people just by talking on

handphone. That is now entirely possible with the new telecommunication technology. A word on the phone while walking along a street can make millions for the speaker while millions are thrown out of work, riot and destroy shops and vehicles.

But we are not deterred of course. It is not the technology which is bad. It is the people who apply the technology who are bad. And so Malaysia intends to make full use of the technology for its growth and development.

First we have launched the MSC, a chunk of land 15 kilometres by 50 kilometres extending between the twin-towers in Kuala Lumpur to the spanking new, state-of-the-art Kuala Lumpur International Airport. Within this area new policy, practices and laws which will facilitate the use of telecommunications for E-commerce and K-economy have been introduced. There will be incubators for small start-up companies and Research, Development and Operation centres for the big world-class companies. There will be software programmers and content producers.

A university, the Multimedia University, will train the majority of the knowledge-workers and will do research in new technologies, and content production and will interact with the R&D facilities of the big companies. An Entertainment Village will provide facilities for pre-production, production and post-production of animated and normal films and combinations of these.

All the necessary telecommunication and other infrastructure have been put in place. Everything that is needed for research, development, worldwide operational centres, have been provided.

Despite the economic downturn of 1997–1998, the MSC and the cybercity called Cyberjaya had not slowed down and has more than achieved its target. Today more than 3/5 of the companies including world-class companies have been located in the MSC although we still have three years to go.

Investments by local and foreign companies have increased significantly from 196 million ringgit in 1997 to 1.7 billion ringgit while expenditure by MSC status companies have reached 2.3 billion ringgit in the 1997–1999 period. Total investment in the MSC is expected to exceed 20 billion ringgit by 2005. In terms of employment, some 35,000 jobs will be created by 2005 compared with only 5,500 new jobs between 1997 and 1999.

The digital divide is synonymous with the knowledge divide. When countries develop they move into a higher level of knowledge. Today prosperous economies are essentially knowledge-based economies. When we talk about the knowledge economy, we are really talking about information sharing. Technology should not be a privilege of those in the urban areas only, or in the rich countries only. Everyone, whether urban or rural, rich or poor must be able to share in this knowledge. The use of IT must be democratised.

However, while prescribing technology to bridge the 'digital divide' one must remember that technology simply provides the means. It is an enabler. The important thing is the application of the data and information that can be accessed. Handling data and information is a different skill. It requires imagination and innovation. It is not just a question of doing what others are doing or what has been learnt. It is about applying data and information to do old things and to devise new things so that greater efficiency and productivity is

achieved. One is always amazed that someone else's application or innovation is so simple that one should have thought of it. Thus the idea of selling goods and service via the Internet. Enough information and illustrations in 3D can be provided to enable a buyer to decide. The method of payment is also provided.

In this regard, I believe the Commonwealth Telecommunications Organisation (CTO) can play a meaningful role in narrowing the digital divide by committing funds, resources and computer and Internet training to the less developed countries before they fall further behind in technology and wealth. I understand that there have been ongoing activities and technical cooperation programmes being implemented under one of CTO's flagship activities namely the Programme for Development and Training (PDT). Nevertheless I hope greater focus will be directed towards addressing the issue of the digital divide.

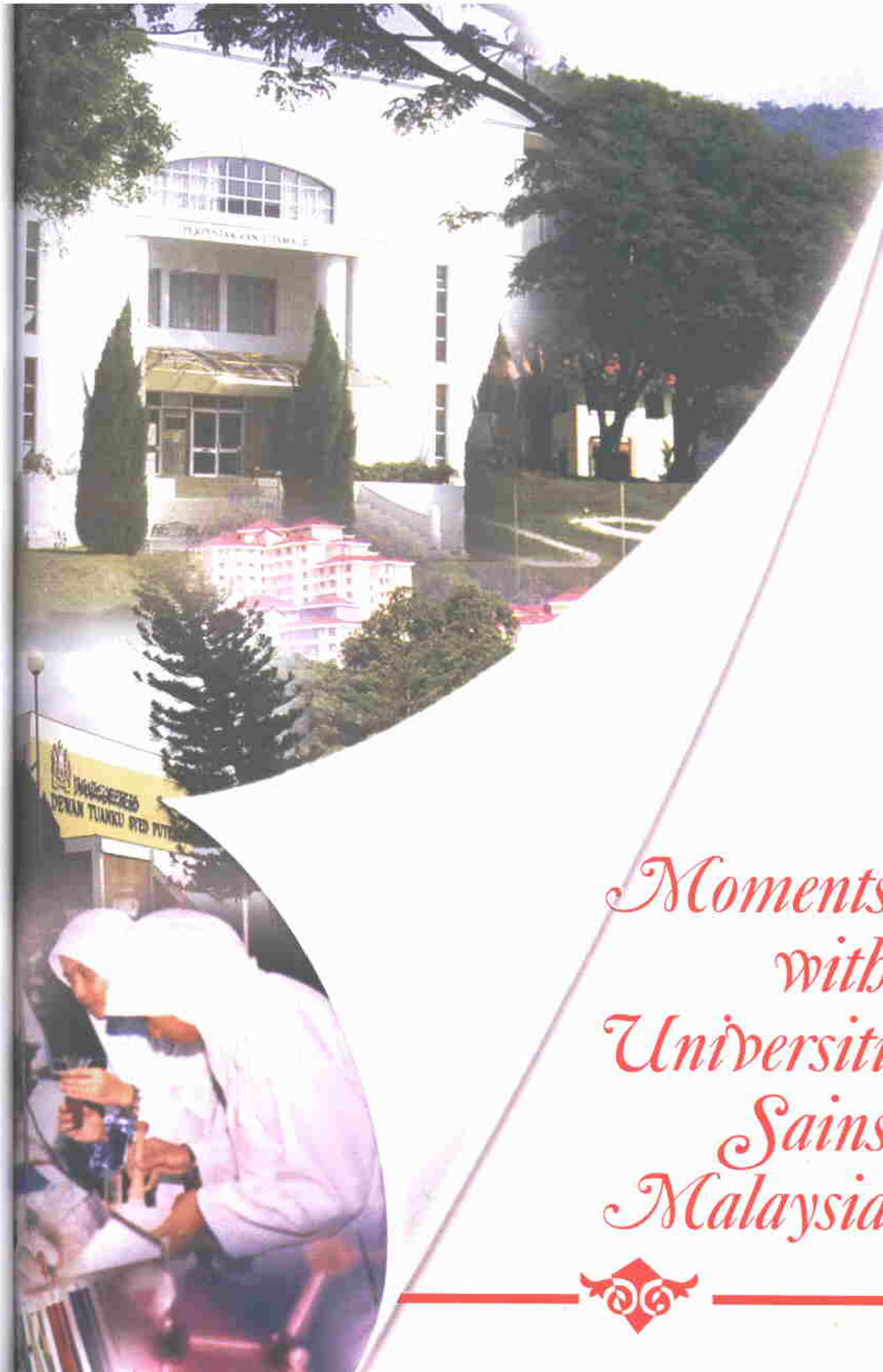
We are aware that for a number of years successive Commonwealth Heads of Government Meetings (CHOGM) have articulated support for a Commonwealth Network for IT Development (COMNET-IT) forum. However, beyond this high level lip service, there is a total void by way of any explicit resourcing or programming in Commonwealth functional cooperation and programme of the Commonwealth Secretariat. While the Council Meeting may not be the exact forum to champion this cause, CTO could serve as a platform to leverage for action in the spirit of making the Commonwealth truly an association of countries where wealth is common.

Unlike the Industrial Age which initially involve only the already rich Imperial Nations, the Information Age provides an opportunity for all countries to start together. All the countries, big and small, have potential markets for

telecommunication. Even remote islands in the Pacific can serve telecommunication needs because as independent nations they can make available certain licenses and facilities.

However, it is true that the rich and the technologically advanced are in a better position to exploit the technology world wide. There is now a rush to gain shares in the telecommunication industry in all the countries of the world by the major international players. The situation is not unlike the oil industry where at one time the Seven Sisters monopolised the industry worldwide. I do hope that the big international companies will not try to monopolise everything. If they are needed to help the industry in poorer countries they should apportion a bigger share of the profits to their partners.

This is an opportunity in a millennium for many poor countries. Do not let them miss out on this.



Moments with Universiti Sains Malaysia

The 2nd Malaysian International Seminar on Antarctica

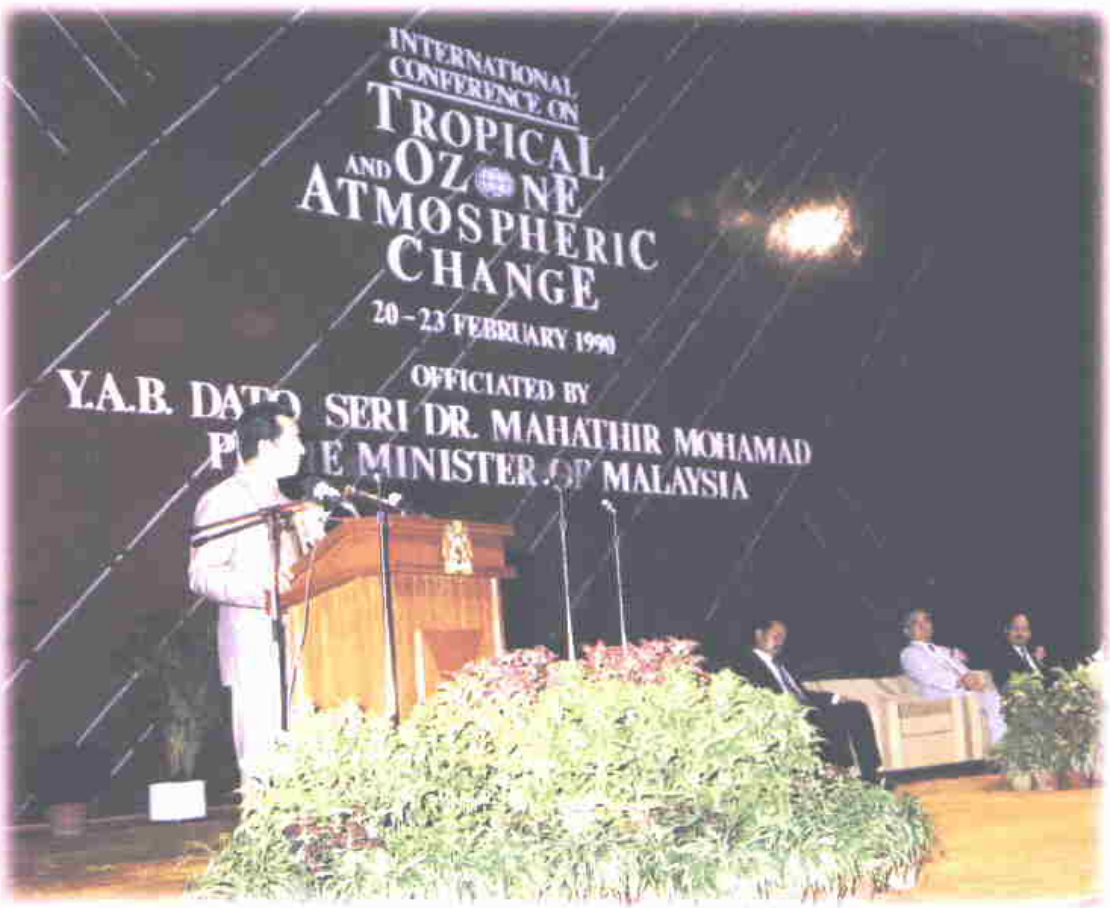
3 May 2004

Expo Science and Technology 2001

30 June 2001

The International Conference on Tropical Ozone and Atmospheric Change

20 February 1990


INTERNATIONAL
CONFERENCE ON
TROPICAL
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ATMOSPHERIC
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20 - 23 FEBRUARY 1990
OFFICIATED BY
SERI DR. MAHATHIR MOHAMAD
MINISTER OF MALAYSIA

Student Leadership Seminar

15 March 1985


KESEDARAN KEPIMPINAN
AN OLEH:
TUK SERI
THIR MOHAMA
MENTERI MAL
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DIRASMIKAN OLEH:
Y.A.B. DATUK SERI

A Visit to USM Solar Energy Park

7 September 1983

The Opening of the 5th International Congress on AIDS in Asia and Pacific

23 October 1999
Dewan Merdeka, PWTC, Kuala Lumpur

"We accept that pharmaceutical companies expend a lot of money on research and need to recoup in order to continue their research, but they should not try to recoup from the sufferings of the poor. The governments of the rich should bear most of the cost of such research. We understand that some countries are never as prosperous as they are now. Surely they can spare some of their wealth to reduce the burden of the poor people in poor countries."

Currently about 33.4 million people are living with HIV/AIDS around the world and 1.2 million are children under 15 years. Some 5.8 million became infected in 1998 alone, of which 590,000 of them were children under 15 years. In 1998 about 2.5 million people died of AIDS and 510,000 of them were children under 15 years. AIDS is among the top five killers in the world and is still considered an emerging epidemic whose deaths toll rises each year. About 13.9 million people have died of AIDS since the beginning of the epidemic.

What is most disconcerting is that more than 95 per cent of all HIV-infected people live in the developing world and 95 per cent of all deaths from AIDS occur in the developing world, 'largely among young adults who would normally be in their peak productive and reproductive years'. When it comes to HIV infection, women appear to be heading for an unwelcome equality with men. About 41 per cent of worldwide infections in 1997 were women and in 1998 this figure rose to 43 per cent. Sub-Saharan Africa is home to 70 per cent of people who became infected in 1998. It is also the region where four-fifth of all AIDS deaths occurred in 1998. Nine out of 10 children who became infected in 1998 live in Africa. In some countries, life expectancy has been reduced by as much as 22 years because of AIDS. In Asia, well over 7 million Asians are already infected, and HIV is clearly beginning to spread in earnest in India and China. Whether measured against the yardstick of deteriorating child survival, crumbling life expectancy, overburdened health care systems, increasing orphanhood, or bottom-line losses to businesses, AIDS has never posed a bigger threat to development than it does now. And unless something is done it will pose an even bigger threat in the years to come.

One of the reasons why developing countries are over represented in the satistics for infection and death is that many

developing countries do not have the resources to carry out effective prevention programmes. Many are struggling under crippling debt, and some are politically unstable. Under these conditions, health care budgets are grossly inadequate to provide basic healthcare let alone conduct effective prevention programmes. Countries in Asia and Pacific have been affected relatively late by AIDS. Unfortunately, some have been in denial about their vulnerability to HIV. Responses to AIDS have therefore been slow and inadequate. Also, developing countries cannot afford to provide treatment to their people infected by HIV. HIV drugs are extremely expensive. Thus more people die and at a faster rate in developing countries than in developed countries. AIDS deaths in the US dropped by 50 per cent after the introduction of protease inhibitors. Thus developing countries not only have more people becoming infected but once infected, they cannot get help to survive. In contrast, in developed countries, less people are becoming infected and those that do live longer and lead normal lives because of the availability of treatment. Hospices for people with AIDS are being closed in the UK and Switzerland but in developing countries, people cannot even set up hospices and some people with AIDS have to be cared for at home. There is not enough bed space in hospitals for people with AIDS. AIDS has therefore augmented the divide between the North and the South, between the haves and the have-nots. What is worse is that the have-nots will have even less because of AIDS.

There are people who would rather believe that AIDS only happens to other people, to foreigners, to those who have 'sinned', anyone but to our families, our friends, our communities, ourselves. While we deny, we will not take action and therefore we expose our people to the risk of infection through sheer ignorance. In Asia, we do not need to re-invent the wheel. There are major lessons to be learnt from Africa; even though conditions here may sometimes be different, we

must not insist that we are so unique that we do not have to learn from the suffering of Africa. If we do, then we will have to learn through tragic experience. We must therefore all work together because AIDS requires a comprehensive response. Collaboration between all sectors, whether within governments, between governments and non-governmental organisations (NGOs), between different governments, with the participation of all sectors of society, is the only way to effectively manage the AIDS pandemic. Leaving any gaps will allow the virus to get through and spread the epidemic.

We have worked hard to develop our economies. Lately these have been attacked and in some cases, governments have been destabilised by these attacks. Without political and economic stability, governments cannot pay enough attention to AIDS. Furthermore, AIDS has the potential to further derail any recovery that we work for. This is because AIDS lowers the resistance to diseases, and treating these diseases will increase the cost further. In addition, there will be the need to care for the families and orphans of AIDS victims. Access to care and treatment – the high cost of HIV drugs means that most people in developing countries just cannot afford them. But this high cost need not be so if developing countries can get together and challenge the pharmaceutical companies to reduce the prices or allow compulsory licensing of lifesaving drugs. Compulsory licensing is allowed under World Trade Organization (WTO) but it is sad to see certain powerful countries aligning themselves with giant pharmaceutical companies to deny developing countries the right to produce cheaper drugs to save the lives of their people. Profit is taking precedent over people's lives. Access to care means not just access to the most sophisticated antiretroviral drugs but also to drugs to treat opportunistic infections. This is possible for many countries, even if they cannot afford the protease inhibitors.

We accept that pharmaceutical companies expend a lot of money on research and need to recoup in order to continue their research, but they should not try to recoup from the sufferings of the poor. The governments of the rich should bear most of the cost of such research. We understand that some countries are never as prosperous as they are now. Surely they can spare some of their wealth to reduce the burden of the poor people in poor countries.

Still, whatever their Gross National Products (GNPs) and national reserves might be, governments must ensure that people living with HIV/AIDS get the best possible medical care to the level that they can afford.

Governments must also try and ensure that an equitable portion of their health budgets go to HIV treatment and care services. This leadership from government will also help in reducing discrimination towards people living with AIDS, who are often told that no medical care should be spent on them since they are 'going to die anyway'. Stigma and discrimination remains the greatest obstacle to prevention and care and treatment. People living with HIV/AIDS are an invisible sector of society, forced to hide their status because of the fear of society's stigmatisation and marginalisation. When their status becomes known, their fears are well-founded – people with HIV/AIDS have been fired from work, denied treatment in hospitals, or given lesser treatment, have been thrown out by their own families and ostracised by their neighbours. In extreme cases, some have committed suicide because life became too unbearable.

As long as there is stigma and discrimination which drives people with HIV/AIDS underground, prevention cannot work. People's lives cannot be extended by care and treatment if they are afraid to even come to hospitals. They cannot afford

to provide for their families and for their own medical expenses if they have no work. Their families suffer just as much – the stigmatisation extends even to the next generation.

Religion plays a vital role in the prevention, care and treatment. For too long, many religious officials have hidden behind a veil of denial, condemning those who have been infected while doing little to prevent others from also suffering the same fate. They have not extended their hand to those who became infected nor to their families. This leads to despair and even disillusionment with the religious authorities because of their uncaring attitudes. It is not for us to condemn and punish, for many who have contracted the disease are victims of ignorance and the culture of their society.

Every religion promotes the preservation of life and urges its adherents to extend their hand to those in need. In this respect many people fail in their religious duties while at the same time claiming moral superiority over those who have been infected. They take no responsibility over the increasing numbers of people becoming infected even though it will mean that their congregations will become smaller and smaller. Religious authorities need to be educated to play their role in a meaningful way, not to obstruct efforts by others.

Governments play a leading role because they set policy and facilitate the implementation of policy. But how is policy derived? Good HIV/AIDS policy comes from knowledge about HIV/AIDS and from consultation of all affected parties especially people living with HIV/AIDS. An effective government response comes most of all from the political will to do the best for its people. Political will ensure that adequate budgets are directed at effective prevention programmes which are constantly evaluated. Political will ensures that people living with HIV/AIDS will not suffer needlessly from financial

burdens, from stigma and discrimination. Political will ensures that all sectors of society will play their part in fighting the HIV/AIDS epidemic, including NGOs, businesses, religious bodies, schools and government departments. Without political will, the best policies will never be effective. Cambodia is a fine example of how, with political will, even a poor country can do something. A government that is effective managing its HIV/AIDS epidemic is one that is essentially democratic because HIV transmission is facilitated in an undemocratic setting. Where people have no rights to the maintenance of their health because of financial reasons, ignorance or discrimination, they will be more likely to become infected with HIV. Therefore a government that believes that all its citizens has a right to life and to good health will have a better chance of reducing the impact of HIV/AIDS on the country. The right to life and health is a basic human right.

An effective government is one that understands that the virus recognises no borders and therefore it is imperative that governments cooperate with each other to fight the virus. HIV travels wherever human beings travel, whether it is for pleasure or for work or because of political reasons (refugees), and man-made barriers cannot really stop it.

What can stop HIV is cooperation between NGOs, governments and other health organisations to address the issues of cross-border movement of peoples, migrant workers, especially illegal ones, and the trafficking of women and children. Blaming foreigners for bringing HIV into a country is misplaced, especially if one's citizens are also free to travel abroad. NGOs and governments therefore need to sit down together to discuss what is best for their own citizens even when they are in another country. When migrants are marginalised in another country, they also become vulnerable to infection which then puts them at risk of deportation. When they are deported

home to a country which is even less able to help them, the risk of further transmission of HIV is almost guaranteed. Men who work abroad and who get infected with HIV often return home and infect their wives because they are ignorant of their status and of what can be done to protect their wives. Efforts to educate migrant workers about HIV before they leave home as well as during their stay abroad will result in less infections among them and therefore among their wives and children. Governments working together are an example of good neighbourliness and also an example of the Association of South-East Asian Nations (ASEAN) philosophy of 'Prosper-Thy-Neighbour'. Not working together implies a 'Beggar-Thy-Neighbour' attitude.

In Malaysia, the government had responded to the HIV pandemics as early as 15 years ago, that is immediately after the first HIV victim was confirmed in 1986. Since then the prevention and control of HIV/AIDS epidemics has been organised, coordinated and collaborated through a 'National AIDS Task Force' comprising of 28 members representing various public, private, academic, religious and NGOs. Through this National AIDS Task Force, we have developed our policies, objectives, strategic approaches, technical guidelines and researches pertaining to HIV/AIDS.

In 1993 AIDS/Sexually Transmitted Disease (STD) section was created as a separate component of Disease Control Division in the Ministry of Health. Now this HIV/STD section is entirely responsible for planning, organising, coordinating, monitoring and evaluating the promotive, preventive and curative parts of the AIDS epidemics.

The Ministry of Health in its efforts to strengthen its collaboration with NGOs working with HIV/AIDS issues, has responded to their call to assist in the formation of Malaysian AIDS Council (MAC) which was registered in 1992. And now

the MAC is recognised as an umbrella organisation which coordinates the activities of other HIV/AIDS-related NGOs.

In view of the growing number of young people becoming infected with HIV, we have started incorporating comprehensive HIV and drug abuse prevention education through PROSTAR (Program Sihat Tanpa AIDS untuk Remaja or Staying Healthy without AIDS for Youths Programme) in 1996.

PROSTAR is a community mobilisation programme where youths between the ages of 16 and 25 will be trained as peer mobilisers, energisers, motivators and changing agents towards 'Healthy Young Generation'. As of March 1999, about 21,500 selective youths have been trained to lead their peers on issues pertaining to HIV/AIDS. To ensure our youths will sustain their wealth of energy, ideas and enthusiasm, we – as parents, leaders, decision-makers, professionals and communities – need to work closely with them.

Recognising that women are especially vulnerable to HIV infection, the government had addressed this critical issue through two nationwide programmes, namely screening of pregnant mothers for HIV, and women and AIDS. For this programme alone, the government has already spent RM6 million since it started in 1998, and as of May 1999, about 25,000 antenatal mothers had been screened for HIV infection, 100 cases turned out HIV positive, and were immediately given free treatment costing RM600 for each case per month.

As evidence of our commitments, the government has spent almost RM43 million for the HIV/AIDS control programme every year since 1993. About RM16 million goes to curative services, RM5 million for healthy life style promotion, while RM22 million goes to preventive aspect of the programme.

It is now time for all of us, for all Heads of Governments in the Asia-Pacific region to hold a summit on AIDS so that we may better coordinate our efforts in recognition of the transborder nature of the epidemic. This will show leadership in the region and within our own countries and underline the seriousness of the AIDS pandemic and the need for urgent action to combat it.

The World Renewable Energy Congress 1999

8 June 1999
The Palace of the Golden Horses Hotel,
Kuala Lumpur

"Almost 40 per cent of the world's population has inadequate energy for basic needs. A World Solar Commission report pointed out that these people not only have no access to power distribution networks, but cannot expect to have access to them in the medium term. This alone will impede development and progress. When we speak of sustainable development, we must also think of equity. Climate change will be meaningless if there is great disparity in emission levels between developed and developing countries. Sustainable development must help to reverse environmental degradation without impoverishing the poor any further."

Energy is vital to human progress. But there is a cost that is not confined to just finance in order to make energy available for human development. The more important cost is the effect of energy generation on the environment. Admittedly, we cannot get something for nothing. And so we cannot get energy without paying a price, in terms of finance and in terms of environmental degradation. But we can at least reduce the cost, not so much in monetary terms but more in terms of the effect on the environment. Today almost everyone favours higher financial cost than higher environmental cost. I say almost everyone because when people are very poor, they cannot be blamed if they care less for the environment than for the money they have to spend. We really cannot blame the poor from cutting down timber to burn for their energy needs. They cannot be expected to freeze to death or to eat uncooked food because the rich object to trees being cut and smoke from wood burning to pollute the environment.

We should therefore get our priorities right. If we feel that even the poor should not pollute the environment, then the rich should be prepared to pay for them. At the Rio Summit in 1992, we agreed that the rich must contribute towards the poor countries in order that they will not cut down their trees et cetera to develop their countries and their people. But as we all know he contribution is not forthcoming. Yet their environmentalists, particularly their NGOs are relentless in their condemnation and action against those who have little choice but to exploit their few natural resources.

Poor countries and even middle-income countries have a duty to develop and bring a better life to their people. While we are debating which fuel mix is most sustainable for a better life style, the United Nations statistics show that more than 2.4 billion people in developing countries do not have any access to

commercial energy. This means that almost 40 per cent of the world's population has inadequate energy for basic needs. A World Solar Commission report pointed out that these people not only have no access to power distribution networks, but cannot expect to have access to them in the medium term. This alone will impede development and progress. When we speak of sustainable development, we must also think of equity. Climate change will be meaningless if there is great disparity in emission levels between developed and developing countries. Sustainable development must help to reverse environmental degradation without impoverishing the poor any further.

Renewable energy can be justified based on the fundamental objectives of national energy policies whose main goal is to ensure security and sustainability of energy supply at reasonable cost. Sustainability naturally implies efficient utilisation and the wider applications of environmentally friendly technologies. And the best assurance of energy supply security and sustainability is to develop and use the country's own energy resources. On this basis, indigenous renewable energy sources can be easily justified, but they must be at reasonable cost. If costs are high, it will not interest industry and business leaders, unless the government is willing to subsidise the price. Within the constraints of cost, a major challenge, therefore, is for policymakers and planners to formulate institutional and enabling regulatory framework to facilitate private sector involvement in renewable energy development. In this context the richer developed countries must recognise the need for developing countries to have access to renewable energy technologies at subsidised or at least affordable prices. Only then can we overcome barriers to sustainable development.

I would also like to highlight a major initiative of the World Solar Commission, of which Malaysia is a member. The Commission held its first World Solar Summit in 1996 in

Harare. This Summit had launched the preparation of a ten-year World Solar Programme on the basis of an outline plan submitted to it by the Commission. Following elaborate consultations with governments, NGOs, international agencies and business leaders, the World Solar Programme, which identifies implementation strategies at the global, regional and national levels, was finalised in June 1997. This programme particularly offers realistic renewable energy alternatives to the rural communities in developing countries where grid connection is prohibitively expensive and not seen as possible for a long time to come.

It is hoped that the World Renewable Energy Network will work hand-in-hand with the World Solar Commission and the global community in providing the necessary R&D and rapid commercialisation support for the World Solar Programme. To promote greater utilisation of renewable energy technologies, we must complement each other. In this way, we will not only offer a realistic hope of economic progress to the 2.4 billion people in the developing world, but will also address issues relating to global climate change.

In line with our commitment to the Rio Summit, Malaysia signed the Framework Convention on Climate Change in 1994 and the Kyoto Protocol early this year. Notwithstanding the current financial crisis, Malaysia is positive and willing to contribute and play its role in seeking the way forward for a sustainable solution to the concerns of climate change and the economic and social development of our people.

For almost two decades, Malaysia has devoted substantial resources towards the development of diverse power generation systems. This is in order to help stabilise electricity prices, reduce the environmental impacts of electricity production and support research and development in renewable

energy and energy efficiency as alternative energy options. It is now timely to accelerate and make necessary preparations to bring these 'fringe' but unique domestic energy options into the mainstream. The technological solutions to harness these options also offer an opportunity for mass production in Malaysia for domestic use and export, thereby offering an opportunity for cost reductions.

In this regard, I am happy to announce our plan to study the merits of expanding our current four-fuel strategy by incorporating renewable energy as the fifth fuel. In fact, this Congress comes at the most opportune time as we assess our National Energy Policy towards developing a more sustainable national energy system. The next five-year national development plan, the 8th Malaysia Plan, will identify appropriate implementation strategies for the development and utilisation of renewable energy sources as an important component of our total energy mix. As a unique domestic resource, recurring savings from energy efficiency programmes will also qualify as renewable energy.

Currently, the success of the four-fuel strategy, that includes oil, gas, hydro and coal, is obvious in the electricity sector as shown by the high growth in electricity consumption over the last two decades. Today, the environmentally friendlier gas accounts for over 70 per cent of the country's total electricity generation. However, too much reliance on gas is obviously not wise in the long term. We have to fall back on truly renewable energy source such as hydro. As I have pointed out, we cannot get something for nothing. Hydropower requires some sacrifice in terms of deforestation. But Malaysia is 70 per cent covered by forest and tree plantation. The actual areas to be cleared would not affect this percentage much. Yet the electricity generation is less polluting than even gas.

Concerted and co-ordinated efforts must therefore be put into motion to begin pre-commercialisation demonstration projects to evaluate the economic viability and ease of implementation of the more promising renewable energy technologies. In this regard, the government has established a special purpose vehicle, Pusat Tenaga Malaysia (PTM) or Malaysia Energy Centre, to promote and coordinate these efforts among the public and private sectors. This Centre will play an important role to bridge R&D and commercialisation of renewable energy technologies and work with international organisations to build the necessary capacity to implement market-oriented renewable energy and energy efficiency programmes.

I must also commend the trustees of the Malaysian Electricity Supply Industry Trust Account (MESITA) for their generosity to contribute substantial funding towards energy efficiency and renewable energy research projects despite current financial difficulties. For the information of our distinguished foreign participants, MESITA was set up in 1997 to serve as the industry's machinery to meet its social and national obligations. All power generation companies contribute annually, on a voluntary basis, one per cent of their total generation revenue towards MESITA. MESITA's top priority is rural electrification. In addition, MESITA also supports projects on energy efficiency, R&D in renewable energy and human resource development for the electricity industry.

While we act locally, we must also think globally. In line with our commitment to the World Solar Programme, we must work closely with the World Solar Commission to promote the Programme globally. Through the generosity of MESITA, Malaysia has contributed to the World Solar Commission Trust Fund to enable the Commission to implement the World Solar Programme. Besides offering to host the Business and

Investment Forum for Renewable Energy in the Asia and the Pacific Region, Malaysia is also keen to set up a regional network for Education, Training and Information Dissemination for renewable energy. This network will support the global network being set up by the World Solar Commission Secretariat based in Paris. We will work with countries in the Asia and the Pacific region with the support of bilateral and multilateral technical support agencies to set up this virtual network.

The Dinner Speech Hosted by the Academy of Sciences Malaysia

2 November 1998
JW Marriot Hotel, Kuala Lumpur

"It is especially difficult to assess the value and the returns on basic research. Such research is not directed towards application. In many instances the applications will need research by other institutions. Yet we know that in many advanced countries, basic research has brought about huge returns for the nation due to applications devised by commercial organisations and their own applied research facilities.

I challenge the Malaysian scientific community to produce a Nobel Laureate by the Year 2020."

Science, Engineering and Technology (SET) have a pivotal role in the development of our economy. It is through SET that the government will expect the growth of the economy to be facilitated.

The emergence of a new global economic order – unrestricted by geographical and political barriers – will result in greater integration of the world economy. Knowledge, skills, information and investment funds will move around freely. Properly utilised these new freedoms will bring about great prosperity for all. However, we have seen how the sudden pull out of funds can result in the destruction of economies at a faster rate than the build-up. And so the infatuation with SET must be accompanied by an even greater adherence to morality and the higher human values.

Today while there is a great deal of pressure for the opening up of countries and markets to everyone, there is not that much pressure for SET to be made available to every country and everyone. In fact the pressure to protect intellectual property is greater today than at any time in history. The machinery of international institution and those of powerful national governments are mobilised to protect intellectual property rights as never before.

There seem to be something wrong in this. Why is it that while markets cannot be protected, markets which may be the sole asset of poor countries, intellectual properties must be protected at all costs.

A choice must be made here. If we want to protect intellectual property then we must also protect markets. Alternatively we should insist on markets and intellectual property to be equally free for everyone.

SET are the results of studies and research. Although research seems to imply some mysterious inborn intelligence it is really a matter of money and manpower. Today sophisticated research laboratories can be set up by anyone but the cost is prohibitive. The personnel are again easily available if one is prepared to pay them.

Again here we see the impact of globalisation. Good researchers can be recruited from any country to work in any other country. There is no such thing as national loyalty any more. If the right pay is offered, researchers would be easily employed from any country in the world.

Since poor countries have neither the costly laboratories nor have they the ability to offer good pay, they usually lose their researchers to the richer countries. The loss in most cases is permanent as the researchers are often offered citizenship as well. This brain drain is very costly to the poor countries, as they will have to pay royalty for the results of research carried out by their own nationals in other countries.

Research today is much more methodical and much less dependent on individual genius. All that is needed is fixing the objective and making a series of modification to a product in order to improve the results. The method is the same whether it be in physics, chemistry, biotechnology or whatever. Eventually something worthwhile would be discovered or invented. This way almost everyday something new is discovered or developed.

Besides original research there are plenty of opportunities for applied research. The original discovery or invention may be done by someone else in some other country but the application of the results can be done elsewhere, including in developing countries too poor to conduct original research. The cost of applied research may also be high but there are ample possibilities for low-cost applications.

Merely by catering to local conditions for applications developed in the developed countries, numerous modifications can be made and patented. Although royalty may have to be paid for the original research, at least there will be ownership of local applied research results. Since most of the original and applied researches are being done in the temperate climate, application in the warm humid climates of the tropics can be studied and developed in these regions. Tropicalisation is almost a science of its own and the scientists in the tropical countries have the whole country as a laboratory for testing in tropical condition.

Then there are cultural and religious needs and injunctions to be looked into. Muslims in particular require certain facilities and conditions in the products they use. Muslim and non-Muslim researchers can look into modifications to suit Muslim needs and requirements.

Malaysia is a developing country and has inadequate funds for research, original or applied. The royalty paid by Malaysia for imported technologies yearly is very high. This is of course a drain on our foreign exchange earnings. At this time of economic turmoil we cannot afford this outflow of funds. We should therefore develop our own technology and engineering innovations. It will not only reduce the cost of technology but we may even be able to export it to reverse the flow of royalties paid. Malaysia would do well to spend money on research, especially applied research. The economic recovery can be speeded up, and we may emerge from the turmoil stronger.

The 7th Malaysia Plan promotes a shift in the national development strategy, from one that used to be input-driven towards one that is productivity-driven. This strategy is further emphasised in the Second Industrial Master Plan. For growth to improve further, the contributions from technical

progress need to be enhanced. The government has therefore emphasised research and development as well as accelerating the application of information technology, particularly in the development of the MSC. It is envisaged that these improvements will lead to increased productivity and enable the economy to generate an output at a higher rate of growth vis-à-vis resources availability and utilisation.

The realisation that productivity-driven growth is very much dependent on the SET strengths, R&D inputs and the capability of the people, has prompted the government to invest in SET. The government of Malaysia has allocated RM1 billion through Intensification of Research in Priority Area (IRPA) in the 7th Malaysia Plan for the development of SET. This is an acknowledgment by the government that our long-term economic growth will be dependent on the increased use of knowledge, technology and skills to enhance industrial productivity and competitiveness as well as to improve the standard of living.

To realise our goals of ensuring continuous scientific and technological development to support and sustain high economic growth, accelerate industrial development and build a society that is scientifically and technologically advanced as envisioned in Vision 2020, the government has put in place a SET management system that is aimed at harnessing the creation and innovations in science and technology for economic growth and development.

The SET management system is created to satisfy three main objectives, namely to stimulate scientific curiosity, to develop new products and processes, and applications and to realise the social benefits of science and technology.

There are three components of the SET management system: the policy, infrastructure and finance.

The National Science and Technology Policy was formulated to promote the use of science and technology in economic development and improving the quality of life of all Malaysians. It focuses on upgrading R&D capacity and capabilities as well as improving the scientific, educational and other relevant infrastructure. The task of driving scientific and technological development in this country is being shouldered by the National Council for Scientific Research and Development.

Within our SET management system, we have created institutions at various levels to ensure that there is sufficient capacity, capability and financial resources to undertake SET programmes. Our national education system is designed to provide trained manpower in SET. The various science, technical and vocational schools across the country are meant to produce knowledgeable and educated workers for the SET system.

The government has also established various institutions to ensure that the SET management system delivers its result for the benefit of the nation. Malaysian Institute of Microelectronic Systems (MIMOS), Technology Parks, Kulim Hi-Tech Park, Malaysian Industri-Government Group for High Technology (MIGHT), Malaysian Invention and Design Society (MINDS), Space Science Studies Division (BAKSA), the various research institutions, universities and the Academy of Sciences Malaysia are parts of the SET delivery system. To finance the commercialisation of R&D results the government has established Malaysian Technology Development Corporation (MTDC). MTDC functions as a catalyst in developing venture capital and transfer of technology in Malaysia.

The government is not hesitant to invest in R&D. We have made a fairly large sum of money available. But administering the fund is very complex. Administrators find it

difficult to invest government funds in something that cannot be quantified in the usual manner, and the results of which, that is the return on the investments, are not so tangible. The risk on the investment appears high simply because the results cannot be guaranteed and the usefulness of the result in terms of application cannot be properly assessed.

It is especially difficult to assess the value and the returns on basic research. Such research is not directed towards application. In many instances the applications will need research by other institutions. Yet we know that in many advanced countries, basic research has brought about huge returns for the nation due to applications devised by commercial organisations and their own applied research facilities.

It is therefore important for those in charge of disbursing government funds for research to acquire expertise in evaluating research projects and to accept a long payback period. Indeed in some cases we have to accept that we should do research for the sake of research without knowing the possible returns on the capital outlay. There should not be too much of this kind of research of course. But a certain amount should be allocated for this.

I understand that there are a number of research facilities which are hardly utilised. While the equipments are provided for, there is a reluctance to employ research or to allocate funds for research work. This is indeed unfortunate. The institution concerned should make a study of the facilities available and determine how to utilise them more fully. If we do not have enough researchers we should be willing to employ foreign personnel. There is of course a risk of leakage but it is a risk we have to take. After all developed countries take all kinds of risks and have clearly profited from them.

The latest effort by the Malaysian government to strengthen the country's economic position is the establishment of the MSC. Through MSC, Malaysia will compete in the new information era. An explosive array of innovations centering around telecommunications and informatics has produced a revolution in IT. IT will reorientate global commerce and redefine the workplace. It will have a serious implication on the labour market as demand will be on more knowledge workers.

The government realises that investment in IT is important, as it is the central nervous system that will sensitise all the other sectors of SET. Through IT the potential of technologies can be realised, creating subrevolutions in other areas.

Malaysia's technology agenda remains very broad but focuses on the need to enhance efficiency and effectiveness of our industry. The government has long recognised the importance of technology in poverty eradication and ameliorating environmental problems. In poverty eradication, relevant technologies can be diffused into the target groups or community to improve agriculture practises, increase food production and provide better health care services and population planning. For environmental problems, not only are there new technologies, but even existing ones can be modified to improve energy efficiency, exploration of new forms of energy, better forms of transportation, effective management of waste and new methods of fertilisation.

For the past 41 years since independence, Malaysia has made rapid technological evolution. From a predominantly agriculture nation, we have transformed ourselves into an industrialising nation. In preparing the nation for the next phase of growth, the government is putting in place the fundamentals necessary for launching the country into the information age.

For us to succeed further, mastering of SET is of paramount importance.

The government remains committed towards promoting SET. We have formulated the policy, built the infrastructure and allocated the financial resources. But beyond that we need the scientific and industrial community to push it further. To innovate and create, to continuously challenge old thinking with new ideas, to continuously search for new knowledge and solve problems. We have to strive for and in the process transform Malaysia into one of the world players in science and technology (S&T).

Scientists and researchers should capitalise on the government layout infrastructure and facilities to deliver their results. Over the years, our scientists have achieved major breakthroughs in various fields of SET. It will be for the benefit of all of us if the Academy of Sciences Malaysia could take up the initiative to document all these breakthroughs. Although these breakthroughs are sporadic, it indicates that Malaysia possesses scientists and researchers who are capable of performing high-level research.

Having said that, I challenge the Malaysian scientific community to produce a Nobel Laureate by the Year 2020.

The Opening of the Seminar on Virtual Reality

14 April 1998
Mines Exhibition Centre, Seri Kembangan

"The Internet for example, is the greatest instrument for direct communication of the truth, free of government or non-government censorship and distortions. But it is clear that the Internet too can be a medium for untruth and for a variety of rather unacceptable activities. The solution does not lie in technology. It lies in the return to good ethics and values. It is worthwhile to ponder over this even as we rave over the wonder of virtual reality."

Just a few years ago, virtual reality was regarded more as a toy than a tool. The use of head-mounted displays and data gloves supported a science fiction impression. The entertainment business embraced the virtual reality tools, promising to provide virtual worlds as computer-generated alternatives to the real world. In business, however, this science fiction orientation detracts from the usefulness of virtual reality. Today practical applications of virtual reality exist, particularly in areas such as architecture and computer-aided engineering design. Virtual reality projects around the world introduced two important innovations: the ability of the end user to gain a feel and experience near real sensations in a simulated world and become part of its dynamics; and the provision of some interesting insights on how people and technology will interact. Both developments attracted lots of media attention that helped publicise virtual reality.

Jaron Lanier, the 'VR guru' who coined the term 'Virtual Reality' and founded the virtual reality industry, is of the opinion that there will be a new emergent social consciousness that can only exist through the medium of virtual reality. People tend to imagine virtual reality as being an escapist thing where they will be more removed from the real world and the need to react with it. On the contrary, virtual reality will make us intensely aware of what the real thing is going to be and to adjust, react and adapt it to the real situations.

Perhaps the best known application in virtual reality is the flight simulator. The extensive use of this training tool has saved much time and money without the exposure to the kind of mishaps of actual flights which trainees are prone to. Over the years the simulators have been vastly improved as to make them as nearly real as possible, and this includes the management of emergencies and accidents. There can be no doubt that simulators of all kinds will be used in the future for all kinds of

training. They will be more simple and less costly. In fact, there are already certain applications which use the personal computers (PC). It would not be too difficult or take too long a time before simple controls are devised or headsets developed which will enable us to get into the inside of objects in order to see what the hidden inside look like. This would give us a better idea of how to improve on designs for better function and maintenance.

In a few years we will see medical virtual realities, where handicapped people can experience full motion interaction with others, where people with movement disabilities or paralysis will be able to experience the functions of a complete body. Another medical use is having surgery simulators so that surgeons can enjoy the same benefits that pilots do and learn without putting lives at risk. Of course, surgeons can do that with cadavers too, but a cadaver is not the same thing as a body that really reacts, that can really bleed. The other great advantage is the ability to repeat the procedure any number of times, and this will obviously help sharpen the skills. Similarly, new techniques can be developed and tried before proceeding to the real thing.

While virtual reality is still crude as an enabling technology and major problems exist in the areas of software support, tracking display, image generation and the like, there are a growing number of applications which go well beyond the confines of the virtual reality games. The popularisation of virtual reality on PC-based systems will enable more companies to use the technology in their business and industry. Interactive 3-D tools with real space and virtual reality aspects not only help to produce higher quality designs and a more effective market punch but also shorten development cycles significantly. This provides a competitive edge and also helps to reduce modelling costs substantially. On the other hand, buyers in the future can

have a virtual examination of whatever they are buying and make alterations to the colours or shapes in order to see how much better or how much worse the product will be.

There are special things about virtual reality to keep in mind. First, it is a reality in that the impossible can be rendered possible, as for example walking through the inside of a small engine which would be impossible with the real thing. We therefore see what the inside looks like. We can enlarge and make out the details. We can thus know more about the design than we can from the actual product or from a full-scale model.

As with everything else involving computers, the things we see or access depend on what we put in. The more details we put in the more we can learn from the computer simulation of the product or the function of the products. Obviously an understanding of design, materials and engineering involved is very important.

Much of the software for virtual reality is already available but it is still necessary to learn about the software and its capacity. Programming after that will take a long time and will need quite a lot of work. Skills in this area are very important or the potential of the software cannot be fully exploited.

We therefore need to train a lot of people in the application of the software if not in the writing of the software itself. Fortunately the training required is less difficult as the software is getting more and more user-friendly.

Today there exists an impressive array of virtual reality applications in manufacturing, finance, education, medicine, et cetera. But there is also a need for new, imaginative implementations due to the rapid changes in business and industry caused by the availability of computers and data. While

the new technology can bring about progress and enhance the quality of life and the wealth of our society, it can also do a lot of damage.

The economic turmoil that we are experiencing today is a direct result of the application of virtual reality to business and in fact by making virtual business possible and real. Where before we have to deal in real money, goods and services, today none of these are really necessary. As a result there seems to be no limit to the amount of business that can be done and profits made. Unfortunately in the process, real money, real jobs and real business can be very badly damaged. Currency trading is a very good example of how virtual money can be used for trading and considerable real profits or losses made.

In currency trading a trader can borrow millions of unit of any currency without actually taking or handling the money. Figures are changed on the computer screen to show that the money has been borrowed. The trader then sells the currency by recording the transaction on computers, and this change appears on the screens of all the computers in the trading rooms of banks and currency traders. Likewise he can buy the currency without actually taking possession of it. Only the figures on the computer screen change to record the transaction.

Now, in the rule devised by the currency traders, the currency depreciates in value every time it is sold. In normal commodity trading the price remains so long as there is a willing buyer and willing seller. But currency traders dealing with virtual money are not constrained by the supply of the currency. Since it is possible to sell the currency repeatedly, the figures on the screens will change and the currency devalues to any level desired. In one case the currency went down by 600 per cent, that is it ceases to be money altogether. The trader can then

buy the currency at the much-depreciated price and deliver, again via the computer to the buyers to whom he had previously sold at a higher price, pocketing a big profit. The money borrowed, which had never really been taken out of the bank, is now electronically returned to the bank and a fee or commission paid. Thus, vast sums of money can be borrowed, sold and bought without a single coin or note becoming involved. In other words, the money traded was virtual, not real. It is not surprising that in one day 1 trillion US dollars are traded, that is about 20 times the trade in goods and services world wide.

The trading is in virtual money but the effect of devaluation is very real. Today whole countries and regions are impoverished because of currency trading, in some cases by 400 per cent. Banks, businesses are bankrupted, millions of workers thrown out of jobs, high inflation results in people not being able to buy food or medicine and a host of catastrophes befall people – real people, not virtual people. To import goods or services with currency that has fallen by 400 per cent requires four times the amount of local currency compared to before the devaluation. How is an importer, how is a country going to find four times the amount of money when the economy has gone into recession, consumers have no money to spend and all economic activities which can generate profits grind to a halt?

The point that is to be made here is that virtual reality, as with everything else conceived or invented by Man, can benefit humankind or can damage it. Whether it does one or the other depends on the users, that is the individual society or the state. There is a tendency for people to be carried away by new skills and powers that they develop. Man is by nature schizophrenic. He is both good and bad. The struggle between good and bad goes on all the time in Man and in the society he creates. In this struggle there is an ebb and flow that is comparable with that of tidewater. When an idea catches on, the

tendency is for it not only to spread but to widen, that is to expand in terms of interpretation, scope and application. In the process the original objective and principle may become very thin, very vague and may actually deviate from the original. And so it can be with virtual reality. Instead of constructive things virtual reality may and can result in destructive or morally unacceptable products. Thus, the Internet for example, is the greatest instrument for direct communication of the truth, free of government or non-government censorship and distortions. But it is clear that the Internet too can be a medium for untruth and for a variety of rather unacceptable activities. The solution does not lie in technology. It lies in the return to good ethics and values. It is worthwhile to ponder over this even as we rave over the wonder of virtual reality.

The 1st Asian International Congress on Emergency Medicine

3 April 1997
The Tun Dr Ismail Hall, PWTC, Kuala Lumpur

"On the clinical front, attention is being paid towards building new infrastructure, restructuring the service system and providing personnel trained in emergency medicine. A comprehensive and integrated emergency and trauma services include pre-hospital care, resuscitation and stabilisation at the emergency department, definitive care and rehabilitation."

Emergency medicine I understand is a relatively new field when compared to other disciplines, not only in Malaysia but in the world generally. In the US it was only fully established in the 1970s. In developing countries like many in Asia, emergency medical services is poorly developed and frequently a low priority with the respective governments. And yet, emergency departments form the gateway to definitive care.

As Malaysia moves towards full industrialisation, it has to make significant shifts towards regionalised and specialised care, and towards this end the government is moving quickly and expeditiously especially in the areas of emergency medical services and trauma care.

Dramatic shifts in the incidence and frequency of illness have taken place over the past two decades. Malaysia's epidemiological profile now resembles much more closely that of an industrialised country, with cardiovascular disease, cancer and injury representing the major killers. Furthermore, the incidence of injury due to road traffic and industrial accidents is fast accelerating. It equals, if not exceeds, that of Western countries due to the faster rate of development in Malaysia. Urgent action is required both in terms of injury control and prevention as well as in the development of service systems of emergency medical and trauma care. Prevention is an urgent priority where intersectoral and interministerial cooperation becomes a crucial requirement in the reduction of morbidity.

In 1993, 56 per cent of all hospitalisations were from injury sustained through motor vehicle accidents, while 27 per cent were from falls with 7 per cent from machinery-related events.

The high number of death due to accident is expected to increase to 31.2 per 100,000 populations, and this trend is

consistent with the increase in the number of registered vehicles in Malaysia, of which motorcycles make up 58 per cent of the number.

The rise in fatalities becomes more marked during periods of heavy population movement. During the 18-day holiday season over Chinese New Year and Hari Raya, 614 persons lost their lives, 565 sustained serious injuries and 892 minor injuries. Reflecting the rapid switch from agriculture to industry an analysis of occupational injuries in 1993 indicated that the rate is 5 times higher than that of Japan, Sweden and United Kingdom.

In economic terms, this clearly represents a significant loss to the country. A large proportion of casualties are young adults in the 20–40 age group. In 1993 where there were 27.8 deaths per 100,000 population, 130,000 years of life were lost.

Other major causes of death requiring emergency services relate especially to ischaemic heart disease, diabetes mellitus and cerebro-vascular accidents. As a result of the changing lifestyle, the incidence of these diseases mirrors similar disease patterns in the developed countries of the West. Mortality from these diseases rose 18.6 per cent in the 10-year period between 1982–1992.

Chronic obstructive airways disease (COPD) saw a 25 per cent increase over the same period. Residents in Kuala Lumpur have more than twice the risk of dying from COPD than the national average. Studies have shown that there is a causal relationship between the incidence of COPD and the degree of air pollution.

Malaysia has undertaken numerous programmes to overcome these trends. In most instances such programmes are

interministerial in nature. Preventive strategies in minimising road traffic accidents include seat-belts, side impact beams and airbags; infrastructure development and grade separated crossings to minimise traffic crossflow, speed control and walkways that separate pedestrians from motor traffic; public education campaigns, increased surveillance and stricter enforcement of rules and laws. We are resolved to make safety a priority.

On the clinical front, attention is being paid towards building new infrastructure, restructuring the service system and providing personnel trained in emergency medicine. A comprehensive and integrated emergency and trauma services include pre-hospital care, resuscitation and stabilisation at the emergency department, definitive care and rehabilitation. The decentralisation of Hospital Kuala Lumpur, the national referral centre, is a move towards establishing a modern and new technology department. Two new hospitals with state-of-the-art technology are currently being built at Selayang and Sungai Buloh. The Selayang hospital will be a first in that it will be 'paperless' and will have a large catchment area involving one third of the population of Kuala Lumpur and will act as a tertiary referral centre for disciplines like hand and microsurgery, urology, nephrology and cardiology. The infrastructure within has been redesigned by local experts and customised to our needs.

The Sungai Buloh Hospital on the other hand has been designated as the main medical centre of Klang Valley where the national trauma centre and other major medical department will be sited. It will be self-sufficient somewhat like a medical city.

The trauma centre will provide an integrated and comprehensive emergency medical and trauma system and will act as the main co-ordinating centre for the clinical service networking among the hospitals in the Klang Valley.

As the Malaysian health care system matures and regional emergency service networking established, there will be increased demand for the transport of patients between facilities. This will have a significant impact as Hospital Kuala Lumpur is dispersed over four or more facilities with differing missions and case mixes. As health facilities become more specialised the need for an efficient communication and consultation services becomes crucial. The inter-facility transfers of patients will have to be coordinated through good communication and dedicated medical communication system.

A comprehensive communication system with universal access line ala the 911 System which will give the public access into the health care service to acquire any form of medical assistance needs to be established in this country as soon as possible.

Malaysia is now planning for the establishment of an emergency communication network which will include telemedicine and tele-emergency capability. Advances in audio-visual technology have made it possible for the complete assessment of patient condition between hospitals. This is ideal for our current situation where we do not have adequate specialist service in every part of the country and hence, tele-medicine will provide access to expert consultation.

Currently in Malaysia, local universities produce approximately 400 to 500 doctors per year. With the establishment of new schools, both government and private, by the year 2000 we hope to produce 500 to 600 more doctors per year which will considerably reduce the present doctor: patient ratio of 1:2,400. The three local universities have also been running Post-Graduate Masters Programmes for the various specialities where students graduate with a Master Degree at par with those given by foreign and more established institutions.

Nurses and medical assistants are currently being trained at various training schools nationwide. Despite this, demand far outstrips supply. With the mushrooming of private hospitals, the need for trained paramedic staff becomes more urgent. In line with this, we are considering establishing a Paramedic Training Institute which will not only train paramedics for in-hospital needs but also provide personnel for an efficient and skillful pre-hospital service.

The concept of the 'first responder' has been introduced in Malaysia where individuals who are not specifically trained in providing emergency care but who by nature of their occupation are the first to arrive at the incident site, for example police, will be trained with life support skill to focus their service life to save victims and initiate life support procedure together with the management of other aspects of the accident. First responders are recognised internationally as a cost-efficient and effective part of an overall emergency medical system. Police and fire and rescue personnel would therefore be encouraged to assume this role where they can perform initial assessment and basic life-support procedures.

The Fukuoka Dialogue, the Digital Century: Opportunities for Mutual Collaboration Between Japan and Malaysia

28 Mac 1997
Fukuoka, Jepun

"The digital age has created conditions for the first time in history that will enable countries and companies to mutually enrich one another. It is no longer a zero sum game with winners and losers. There is a tremendous opportunity for those companies and countries with the courage to embrace these changes. For a limited time, there is a relatively level playing field where developed and developing countries can work together in ways that create benefits for both."

The digital economy stresses the importance of networking of personnel worldwide or collaboration of human efforts in exploring new and powerful ways to achieve common enrichment through the use of it IT. This is definitely one area in which Japan and Malaysia can reap mutual benefit. Malaysia has manpower skills in certain areas which are relatively cheap and can be accessed by Japanese companies even if not located in Malaysia, while Japan of course has multimedia technology which can play a role in a borderless economic world.

For technology companies to be internationally competitive in the growth industries of the 21st century, new industrial global standards need to be re-defined, even as revolutionary IT products and services are developed. Digitisation ensures greater accuracy and is said to be the key factor driving the consumer electronics industry in Japan in the 1990s. Digitisation in many fields has not yet been fully exploited. With Japan's experience and knowledge in this field and in the use of multimedia, there are almost unlimited possibilities for new industries to be developed and expanded throughout the world with hardly any need for direct face-to-face interaction of personnel.

As we approach the 21st century, fantastic changes are taking place which made what was impossible in the old economy of the Industrial Age suddenly possible in the Information Age. For practical purposes, borders have already disappeared because knowledge, capital, company activities, and consumer preferences ignore lines drawn on a map. Where countries once competed with one nation's trade surplus resulting in another's trade deficit, in the future both countries can benefit because networks of companies collaborate across borders to deliver value to customers in the most economically sensible way.

In short, the digital age has created conditions for the first time in history that will enable countries and companies to mutually enrich one another. It is no longer a zero sum game with winners and losers. There is a tremendous opportunity for those companies and countries with the courage to embrace these changes. For a limited time, there is a relatively level playing field where developed and developing countries can work together in ways that create benefits for both. This is because many of the wealthier developed countries are locked into obsolete industrial structures and legislative frameworks. Vested interests in these systems will stubbornly oppose any change. Fortunately, these corporate interests have not had time to develop and become powerful in the developing countries, like Malaysia.

Briefly, let me explain to you our plans to develop the IT industry. The MSC in Malaysia will be the first place in the world to bring together all of the elements needed to create a special environment that will combine world leading IT and physical infrastructure with a comprehensive investment friendly package of incentives and support in which multimedia companies can develop new technologies and applications. The MSC will be a multicultural 'web' of mutually dependent international and Malaysian companies collaborating to deliver new products and services to customers across an economically vibrant Asia and the world. This 'web' will eventually extend beyond Malaysia's borders and out across Malaysia's multicultural links to our neighbours. In other words, when we produce a product, component manufacturing can be done in China, on machines that are programmed from Japan, with software written in India, and financing coming from the Labuan International Offshore Financial Centre. The product may be assembled in Penang and shipped to global customers direct from our new airport, Kuala Lumpur International Airport within the MSC.

The first phase of the MSC should see hundreds of large and small companies working collaboratively with one another and with partners across the Asia-Pacific and the world. Some of these companies will certainly be today's leaders. Many others will be the smaller companies that are members of each of these companies' 'web'. Hopefully, a few of tomorrow's leaders will be from Malaysia with new products and services in the MSC.

Ultimately, MSC is envisaged to become a global community living at the leading edge of the Information Society. This will set the stage for Malaysians to enter the digital century.

We therefore would like to invite your companies to set up your R&D centres in our MSC, a green field area which runs from the world's tallest buildings in the Kuala Lumpur city centre, down to what will be the region's largest international airport when it opens next year. We seek your co-operation for collective and mutually-beneficial collaboration in developing the MSC.

In addition, an MSC status qualifies companies for a package of financial and non-financial incentives. Companies may enjoy the following financial incentives:

- five-year exemption from income tax, renewable to 10 years; or a 100 per cent Investment Tax Allowance (ITA); and
- duty free importation of multimedia equipment.

In addition to the financial incentives, MSC-status companies will be given the following non-financial incentives:

- Unrestricted employment of foreign knowledge workers
- Freedom of ownership
- Freedom to borrow funds globally

Other MSC benefits include world-class physical and IT infrastructure, intellectual property protection, globally competitive telecom tariffs, no censorship of the Internet, and excellent educational facilities, including the region's first Multimedia University.

We have defined this path which hopefully will transform Malaysia into a knowledge society. As a first step, by 2000, we expect to see seven flagship applications being developed in the MSC by webs of international and Malaysian companies. These flagship applications are electronic government, a national multipurpose smart card, smart schools, a R&D cluster telemedicine, a world wide manufacturing web and borderless marketing. We intend to be global pioneers in these applications. Other countries have embarked on similar initiatives. However, many are hampered by entrenched interests and most do not provide the needs of the IT industry as comprehensively as we do.

Over time, each of these flagship applications will generate a web of world-class and Malaysian companies collaborating to develop and deliver innovative products and services.

In this context, it will be exciting for a project champion to be identified for each of the areas of the flagship application of the MSC. No company can be the champion for every application. As such, we can co-operate to find out which company can champion the application in which they can be the best in, and work with their respective counterparts, whether

be Japanese or Malaysian. They can then develop the identified application into one which can be used as a model for the world.

On the top of the priority list for mutual co-operation we will be recreating and building paths that lead us back to the basics of humanity. For all the new technologies, strategies and structures, both physical and invisible ones that are taking place inside organisations today, the one central element crucial for the continued growth of mankind is the one which focuses on mobilising human intellect and spirit. Only by bringing back that humanity and self-identity elements can organisations hope to compete in this digital century, which has been described by Lester Thurow as an era of man-made brain power industries.

With all the dazzling effects of IT, we must never forget that artificial intelligence can never replace human intellect. People – and specifically, managers of corporations – must lead business and society with a social responsibility that displays not only a balanced set of values of humanity and ethics into their organisations but one that will inculcate the spirit of corporate integrity. In the digital century, in which everything is reduced to bits and bytes, one needs to have something solid and real to fall back on. As such, we will look towards the corporate leaders from our two countries to propagate our own philosophy of knowledge that is imbued with our own sets of Asian values.

Japan and Malaysia should co-operate to create the electronic communities that would actively produce the indigenous content suitable to our needs. In this regard, the MSC will provide the perfect opportunity for this to take place. Again, we invite and welcome Japanese businessmen, IT and technology experts to our MSC to share with us their skills and

knowledge, and together, develop localised contents for multimedia applications that will be of world class standards.

In the face of the information onslaught, we should adopt a proactive approach towards counter-balancing the Western dominance of the cyberspace. We are not saying that Western influence is all bad. What we are emphasising is that by being digital, being IT literate and being technologically advanced does not mean that our Asian values are not irrelevant. If anything, they will be even more relevant for our men and women as they search for their own niche and identities in a borderless environment.

Our nations need more than industry and IT competent men and women to stay ahead of the race in the digital millennium; we will need also the zest of creative imagination and free spirits, as expressed in the arts and creative sciences. It will only be possible if leaders can continue to create the means to mobilise the energy and spirit and inner-strength of the workforce.

Malaysia has much to learn from Japan. In fact, we have adopted a Look-East Policy for almost 15 years, in which we look to Japan as a model for our development. We are particularly keen to learn about your work ethics, your industrial practices and your technology. We have been sending students to Japan to learn more from Japan. Our bilateral relationship has therefore grown from strength to strength.

In this context, Japanese companies can form strategic alliances with Malaysian companies for business collaboration in Third World Countries. Such smart partnerships will benefit all three partners. More such trilateral relationships can be explored meaningfully as we move into the digital century.

Malaysia and Japan can together move into countries of the South. Together, we can combine our resources and achieve synergies in getting into Africa, Central Asia and Latin America. Malaysia's pivotal position among the G-15 countries and Islamic nations can be of strategic advantage to Japan. We can together, identify opportunities in these nations, bringing to them the technologies they need to help them move ahead into the digital century.

We have always welcomed Japanese investors in Malaysia. Japan is currently Malaysia's biggest foreign investor. Investments from Japan increased by 91.2 per cent from RM2.3 billion in 1995 to RM4.4 billion in 1996. Japan ranked first both in terms of number of applications and proposed capital investments, in which a discernible concentration was in the electrical and electronic products industry. The Plaza Accord have brought large numbers of Japanese investors to Southeast Asia in the mid-1980s and helped Japan overcome the problems caused by the endaka.

As we are poised to enter the digital century, we should look at the structure and momentum of Japanese investments, in Malaysia in particular and South-East Asia in general. We in Malaysia require more capital intensive and high technology investments, and Japan is in a position to meet this requirement.

The Silicon Valley Conference for Investors on the MSC: Global Bridges to the Information Age

15 January 1997
Stanford University, Santa Clara, California

"Our goal is to attain developed country status by the year 2020. These interlinked webs will allow us to achieve the goals of Vision 2020 by developing a strong services sector to balance our already strong manufacturing sector while helping to improve the productivity and quality of life in the nation. Equally important, the MSC will provide a platform to tie us together and celebrate our culture while helping to educate us in new and different ways."

The success of a country depends on its ability to adopt and adapt to global forces and not on the bases exclusively of comparative advantages such as natural resources, population, or labour costs. Visionary countries can choose to create value rather than merely struggle to make the most out of existing circumstances. Just as companies cannot succeed by trying to do everything themselves, the same is true of countries – especially developing countries. Malaysia is not trying to build a replica of Silicon Valley or Hollywood. We would be deluding ourselves if we expect storyboards not to be created in Hollywood or R&D on the highest value-added components not to be done in Silicon Valley.

We realise you are more advanced and that we have much to learn, but precisely because you are so developed there are very important things we can do that you cannot. Malaysia is offering the world a special greenfield environment designed to enable companies to collaborate in new ways and reap the rich rewards of the Information Age. There are no legacies of artificial constraints created and perpetuated by entrenched interests. We offer the MSC as a gift to the world – a global bridge to the Information Age that will enable genuine mutual enrichment for our partners possessing the vision to participate.

The MSC is truly a world first – the careful creation of a region with the infrastructure, laws, policies and practices that will enable companies to explore the Information Age without the usual constraints which frustrate them. The MSC is a 15 km wide by 50 km long corridor that runs from the world's tallest buildings in the Kuala Lumpur City Centre, down to what will be the region's largest airport when it opens in early 1998.

More than two years of careful study have gone into developing a package with four key elements which will make the environment within the MSC very special:

- First, the MSC will have the best physical infrastructure that can be offered in the world. This includes the Kuala Lumpur City Centre, a new airport, rapid train links to Kuala Lumpur, a dedicated highway and two new intelligent garden cities. The Kuala Lumpur City Centre is the Northern gateway to the MSC. The Kuala Lumpur International Airport to be commissioned in 1998 will initially have 80 gates with two parallel runways. The airport will also become an integrated logistic hub with the latest in IT to facilitate movements of people and goods.

- The first intelligent garden city, Putrajaya, will be our new administrative capital where most ministries will be relocating beginning with the Prime Minister's office in 1998. Putrajaya will be Malaysia's new electronic government administrative centre served by state-of-the-art communications and transportation systems. The neighbouring Cyberjaya is a city designed to provide the physical and psychological spaces needed for creativity, the pursuit of information age technologies, and businesses and relaxation. It will be built around the new Multimedia University. Cyberjaya will provide top quality intelligent buildings, multimedia enterprise estates, residential housing, leisure and recreational facilities, and state of the art supporting infrastructure. It will support a working population of approximately 150,000 and a living population of over 100,000.

- Second, the MSC will have the world's best soft infrastructure of supporting laws, policies and practices. This includes a comprehensive framework of societal and commerce-enabling cyberlaws on intellectual property, digital signature, computer crime, distance learning, telemedicine and electronic government. For example,

our new Digital Signature Act creates a regulatory framework for certifying authorities and severe penalties for cyber-fraud. In addition, we are developing a Multimedia Convergence Act that will merge and update our telecommunications, broadcasting and information laws to reflect today's rapid technological convergence. Finally, we know how critical skilled workers are and have a series of educational and training initiatives across the country. All schools will be connected to the Internet by the year 2000 and a Multimedia University will produce graduates that will meet MSC companies skill requirements.

- Third, the MSC will leapfrog available information infrastructures with 2.5–10 gigabit Open Multimedia Network that will use the latest Asynchronous Transfer Mode (ATM) switches to provide fibre to the Building. This network will have a 5 gigabit international gateway with direct links to the US, Japan, Europe and other ASEAN countries. This will be operational by 1998. Value-added service providers will be able to compete freely on this network with no restrictions on foreign ownership and cost-based interconnect tariffs. Telekom Malaysia has committed to offer competitive tariffs that are comparable or better than other global carriers and will provide world-class network performance standards.

- Fourth, a fully empowered one-stop shop called the Multimedia Development Corporation (MDC) has been created to manage and market the MSC. The MDC will be opening ten offices around the world over the next two years so it can be close to the companies who will be its clients. In addition, the MDC has been incorporated under the Companies Act so it will be able to operate independent of civil service rules and regulations. The

MDC has a free hand to hire the best people in the world and a business plan to serve the needs of companies relocating to the MSC, both before and after they decide to establish operations in Malaysia. The Deputy Prime Minister and I will personally oversee the activities of the MDC and will resolve issues brought to our attention.

Malaysia will be changing the way its people live and work particularly within the MSC. This special area will be a global 'test-bed' for new roles of government, new cyber laws and guarantees, collaborations between government and companies, companies and companies, education, delivery of healthcare and applications of new technologies. We are looking for 'smart-partnerships' – win-win-win relationships between companies and the government. For example, we will no longer require multimedia companies to go through a traditional request for proposal (RFP) process that requires us to have a crystal clear concept of exactly what the company must deliver. Leading companies told us this was inappropriate for new areas of multimedia where the solutions are developed rather than assembled from existing knowledge. Instead of traditional tenders and RFPs, we will ask companies for 'concept proposals' that describe the approach they would take to developing solutions or achieving the benefits we have requested. This allows us to select a consortium of companies as a smart-partner to innovate new products and services in the MSC. We will be doing this in several application areas that I will describe shortly.

In short, Malaysia is taking a single-minded approach to developing the country using the new tools offered by the Information Age. The MSC will be the R&D centre for the information based industries, to develop new codes of ethics in a shrunken world where everyone is neighbour to everyone else, where we have to live with each other without unnecessary tension and conflicts. Indeed, the MSC is a pilot project for

harmonising our entire country with the global forces shaping the Information Age. Phase one involves making the MSC a success by learning from our partners and the experience we gain; phase two will link up with other islands of excellence within Malaysia; and phase three involves making all of Malaysia a MSC that is connected to other smart-regions around the world. I expect Malaysia to be in the final phase by 2020 by which time we hope to be a developed nation.

To our knowledge no other country is even considering anything similar. Other plans may sound similar because they all use 'IT, cyber, or multimedia' to market one or another development. But we are not adding new facilities to existing ones or adapting a concept to an existing area; we are building and installing the latest on a huge 15 km by 50 km greenfield site designed to realise the full potential of multimedia. I hope others will link with our MSC and become one of the central pillars in our global bridge connecting the smart-cities of the world. It is in our mutual interest to collaborate rather than undermine each other because we both will benefit from a better bridge.

As we approach the 21st century, fantastic changes are taking place which make what was impossible in the old economy of the Industrial Age suddenly possible in the Information Age. For practical purposes, borders have already disappeared because knowledge, capital, company activities and consumer preferences ignore lines on a map. Where countries once competed with one nation's trade surplus resulting in another's trade deficit, in the future both countries can benefit because networks of companies collaborate across borders to deliver value to customers in the most economically sensible way. Although none of this activity is captured by the economic statistics developed in the Industrial Age, its impact is clear and will require new types of international institutions. In short, the

Information Age has created conditions for the first time in history that will enable countries and companies to mutually enrich one another – it is no longer a zero sum game with winners and losers. This is a tremendous opportunity for those companies and countries with the courage to embrace these changes. For a limited time, there will be a relatively level playing field where developed and developing countries can work together in ways that create benefits for both. This is because many of the healthier developed countries are locked into obsolete industrial structures and legislative frameworks and vested interests in these systems stubbornly oppose any change. Fortunately, these corporate interests have not had time to develop and become powerful in developing countries like Malaysia.

The MSC is the first place in the world to bring together all the elements needed to create the kind of environment to engender this mutual enrichment. I see the MSC as a multicultural 'web' of mutually dependent international and Malaysian companies collaborating to deliver new products and services to customers across an economically vibrant Asia and the world. I fully expect that this 'web' will extend beyond Malaysia's borders and out across Malaysia's multicultural links to our neighbours. Component manufacturing can then be done in China, on machines programmed from Japan, with software written in India and financing coming from Malaysia's Labuan International Offshore Financial Centre. The product may be assembled in Penang and shipped to global customers direct through our new airport.

Malaysian companies are already working with world-class international companies and technology transfer is taking place. Moreover, companies and neighbouring countries are benefiting as well because parts of the product are produced in other locations. The consumer benefits most of all because they

get top quality products at the best possible price. In short, all parties touched by this 'web' will benefit and are enriched through their contribution to it.

Phase 1 of establishing the MSC will be complete when the MSC is home to hundreds of large and small companies working collaboratively with one another and with partners across the Asia-Pacific region and the world. Some of these companies will certainly be today's leaders. Many others will be the smaller companies which are members of each of these companies' 'web'. Hopefully, a few of tomorrow's leaders will be from Malaysia with new products and services in the MSC. I like multimedia because the most successful companies are those which collaborate with many partners and truly transfer technology to them – not out of charity but out of collective self-interest. These companies know that they cannot stay at the leading edge if they try and do everything themselves. They realise that a web of smaller companies working to common standards can deliver more benefits to the consumer. I hope to see some multicultural Malaysian companies alongside international companies thus mutually strengthening the capabilities of both.

Phase 2 of linking the MSC with other islands of excellence will be complete when the MSC becomes far more than a business development. By then, the MSC will be a global community living at the leading edge of the Information Society. Citizens' smart homes will be connected to a network through which they can shop, receive information, be entertained, interact with one another and educate themselves.

Phase 3 of leapfrogging all of Malaysia into the Information Age will be complete when the entire country is living and working in these new ways. Of course when they grow tired of all these new tangled things they can enjoy the pristine environment which we have preserved in Malaysia.

To achieve this vision, I think it is important to define a path that leads to it. By 2000, I expect to see seven specific applications being developed in the MSC by 'webs' of international and Malaysian companies:

- First, Malaysia will be a pioneer in electronic government. This will be a multimedia-networked paperless administration linking Putrajaya to government centres around the country to facilitate inter-governmental collaboration and citizen access to government services. It will start with the Prime Minister's office when it moves to Putrajaya in 1998 and roll out across the other ministries as they relocate.

- Second, Malaysia will have the world's first national multipurpose smart card. A single platform will have the individual's ID and electronic signature and access to government, banking, credit, telephone, transport and club services. Of course, security will be critical but the technology is, I believe, already here to enable all of these services to be on one secure platform. Imagine the convenience as we are freed from having to carry a huge pack of plastic cards and selecting one every time we need to use a card. Imagine the opportunity for companies of having no uncertainty that this one card will be in the hands of every Malaysian.

- Third, Malaysia will have a comprehensive programme for smart-schools. All schools will be connected to the Internet. A new curriculum is being developed, and our teachers will be retrained so they can work with technology to do far more than convey knowledge in the traditional way. World-class distance learning facilities will be built at the Multimedia University and we hope to hold virtual classes with teachers and students in other universities around the world. We will use our schools to help

students learn the judgement and skills required to choose between the overwhelming amount of information that will be available to them.

- Fourth, I hope the MSC will become a collaborative cluster of academic and corporate R&D centre, using distance learning to produce world-class graduates and next-generation innovations. Multimedia University will be the centre for this, and I would like to invite faculty and students from Stanford University to help develop our new institution in Malaysia through exchanges of students and faculty. I would also like to invite companies interested in partnering with Multimedia University to contact us. This university will have close links to MSC companies to ensure it will produce graduates with the right skills.

- Fifth, Malaysia will be a regional centre for telemedicine. With our Chinese, Ayurvedic, Malay and Western medical knowledge and vast biogenetic resources, we are a natural hub. Rural clinics can be connected to medical experts from Malaysia and to the great clinics worldwide using new tele-instruments for remote diagnosis, therapy, or even surgery. The doctor no longer has to be in the same room as the patient, and our new cyberlaws will make this legal. Key information can be transmitted using new instruments such as electronic stethoscopes operated by nurses or technicians. This can be viewed and compared with other patients by the world's best doctors and the data on millions of patients already in the world's computers.

- Sixth, I hope the MSC will be a remote manufacturing coordination and engineering support web that electronically enables companies in high cost countries to

access plants across Malaysia and Asia as virtual extensions of their domestic operations. While we have real strengths in manufacturing, we recognise the need for companies to operate a network of facilities around the region.

- Seventh, the MSC should become a marketing and multimedia customer service hub leveraging Malaysia's unique multicultural links to provide electronic publishing, content localisation, telemarketing and remote customer care to a market of 2.5 billion people. For example, a Japanese company's catalogue can be translated into Chinese or Bahasa Malaysia/Indonesia or Indian languages by a company that takes orders through a system that automatically localises the sizes and currencies.

Over time, each of these flagship applications will generate a web of world-class and Malaysian companies collaborating to develop and deliver innovative products and services. They will take root and grow in an environment that provides the required lifestyle, infrastructure, laws and policies. Equally important, I expect links will develop which will connect each of these webs together into one large MSC web. Indeed, it is these links which will allow the MSC to sustain its competitiveness over time. Malaysia is a country with a vision and a strategy to achieve the vision called Vision 2020. Our goal is to attain developed country status by the year 2020. These interlinked webs will allow us to achieve the goals of Vision 2020 by developing a strong services sector to balance our already strong manufacturing sector while helping to improve the productivity and quality of life in the nation. Equally important, the MSC will provide a platform to tie us together and celebrate our culture while helping to educate us in new and different ways.

Beyond Malaysia, the MSC becomes a global bridge when its web is interlinked with those of other regions around the world. This bridge will, I hope, connect with the digital entertainment community in Hollywood and to the high-tech companies in Silicon Valley. For example, storyboards can be developed in California but animation be executed in the MSC, electronically transmitted back to LA for editing, sent back to the MSC for colour-balancing, and then transmitted to the studio for final approval and distribution. Let us explore ways to mutually enrich our companies and countries through this gift being provided by Malaysia.

The breadth of what I am describing has probably never been attempted anywhere else in the world. You may be thinking, 'Why Malaysia?'

- First, Malaysia's physical location at the centre of ASEAN and its multicultural links with the biggest Asian markets is unique. The Malaysians are made up of people of Malay, Indonesian, Indian and Chinese origin. We are only a few hours flight from the major Asian capitals. We have language skills and cultural knowledge that can be very helpful. Most people speak English as well as one or more languages such as different Chinese or Indian dialects, or Malay. With the new airport and communications infrastructure being built, Malaysia will be a highly efficient and effective hub for the region.

- Second, Malaysia still has a cost advantage as compared to the 'tigers' in the region. In fact, a recent study done by international consultants on the cost of doing business in Malaysia indicated that it is among the most competitive in the ASEAN region. To sustain this the government will continue to provide the enabling environment. Our people are among the most productive in Asia.

- Third, the newness of multimedia to Malaysia provides an important advantage – we have no inherited systems or entrenched interests determined to defend their current positions. We have the political will and the power to rapidly change any existing laws or policies that impede the ability of companies to capitalise on the benefits afforded by the Information Age. We will not be diverted by excessive politicking in Malaysia. In Malaysia things that need to be done will be done quickly unobstructed by corruption.

- Finally, we are highly committed to making the MSC a success and we have a track record of meeting our commitments. We are a pragmatic government which has consistently proven our critics wrong even when we adopt unconventional policies and strategies. Malaysia's history since independence has shown consistency and predictability so that long-term investment will not be threatened by the twists and turns of volatile local politics. The Malaysian government sees multimedia as the strategic sector to achieve our Vision 2020, the attainment of developed country status through productivity-led growth, and the MSC is at the leading edge of this key sector. Consequently, we simply cannot and will not allow the MSC to fail.

We have been very busy over the last two years working with leading companies such as NTT to understand the future needs of world-class companies. McKinsey & Company has interviewed hundreds of companies to understand their requirements and is working with us to learn lessons from the experience of other countries.

To ensure that the MSC will not fail, Malaysia is offering a ten point Multimedia Bill of Guarantees. The government of Malaysia formally commits the following to all companies

receiving MSC Status from the Multimedia Development Corporation:

- Malaysia will provide a world-class physical and information infrastructure
- Malaysia will allow unrestricted employment of knowledge workers from overseas
- Malaysia will ensure freedom of ownership of companies
- Malaysia will allow freedom of sourcing capital globally for MSC infrastructure and freedom of borrowing funds
- Malaysia will provide competitive financial incentives including no income tax or an investment tax allowance for up to ten years, and no duties on the import of multimedia equipment
- The MSC will become a regional leader in intellectual property protection and cyberlaws
- Malaysia will ensure no censorship of the Internet
- The MSC will offer globally competitive telecom tariffs
- Malaysia will tender key MSC infrastructure contracts to leading companies willing to use the MSC as their regional hub
- Malaysia will ensure that the newly established MDC, a high powered implementation agency, will act as an effective 'one-stop shop' to meet company needs.

These companies must be providers/heavy users of multimedia/IT products and services and employ a substantial number of knowledge workers. The MDC is registering interested companies and will be taking formal applications for companies seeking 'MSC status' in March. In addition to seeking world class companies, the MDC is also seeking world class employees to help it build the MSC.

To the students, I invite you to submit your resumes to the MDC and fill out the employment application on its website. There are opportunities at its ten world wide offices and at headquarters in Malaysia. To the companies, I welcome your participation and input. We need your vision, creativity, entrepreneurship and skill to give life to the MSC. To the international community, we offer you a perfect environment to try and find solutions to some tough questions whose answers must cross borders:

- How will value that is collaboratively created in several countries but sold in another be taxed?

- How can intellectual property rights of knowledge-based products and services be defined and protected?

- How can responsibility for the accuracy and integrity of information on the Internet be ensured?

- How can society be protected from new forms of fraud, counterfeiting, piracy and viral attacks on the systems that run companies or even countries?

In Malaysia, we are looking at the possibility of creating a new Cyber-Court of Justice as an international centre to look into these issues.

We may sound very ambitious for a small country, but America itself was a small country in the 19th century. At that time, England launched the Industrial Revolution but America won it. Why? Because the technology could be moved to an environment much more conducive to realising its full potential. Malaysia has come late to industrialisation, and this has given us the will and skill to make sweeping changes that others cannot because we have much less to lose. The MSC provides all the critical components required to create the perfect environment to achieve the promise of the Information Age. Today, it is much easier to move technology and knowledge than it was 100 years ago. This is why we believe we can build the global bridge needed to move beyond the limits of the Industrial Age. While I may be an optimist, I believe this path to prosperity will be chosen over the alternative of hegemony and win-lose economic relationships. The globalising and harmonising forces of the Information Age will prevent a clash of civilisations or the Century of Asia. It will create the World Century, the true Commonwealth of the World.

The 2nd Asia Pasific Conference on Plant Physiology

21 August 1996
The Pan Pacific Glenmarie Resort, Shah Alam

"Gene banks will be sprouting in many countries and hopefully the people living in the lands where these plants grow naturally will not be once again cheated of their heritage. Their scientists may not have the skills and the means to identify and extract the valuable compounds from the plants growing in their jungles, but hopefully their rights and their share of the discoveries will be respected."

Agriculture is the world's oldest and most important industry. Not only does it provide us with food as well as clothing and shelter but it is also a useful contributor to the chemical and medical-based industries as well as to the construction sector.

What is interesting is that while the first great civilisation arose around the fertile plains of the Nile as well as the Tigris and Euphrates rivers, these regions did not receive enough rain for crops to grow. It was the invention of irrigation which raised farming to a sophisticated level and helped to release and move people away from the need to produce food for their own consumption. With this freedom they were able to focus on other activities such as crafts, trade and the pursuit of knowledge. Thus began the early civilisations.

Today the problems facing agriculture have taken on a new dimension. It has to address an alarming population growth of approximately 100 million per annum. The world is expected to accommodate 10 billion inhabitants by the year 2050 compared to 6 billion today, and these people must be fed and must enjoy a good quality of life. But there is already a disturbing trend in the world today to use food as a bargaining political tool in the international arena, including the use of trade sanctions in order to achieve compliance. The situation is made worse because the recent Grains Crisis has revealed how much the developing countries depend on the developed countries for their food supply. Statistics reveal that in 1993/94 developed countries accounted for 78 per cent of the 192 million tons of total grain exports while developing countries accounted for 66 per cent of the imports. Already the peoples of certain developing countries which face sanctions are being deprived of food, while exports of subsidised excess grains by the developed countries have undermined into the export markets of developing countries.

Malaysia has charted a course into the next millennium which hopefully will bring her into the league of developed nations. Industrialisation programmes have turned the economy from one of raw material supplier to a nation also involved in the business of manufacturing products, construction and the provision of services such as shipping, insurance and finance.

Agriculture in Malaysia faces structural and organisational issues that need to be resolved if the sector is to be re-engineered for growth and development. Current challenges to the industry have to be addressed and translated into innovative strategies and pragmatic policies if the food, fibre and energy needs of the nation are not to be jeopardised. Already the import of food items is among the biggest segment contributing to our current balance of payment deficit. With a rapidly growing and more affluent population, the situation can only get worse before it can get any better.

Our agricultural strategy has been embedded in two policy documents, namely the New National Agriculture Policy (1992–2010) and the 7th Malaysia Plan (1996–2000) which was recently launched. The former emphasises a more commercial approach to agriculture in order to enable those involved to earn higher incomes. But after four years this is still not happening and the policy is therefore being revised to also take cognisance of the changing scenario in a rapidly industrialising nation.

The 7th Malaysia Plan which was launched in May, presents clearer strategies for a more commercially attractive approach to agriculture, and in it the private sector has been called upon to be an equal and vital player in its implementation. The primary focus of the plan is to improve productivity through a much more effective and efficient use of resources. The private sector has been called upon to initiate, manage and

drive large-scale production of food and value-added products, including horticultural produce. A new renaissance-style paradigm shift has also been advocated to ensure that modern management techniques be introduced to replace the basically peasant style agriculture and small holdings which are no longer capable of meeting a mass-consumption economy. The shortage of labour has to be overcome through reinvestment in machinery and increasing the size of holdings in order to maximise the efficiency of new farming techniques. In any case the children of farmers are now better educated and cannot be expected to labour on small peasant holdings.

Our researches have over the years built up a solid bank of knowledge in various aspects of agriculture. Based on this data we hope to innovate and apply so that we can increase yield, hasten maturity, process the harvests to supply our needs and to expand our exports. The 7th Malaysia Plan is also concerned with our excess of imports over exports. The agricultural sector must help to reverse this trend and be a source of foreign exchange through the application of new processing technology for added value to our exports. All agricultural produce must be fully utilised. Thus the palm-oil industry should not just produce palm-oil for export but should produce animal feed and fibres for furnishing and fibreboard. The vitamin contents of palm leaves have to be extracted and marketed as well.

Faced with shortage of land and labour Malaysians will have to invest in other countries in order to continue using our expertise in estate management and our newly developed high-yield planting material. We believe that this strategy will also be beneficial to host countries where land is available and labour is cheaper and plentiful. It has always been our belief that helping neighbours to prosper through investments will eventually benefit us. Today there are no more boat people coming to our

shores because there are now enough employment and business opportunities in their own country to keep them at home. Indeed repatriation of boat people has been made possible and acceptable because of this.

Malaysian experience in tropical agriculture is considerable. Most of our tree crops are based on non-indigenous plants. Thus rubber is from Brazil while oil palm and cocoa are from West Africa. These trees have done very well in Malaysia, in fact better than they do in their homelands. It is not just that the climate and soil is eminently suitable, but the approach toward exploiting these crops has always been more commercially oriented. Thus while in Brazil rubber was gathered largely from trees growing naturally in the forests, in Malaysia rubber has been grown in large estates with the backing of intensive research in planting methods, high-yield clones and constant replanting with better clones. The Malaysian rubber tree produces ten times more than the original rubber tree brought to this country via Kew Garden in the UK. The same can be said of oil palm.

We are obviously interested in producing these agricultural produce because of the income and wealth that it generates. It is not a business based on sentiments about agricultural traditions alone. And so we tend to maximise earning through every means possible. Thus besides producing latex rubber trees also produce good timber suitable for furniture. After years of reducing the girth of rubber trees while increasing the yield, we are now keen to increase the girth of rubber trees so as to yield more timber. At the same time the rearing of sheep in rubber estates seems to be a good business proposition. Deer raising in palm-oil estates can also add to the income from the use of land.

Producing agricultural products efficiently is important but equally important is the marketing of these products. Other than rice and vegetable which Malaysia does not produce enough, other products such as cocoa, rubber and palm-oil are produced for the world market. And the world market is subject not only to demand and supply equations but also to manipulations by international traders and commodity markets operations.

Attempts to stabilise markets through buffer stocks and agreements between producers and consumers have not really worked. More often the producers lose in this game. For decades now commodity producers have been selling more and more of their products in order to buy less and less of the manufactured goods they need. Had Malaysia continued to depend on commodities, it would today be one of the poorest developing countries. Where before 100 per cent of our exports was made up of rubber and tin, today only 20 per cent of our exports is made up of commodities, although to rubber and tin have been added palm-oil, cocoa, petroleum and gas. In other words instead of having a per capita income of US$4,000, we would probably have a per capita income of US$800 or less.

Clearly there is a need to look into the marketing of commodities, especially agricultural products. We know for a fact that many developed countries subsidise the farmers heavily and quite often use excess production as gifts to countries which are the markets of the producers in developing countries. The charitable gesture is commendable but it impoverishes the poor countries.

Off and on speculators corner the market, bringing down prices to below cost. Then when they have gained control of the market they would raise prices and make a killing. The producers in poor countries can do nothing about it. But rich

powerful countries can force open the markets of other countries in order to sell their excess harvests. Indeed rich countries with their technology, capital and large-scale production methods are making poor farmers in developing countries even poorer. We now see cultivation of rice and the exotic tropical fruits in certain rich countries which will have a detrimental effect on the poor farmers in poor countries. Unlike their counterparts in rich countries who can apply pressure on their governments through demonstrations, et cetera, the poor farmers in the poor countries can do nothing about their misfortunes.

New sciences have been developing in the field of phytochemistry and others. Suddenly all the plants in the forests seem to acquire new value. Of course we have always known of the medicinal qualities of certain plants. In Malaysia we have always known about treating certain diseases with extracts from certain plants. But Western scientists were quite cynical about the claims made. They were not scientifically evaluated or studied and therefore they were mere old wives tales. Chemical formulas were scientifically synthesised and precise and must therefore be superior to the imprecise concoctions extracted from parts of trees and bushes.

But now more and more often we are finding the chemical compounds unsafe and possessed of many side effects, even dangerous ones. On the other hand the natural extracts seem to be more friendly to the human systems. No doubt in time the findings regarding natural extracts will be debunked. But until then there will be amplified interest in the properties of certain naturally growing plants.

If scientific methods can be used to evaluate synthetic chemicals, there is no reason why the same method cannot be used for extracts from plants. A new science that is closely related to agriculture is fast developing. In time we should be

seeing large plantations of medicinal plants whose value may far exceed the fruit trees, grain-bearing grasses and other plants which today make up much of our agriculture.

Gene banks will be sprouting in many countries and hopefully the people living in the lands where these plants grow naturally will not be once again cheated of their heritage. Their scientists may not have the skills and the means to identify and extract the valuable compounds from the plants growing in their jungles, but hopefully their rights and their share of the discoveries will be respected. Already there have been instances where they have lost their natural heritage as foreign companies pillage their forests and take as their own the medicinally valuable extracts from the tropical plants growing in their jungles. It is hoped that the international community will act to stop this daylight robbery.

We should appreciate the work of these scientists and the foreign companies which finance them and we should give them their due. But the people and the countries where the plants are found must also be given their legitimate share. Just because this is an unfair world does not mean we should not try to be fair where we can.

Clearly there is still a lot of life in agriculture. It is not a sunset industry. Its potential is tremendous if we only apply all the latest technology and scientific methods in identifying, analysing, developing and marketing of new agriculture and agricultural products. More money should be made available by governments and corporations for research and development. The best minds must be applied to agro-research and they must be handsomely rewarded. Somewhere, somehow the advances in science and in particular in IT should be harnessed to make agriculture, the new agriculture, relevant and beneficial to human society and human life.

The Award of Honorary Fellow of the Academy of Sciences Malaysia

2 August 1996
Hotel Istana, Kuala Lumpur

"There is no magic in the discoveries and inventions by the great societies and technological geniuses. It was a matter of applying known scientific laws to differing situations repeatedly and tirelessly, using all the techniques and instruments available until the correct formula is found. Inspiration is useful, but hard work counts more."

For many Malaysians, science and technology (S&T) is still strange and even incomprehensible. But like everything else S&T will not remain strange for long if we apply ourselves to mastering them. And this we can do because S&T are logical and precise. The behaviour of materials whether chemically or physically does not change. And so once we know we need only to remember. Unlike the arts which vary according to the perceptions of people, no variation is possible for any scientific or technological reaction merely because different people observe it. The laws which govern scientific and technological behaviour are mere statements of what will always happen and not what may happen when the laws which normally govern our society are applied by different judges. Scientific laws are learnt and not formulated according to the wishes of society. Once these scientific laws are known, the reactions under any circumstance can be quite precisely predicted. There is no magic in the discoveries and inventions by the great societies and technological geniuses. It was a matter of applying known scientific laws to differing situations repeatedly and tirelessly, using all the techniques and instruments available until the correct formula is found. Inspiration is useful, but hard work counts more. We need not be geniuses to make scientific or technological advancements, but we do need to be determined and dedicated.

Malaysia in the year 2020 hopefully will be a scientifically progressive, innovative and forward-looking society with the capacity to make significant contributions to the scientific and technological world. This vision is not a dream because Malaysia in 1957, recognising the importance of S&T in development, enshrined it in the Rukunegara and incorporated it in the national education system. Thus, primary and secondary schools, universities and polytechnics have already implemented science as the key discipline to produce a skilled and competent

scientific workforce. The rapid, modern technology-based industrialisation bears testimony the correctness to our efforts.

An important prerequisite to progress is a balanced approach to S&T development. Today, nations look forward to S&T for salvaging stagnant economies and overcoming misery and poverty. And so we need to focus on applied research, looking for what is relevant and useful for us and our society. Research for the sake of knowledge may eventually result in something useful, but we do not have the money or the time for this luxury.

Recognising the importance of infrastructure as one of the prerequisites for a sustained S&T development, Malaysia has established several agencies. Among them are MTDC, MIGHT and MINDS. These agencies provide institutional and support infrastructures and are themselves involved in S&T management and implementation.

The trend towards globalisation of business requires a strong public and private sector partnership. Globalisation requires coordination of available technological resources to mutually benefit businesses operating in a number of host countries. This government-industry partnership must work towards strengthening our current comparative advantage so as to sustain, and even enhance our competitiveness. Strengthening the indigenous technological capacity and capability requires concerted effort to ensure acquisition of foreign technology. We can expect that others will not transfer all their technology to us. But we need to know as much of the basic as possible for us to develop the rest. We must always remember that when we come upon anything new and valuable in terms of our own research, we do not rush to transfer it to others.

Indeed our culture is against the transfer of our specialised skills to others. Thus while Western doctors report regularly in the medical journals about their findings in the treatment of some diseases or other, our dukuns or bomohs would never dream of telling anyone their secret cure. And so many useful cure dies with the practitioner.

We have to get over this cultural mental block. We have to report our discoveries because it is good for the progress of mankind. Our reward should be recognition by society through such awards as the Nobel Prize. We can of course patent our discovery and be paid royalty for the rights. But the worse thing we can do is to carry out knowledge and our skills to the grave. Let us think of this sometimes when we complain about others not wanting to transfer technology to us.

The Academy of Sciences Malaysia is a congregation of the top scientific and technological minds in our country. The academy is well poised to participate in high-level thinking and deliberation of scientific and technological issues. It can play an important role in formulating proposals for the consideration of the government.

I am happy to note that the Academy of Sciences Malaysia, since its inauguration in September 1995, has been able to formulate and implement programmes that impact on creating S&T awareness among the public via workshops, public lectures and orations on subjects related to the latest developments in S&T. It has also managed to produce a number of publications.

The 11th Asian Pacific Federation Congress of International College of Surgeons

10 January 1996
Shangri-La Hotel, Kuala Lumpur

"Today, by far the most important development is the advent of molecular biology. It has contributed towards major advances in the understanding and treatment of inherited disease and disease disposition. The discovery of the variation of genes and mutations in the process of carcinogenesis appears not only exciting but also a promising development in the battle against disease."

Tracing the history of medicine over the past 200 years, the progress that society has made can be closel linked to the advances in science. Looking back at this century, medical progress has been phenomenal compared to the days of the 'Medicine Man' and the 'Barber Surgeon'.

Indeed, the understanding of bacterial infections and their conquest by antibiotics; the concept of immunology and its far reaching applications to blood transfusion, immunisation, the prevention of viral infections; the success of transplant surgery and the delaying of the ageing process; the progress in endocrinology and its application to human reproduction, contraception, the treatment of disease and menopause; and many other advances highlight the remarkable achievements made by society.

In addition, nuclear physics and pharmacology have given us new tools to treat cancer, although cancer itself remains unconquered. The advent of X-rays, thermography, ultrasound and magnetic resonance has made physical imaging, foetal monitoring and therapeutic procedures not only possible but also successful. In fact, it has made surgical intervention more precise and less disfiguring.

Notwithstanding all these new discoveries, the universally accepted principle in the practice of medicine is that investigation and treatment should be as minimally invasive as possible; that there should be very little pain; and recovery should be rapid. With advances in endoscopic techniques, fibre optics and laser, all these have been made possible.

The advent of in vitro fertilisation (IVF) in humans and its success with the birth of Louise Brown in 1977 also brought new hopes to the management of infertility. The techniques are widely reproduceable although they are neither simple, nor inexpensive, nor highly reliable to produce a baby. IVF,

however, does hold wider application in medicine, the possibility of pre-implant, genetic diagnosis, gene therapy and delayed conception. The results from experiments with embryonic cells appear promising as they may hold the key to tissue repair and in replacing diseased or ageing organs.

Today, by far the most important development is the advent of molecular biology. It has contributed towards major advances in the understanding and treatment of inherited disease and disease disposition. The discovery of the variation of genes and mutations in the process of carcinogenesis appears not only exciting but also a promising development in the battle against disease. Further research in this direction may even help to conquer the deadly HIV virus.

As for today, looking at the audience, I am happy to see that surgeons from all over the world are gathered here to share their knowledge. Dr Max Thorek conceived an idea 60 years ago and founded the International College of Surgeons (ICS), an institution that would provide medical knowledge to all parts of the world, knowing no boundaries or prejudices. His dream has indeed become a reality, probably far greater and more promising than he had imagined.

It is a pleasure to note that in the ICS concept, leadership positions are open to all persons regardless of colour, creed, ethnicity or politics. Looking at the list of office bearers, one can truly appreciate how international the ICS is. I am glad that Malaysia is also ably represented.

In achieving the goal of this congress, the participants in their deliberations should take into consideration the escalating costs of new techniques and its effects on developing countries. They have to examine the ethical and medico-legal implications of the new methods and also to be sensitive to cultural and religious feelings.

Malaysia is striving to become a fully developed nation. We therefore look forward to the next millennium, in particular the year 2020 to achieve this aim. Our progress shall be balanced; be it in education, industry or new technology and shall be guided by our beliefs, moral values and traditions. We welcome the free flow of information and knowledge which can contribute towards our progress. We also support research and development. The ICS is most welcome to participate in our ever-expanding sphere of medical education, especially in the training of young surgical scientists.

Up to now Malaysia has been quite free of the kind of litigation mania found in many developed countries. We appreciate the need to protect patients from incompetent and careless treatment by the practitioners of medicine and surgery. But excessive awards made by courts have resulted in doctors either avoiding to help in accident cases, or carrying out unnecessary and costly investigations or charging very high fees in order to cover high insurance premium. The result is that the poor are deprived of medical treatment and even members of the middle-income group can be bankrupted by medical bills. Medical insurances have become unaffordable and even governments are not in a position to provide basic medical care for the people. We hope that we will remain free of this craze. We must symphathise with the victims of irresponsible practices, but the cost of this misguided sympathy, in terms of deprivation of medical treatment, is infinitely higher. Awarding ridiculously high compensations does no one any good.

The International Conference on Wetlands and Development

9 October 1995
Hyatt Regency Saujana, Subang

No government can fight against the continuous and massive pollution that people perpetrate, whether deliberately or through circumstances. Of course, when people are poor the pollution is more extensive. Unable to pay for waste disposal or to dispose of it with care for the environment, they just throw their waste around them. The result is pollution and destruction. Poverty is therefore the biggest cause of pollution, and they who impoverish people are directly guilty of polluting.

It is acknowledged that wetlands and their resources play a critical role in supporting the lives of millions of people throughout the world. Wetlands not only provide a wide range of valuable products to society, including fish, fodder and timber, but also perform a number of natural biophysical functions such as flow regulation and ground water recharge. They are therefore relevant for research and understanding to ensure that their contributions to the development of the ecosystems are maintained.

As we meet here today, these life-sustaining systems remain under threat. Many wetlands, especially in the North, have been destroyed or degraded through over-exploitation or environmentally unsound development. As usual people at large are the biggest destroyers and polluters. Accordingly only they are in a position to protect their environment, particularly the wetlands. They need to be committed to sustaining the environment, whether it is wetlands, drylands, marine land or the highlands. All too often, however, this responsibility is left to the government. But no government can fight against the continuous and massive pollution that people perpetrate, whether deliberately or through circumstances. Of course, when people are poor the pollution is more extensive. Unable to pay for waste disposal or to dispose of it with care for the environment, they just throw their waste around them. The result is pollution and destruction. Poverty is therefore the biggest cause of pollution, and they who impoverish people are directly guilty of polluting.

Malaysia has more than 3 million hectares of wetlands covering nearly 10 per cent of its land area. The main wetlands are lakes, swamp forests, mangroves, swamps, shallow coastal waters and coral reefs. Many of these areas are critical for production of fish, timber and other forest products, for water supply, flood mitigation and also recreation. Estimates have

been made that Malaysian wetlands contribute over US$2 billion to the economy every year, directly and indirectly.

Many Malaysian wetlands support unique forests of valuable trees such as mangroves. The swamp forests of Selangor, Pahang and Sarawak are some of the best and most important examples of these in the world. It may not be possible to preserve every square meter of these swamps but where it is preserved it can already generate wealth through the great interest in eco-tourism shown lately. The Matang mangrove forest in Perak state is internationally recognised as one of the best-managed wetlands in the world, with a sustainable forest management system of nearly 100 years, which has maintained high yields of forest products. At the same time, it has supported one of Malaysia's largest inshore fisheries and remains rich with wildlife.

Scientists from around the world have come to study wetland habitats and species in Malaysia. Strategic research is an important prerequisite for sustainable resource management, and it is encouraging that several Malaysian scientists have now become leading experts in these fields.

Three years ago, at the Rio de Janeiro Earth Summit, the international community adopted the Rio de Janeiro Declaration on Environment and Development as well as Agenda 21. The declaration set out fundamental principles while Agenda 21 spelt out specific programmes of action. Collectively the Declaration and the programme of action underscored the common resolve of the global community to safeguard the environment while promoting an ecofriendly development process. It was agreed that environmental onsiderations would be factored into the development process, for the benefit of the present and future generations.

It was also agreed that developed countries would assist developing countries with adequate and additional resources to enable them to make the transition towards an ecofriendly development process, often referred to as sustainable development. While the vast majority of developing countries have abided by the Rio compact, regrettably the developed countries have not fulfilled their half of the bargain.

Although many developing countries including Malaysia are prepared, and in fact are committed to play our part for our collective good, we will not be held hostage by those bent on retarding the development process of developing countries. The onus of change towards sustainable development must be borne equitably by all. Developing countries made earnest commitments to participate in what was to be a new global effort to save the planet from environmental damage, encouraged by the expectation of assistance by way of additional and new financial resources and technology transfer. These have not been forthcoming. The conventions have been caught up in wrangling over procedures and interpretations of agreed texts. And developed countries see in the concern for environmental protection only opportunities to sell the technology that they have developed for profit.

The task of caring for our environment, including the wetlands, involves the entire spectrum of society. The public and private sectors as well as the rest of society can and must make their contributions. Given the increasingly important role which the private sector plays as the engine of growth, the private sector must strengthen its commitment to care for the environment. I am happy to note the involvement and support of several local members of the private sector to this conference. It is a clear manifestation of their serious concern for the environment.

I believe that local NGOs can also play a proactive role in the conservation of the environment. For this to happen they need to become highly professional, to focus on real issues affecting society and to understand the balance that must be reached between development and environment. NGOs must accept the fact that nothing damages the environment more than poverty. Huge forests have been totally decimated because the only fuel the poor can afford is wood. To use other fuel they need wealth and wealth can only come through wealth-creating development. The small environmental sacrifice which has to be made in order to develop is far less than the damage due to unmitigated poverty.

Admittedly wealth, through mass consumption, will also contribute towards pollution. But there is much that the rich can do to reduce their polluting ways. Certainly they can reduce wasteful consumption, as, for example, the emission of carbon dioxide from heedless fuel burning. By being willing to pay more for their luxuries they can subsidise the installation of various pollution control measures. Indeed they can pay to preserve the wetlands and other natural heritage without, for example, forcing the poor countries to preserve their forest in order to absorb the noxious gases produced by the rich.

Launching of the Academy of Sciences Malaysia

8 September 1995
Istana Hotel, Kuala Lumpur

"Asian scientists should cherish the high purpose of their scientific learning and not be made the instruments of people with ruthless ambition. With the current political stability and conducive economic climate in the major part of the Asian continent we may now return to the moral high ground of applying learning for the betterment of mankind."

The growth of science has been exponential in character to the extent that it is now hardly possible to apply a new discovery to practical use before a new discovery is made. Technology now enjoys a synergistic and symbiotic relationship with science. If the pre-twentieth century technology was merely the result of utilitarian application, with limited understanding of the mechanisms involved, for example, the steam engine, telephone and chemical technology – the technological applications of today is much more scientific with true understanding of the scientific principles on which they are premised. Science, that is its study and research has in turn benefited from the products of technology in terms of new materials, new devices, new designs and new machines. The ever-increasing role of computers in scientific research provides a very good example of how technology accelerates the advancement of the sciences. We are now at the end of the 20th century and already we have seen the advent of the atomic age, the space age, the age of electronics, the age of biotechnology, the age of advanced materials and above all the information age. With such a tremendous pace of growth, it would be foolish for a nation not to be an active participant in this rapid development, for otherwise the nation would be handicapped, economically, technologically and culturally.

Asia has been the home of ancient civilisations – Persians, Arabs, Chinese, Indians and Javanese – and for a considerable period Asia led the world in the sciences and technology. We gave to the world the alphabets, the numerals and the units of tens, algebra, astronomy, celestial navigation, paper and gunpowder, amongst other things. This leadership was lost momentarily, and we suffered a period of colonialism due to the technological superiority of others. We are, however, proud that in general we had not used our technology for the purpose of improving our capacity to destroy Man and his civilisation. Asian scientists should cherish the high purpose of

their scientific learning and not be made the instruments of people with ruthless ambition. With the current political stability and conducive economic climate in the major part of the Asian continent we may now return to the moral high ground of applying learning for the betterment of mankind. We in Malaysia must now generate our own homegrown S&T to a level comparable to those of Europe, North America and Japan. We must all look forward to the healthier and more constructive relationship between nations that will benefit all mankind.

Malaysia has a strong commitment to the development of S&T. We are aware that we cannot provide for the welfare of our people unless we can develop and sustain a strong technological and scientific base. Malaysia has been an independent country for less than four decades. During that period we have made quite unprecedented progress. However, we must not be complacent. As latecomers, we realise that the world is not waiting for us to catch up and pass those ahead. To ensure a more intensive process of building on endogenous S&T, we must shift the majority of our school children and university graduates to the scientific stream so that instead of the present 25 per cent, we should have in excess of 50 per cent in the near future. This requires the propagation of a value system that encourages scientific scholarship with excellence.

At another level, the government has allocated a substantial amount of money for long-term scientific research under the IRPA programme for the past few Development Plans. To be effective and to ensure a sustainable growth of scientific research within the capabilities of the country, we will reexamine, and where necessary, revise our strategies of allocating funds in accord with the latest trends. This is not an easy task, particularly in finding the right balance between applied and basic research. For industries, there is a slightly more defined task to generate products and processes that sell,

and as such, investment in applied research and technological innovations should be given priority. Longer-term benefits for the nation are, however, much harder to ascertain since, in addition to the economic dimension of the research, there is the nebulous cultural dimension that may be beneficial by acting as a catalyst to further scientific enquiry. This is particularly true for the basic researches whose output may not be of commercial value today but may yield greater economic benefits in the future. Here, the Academy can play a major role as a body of scientific experts in assessing researches being done here and so guide the country towards strategic areas of benefit to the nation's progress. The government will be willing to support any promising research, including those which will ensure sustainable growth of scientific knowledge and technology which can put the nation at the cutting edge of modern science.

The public should be made aware of what could happen to their lives and future generations given that science has the power to affect human society and the world systems in a very major way. A scientist has the ethical responsibility to ensure that his research does not have negative effects, either in the form of potential environmental degradation, invasion of privacy, or violation of human rights. Here the Academy Secretariat can help in communicating with the public through their own scientific bulletins and colloquiums.

Development of science should always be balanced. While there may be priorities, no one science can be developed at the expense of another. Science should be understood as a unity. This is particularly true today where different disciplines of science have come together for mutual support and some eventually will give birth to new fields and disciplines.

It is true that we in Malaysia have mostly be the consumers of technology. But looking at the numerous inventions and innovations at this year's 'Mindex' Exhibition, I am hopeful that the central stress on S&T will pay off handsomely, and more and more Malaysians will develop an enquiring mind and dare to venture into newer fields of scientific knowledge. However, science for the sake of science is sterile and may even be harmful. At all times Malaysian scientists must be moved by a desire to apply science for the good of mankind.

The Official Opening of the 9th Biennial Scientific Meeting of the Asian Pacific Association for the Study of the Liver

27 January 1994
The Shangri-La Hotel, Kuala Lumpur

‘As Malaysia moves to be a fully developed industrialised country by the year 2020, I am confident that we will not only have the resources but highly trained medical personnel to equal the other developed countries in specialised medical care.’

Not so long ago, diarrhoea, dysentery, maternal and neonatal diseases and infections and infestations of the liver were the principal causes of deaths in Malaysia, particularly in the rural areas.

With improvement of good water supply, a cleaner environment and better health education provided by the government, we have experienced a drastic decline in the bacterial, protozoal and other intestinal infections affecting the liver which plagued this country. Statistics show that cardiovascular diseases and trauma now rank as the top causes of deaths in Malaysia while diarrhoea and dysentery have dropped to the sixth place.

However, viral infections of the liver still remain a major health problem in the Asian-Pacific region. For instance, the world wide number of hepatitis B carrier is estimated to be 280 million, and 78 per cent of them are living in the Asian-Pacific region. Hepatitis B virus carriers account for 5 per cent to 20 per cent of the whole population in this area.

In Peninsular Malaysia, the incidence of hepatitis B carriers is 3.5 per cent of the general population. In the Asian-Pacific region, the incidence of liver cirrhosis and its complications, including liver cancer, are also high with a maximum incidence of 150 cases of cancer in every 100,000 people. Hepatitis B is detected in 50 per cent to 80 per cent of these liver cancer patients and they are all hepatitis B carriers.

In contrast, the incidence of liver cancer in North America and Europe is very low, with one to three cases in every 100,000 people, while only 3 per cent to 5 per cent of these patients are hepatitis B carriers.

Since the most dangerous infective period of hepatitis B occurs in the neonatal period from mother to child, mandatory vaccination of all new-born infants has been introduced by the Malaysian government since 1989. I am happy to say that we were one of the first countries to do so. We believe this programme of vaccination will eradicate hepatitis B in Malaysia within one to two decades. In addition all regular blood donors, hospitals and health workers, blood transfusion dependent patients like haemophiliac and thalassaemia are given vaccination free of charge.

The prevalence of hepatitis A in Malaysia is endemic since 70 per cent of the general population have antibodies for hepatitis A between the ages of 14 to 69 years. Hepatitis A therefore still remains a childhood infection. With better sanitary conditions, good water supply and hygiene, the incidence is expected to decline. The source of occasional epidemic infections is often the food handlers. Accordingly there is strict supervision of food stalls.

As regards traumatic injuries to the liver, the compulsory use of seat belts has dramatically reduced its incidence in Malaysia.

In the last two to three years, with the availability of immunoassay to screen for hepatitis C antibodies, it is now possible to identify those infected with hepatitis C. The Malaysian Ministry of Health has embarked on routine screening of all blood donors since 1993. Other private hospitals and institutions are now following this procedure. In the government hospitals, only voluntary blood donors are accepted. Replacement of blood from other sources is refused.

The source of infection of Delta Virus (D) is 34 per cent among intravenous drug addicts in Peninsular Malaysia while the

incidence of hepatitis B in this group is 39 per cent. Every effort is being made to discourage young people from falling into drug addiction through education in schools, beginning with anti-smoking campaigns and parental supervision. It would seem that preventive measures are of vital importance in the eradication of all forms of hepatitis.

The Malaysian government has spent considerable sums of money yearly towards the eradication of communicable and preventive diseases. Improving the health in rural areas and small towns has always been the government's first priority.

Now that the mortality and morbidity rates in rural areas have been reduced significantly, we have opened new district hospitals and upgraded existing facilities. Currently, the government is spending RM3 billion on health care yearly.

In the curative aspect, diseases of the liver considered untreatable or with poor prognosis during my days have now better survival rates. To quote a few such diseases: complications of liver cirrhosis, liver failure, portal hypertension, intractable ascites, liver cancer and congenital disease. The indications for surgical treatment have also widened, particularly with liver transplantation. Spectacular development in diagnostics-specially in imaging technology, in anaesthesiology and intensive care has substantially enhanced the care for our patients.

The public's cry for more sophisticated diagnostic and treatment procedures will increase medical costs, especially for Malaysia which has a non-contributory free medical service for all. Even rich nations find that the government itself cannot afford to pay the high costs of medical care. Without private medicine, a National Health Service is just impracticable.

While liver resection has been available in Malaysia since 1964, there is currently no liver transplantation programme in Malaysia. The Ministry of Health has selected many young promising doctors to meet this demand by undergoing specialised training overseas.

During the past decade no area in surgery has captured the imagination of the public more than the solid organ transplantations, particularly of the liver.

The establishment of specialised transplantation units which perhaps will serve only 15 per cent to 20 per cent of the liver patients, will place an additional burden on our economy. Nevertheless, as Malaysia moves to be a fully developed industrialised country by the year 2020, I am confident that we will not only have the resources but highly trained medical personnel to equal the other developed countries in specialised medical care.

Health insurance schemes, charitable societies and private hospitals will also enable such services to be made available to all patients.

Although the long-term plan should be one of prevention of liver diseases, communicable diseases such as viral, bacterial and protozoal infections should be eradicated by an improved environment, providing good sanitation and good water supply, early and mandatory vaccination against viral diseases, health education, better nutrition and changes in lifestyles.

The Opening of the International Conference on Biodiversity

12 June 1990
Holiday Villa Hotel, Subang

‘The 6 per cent of Peninsular Malaysia so reserved, most of it in pristine condition, represents one of the highest of such percentages in this part of the world. This figure compares well with or even exceeds that of some developed countries of the Western world, many of which are quite vocal on the subject of conservation.’

Malaysia is endowed with a great diversity of species in its forests and other natural habitats such as rivers, lakes and surrounding seas. Over 10,000 species of flowering plants, about 2,000 species of vertebrates and about 80,000 invertebrate species have been documented in this country. Only a small proportion of these resources has been utilised for our needs. As a medical man, I am aware of the many plants that are used in traditional medicine. I have no doubt that scientific investigation will reveal that many of these can replace some of the synthetic drugs and can provide new medicinal compounds.

What is of significance is that there is a high degree of endemic of these species in the country. Botanical studies in Peninsular Malaysia have shown that up to 30 per cent of all tree species and 50 per cent of the orchids are not found anywhere else. Biological diversity needs to be conserved to ensure that there remain genetic resources in this world for the further propagation and domestication of potential crops and animals as our forefathers had done with those which we are familiar with today. Many drugs and pharmaceutical products have been obtained from the chemical blueprints provided by plants and animals from the tropical rainforests. Many life sustaining ecological processes, particularly photosynthesis, the water cycle and the nutrient cycle, are the results of the fine interaction of plants and animal species, particularly in their natural environment. The question of carbon dioxide level and greenhouse effect is of great concern to all nations in the world. Maintenance of a critical level of biodiversity is therefore compulsory for the sustainability of natural ecosystems.

Maintenance of global biodiversity is the common responsibility of everyone, as its benefits are universal and not limited to any one country or region. Developed countries with their advanced technological and scientific capability are in a

better position to reap the benefits from the conservation of biodiversity. Thus, this effort must be well supported by the wealthy developed countries without imposing restrictive burdens on the developing ones even though the habitat of the diverse species are now usually in the developing countries. It must be remembered that the developed countries were once also the habitat of numerous species until indiscriminate development eliminated them. While we would not wish to destroy biodiversity, it must be remembered that preserving it imposes a massive cost on the already poor. A way must be found to preserve without bringing development in poor countries to a standstill.

A number of existing international agreements have been formulated for the protection of biological diversity. In the general area of conservation of wild fauna and flora, Malaysia has demonstrated its commitment to conservation by signing such international agreements including the Convention on International Trade in Endangered Species of Wild Flora and Fauna. At this juncture we are also looking at the Ramsar Convention for the protection of Wetlands, the Bonn Convention for the protection of migratory species and the World Heritage sites convention.

I must once again stress that all these conventions are designed to benefit not just Malaysia but also the whole world. The Malaysian government has also promulgated policies towards this end, including the passing of laws and enactments. A primary law is the Forestry Act of 1984 which provides for the establishment of a permanent forest estate comprising productive, protected and amenity forests. The permanent forest estate of Malaysia today totalled 12.74 million hectares of which about 29 per cent are protected or maintained as amenity

forests. The 12.74 million hectares make up about 38 per cent of the total land area of Malaysia. If tree plantations are included about 74 per cent of Malaysia is covered by trees.

It may be argued that tree plantations are not forests. But even if they do not have the same range of biodiversity as the natural forests, they do contribute to the photosynthetic process, the water cycle and other natural functions of greenery.

The measures taken to preserve Malaysian forests carry a considerable cost not only in terms of maintenance but also in depriving the people and the nation much land for living, working and cultivating. The price of land naturally increases as less land becomes available for agriculture and industry. Since what we are doing contribute to the better environment of the rest of the world, some thought should be given to the sacrifices by Malaysia and other developing countries.

Still we have dedicated ourselves to preserving the forests. To reduce forest exploitation we have established forest plantations of species that have short harvest periods.

National parks and wildlife are catered for through various Federal Acts and state enactments. A total of 1.485 million hectares have been set aside as parks, wildlife reserves and sanctuaries. The 6 per cent of Peninsular Malaysia so reserved, most of it in pristine condition, represents one of the highest of such percentages in this part of the world. This figure compares well with or even exceeds that of some developed countries of the Western world, many of which are quite vocal on the subject of conservation.

We in Malaysia have a long and mature history of managing conservation areas. Taman Negara, for example, created in 1939 was the first National Park in South-East Asia

to meet today's international criteria for a national park. This park remains essentially the same as when it was first established.

The Environmental Quality Act sets standards for water and air quality and provides for mandatory environmental impact statements. We have not only sought to implement a high standard of environmental quality but are also determined to be a leader in this endeavour in the region.

In October last year at the CHOGM, I had the pleasure and privilege of presenting a document on the environment for the consideration of that important body. This document was adopted and came to be known as the Langkawi Declaration on the Environment.

This declaration marked a new level of understanding and awareness of the importance of the environment in today's world. It also was the fruit of our own environmental awareness which had been nurtured and developed over the years by many different organisations and institutions in this country. Today we are celebrating the 50th anniversary of one of the organisations in Malaysia that has helped nurture this consideration of nature, its conservation and of the environment.

The Langkawi Declaration recognises that environmental problems transcend national boundries. Therefore, there is a need for all nations to cooperate if these environmental problems are to be solved. The declaration promotes afforestation in developing countries to arrest the deterioration of land and water resources. It also calls on countries to upgrade efforts in sustainable forestry. It calls for the support of activities related to the conservation of biological diversity and genetic resources including the conservation of

significant areas of virgin forests and other habitats. The unanimity with which this document was supported demonstrates the oneness and the will of the Commonwealth nations to carry out and implement the terms of the declaration.

It is to the Malayan Nature Society and other responsible conservation bodies that we in the government look to for feedback on how these national and international policies are actually working out in practice.

There must be a sharing of efforts and responsibility for maintaining biodiversity. The numerous species that are being preserved are not all harmless. Some are dangerous to health. To ask only the developing countries to preserve them is to expose the peoples of these countries to unacceptable threats to their wellbeing. It is difficult to convince a man who is about to be eaten by a tiger or trampled by an elephant or dying of typhus or malaria that he is helping to preserve biodiversity. It is imperative that the developed countries do their bit for biodiversity.

The developed countries are not only rich and advanced in technology but they have vast unpopulated and unused land. The deserts of the western United States can in part at least be grown with trees using the vast resources of underground water. Some of the flora and fauna can be transferred to these new forests.

Lest there be protest over this idea, let me remind you that quite a substantial area of these deserts together with their abundant acquifers have been developed as resort cities complete with vast golf courses and artificial lakes on which stand luxury hotels. Additionally it must be remembered that tropical plants and flowers have been and are being cultivated in the developed countries under artificial climatic conditions

because they have commercial value. In suggesting that some of the deserts be converted to forests, I am not being facetious. Indeed if developed countries want to they can easily reafforest vast areas of the Sahel, the sub-Saharan areas where the poorest people in the world are dying by the thousands every day from lack of food. Let us not trot out the spurious argument that deserts are essential for biodiversity and must remain untouched by the hands of man. They have been touched. If they can be forested, then a part of them should be forested. Reclaiming some of the deserts will not change the environment. Indeed a large part of these deserts are of recent origin, having been created by misuse by man and animals like the elephants.

The International Conference on Tropical Ozone and Atmospheric Change

20 February 1990
Universiti Sains Malaysia

"The full socioeconomic implications of the Protocol to the low-consuming countries, particularly the developing countries, had not been fully taken into account. The developing countries are required to use less than 0.3 kilogrammes of the controlled substances per capita. In contrast, the Protocol requires the producing countries namely the developed contries, to cut consumption within 10 years to only 50 per cent of their 1986 consumption. It is estimated that this will merely require a progressive reduction from 2 kilogrammes of the controlled substances per person annually to 1 kilogramme per capita."

I wish to thank the Universiti Sains Malaysia for organising this conference, at a time when much of the world's attention is focussed on global environmental issues including the depletion of the ozone layer in the stratosphere, transboundary movements of hazardous wastes, global warming, and loss of biological diversity.

Global environmental issues certainly require not only global attention but also practical solutions at all organisational levels. I note with satisfaction the rapid progress that has been made by the United National Environments in the protection of the ozone layer including the control of substances that deplete the ozone layer as well as in the control of transboundary movements of hazardous waste and their disposal. I also note that further progress are being made at the international, and hopefully later at inter-governmental levels, in the proposed Convention on Climate Change as well as in the maintenance of biological diversity.

It is worthwhile to note that concern over the depletion of the ozone layer in the stratosphere as translated into global action in the name of Montreal Protocol on Substances that Deplete the Ozone Layer is unprecedented in the history of international law. However, the full socioeconomic implications of the Protocol to the low-consuming countries, particularly the developing countries, had not been fully taken into account. The developing countries are required to use less than 0.3 kilogrammes of the controlled substances per capita. In contrast, the Protocol requires the producing countries, namely the developed contries, to cut consumption within 10 years to only 50 per cent of their 1986 consumption. It is estimated that this will merely require a progressive reduction from 2 kilogrammes of the controlled substances per person annually to 1 kilogramme per capita.

Clearly, this represents a double standard, affecting both production and consumption of chlorofluorocarbons or CFCs, that unfairly limits developing countries, consumption to a level 70 per cent lower than that of developed countries. Furthermore, our global efforts to save the ozone layer are further complicated by the unnecessary provisions of trade restrictions to non-parties, a form of non-tariff barrier. A serious consequence of not acceding to the Montreal Protocol is that by January 1, 1992, CFC-containing goods exported from non-parties will be banned by importing countries that are parties to the Protocol. This is only mitigated by further restrictions to be imposed in 1994 on the export of goods which are produced with the controlled substances. Therefore all countries should take an active part in future work on this Protocol and in other multi-lateral negotiations relating to all environmental matters specifically, and in international affairs generally.

The holding of this international conference is not that late for all concerned to re-assess the problems relating to the protection of the ozone layer. Not only the releases of the controlled substances from the tropical counties are less significant than that of the temperate region, but also effects on the tropical environment are least understood. I hope the outcome of your useful work in the tropics, other than over the Artic and Antarctic, will help enlighten not only the localised health and ecological effects of ozone depletion but also the associated socioeconomic implications of the instituted control measures over the consumption of the otherwise very safe substances while in use.

Barring the difficulties that arise from the implementation of the Montreal Protocol, Malaysia is nonetheless committed to reduce its consumption of CFCs and Halons by 20 per cent in the year 2003, and by 50 per cent in

the year 2008. In the meantime, Malaysia has to restructure both its domestic and international investments and trade strategies in matters affecting its present and future consumption of the controlled substances in a number of its important industries. These include the assembly of electronic chips manufacture of room air-conditioners and refrigerators, fabrication of rubber foam products and packaging materials and in fire protection. Like others, Malaysia should have acces to any research work and development of any ozone friendly and environmentally safe CFC substitutes and technology. It is hoped that safe CFC substitutes which are also economically viable are discovered early. Otherwise developing countries, including Malaysia, may not be able to fulfill the requirements under the Montreal Protocol.

Indeed, when required to address global environmental issues, the developing countries have to stretch themselves so thinly that their already limited technical and financial resources are sapped away from earlier commitment not only to revive economic growth, but also to tackle the long overdue environmental problems arising from poverty and uneven distribution of population pressure.

Much more environmental protection activities need to be directed towards the abatement of industrial pollution control of soil erosion, safe disposal of domestic animal, municipal and toxic waste, and rehabilitation of both idle and degraded lands. Thus, to many of us in the developing world, the so-called 'global environmental issues' are quite remote from the management of present local problems.

It is for the developed counties to take effective measures to curb their heavy consumptions of fossil fuels and ozone-depleting substances. The developed countries should

cut their own consumption of CFCs and Halons, not by 50 per cent but at least by 85 per cent by the year 2000.

Should there be any further international initiative to mobilise global action to address any of the so-called 'global environmental issues', such as initiative must take into consideration the overall balance of world development, particularly in solving the debt crises in many developing countries, the need to increase the flow of development finance, and the urgency of stabilising the foreign exchange earnings of low-income commodity producers. This initiative will have to prevail in order to induce far-reaching changes to produce trade, capital, and technology flows that are more equitable and well-balanced with the environment around the globe. Fundamental improvements in market access technology transfer, and international finance are necessary in order to help developing countries widen their opportunities by diversifying their economic and trade bases, and thus building up the necessary confidence to address both local and global environmental problems.

The root of the environmental problems, as admitted by many scholars, rests with the mismanagement of the global economy and the deliberate distortion of the value of renewable natural products from that man-made capital goods and services. Valuing the environment properly is an issues in itself. All this time we have been misled by the way we have been calling 'economic growth'. If we use up our own natural resources, then that is capital depreciation, not a cost to us. But when we import technology and machinery, we have to count their depreciation as a cost to the nation. Yet depreciation of environmental capital is no recorded at all. There ought to be a fair deal, not one based on the presumption that the environment is free! Unless the developing countries receive a fair deal for their natural resource-based produce and exports,

they should not be discriminated against for whatever little damage they may be capable of doing to the environment.

Most of us appreciate the apparent complexity in integrating environmental and resource depletion concerns more effectively in the economic decision-making process. We have yet to develop an effective tool that can help ensure that future calculations of national income truly reflect 'sustainable' income. The current calculations ignore the depletion of natural resources base, and understimate the values of agro-based and forest products. The current calculations also view the sales of non-renewable resources such as tin and petroleum as income.

The subject of the environment is far too important to be left entirely to the external 'free' market forces. It would take quite some time for the current system of national income accounting, with all its limitations, to be revised. In the meantime, it does not mean that the world community could not possibly undertake effective interim measures, inter alia to consider seriously the setting up of a 'Global Environment Trust Fund'. The Fund could be financed by levies imposed on the emissions of greenhouse gases, the production of CFCs and other ozone-depleting substances, and even on chemicals that are in competition with the production and use of natural-product based biocides. Another possible source of revenue is a sales tax on various imports of natural products including agro-based and forest products that are not produced on sustainable basis. An international body with broad and effective representation could be established to manage the generated fund for environmental protection.

Malaysia is committed to the concept of sustainable development which addresses not only the issues relating to the

protection and preservation of the environment but also how to ensure that the environmental issues are not abused by certain quarters to perpetuate their vested interests. The environmental challenges and opportunities should be treated as a major motivating factor to improve international economic relations and resist the negation of the open market systems.

Malaysia has played its due role both at the regional and international level to promote world development that is well-balanced with the environment. Malaysia also made significant contributions to the Langkawi Declaration on the Environment, adopted by the CHOGM in October last year. In 1985, in Kuala Lumpur, ASEAN member countries reached a regional Agreement on Conservation of Nature and Natural Resources.

At the national level, Malaysia is proud of its achievements in controlling pollution from industrial sources. Much progress has been achieved in sewerage development programmes. Numerous sewerage master plans and feasibility studies have been completed practically for all major towns.

On air pollution, Malaysia has been successful in controlling the emissions of polluting gases virtually from all industrial sources. As a result, Malaysia has been largely able to maintain its air quality. In the urban areas, plans are being made to improve the air-pollution situation by introducing mass-transport systems and by encouraging public transport operators and smoky vehicle owners to switch to cleaner fuels or better performance engines.

To promote further growth of our industries, particularly electronics and petrochemicals, Malaysia has signed the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Malaysian Ministry of Science, Technology and Environment

(MOSTE) has successfully promoted private investment in the establishment of fully integrated toxic waste collection transportation treatment, and safe repository of fully treated, innocuous residues facilities. When completed, it will be the first of its type in this part of the world. Malaysia is also actively implementing the London Guidelines on Banned or Severel Restricted Chemicals in International Trade.

By international comparison, particularly on the forest conservation and management, our statistics are impressive. In Malaysia our tropical rainforest cover over 61 per cent of the total land area. If we consider the total areas under both forest and tree crops such as oil palm, rubber and cocoa, it is 74 per cent. In Europe, there is not much natural forest left with exception of Portugal and Austria with about 40 per cent of their lands under forest.

Rubber Research

21 November 1967
The Straits Times

‘Unless we are prepared to spend money and avail ourselves of these research complexes in America we will forever be tied to tyres for our national survival.’

I appreciate the delicacy of your leader-writer in not mentioning names when he commented on the apparent ignorance of the government critic about rubber research during the recent debate in Parliament. Unfortunately, his delicacy is wasted because your news columns clearly pin-pointed me as the ignoramus. I may not remember the exact location or the amount of money spent on research on new uses of rubber but I do remember your hopeful headline once when reporting of the results of this research. However, what my speech repeatedly emphasised was research in America by American research organisations.

One may ask what is the difference between American research and British research? The answer is that there is a world of difference. American researchers have shown greater imagination in every field when compared with the British. Besides American facilities and American knowledge of the American market, the world's greatest consumer market cannot be surpassed. It is well to remember that it is American research which resulted in synthetic rubber and its continued improvement. I have myself toured one of these multimillion dollar research complexes lately. The multiplicity of experts, resources and facilities was breathtaking. The dedication to research was such that an organisation would undertake to perfect the brittleness of potato-chips with as much earnestness as it worked out the method, timing and costing of an oil nationalisation programme for an Arab state or the production of miniaturised radio equipment that worked at near absolute zero temperature for National Aeronautics and Space Administration (NASA).

In every case results were palpable. The only limiting factor to the realisation of seemingly impossible dreams seems to be money. Even time is no absolute barrier as money puts more men to work systematically on a sort of elimination exercise. It is ridiculous to suggest that what we are doing now

by way or research is adequate. What we are doing does not compare well even with the research done by one large drug firm in America; not to mention the chemical giants. Unless we are prepared to spend money and avail ourselves of these research complexes in America we will forever be tied to tyres for our national survival. So let us not be too smug about our knowledge of a subject that is of concern as much to an ignorant Member of Parliament (MP) as it is to a tapper.

X-rays and Sterility

6 July 1965
The Straits Times

‘I know X-rays can cause sterility in the person exposed, but I have never heard of X-ray causing sterility in the children and grandchildren of the person exposed.’

May I repeat that 'Geneticist's' statement implied that exposure to X-rays can cause sterility in the children and grandchildren. This is not quite the same as X-rays causing sterility in the father, the person directly exposed to X-rays. I know X-rays can cause sterility in the person exposed, but I have never heard of X-ray causing sterility in the children and grandchildren of the person exposed. Your sub-editing made me sound as if I do not even know that X-rays can cause sterility.

The Sterilising Effects of X-rays

19 June 1965
The Straits Times

‘Like most ordinary doctors I am aware that X-rays can cause sterility and other diseases to those directly exposed to them.’

I must confess my ignorance of the sterilising effect of X-rays as stated by 'Geneticist' of Taiping. I would be grateful if he could name the literature on this, so that I can read it. Statistical data will no doubt figure prominently in these studies of how X-rays have blighted the innocent offspring of hardworking fathers. Like most ordinary doctors I am aware that X-rays can cause sterility and other diseases to those directly exposed to them. The quantity of X-rays required to do this is indeterminate. Persistent, prolonged exposure is normally regarded as dangerous.

In the case of X-ray assistants it has yet to be proven that the few extra minutes of exposure which after-office hours duty might involve, has or will cause the unfortunate effects mentioned. Use of the lead aprons provided would give more than ample protection of the groin and pelvis. I would suggest that radiologists insist on this rule being followed. In the interest of medical science in this country I would welcome any proven cause and effect study of X-rays on X-ray assistants, attendants and even doctors.

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