

SPEECH

**A Nortel Perspective on How Information Technology is Driving
Globalization and the New Economy
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**The Canadian Club
Toronto, Ontario
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Good afternoon. It's a real pleasure and honor to speak with you today.

Many years ago, when I first joined Nortel, nobody said – as they used to say about the U.S. Navy – “join Nortel and see the world.” They should have – because I seem to be living proof of globalization. But while it's fun to live and do business in different parts of the world, it's always a pleasure to come home to Toronto, where I have family and so many friends and customers.

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Speaking of friends, I'd like to greet my colleagues from the Indo-Canada Chamber of Commerce, who, last year, celebrated their 20th anniversary. On behalf of Nortel, I'd like to congratulate the ICCC, and wish them every future success in the good work they do.

Organizations such as the ICCC are characteristic of a new, outward-looking Canadian business community. Over the last 10 years, the organization has grown from around 100 members to more than 500. This also demonstrates the growing importance of Indo-Canada commerce to both our countries and to the City of Toronto, Canada's financial capital and a world-class communications center that's connected to the networked global economy.

Toronto has another strength -- the wonderful diversity of its ethnic communities and their ability to contribute to the economic and social progress of this great and growing city. This diversity is itself evidence of globalization and the mobility of labor, capital, and creative ideas.

Just as globalization affects this city -- and as it has affected me and my family -- it affects all of us who must earn a living. Look around the world, and it's obvious we're living in a particularly exciting moment in economic and social history.

THE TRANSFORMATION

Peter Drucker aptly described the magnitude the information revolution will have on our lives when he wrote:

- “Every hundred years throughout Western history, a sharp transformation has occurred. In a matter of decades, society altogether rearranges itself – its world view, its basic values, its social and political structures, its arts, its key institutions. Our age is such a period of transformation. Only this time the transformation is not confined to Western society and Western history.”

Today, information technology is overcoming time, distance, and cultural differences to create a global marketplace. It is promoting communications, coordination, integration and contact at a pace and scale of change that far outrun the ability of any government to manage.

In the world of business, information technology is accelerating a condition commonly described as globalization. And in combination, the Information Revolution and globalization are moving us into what Canadian author Don Tapscott describes as the “digital economy,” or The New Economy.

In his bestseller, The Digital Economy, Tapscott, who is, incidentally, a former Nortel employee, writes:

- “In the digital economy, individuals and enterprises create wealth by applying knowledge, networked human intelligence, and effort to manufacturing, agriculture, and services. In the digital frontier of this economy, the players, dynamics, rules and requirements for survival and success are all changing.”

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I want to examine this process – at least, in part – from the perspective of Nortel. Nortel is a company that epitomizes the impact of globalization and the information revolution on modern business, as well as being one of the technological leaders in the forefront of this revolution.

But is “revolution” too strong a word? Daniel Yergin and Joseph Stanislaw, in their widely acclaimed book, The Commanding Heights, argue that the industrial revolution that transformed the 19th century and created an historical discontinuity with all that had come before it, was driven by two technologies: the steam engine and telegraph cables.

People speak today of the information revolution, but the real technological revolution is the microchip and communication networks. In 1946, the world’s first programmable computer, the ENIAC, stood 10 feet tall, stretched 150 feet wide, cost millions of dollars, and could execute up to 5,000 operations per second.

Twenty-five years later, in 1971, Intel packed 12 times the processing power of ENIAC into a 12 mm. square chip with a \$200 price tag. Today’s personal computers, with Pentium processors, perform more than 400 million instructions per second. At the current pace of development, by the year 2012, PCs will be able to handle 100,000 million instructions per second.

Computing power has been doubling every 18 months for the past 30 years. At the same time, the average price of a transistor has fallen by six orders of magnitude. In just six years, the cost of microprocessor computing power has decreased from \$230 to \$3.42 per million of instructions per second. No other manufactured item has decreased in cost so far, so fast.

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These developments have brought the information industry to the center stage of the economy. A recent study in the U.S. called "Cybernation: The Importance of the High-Technology Industry to the American Economy," reported that sales of information technology – computers, the software that runs on them, and the networks that connect them – have grown by 57 percent during the 1990s, to \$866 billion – about 11 percent of the GDP – making the information technology industry the largest in the U.S.

Another study, issued just a few days ago by the U.S. Commerce Department, is called "The Emerging Digital Economy." It reported that information technology – including business on the Internet – is growing twice as fast as the overall economy.

In the United States, the information technology industry employs 7.4 million workers, some of whom earn among the nation's highest average salaries. Meanwhile, Internet traffic has doubled every 100 days, and Internet commerce among business will likely surpass \$300 billion by the year 2002.

This underscores the reality of the "new economy." The revolution in the information industry is changing the way the global economy works; it is changing the way people do business; and it is changing the nature of business and work.

INFORMATION REVOLUTION

The Information Revolution has been building since the dismantling of AT&T and Posts and Telegraph Ministries abroad during the mid-1980s. That opened the door to competition in long distance; the construction of new communications networks; the worldwide process of privatization, divestiture, and deregulation; the lowering of communications costs; better performance; and an explosion of new companies and services.

Beginning in the mid-1980s, the development and coalescing of capital markets – financial integration – gave new meaning to the international economy. The powerful effects of financial integration depended, in turn, upon informational integration. Rapid advances in telecommunications and computing, which linked markets and investors together, provided instant knowledge of performance.

As a result, not only national but also global capital markets could vote not every day or every hour but every minute on stock markets – and thus on national economies. A negative vote could mean a very swift outflow of capital – as we have seen recently in the Far East.

THE INTERNET

The impact of the information revolution is only beginning. I suspect that's true – even in this room. Let's find out. How many of you have used the Internet recently? Just raise your hands. For information? To send or receive e-mail? For home-shopping?

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Well, you've proved my point. But talk about unpredictability. About five years ago, the Internet was an obscure tool for a handful of scientists. Today, it represents the greatest single upheaval in the history of the worldwide communications network.

The Internet represents an historical discontinuity, one whose revolutionary impact is just beginning to be felt. The sheer size and scope of the Net is widening every day. As Robert Metcalfe, the father of the Ethernet and a founder of 3Com Corporation said: "The Internet is to business what North America was to the Europeans in 1492. It's virgin territory, and it's lush. The Information Age is coming, and the Internet is what's bringing it."

Look how quickly the Internet is already changing the way we live our lives and conduct our business. In the office, e-mail is growing faster than faxes, couriered documents, and even telephone calls. The ability to reply instantly – with the click of a computer mouse – has created a new medium.

For my purposes – and for most of the people around me – the telephone and the computer have seamlessly merged. The telephone network – as I have known it for most of my life – is in the process of a radical transformation. Over the last three years, we've seen new and dramatically increased demands for data on the network. The network of today is being optimized for data transmission: for greater speed, capacity, security, reliability, and accessibility to the World Wide Web.

As new Internet technologies create new Internet applications, Internet usage will multiply exponentially. In 1994, three million people, most of them in the United States, used the Internet. In 1998, 100 million people around the world use the Internet. Some experts believe that one billion people may be connected by 2005.

A recent survey of Internet users reported that electronic commerce is "coming of age." The report shows that 24 percent of active Internet users are shopping on-line. According to the U.S. Commerce Department, one of the biggest trends in consumer usage of the Internet is for airline reservations. In 1997, the volume of travel booked on-line tripled, from \$276 million in 1996, to \$827 million in 1997. By the year 2000, the Commerce Department predicts that on-line travel sales could total \$5 billion.

In 1996, Amazon.com, the first Internet bookstore, recorded sales of less than \$16 million. In 1997, it sold \$148 million worth of books to on-line customers. In January 1997, Dell Computers sold less than \$1 million worth of computers per day on the Internet. By the December holiday season, daily sales reached \$6 million on several occasions.

And then there's the promise of Internet telephony. Analysts project that, by the year 2002, the Internet could account for 11 percent of U.S. and international long-distance voice traffic, up from just 0.2 percent last year.

THE IMPACT ON BUSINESS

Businesses began using the Internet for commercial transactions with their business partners about two years ago. Today, hardly any company can exist without a Web site and e-mail. And beyond the external communications of the Internet, most businesses are profoundly involved with internal communications networks, called Intranets, modeled after the structure and technical protocols of the public Internet.

The strategic impact of networks is driving the growth of Intranets to carry voice, data and images among company locations and employees. By one estimate, Intranet servers will outsell Internet servers by more than 10 to one (4.6 million to 440,000) by early next century.

Web-based applications and networking tools, such as e-mail, videoconferencing and groupware, let people work together despite distance, time or corporate boundaries. But the corporate Intranet has become more than just a collection of technologies linking corporate sites. Increasingly, the network is the business.

The globalization of markets, acquisitions and mergers, deregulation, and burgeoning size mean that today's corporation has become a complex network of interdependent systems, products, services, organizations and locales.

Sophisticated information technologies and global networks permit instant communication among the far-flung operations of global enterprises. And the lifeblood of this network is information - information that spells long-term success or failure of the enterprise.

The effects of the information revolution on global economic structures are triggering transformations in the way companies and countries organize production, trade goods, invest capital, and develop new products and processes.

While these developments are revolutionizing the way companies operate, global competition is intensifying as trade barriers fall, the most recent example being the push to "fast track" talks to set up a hemispheric free-trade area covering the nations of North and South America, with the exception of Cuba.

With capital, labor, and technology increasingly mobile, the central reality of corporate activity today is that institutional change – driven by technological change – has led to one single place in which to do business: the global economy.

As technological advances occur ever more rapidly and in more parts of the world, industry has responded by forming joint ventures, alliances, and international research and development organizations.

One result is that trade flows are becoming more global. Nortel once manufactured complete systems in many countries. Today, support for customers involves global teamwork, with local assembly of components and technologies from a variety of locations around the world.

Today, successful companies are producing at the lowest possible costs, using materials and technology without regard to their nationality. They also understand the high value of intangible assets, such as human capital, brand name, and global presence. They're forging domestic and international alliances.

In Nortel's case, we've been very busy over the last few years expanding our network of international alliances and partnerships. And we've globalized our labs to get closer to our customers and help us accommodate different standards, approaches, and customer requirements around the world. Nortel operates 38 facilities in 16 countries throughout North America, Asia/Pacific, the Middle East, and Europe. Two of our labs are in Mumbai and Bangalore in India, where we employ some 900 engineers.

Today, protectionism is largely disappearing, so it's irrelevant whether or not a company wishes to engage in world trade. If it's not managed globally, some other company that is managed globally will take away its market. There's no place to hide in the global economy.

To succeed in this new economy, companies will need to be creative and open minded. They will have to see new market opportunities where others see only obstacles and challenges. They'll be agile and flexible. They'll see their success in helping their customers succeed. They'll have the experience and wits to anticipate where technology, the market, and their customers are going – and get there first.

NETWORKED GLOBAL ECONOMY

Being connected to the networked global economy has become an economic necessity, which is why the countries of the world are investing more than \$3.5 billion a week in information-based network infrastructure – infostructure.

National prosperity will soon be measured in terms of information “haves” and “have-nots.” While some countries, such as China, have made the ramping-up of their communications infostructures a major economic and political priority, about a quarter of the world's population of 5.9 billion people live in countries with less than one phone line for every 100 people.

The lack of phone service is more than merely inconvenient. This is a new form of poverty. Call it "information poverty." There's a real danger of those people, countries and economies being left behind as the Information Revolution charges into the future. Without an adequate foundation of information technology infrastructure, they cannot participate in the New Economy.

This is a world in which people work with their heads instead of their hands. A world in which communications technology creates global competition – not just for running shoes and laptop computers, but also for bank loans and other services that can't be packed in a crate and shipped.

It's a world in which innovation is more important than mass production. A world in which investment buys new concepts or the means to create them, rather than new machines. A world in which rapid change is constant. A world at least as different from what came before it as the Industrial Age was from its agrarian, agricultural predecessor. A world so different that its emergence can only be described as a revolution.

At Nortel, the information revolution and globalization have altered the very nature of our business. Twenty years ago, we were still primarily a Canadian-based manufacturer of telephone equipment for the Canadian market. Today, roughly 45 percent of our revenues come from outside North America. We expect to generate 50 percent of our revenues from Europe, Asia and Latin America by 2000.

You can also see the revolution in terms of our own workforce, as Nortel has shifted from a company composed largely of manufacturing workers, to a knowledge-worker industry. We've hired thousands of knowledge workers for our labs, our headquarters, our business offices, and our engineering functions.

In the late 1980s, 45 percent of Nortel employees in North America were classified as knowledge workers. Today, 70 percent are knowledge workers. By the turn of the century, the figure will rise above 75 percent.

Interestingly enough, by successfully adapting to globalization and the new information economy, Nortel is creating new jobs. Despite a dramatic decline in the proportion of revenues we derive from the Canadian market, there are as many jobs in Canada today – around 22,000 – as there were 10 years ago, even though they are very different jobs.

In effect, Nortel has moved from the labor-intensive manufacturing of hardware – of boxes, so to speak – to creating the software and communications technology for a wide variety of network solutions and services that require heavy investment in R&D and knowledge workers.

The rise in importance of knowledge workers has been going on since Peter Drucker invented the term in the late 1960s, but their effectiveness has been raised to unimaginable heights by the Information Revolution.

CANADA'S FUTURE

Let's step back for a second. I wonder what Marshall McLuhan would have thought of the Internet. The world's most famous communications theorist seemed to anticipate the World Wide Web with his concept of the "global village." In his book, *The Medium is the Message*, he wrote:

"Ours is a brand-new world of all-at-once-ness. 'Time' has ceased, 'space' has vanished. We now live in a global village ... a simultaneous happening. We are back in acoustic space."

Of course, what McLuhan called "the global village" has turned out to be more like "the global marketplace." Whatever we call it, though, the remarkable fact is that McLuhan may be more relevant today than he was 30 years ago. It's no surprise that *Wired*, today's hottest magazine about communications trends and technology, lists McLuhan on its masthead as its "patron saint."

It's also no coincidence that Canada should inspire one of this century's leading communications theorists. Neil Compton, another Canadian writer, observed, back in 1961: "As a nation, Canada represents the triumph of communications over geography."

That perception is even truer today. Earlier this year, Federal Industry Minister John Manley was standing here, speaking to you about the Federal government's vision of making Canada the most connected country in the world by the year 2000. Finance Minister Paul Martin's recent budget earmarked \$260 million to help achieve this goal.

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Canada still has some distance to go: a recent survey reports that Canada is 7th worldwide in per-capita Internet usage – behind not only the U.S., but also Australia, New Zealand, Iceland, Norway and Finland.

Looking at the Internet revolution and the process of globalization of the economy, Manley said that the fundamental issue is that Canada is in an international race, one that will determine whether Canada will be a leader or a follower in the digital economy.

Manley's concern is one Nortel obviously shares. Increasingly, Canada should be – and is – seen by the rest of the world as a high-tech, knowledge-based economy, rather than one based on natural resources. In advanced countries, such as Canada, information is replacing energy and raw materials as the key resource in the creation of economic value.

This “new Canada” isn't emerging by chance, however. It's the direct result of many years of investments in our universities and colleges, our research institutes, and other programs that foster innovation. Such investments must continue in making high-quality education a competitive weapon for Canada.

Where Nortel is concerned, our business process begins with the universities, the source of the talent and new knowledge we need to be a global player. As more work becomes knowledge-based, and therefore, highly mobile, we're increasingly finding ourselves competing in a global labor market for people with critical high-tech skills. Our university relationships enhance our ability to gain a much better source of highly skilled people trained in technical disciplines that address our strategic areas of competitive differentiation.

Our universities are a national resource that will make the difference between success and failure in this new global economy. The bottom line is that Canada must have world-class research and educational institutions that keep bright Canadians at home and generate the new ideas and concepts that will allow Canadian businesses to compete effectively against their global competitors.

Canadian Nobel Laureate John Polanyi makes the point with this comment: "The knowledge that we generate in our universities is the intellectual capital we need in order to sustain our economy and assure the functioning of our society in the period of technological change ahead."

THE QWEST NETWORK

Outside of Canada, an important example of Nortel's collaboration with universities was announced a few weeks ago at the White House, where U.S. Vice President Al Gore unveiled the largest and fastest research and education network in the world. It is called Abilene and is being developed by the University Corporation for Advanced Internet Development, in cooperation with Qwest Communications and Nortel, which is the major supplier of Qwest's high-capacity fiber optic network.

"High-capacity" in this context is almost incomprehensible. Currently, it would take about 27 hours to transmit the 32 volumes of The Encyclopedia Britannica over a conventional 28.8 kilobit-per-second modem. The Qwest fiber optic network, which can carry 160 gigabits – that's 160 billion bits – of information per second, can transmit the contents of The Encyclopedia Britannica, from coast to coast, using a glass wire the thickness of a human hair, in just one second.

Qwest's network will deliver that information with a reliability measured at one bit of error in every quadrillion bits. What's that mean in terms mere mortals can understand? Imagine a 20-mile stretch of desert. Imagine it missing one grain of sand.

But that's just the beginning. Within a couple of years, this kind of network can be beefed up to "terabit" speeds – able to move more than two trillion bits of information per second. At that speed, such a network could deliver the entire Library of Congress from Washington to L.A. in 20 seconds. Such networks remind us that the information revolution waits for no one.

THE SHIFT TO "WEBTONE"

Industry Minister Manley spoke of the importance of leadership in information technology and the new digital economy for Canada. For Nortel, leadership is imperative. Technological leadership has been critical to our success as a company over the last 20 years; it accounts for our present ability to compete internationally; and it will determine our future success.

Nortel has a proud history of technological innovation. We pioneered digital technology on the telephone network, leading the way to the digitization of the North American network during the 1980s, and changing the way the world communicates.

In recent years, our fiber networks enabled the explosion of global data communications that triggered the tremendous growth of the Internet. Today, more than half the Internet traffic in North America is already carried over Nortel network systems.

Our future is going to be even more closely linked to the development of the Internet. We can lead the telecom industry transition from dialtone to what we call webtone.

Today, hearing dialtone on the phone line means that the international telecommunications network is available to the user. In the future, webtone will be just as easy to access and use; but it will also offer immediate, instant availability of web pages and e-mail.

You'll be able to access e-cash across the Net and conduct e-commerce, such as home shopping and banking; access electronic markets; send faxes, make telephone calls, and teleconference; enjoy streaming audio and videos on your PC; play interactive games; exchange text files; and access every other kind of digital information.

Once again, we at Nortel will have the opportunity to be technological pioneers. By building on our strengths, we can help weave very diverse networks into an integrated global infostructure that will enable data networks to deliver the same kind of reliability, integrity, security, and capacity found in voice networks today. And it will always be "on."

This will make the impacts and effects of the information revolution we've seen to-date seem mild.

PUBLIC POLICY ISSUES

Information technology and globalization raise significant questions for public policy. In an integrated global economy, the power of governments to regulate economic activity is severely constrained. Certainly the explosion of technology has undermined government's ability to manage the information technology evolution through regulation.

As the trend to deregulation spreads, governments are finding they have to back off or risk being left behind as the information revolution speeds forward. The result is increased competition through the liberalization of markets, increased investment, and increased innovation in network services and applications leading to increased choice.

Information technologies also limit the capability of governments to control the dissemination of information of all types. They can no longer keep secrets from the world or their own people.

All this raises the question of what constitutes sovereignty in the new world of networks and a global economy. Virtually no government can now act alone, free from the effects of contrary forces. This does not signal the end of nations, however, but rather, that borders are no longer boundaries. Information runs through, over and across geographic borders, as if they didn't exist.

What does all this upheaval mean in terms of the information industry and ultimately the consumer? First, it means the benefits of fierce competition in the information marketplace. Not only will transaction times and costs fall dramatically, but the days are numbered for the artificial walls set up by regulators and legislators between cable TV, local telephone, long-distance networks, and satellite services. Ultimately, market forces will rule.

For business, the key to success in this environment won't be a monopoly franchise, but a market franchise, based on the characteristics of any winning company: cost, quality, variety, reliability, choice, and world-class people. Customers will enjoy new levels of control and convenience.

OPERATING IN THE NEW GLOBAL ECONOMY

I've discussed the positive impacts of information technology, globalization and the new economy; but those same advantages can turn into disadvantages when your business – or your national economy – has basic structural problems. We've recently seen how globalization and information technology can help expose and magnify some of the faults of those Far East and Asia/Pacific countries whose currencies have tumbled over the last few months.

When globalization means that the stock markets are essentially conducting a vote of confidence in your economy every minute of every hour in the day, structural problems in those economies will quickly be revealed. And because the response times have accelerated, the consequences of any problem seem all-the-more dramatic.

In a significant sense, the Asia crisis is the first major crisis of the global economy of the 21st century. It raises the issue of how well-equipped we are to manage a global economy in an increasingly borderless world where time and distance have become irrelevant.

In a sense, it has taken a crisis to remind us that we are in the midst of a revolution. Revolutions don't always run smoothly. Historical discontinuities change the rules. The problem is that it takes a while for everyone to agree upon a new set of rules.

As T.H. Huxley, the great Victorian biologist, wrote:

- “Perhaps the most valuable result of all education is the ability to make yourself do the thing you have to do, when it ought to be done, whether you like it or not; it is the first lesson that ought to be learned; and however early a man's training begins, it's probably the last lesson that he learns thoroughly.”

Revolutions are great teachers, and we have all experienced a hard and practical education during these last few years. The result of that education, as Huxley says, is to learn what needs to be done – whether we “like it or not.”

THE NEW RULES

Based on Nortel's experiences – and those of other companies who've been successful in managing globalization and adjusting to The New Economy – these are rules, or lessons, that take into account the changing roles of business and government, and the impact of new communications technologies and globalization on the new economy. And whether we call them “rules” or “lessons” – either way, they have been hard-won.

We can enumerate them as follows:

- That the symbiotic interdependence of economies has rendered the notion of economic sovereignty virtually obsolete. Government intervention and management of the economy doesn't work, nor can national economies be sheltered from global competition. Globalization is inevitable.
- That government can support the competitiveness of local business by creating incentives for research and development, and by promoting long-term economic and social commitments, such as investment in education and other generators of human capital.
- That when government regulations do not inhibit competition, private capital can develop communication technologies which, in turn, can spur economic growth.

- That information technology is creating a highly integrated global marketplace with the Internet at its center. The Internet is beyond the reach of the state. While governments can promote it, they cannot control it.
- That the hallmark of this new globalization is the mobile economy. The spread of fast, reliable information and communications technology pushes companies to draw on people and resources the world over.
- That in the aftermath of "re-engineering" and restructuring, competitive forces now demand a rediscovery of employees and the knowledge they command.
- And finally, that information technology is transforming old pyramid-shaped hierarchical corporate structures into flatter organizations with less bureaucracy, more teamwork, and greater dispersion of responsibility, information and decision-making, with a new emphasis on speed-to-market and entrepreneurial skills.

These are rules for a new economy, based on a shift in the balance of power, with technology as the catalyst. We are part of history's first truly global economy, integrated and interconnected, in which work and production are networked around the world, and in which everything from knowledge to commerce is taking electronic form.

With all its benefits and all the hopes it sparks, this assertion of a free market will encounter a host of new challenges and tests in the 21st century. Yes, there will be unease with its demands, its impact, and the reordering that it can impose. But the new opportunities the information economy can create for people are enormous.

Not long ago, North America was the New World. People left the Old Country and risked everything for a chance to make a new life in this new world, for the opportunity to fulfill their hopes and dreams.

Today, the New World is here again, but it's no longer a matter of geography. Technology and ideas and free markets are coming together to create a New World we can all be a part of.

Risk-taking will still be part of the price of admission to this new world. But it is out of risk that emerge the innovation and the incentives – and the imagination and vision – that drive the world forward.

GANDHI QUOTE

In writing about political revolution, Gandhi said: “A non-violent revolution is not a program of seizure of power. It is a program of transformation of relationships, ending in a peaceful transfer of power.”

We are in the midst of a great economic and social transformation that is bringing about a transfer of power. It, too, is essentially non-violent. Not only is this a revolution without bloodshed or gunfire, this revolution is also a “transformation of relationships,” one that will completely change our lives.

The result of this revolution will be a networked global economy that's knowledge-based, technology intensive and whose impact will be both significant and, I believe highly beneficial to the world community.

Thank you.