

THE CHALLENGE OF WORLD KNOWLEDGE GAP AND SPACE LAW *

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"The sciences should be at the service of humanity as a whole, and should contribute to providing everyone with a deeper understanding of nature and society, a better quality of life and a sustainable and healthy environment for present and future generations." Declaration on Science and the Use of Scientific Knowledge, adopted by the World Conference on Science in Budapest on 2 July 1999.

Introduction

"We must ensure that no one is left behind as we move forward in the great adventure of exploring and developing outer space."

Saying these words in the opening meeting of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (Unispace III), in Vienna, 19 July 1999, United Nations Secretary-General Kofin Annan has raised a question which may be one of the greatest challenge of our age – a challenge certainly more complex than the human trip to Mars or the invention of a new really economic, secure and efficient mean of access to outer space.

The question is: How to ensure that no one is left behind as we move forward in the great space adventure?

This paper is an attempt to throw some light on such crucial issue, within a wider framework of the scientific and technological development of our frenetic time. I try to present the main aspects of its current extent and gravity, as well as different proposals already made to deal with this challenge. At the same time, I make general considerations from the point of view of international space law, whose first principle defines the exploration and use of outer space as "province of all mankind".

If outer space is "province of all mankind", have we the right "to leave someone behind"? Or, in other words, have we the right to accept as a normal fact the widening gap that today is leaving behind most of the humanity, after all in the fundamental field of knowledge - the major contributor to people's well being?

1. What is the knowledge gap?

Knowledge gap is "the unequal distribution of technical knowledge or simply know-how across and within

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countries", the World Development Report, 1998/99. Knowledge for Development, from the World Bank says (1). As technical knowledge is derived from scientific knowledge, it is more correct to speak after all on the unequal distribution of scientific knowledge.

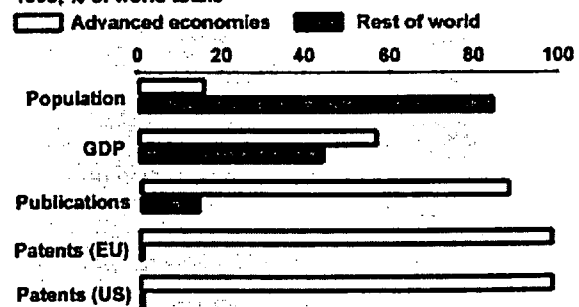
The knowledge gap between countries – the subject of this paper – is constantly widening. The entire human history probably has never seen such deep and serious disparities among nations and individuals as today.

According to a study by Lant Pritchett of the World Bank, in 1870 the world's richest industrial countries, Britain and the United States, had an income per head roughly nine times that of the poorest country; and in 1990 America's income per head was more than 45 times that of Chad or Ethiopia. Pritchett calculates that in 1870 the average income per head of the world's 17 richest countries was 2.4 times that of all the other countries; in 1990, the same group was 4,5 times as rich as the rest. (2)

However, the situation is even worse indeed. "The inequalities of income across the globe are actually exceeded by inequalities of scientific output and technological innovation", the academic economist Jeffrey Sachs, director of the Centre for International Development and professor of international trade at Harvard University, USA, notes. (3) He offers us the following chart showing the remarkable dominance of rich countries in scientific publications and, even more notably, in patents filed in Europe and the USA:

Different resources

Indicators of global science
1995, % of world totals



Sources: J. Sachs; UNESCO

The UN Secretary-General, Kofi Annan, in his address to the Unispace III, stressed that "the telecommunications

industry is estimated to be worth a trillion dollars annually, yet one third of the world's population has never made a telephone call, and only five percent has access to computers; and as technology moves forward, the gap widens between those who are part of the wired world and those who are not".

The Secretary-Executive of the Unispace III, Nandasiri Jasentuliyana, in his closing statement to the Conference, considered necessary to speak "of those deprived in a world where 84% of all mobile cellular subscribers, 91% of all fax machines and 97% of all Internet host computers are located in the developed world", as well as "of the people in developing countries, where a billion are illiterate, a third of the population has no access to safe drinking water or health services, in a world where three families have more wealth than the 48 least developing countries combined".

Anton Costas, professor of Political Economy at Barcelona University, Spain, wrote in his article "More rich and unequal", issued January this year, that the 225 richer people all over the world accumulated a wealth worth more than one billion dollar, which is the equivalent to an annual income of 47% of the world population, i. e., 2,5 billion people. (4)

The 1999 World Bank Report on World Development, issued in September, informs that the number of people living with less than one dollar per day went from 1,2 billion in 1987 to 1,5 billion today. It also estimates that this group will have 1,9 billion people in 2015. This Report adds that 60% of the 4,4 billion people who live in poor countries do not have access to the basic sanitary conditions. (5)

The Executive director of the Third World Academy of Sciences, Mohamed Hassan, also has spreaded alarming figures on the gap: "The industrial north, which makes up 20% of humanity, currently accounts for over 90 per cent of the world's production of scientific knowledge; in contrast, the countries of developing 'south', in which 80% of the world's population live, contribute less than 10%. This difference has itself helped the science-rich countries to generate their considerable wealth, contributing significantly to current patterns of global economic inequality. The income share of the richest 20% of humanity is about 85% of the world's total – and less than sixty times higher than that of the poorest 20%."

Even more disturbing, Mohamed Hassan added, is the fact that "the industrialized countries, with their substantial investments in research and development continue to advance rapidly along the frontier of scientific knowledge, making it very difficult for the developing countries, with their relatively small R&D, to catch up; of a total global R&D expenditure of about US\$ 470 billion in 1994, only 10% was contributed by the South". (6)

The concern of the main scientific leadership all over the world in face of this widening gap deserved a special mention in the "Declaration on Science and the Use of Scientific Knowledge" and in the "Science Agenda - Framework for Action", adopted by the World Conference on Science, assembled in Budapest, Hungary, from 26 June to 1 July 1999 under the aegis of the United Nations Educational, Scientific and Cultural Organization (Unesco) and the International Council for Science (ICSU). (7)

The Declaration on Science states: "Most of the benefits of science are unevenly distributed, as a result of structural asymmetries among countries, regions, and social groups, and between sexes. As scientific knowledge has become a crucial factor in the production of wealth, so its distribution has become more inequitable. What distinguishes the poor (be it people or countries) from the rich is not only that they have fewer assets, but also that they are largely excluded from the creation and the benefits of scientific knowledge."

World Bank Report also stresses this topic, from its own point of view: "Poor countries – and poor people – differ from rich ones not only because they have less capital but because they have less knowledge." Typically, developing countries have less of the most important know-how than industrial countries, and poor have less than the non-poor. (8)

The central point is that the "modern society and prosperity rest on the foundation of modern science", Jeffrey Sachs underlines. (9) Hence the knowledge gap has the deepest economic and social implications.

The World Bank Report emphasised it this way: "Knowledge has become perhaps the most important factor determining the standard of living – more than land, than tools, than labor. Today's most technologically advanced economies are truly knowledge-based. And as they generate new wealth from their innovations, they are creating millions of knowledge-related jobs in an array of disciplines that have emerged overnight: knowledge engineers, knowledge managers, knowledge coordinators." (10)

Not occasionally, half of the fastest growing USA companies are "knowledge companies", selling the knowledge and know-how of their employees rather than manufacturing products or providing services. (11)

The Director-General of Unesco, Federico Mayor, in his closing address to the World Conference on Science, has asked: "What does it mean when we say we live in a knowledge society? When we say information and knowledge are the main resource and the real currency of our age?" And he answered: "It means that for the first time ever, the key resource of humanity is not finite. We will never have to wage over diminishing supplies of knowledge!" (12)

Maybe there will not be a war, yet it seems very clear that one of the more dangerous effects of the knowledge gap in the international level is precisely the growing tension it instigates between knowledge rich and poor countries.

But there is something greater than the knowledge gap between countries. It is the gap in the capacity of creating knowledge. Thanks to this capacity the developed countries constantly push the knowledge frontier outward.

That is certainly why the Declaration on Science stands up for "the urgent need to reduce the gap between the developing and developed countries by improving the scientific capacity and infrastructure in developing countries".

Helping poor countries, which are the majority of the world, make the transition to a knowledge-based economy should to be at the center of development aid strategies. If in the past it was an option or aspiration, this change

becomes a necessity for the sound development of the planet.

The historical task requires from the worldwide political, economic and intellectual leadership a greater sensibility to social and cultural problems, as well as much more co-operation and true multilateral efforts. The developed countries must support programs of developing countries to increase their capacities to acquire, absorb, create and utilize knowledge, including in the space area.

2. Does narrowing and closing the knowledge gap interest only the poor countries?

There are strong reasons to believe that all nations, without exceptions, are objectively interested in reducing the knowledge gap.

"The future of humankind will become more dependent on the equitable production, distribution and use of knowledge than ever before", the Declaration on Science says. It presents other arguments also:

1) "The contribution of science is indispensable to the cause of peace and development, global safety and security.

2) "Science relies on critical and free thinking, which is essential in a democratic world."

3) "A new relationship between science and society is necessary to cope with such pressing global problems as poverty, environmental degradation, inadequate public health, and food and water security, in particular associated with population growth."

With regard to this, Jeffrey Sachs observes, concerning to the poorest countries: "A much more important challenge, as yet mainly unrecognized, is that of mobilizing global science and technology to address the crises of public health, agricultural productivity, environmental degradation and demographic stress confronting these countries." (13)

It is worth to add the motivation stressed by the Director-General of the World Trade Organization (WTO), Renato Ruggiero:

"Without a coherent plan for tackling the unacceptable marginalization we see in the world today we risk building this new global economy on foundations of sand." (14)

Specifically in the space field, Bin Cheng has reminded "States with space capabilities that it must be in their long term interests that space technology and space benefits are shared to the widest extent possible", as "even the most mercantilist State must realise that in the long run one must be better off living in a world not populated by hungry mouths, but by well-to-do clients". (15)

In fact, not all rich countries use to act in long reach vision, preferring the apparently more secure way of pragmatism and immediatism under the hard pressing market rules. Nevertheless, the potential interest of the States in being more consequent historically exists, of course. Just as well.

However, only the potential interest of these countries, although positive, does not guarantee by itself that they will act effectively and in the right proportion in order to minimize the gap. It seems evident that such a sizeable and complex change requires a coordinated action, global, vigorous, determined and persistent, from most governments, from

the main international organizations and international non-governmental organization, as well as from the public opinion in general. As the question is clearly global, the mobilization to face it with hope for success, must also be, necessarily, global, mobilizing the best cultural, political and legal resources accumulated by human civilization.

3. Who is responsible for closing the knowledge gap?

There is a consensus that all countries are responsible for the historical task of reducing the knowledge gap. But is that responsibility equal for all of them?

No, the Declaration on Science says: "There is a responsibility of the developed world to enhance partnership activities in science with developing countries and countries in transition."

It probably means that it is up first of all to developed countries, which are much better equipped and prepared for this, the main initiative in the indispensable international co-operative efforts.

This kind of idea met with opposition of developed countries along the discussion on the "space benefits" in the meetings of the Legal Subcommittee of the UN Committee on Peaceful Uses of Outer Space (Copus) from 1991 to 1996. These intense debates led to the adoption of a compromise text entitled "Declaration on International Co-operation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking Into Particular Account the Needs of Developing Countries" (16).

This Declaration, in its paragraph 3, recommends: "All States, particularly those with relevant space capabilities and with programs for the exploration and use of outer space, should contribute to promoting and fostering international co-operation on an equitable and mutually acceptable basis. In this context, particular attention should be given to the benefit for and the interests of developing countries with incipient space programs stemming from such international co-operation conducted with countries with more advanced space capabilities."

To Marietta Benkö and Kai-Uwe Schrogl, this means that "the space powers must not forget to integrate the developing countries into space exploration" (17). Although the paragraph 3 affirms that "particularly" the developed countries should contribute to international space co-operation, it leaves to each country the discretion of decision to co-operate. That disposition, of course, places the financially and technologically strongest side in a quite advantage position. It shows that the United Nations need to advance even more in this crucial question and adopt some concrete international criterion on co-operation, in order to avoid arbitrary decision of individual governments.

The paragraph 5 of the Declaration lists the goals of the international co-operation, "taking into particular account the needs of developing countries". Two of these goals are especially important for the developing countries: "(b) fostering the development of relevant and appropriate space capabilities in interested States" and "(c) Facilitating the exchange of expertise and technology among States on mutually acceptable basis". This paragraph reinforces the

“liberal” spirit that permeates all document. (18) It links the international co-operation to the need for “rational and efficient allocation of financial and technical resources”, which is in principle a very good disposition. However, to be really fair in this relation, we would have to create an international criterion to judge the rationality and efficiency of financial and technical resources allocation. Otherwise, it probably would be decided alone by the State who allocates these resources.

Such a spirit appears quite clearly in the paragraph 2 of the Declaration:

“States are free to determine all aspects of their participation in international co-operation in the exploration and use of outer space on an equitable and mutually acceptable basis. Contractual terms in such co-operation ventures should be fair and reasonable and they should be in full compliance with the legitimate rights and interests of the parties concerned as, for example, with intellectual property rights.”

Properly, the Argentinian professor Manuel A. Ferrer defined the Declaration as “realistic” (19), and the Ambassador Raimundo González Aninat, representative of Chile at Copuos, observed that “in some of its operative paragraphs there is an escape door for this cooperation to remain in a certain way subject to the opinion of the country that will provide this cooperation, that, to my judgement, from a strictly legal point of view, is relatively imprecise and lacks consistency with fundamental principles”. (20)

In fact, the Declaration removes any vestige of “forced co-operation”, as wanted developed countries. This way, its final text restricts itself to call on these countries to demonstrate comprehension and good will in its space co-operation programs with developing countries.

It is a positive and opportune document, indeed. But would it be enough to change qualitatively the current world scientific, technological and economic tendencies to concentration, as well as to reduce the knowledge gap?

That’s hardly probable. And the issue is not to simply “to force” States to co-operate. This kind of solution really hasn’t any chance to succeed. The better way seems to be that of developed and developing countries adopting commonly agreed effective measures and obligations to cope the gap challenge. However, developed countries must be decisively in disposition to do so, what doesn’t happen yet.

4. What is the impact of space activities in the knowledge gap?

The scientific and technological space knowledge is certainly one of the fields where this gap is widening more quickly.

Of every dollar spent by government around the world, the USA government spends seventy-five cents, and the USA spends eight times more than any other economic block. These figures published by John M. Logsdon point out not only that the USA plays a major role in most aspects of space activities but also that these activities are more and more concentrated in some few countries. (21)

Such countries, having the USA at the top of the list,

are running forward scientific and technological enterprises in all space areas. A growing distance among them and all other nations in this essential field is among the strongest factors for the widening of knowledge gap.

Curiously, very often space technologies, especially in telecommunication and remote sensing areas, are presented as ideal means to reduce the gap. Potentially they are so indeed. In fact, they still are far from playing such a beneficial role they could play, nevertheless the valuable international space co-operation agreements already existing.

In this connexion, the representative of Cuba at the Unispace III expressed the opinion of a large number of countries when he said that since the Unispace II, in 1982, “the disparities between developed and developing countries have increased, so that it becomes more difficult to the last ones to receive benefits of space researches and applications”.

There are already some useful international co-operative programmes, undoubtedly. However, as emphasized by the Cuban diplomat: “It is not enough that developed countries offer opportunities for developing countries to train their scientific personnel. This is important, but is only one of the many sides of the problem. The main obstacle for developing countries is the lack of financial resources for the acquisition of space technology. Thus, it is necessary that this becomes the focal point of international cooperation.”

The Statement of the G-77 and China at the Unispace III also underlines this topic: “There are some extremely useful and concrete ideas (in the draft report for the Conference) outlined for programs for education and training, inter-organizational co-operation, regional co-operation, technology transfer and other areas. However, for these to become meaningful projects, the urgent need is for adequate funding. The Group, therefore, urges all Member States to generously fund such projects and programs so that they can realize their fullest potential.”

All right, all States should participate as much as possible in such funding efforts, but the main role in it, of course, belongs to the countries that possess much more financial, scientific and technological resources. They have the key of a new relationship and a new evolution in these strategic affairs.

Although the commercialization and privatization are in principle a powerful means to push development of space activities, they can raise new difficulties to the developing countries. In this regard it is important the alert made by the Head of the Brazilian Delegation at the Unispace III, Ambassador Sergio de Queiroz Duarte. He said that “the increasing involvement of the private sector in international co-operative agreements should not result in an increase of the gap between developed and developing countries, but rather in the strengthening of true international co-operation in the use of space as the common domain of humankind”.

In this relation the representative of Cuba also stressed that outer space is a common good which must be used to the benefit of all mankind. Its privatization leads to the transposition to this scenario the deep differences today existing among countries with financial resources and those who lack them. This privatization equally limits, at some

extent, the possibilities that research and space exploration benefits can offer to the citizens of our countries.”

Thus, the impact of space activities in widening the knowledge gap cannot be underestimated. And, exactly because they are strategical and unreplaceable to any national and global development effort, they must play a fundamental role on the follow up and solution of the problem. The advancements to be achieved in the space area in order to control and reduce the gap can determine with a certain speed a change in the present negative tendencies and point out to a new dynamics for global development, that in some way can benefit all countries and peoples.

5. What are the basic requirements to reduce the knowledge gap?

The listed here ideas are not related only to space S&T, but they are in general valid for this field also. And the list is not exhaustive, of course. It aims only to systematize some valuable ideas on this question, hoping to amplify and deepen its discussion:

1) More co-operation between rich and poor countries

To Jeffrey Sachs, “the time has arrived for fundamental re-thinking of the strategy for co-operation between rich and poor, with the avowed aim of helping the poorest of the poor back on their own feet to join the race for human betterment”. He proposes four steps which “could change the shape of our global community”:

I - “Rich and poor need to learn to talk together” and they “should join in a quest for common action”. To him, the rich-country summit (G-7), which met in 1999 without the presence of developing world, “should be the last of its kind” and “a G-16 for the new millennium should include old and new democracies such as Brazil, India, South Korea, Nigeria, Poland and South Africa”.

II - “Rich and poor countries should direct their urgent attention to the mobilization of science and technology for poor-country problems.” In the Jeffrey Such assessment, International Monetary Fund (IMF) and the World Bank “are not equipped for that challenge”; and “the specialized UN agencies have a great role to play, especially if they also act as a bridge between the activities of advanced-country and developing-country scientific centers”; “they will be able to play that role, however, only after the USA pays its debts to the UN and ends its unthinking hostility to the UN system”.

III - “The global regime on intellectual property rights requires a new look”, just because “knowledge is becoming undisputed centrepiece of global prosperity (and lack of it, the core of human impoverishment)”. Jeffrey Sachs considers this “new look” essential as “now transnational corporation and rich-country institution are patenting everything from the human genome to rainforest biodiversity”. (22)

About the last topic, it is opportune to add that “the notion that legal monopoly, through the patent, contributes to amplify knowledge diffusion, is giving place to the old

idea of the natural right to patent protection, that is to say that the fact of investing in research justifies monopoly (even if temporary) on its results. This has implicated in the growing protection of proprietary rights on technologies – which means more privatization and monopolization of these knowledge and information – and less emphasis on its public diffusion, restricting access to external technologies and even the diffusion of basic science”. (23)

It is worthwhile on this matter the recommendation of the Science Declaration: “Measures should be taken to enhance those relationships between the protection of intellectual property rights and the dissemination of scientific knowledge that are mutually supportive. There is a need to consider the scope, extent and application of intellectual property rights in relation to the equitable production, distribution and use of knowledge. There is also a need to further develop appropriate national legal frameworks to accommodate the specific requirements of developing countries and traditional knowledge, sources and products, to ensure their recognition and adequate protection on the basis of the informed consent of the customary or traditional owners of this knowledge.”

The Science Agenda – Framework for Action recommends:

I - “Acceleration of technology transfer to promote industrial, economic and social development should be supported through the mobility of professionals between universities and industry and between countries as well as through research networks and inter-firm partnerships.”

II - “Governments should provide increased support to regional and international programs of higher education and to networking of graduate and postgraduate institutions, with special emphasis on North-South and South-South co-operation, since they are important means of helping all countries, especially the small or least developed among them, to strengthen their scientific and technological resource base.”

2) More participation of developed countries

The Science Agenda recommends:

I - “Donor countries and agencies of the United Nations system are urged to foster co-operation in order to increase the quality and efficiency of their support to research in developing countries. Their joint effort should be focused on strengthening national research systems, taking into account national priorities and science policies.”

II - “Industrialized countries should co-operate with developing countries through jointly defined S&T projects that respond to the basic problems of the population in the latter.”

III - “All countries should share scientific knowledge and co-operate to reduce avoidable ill-health throughout the world.”

IV - “Networks for human resources interchange, both North-South and South-South, should be set up.”

3) More participation of developed countries in the United Nations

Jeffrey Sachs urges that “the wealth governments enable the grossly underfinanced and underempowered United Nations institutions to become vibrant and active partners of human development”. He do not hesitate to affirm that “the failure of the USA to pay its UN dues is surely the world’s most significant default on international obligations”. (24)

4) More participation of the international organizations

The World Bank Report has focused a spotlight on the need for international organizations – including the bank itself – to give the issue of technology transfer and the central role of science and education in development the same attention as free trade issues have commanded in the past.

The Science Agenda recommends:

I - “Innovative and cost-effective mechanisms for funding science and pooling S&T resources and efforts of different nations should be examined for implementation by relevant institutions at the regional and international levels.”

II - “In developing an appropriate international legal framework, World Intellectual Property Organization (WIPO), in co-operation with relevant international organizations, should constantly address the question of knowledge monopolies, and (World Trade Organization) WTO, during new negotiations of the TRIPS Agreement, should incorporate into this Agreement tools aimed at financing the advancement of science in the South with the full involvement of the scientific community. In this regard, the international programs of ICSU and the five intergovernmental scientific programs of UNESCO should play a catalytic role by, inter alia, improving the compatibility of data collection and processing, and facilitating access to scientific knowledge.”

III - “The international community should support the efforts of developing countries in implementing this Science Agenda.”

The Final Report of the International Institute of Space Law Workshop on Space Law in the 21st Century has recommended to the participants at Unispace III: “The concept of ‘public service’ in its various manifestations should be further elaborated, paying particular attention to the global public interest and to the needs of the developing countries.” Probably reducing the knowledge gap could be defined as a question of highest global public interest.

The Final Report of IISL Workshop at Unispace III also recommends that the unlimited space resources, as orbits, frequencies and access to ground infrastructure should be dealt with by means of “coherent global resources management frameworks” and that “the global public interest in this field can primarily be safeguarded by public institutions”. “Currently, adequate co-ordination is lacking,” the document stresses.

Another important recommendation of the IISL Workshop at Unispace III is that “the Legal Subcommittee of Unopuos should start with the elaboration of a treaty covering remote sensing from outer space on the basis of the 1986 Principles, taking into particular account the expanding growth in commercial remote sensing services

and preserving the principle of non-discriminatory access to data”. This principle is crucial to reduce the knowledge gap.

It is interesting to note that the Space Generation Forum — held during the Unispace III with 160 participants from 60 developed and developing nations — has recommended the creation of an “international space authority” in order to make possible “oversight and enforcement of a balanced regulation of the multiple interests in space”; and “access for all people to the material benefits and knowledge and understanding resulting from the exploration and use of space resources...”

5) More participation of developing countries

Science Agenda recommends:

I - “Through participatory mechanisms involving all relevant sectors and stakeholders, Governments should identify the needs of the nation and give priority to support of the public research needed to achieve progress in the various fields, ensuring stable funding for the purpose. Parliaments should adopt corresponding measures and levels of budget appropriation.”

II - “National policies should be adopted that imply consistent and long-term support to S&T, in order to ensure the strengthening of the human resource base, establishment of scientific institutions, improvement and upgrading of science education, integration of science into the national culture, development of infrastructures and promotion of technology and innovation capacities.”

III - “It is imperative to tackle the issue of endogenous generation of technologies starting from problems that pertain to developing countries. This implies that these countries should have resources available to become generators of technologies.”

IV - “Governments of developing countries and countries in transition should enhance the status of scientific, educational and technical careers, and make determined efforts to improve working conditions, increase their capacity to retain trained scientists and promote new vocations in S&T areas. Programmes should also be set up or promoted to establish collaboration with scientists, engineers and technologists who have migrated from these countries to developed countries.”

6) More participation of private sector

The Declaration on Science states: “Governments at all levels and the private sector should provide enhanced support for building up an adequate and well-shared scientific and technological capacity through appropriate education and research programs as an indispensable foundation for economic, social, cultural and environmentally sound development. This is particularly urgent for developing countries.”

6. More participation of non-governmental organizations

The Science Agenda recommends:

I - "Research groups and institutions and relevant non-governmental organizations should strengthen their regional and international co-operation activities, with a view to: facilitating scientific training; sharing expensive facilities; promoting the dissemination of scientific information; exchanging scientific knowledge and data, notably between developed and developing countries; and jointly addressing problems of global concern."

II - "Universities in developed and developing countries should intensify their co-operation, for example through twinning arrangements."

III - "Professional organizations of scientists, such as national and international academies, scientific unions and learned societies, have an important role to play in the promotion of research, for which they should be given wide recognition and corresponding public support. Such organizations should be encouraged to further international collaboration on questions of universal concern."

IV - "Scientists, research institutions and learned scientific societies and other relevant non-governmental organizations should commit themselves to increased international collaboration including exchange of knowledge and expertise. Initiatives to facilitate access to scientific information sources by scientists and institutions in the developing countries should be especially encouraged and supported."

V - "Countries that have the necessary expertise should promote the sharing and transfer of knowledge, in particular through support to specific programs set up for the training of scientists world wide."

I open here an especial paragraph for actions recommended by "The Space Millennium: Vienna Declaration on Space and Human Development", Unispace III main document. These actions, in my view, are related to the gap question:

I - "To improve knowledge-sharing by giving more importance to the promotion of universal access to space-based communications services and by devising efficient policies, infrastructures, standards and applications development projects";

II - "To assist States, especially developing countries, in applying the results of space research with a view to promoting the sustainable development of all people";

III - "To improve the sharing of information on and use of spin-offs from space activities, in particular between developed and developing countries, by making use of appropriate communications technologies";

IV - "To assist in the improvement of the capacity-building process in developing countries and countries with economies in transition (former European socialist countries) by emphasizing the development and transfer of knowledge and skills, by ensuring sustainable funding mechanisms for the regional centers for space and technology education, affiliated to the United Nations, by enhancing support for the United Nations Program on Space Applications through the provision of adequate resources, and by participating in the implementation of the new strategy of the Program arising from Unispace III";

V - "To promote the efforts of the Committee on the

Peaceful Uses of Outer Space in the development of space law by inviting States to ratify or accede to, and inviting international intergovernmental organization to declare acceptance of the outer space treaties developed by the Committee and by considering the further development of space law to meet the needs of the international community, taking into particular account the needs of developing countries and countries with economies in transition";

VI - "To further reconsider the agenda structure and working methods of Committee on the Peaceful Uses of Outer Space and its two subcommittees to better reflect issues of global concern, including international co-operation in space activities, taking into particular account the needs of developing countries and countries with economies in transition..."

VII - "To adopt measures aimed at identifying new and innovative sources of financing at the international level, including in the private sector, in order to support the implementation of the recommendations of Unispace III in developing countries";

VIII - "To encourage all States and international organizations to strengthen their efforts in promoting the peaceful uses of outer space for the benefit and in the interest of all States, taking into particular account the interest of developing countries and countries with economies in transition, by facilitating programs and activities between space-faring and no-space-faring countries, as well as among developing countries, and involving civil society, including industry"

XIX - "To emphasize that the shared objective of sustainable development for all countries will require timely and effective action to achieve the stated goals and that such an endeavor will provide ample scope for space science and technology to play their proper role as major contributors to people's well-being."

6. Which is the role of the Law, and especially of the Space Law, in the efforts to reduce the knowledge gap?

My starting point here is a thought of the Italian Professor Norberto Bobbio, which I dare to adapt to this case: To the group of efforts undertaken by man in order to transform the surrounding world and make it less hostile, belong the search for knowledge and the technics to produce instruments, devoted to the transformation of the material world, as well as the conduct rules, devoted to the modification of interindividual and international relations (intergovernmental and non-governmental), in a way to make possible peaceful coexistence, survival itself and sustainable development for groups and peoples. (25)

The law, therefore, as a set of conducting rules, can and must play the role of modifying to better the economic and social relations, in any local, regional, national and international levels, and not only as a guardian and holder of the existing situation.

Thinking this way, I am sure that the international law and particularly the space law have an irreplaceable role to play in any global initiative to effectively narrow and close the increasing knowledge gap. The main proposal and programs related to these efforts should be converted in

international agreements and legal instruments, in order to guarantee its fulfillment.

Can the market regulate such a question? A good answer is the following comments of Jean Touscoz, director of Center of Studies and Research on International Cooperation at Nice-Sophia Antipolis University, in France: "The market, be it worldwide or geographically limited, does not generate justice. Quite the opposite, the search for profit maximization can affect solidarity and amplify inequalities; reactions provoked by such situations, as they last or get worse, can threaten security (international economy)." To Jean Touscoz, "reinforce international economic security in the picture of globalization is to regulate the market, making prevail, in a last analysis, the general interest of humanity, mainly of the poorest that lack security, above private interests". (26)

For that, of course, it is imperative a new political and legal approach. In this relation, *Nature* rightly pointed out that "writing the international rules in a way that those who benefit from them most are those who are already the most economically powerful is not necessary in the best interests of those who are largely excluded". In other words, it is necessary to adopt international rules that benefit not those who are already the most economically powerful, but mostly those who are largely excluded from the scientific and technological progress. (27) The World Bank Report recognizes that the current rules may in fact be hindering the technological development of developing countries. That is why, the concepts and practices of co-operation need to be up-dated and renewed. Ultimately, what may be needed is a new set of ground-rules for research and innovation between the industrialized and developing world.

As Renato Ruggiero, Director-General of World Trade Organization, properly remarks: "We need to make a real collective commitment to working together, and show a willingness to respect the concerns and interests of others. We need a realistic appraisal of what can be achieved together – based on workable proposals and multilateral approaches. And we need a new vision of internationalism – backed by a new political determination to defend it." (28)

The specific basis for all innovative political and legal actions is the Article I of 1967 Space Treaty, according to which "the exploration and use of outer space (...) shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind".

If the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, it is morally and legally unacceptable that space activities contribute to amplify the different degree of economic and scientific development already existent among them. And the exploration and use of outer space can not be the province of all mankind if the most part of them is less and less prepared to carry out this task.

Can the conception of common heritage of mankind help us to confront the knowledge gap? This conception, which was referred to in Outer Space Treaty, in the Law of the Sea Convention and in the Moon Agreement, has been thought after all as a way to make possible some equitable

wealth sharing of by developed and developing countries. It was considered to be an approach that should introduce an element of solidarity into international (space) law. (29) However, developed countries refused the sharing idea. Nevertheless, "it is still clear that some form of preferential treatment as well as actions to the advantage of developing countries remain within the scope of the economic element of the common heritage of mankind conception", but this economic element needs further precision, as Stephan Hobe rightly stressed. (30) Hence, it also depends on the new look cooperation between developed and developing countries.

7. Some remarks as conclusion

The growing knowledge gap as a global question requires a global solution and must be faced the sooner the better.

Only truly collective efforts with strong and decisive participation of developed countries can change the situation. All the best and more efficient that have been done in international cooperation up-to-date will give a faint idea of how much is absolutely needed to narrow the gap. The main role will surely up to governments, which will have to act as entities capable of preparing and making real long term planning, as well as mobilizing forces able to join together different organizations state, private and social.

No real change will be effective without the contribution of space activities in science, technology and applications.

Space Law already has an essential minimum basis to play an active role in this historic operation, but it needs to be further developed, especially through deepening the conception of public interest, without prejudice for legitimate private interests. The more practical and wider will be the legal framework of global public interest, the more effectively will the rights and the interests of all mankind be protected.

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