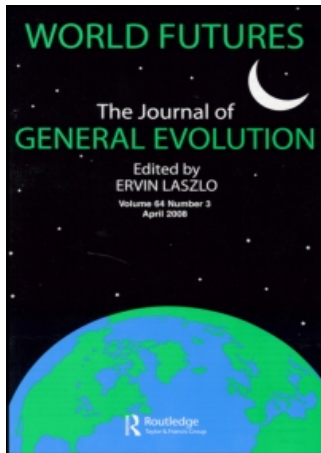


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### Can Information and Mobile Technologies Serve to Close the Economic, Educational, Digital, and Social gaps and Accelerate Development?

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## **CAN INFORMATION AND MOBILE TECHNOLOGIES SERVE TO CLOSE THE ECONOMIC, EDUCATIONAL, DIGITAL, AND SOCIAL GAPS AND ACCELERATE DEVELOPMENT?**

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The emergence of information, and more recently, mobile broadband telecommunication technologies, was accompanied by the hype that they could serve to close the economic, educational, digital, and social gaps of our planet among the rich and the poor regions. The hopes, which were based on a number of assumptions, were partly dismissed at the dawn of the new millennium for a number of reasons exemplified in this article. The authors propose a repertoire of pathways through which technology may still serve to bridge the divide. They conclude that in order to achieve this goal, developing nations need not only to understand the complex interrelationships between technology and development, but moreover, to demonstrate their commitment and will by implementing a well-thought and aggressive strategy.

*KEYWORDS: Development, digital–social divide, divide, economic divide, educational divide, m-learning, peace technology.*

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## INTRODUCTION TO THE PROBLEM

The year 2005 marked 60 years without armed conflict between the world's major powers; the longest period in the history of the modern system of states. It also marked half a century of unsurpassed development in information technology with an almost sustained rhythm of doubling computing power every 18 months. Yet, in a world characterized by vast global changes and enormous technological progress, the dawn of the 21st century is loaded with countless political conflicts both across and within states. The year 2005 also signalled the end of a 10-year cycle in which civil wars and ethnic cleansing claimed more than 5 million lives. Ethnic and related political conflicts are considered today to be the prime reason for international violence, terrorism, poverty, and abuses of human rights.

Nearly one third of all countries in the world have experienced some type of violent conflict during the past 15 years. In the 1990s, deadly conflicts in various regions of the world (e.g., Haiti, Chechnya, Afghanistan, Sierra Leone, Rwanda, Burundi, Zaire, Liberia, Sudan, Iraq, Bosnia) cost the international community an estimated \$200 billion, not to mention the tragic loss of human lives. The more recent war in Iraq has cost over \$345 billion (Cost of War, 2006) and has set a most negative example of how modern technology can be applied to kill people and to destroy countries. These amounts do not include the indirect costs to the countries concerned. In most cases, economic development has been set back by decades, thus seriously contributing to the widening of the economic divide (United Nations Publications, "United Nations Global Teaching and Learning Project," *Cyber School Bus*, [www.un.org/cyberschoolbus](http://www.un.org/cyberschoolbus), last accessed January 10, 2005; argumentation and sources, Laouri, R., 2005).

Understanding the underlying mechanisms and devising innovative methodologies to resolve and neutralize ethnic problems is thus becoming one of the top political priorities of all progressive powers in the world. The challenge for the educator, with a global perspective, for the social entrepreneur, and for the peace technologist in general, is to identify the most efficient point of entry into the system; the intervention with the best cost-effect ratio. Contemporary analysts, with long experience in the Cyprus problem (e.g., Anastasiou, 2000; Gumpert and Drucker, 1997; Hadjipavlou-Trigeorgis, 1993; Joseph 1997, p. 4; Laouris, 2004; Laouris and Anastasiou, 2005), focus their attention especially on the triad of a new economy, communication, and education. Some of them claim that the new economy (*vide infra*), in connection with the unraveling effects of globalization, has the power to bridge differences between conflicting communities, promote a culture of peace, and accelerate economic development. In almost all conflict situations, misconceptions about "the other" and "wrong beliefs," as grounded through our biased educational systems, contribute enormously toward the build-up of distrust and hate. In most cases, the lack of communication between the conflicting societies is responsible for such misconceptions and subsequent escalation of conflicts (Gumpert and Drucker, 1997). The application of modern technology is vital in alleviating such underlying mechanisms due to the key role it plays in communication and especially in the fields of business and education.

As a consequence, the emergence of information-, and more recently, mobile broadband telecommunication technologies (IT, mT), was accompanied by the hype that they could serve to close the economic, educational, digital, and social gaps of our planet among the rich and the poor regions. The hopes were based on a number of assumptions that appeared quite reasonable a decade ago:

1. The increasing power of computers, in connection with their falling prices, and the increasing penetration of Internet access in third world countries, made information, and all other types of digital assets, accessible to virtually all people on earth (the “One Laptop Per Child” project is a good example).
2. The alleged promise in the world of business was the idea that information computer technology (ICT) would not only permit entrepreneurs in small countries to launch global businesses and compete worldwide, but it would also increase their market visibility and profitability.
3. The integration of modern technology in the educational systems signaled a paradigm shift. Technology invites learners to engage in more *constructive* (along the Vygotsky model; Vygotsky, 1962, 1974; see also Laouris 1998; Laouris and Anastasiou 2005; Laouris and Eteokleous 2005a) knowledge building. They are encouraged to do research, discuss with others in their class, or elsewhere on the planet; and then, they are able to construct a common understanding about an issue, test hypotheses through further investigation and experimentation, and so on. Within such a context, learners achieve a much broader and more objective understanding of reality. This process can significantly reduce their misconceptions.
4. The next assumption was that the advancement of globalization, in connection with the exponential growth of available information on the Internet, and the explosion of mobile phone penetration, would dramatically increase possibilities for immediate, efficient, and transparent communication between conflicting societies. It would permit information verification, thus eliminating misinterpretations and prohibit the ability for propaganda to flourish. It also invites the development of new models of education such as those based on conversation theory (see for example Pask, 1976; also Laouris, Y., 2005 and Sharples, 2005).
5. Finally, IT characterized by low-cost entrance (compared to starting traditional businesses), would allow young scientists/entrepreneurs from developing countries to embark into what is called the “New Economy.” This would allow for accelerated business evolution, making it possible to compete with colleagues in developed countries. The new economy (i.e., IT- and knowledge-based) was expected to gradually take over the traditional, inflexible, heavy-duty economy. This economic transformation would allow small, innovative, and flexible companies to compete with international giants.

Unfortunately, hopes were partly dismissed at the dawn of the new millennium for a number of reasons. First, the integration of computers and modern IT in the educational context was not as successful as originally expected (for a relevant review see Eteokleous and Laouris, 2005). Years later, we are still struggling

to find successful and practical ways of integrating technology and continuously transforming our educational paradigms to meet rapidly changing needs (see, for example, the continuing challenge of integrating video game technologies or the recent emergence of mobile learning). Second, information availability/accessibility alone does not guarantee that it will be reached and/or used. The situation proved to be far more complicated than originally envisioned. People interact with information only when they are in a relevant context; they need to have the necessary background and skills, to have a vision and a goal, to be encouraged and empowered by their local social and political networks and to be supported and protected by local infrastructure and regulations. Third, the collapse of several international stock markets, especially the dot-com bubble, which correlated in the minds of many as the concept of the new economy, eroded faith (Yaffe, 2005; Shiller, 2005).

If the new economy dream did not succeed in the United States, Japan, or Germany, what were the chances it would succeed in second or third world countries? The Republican government in the United States promoted an oil-based rather than an information-based economy (get a full review published by the Danish Board of Technology Teknologirådet and The Society of Danish Engineers, 2004). This policy has long-term effects on global economies, as well as security, innovation, research, and so on. If this focus does not shift, using technology as a means for bridging the economic, educational, digital, and social divides will remain an elusive dream.

The search for possible ways modern technology may still offer an opportunity to bridge gaps is the focus of the next sections of this article. The authors sustain the thesis that using modern IT and wireless broadband technologies to accelerate development and serve the vision of global peace remains a viable possibility. The initial failures described thusfar may be partly explained by the fact that expectations were too high and that more time is required for some of the mechanisms to mature and produce tangible results. They develop their arguments based on their experiences in applying technology to support the peace process in Cyprus (see [www.tech4peace.org](http://www.tech4peace.org)) and on lessons derived from an island-wide experiment during the computer era (for a review see Laouris and Anastasiou, 2005). They conclude that in order to achieve this goal, *developing nations need not only to understand the complex interrelationships between technology and development, but moreover, to promote actively "Development Education" and demonstrate their will and commitment by implementing well-thought, consistent, and aggressive strategies toward that goal.*

## PRELIMINARY CONSIDERATIONS; SETTING THE STAGE

We ran a Google search in July 2005 using [+ technology + peace] and came up with 23,100,000 references. Having studied the first 200 we came up with the following conclusions: First, there is an extremely high level of cross listing, which leads to the same projects appearing thousands of times (i.e., different pages within the same website). Second, the great majority of the references are not relevant to our angle of interest. Many of these references simply misuse the terms for projects that are completely unrelated (e.g., a computer company simply calls

itself peace technology, without having anything to do with peace), whereas many others use the terms to denote the use of military technologies for peacekeeping purposes and more recent ones for military interventions (i.e., “peace invasions”). Third, links almost exclusively point to U.S.-based and U.S.-initiated projects. We did the same search on the scholar.google.com and received 42,800, but also, here, the same aforementioned arguments apply. The most important links and relevant projects were compiled and are summarized for the interested reader in Appendix 2.

### DEFINITION ISSUES

We do speak of gaps and divides in different contexts and domains.<sup>1</sup> Most people understand the term “close the gap” to mean the gap between the rich and the poor countries. However, we need to consider other meanings and other applications of the term. For instance, there might be lessons to be learned from experiences gained in trying to close the gap within a community, that is, the gap between the rich and the poor within a country or the gap between different communities of one and the same country. We can also learn by studying experiences derived from European Union (EU) projects. The EU is today an international leader in developing and applying socially responsible policies. The Cost219ter ([www.Cost219.org](http://www.Cost219.org)) network envisions to use technologies to bridge the gaps for the disadvantaged and the Cost298 ([www.Cost298.org](http://www.Cost298.org)) network aspires to make broadband technologies available to all people of Europe.

Critics and opposing political groupings may complain that the efforts are not satisfactory, but it remains a simple fact that the EU is among the very few political schemes that employ think tanks and promote regulations and guidelines that aim to close all types of gaps within and across nations. Another good source of experience might come from projects and initiatives that address the digital divide between children and the older generations. How do we go about bridging this divide that, according to some, is steadily growing?

In this article, we focus our attention to the literacy, economic, and digital divide that exists between the developed and the developing world. We do not restrict the definition of digital divide to access to computers and mobile phones. Moreover, we suggest that the necessary infrastructures (i.e., broadband; Internet) and digital content produced nationally (or regionally) are indispensable. We use the term “technology” to refer to computer-, e-, m- (mobile), IT-, software-based, algorithms, digital recipes, and the like, applied primarily toward bridging the digital divide. We do not refer to large industrial or military technologies, but rather, to small, low-cost technologies that have the potential to penetrate poor regions. Our approach is based on the hypothesis that closing the digital divide will significantly support our efforts to bridge the economic and the literacy divide (*vide infra*).

#### *How Does the Digital Divide Relate to Other Divides?*

For some (refer to Nyiri’s theses in the Discussion section) the digital divide is a thing of the past and it will soon be eliminated, as new technologies become

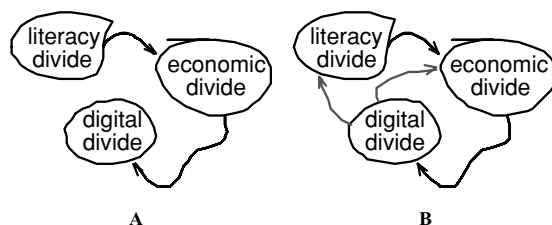


Figure 1. Relationships between the literacy (LD), economic (ED), and digital divide (DD). A: Simple linear causal model. LD aggravates ED, which in turn aggravates DD. B: The DD aggravates both ED and LD (red arrows). It is therefore concluded that eliminating the digital divide will have positive effects on the literacy and the economic divide.

cheaper, more powerful and more accessible. For others, there exist such causal relationships between the various types of the divide that make its elimination impossible. Figure 1A illustrates a think model in which the Literacy Divide (LD) aggravates the Economic Divide (ED), which, in turn, aggravates the Digital Divide (DD). According to this model (i.e., 1A) of causal relationships, to “fix” the DD we must first eliminate the other two divides. If this is not *mission-impossible* it is certainly an expensive and slow process. Therefore, according to this model, even if development of technology enables us to overcome the DD, this will not have any positive effects on the other divides. Figure 1B illustrates a different model, one in which the DD worsens the ED and the LD (red arrows). If we adopt this as our working model, intervening at any of the three levels will produce global improvements. We may thus focus on policies that affect any of these levels and still achieve positive effects on all other divides by taking advantage of their interrelationships. Yet, the one that requires the smallest investment and is capable of achieving the maximum effect, is the bridging of the DD. One could easily envision many other relationships between these three divides. However, understanding the simple interrelationships of Figure 1B may support us to develop two important strategies:

1. The International community (and especially the G8, the UN, and the EU) must engage in an orchestrated effort to bring technology closer to the poor countries.
2. The countries themselves must focus on development goals and transformation tasks that are easier to achieve, have lower costs, and faster implementation rates.

### *Agenda for Peace*

This fairly new term came into popular use after the 1992 “Agenda for Peace” announcement by the United Nations Secretary General Boutros Boutros-Ghali (1992). Generally, it refers to activities that attempt to go beyond crisis intervention and toward long-term development, the building of governmental institutions and structures and the inclusion of nongovernmental organizations, religious

institutions, and citizens. It is about structural transformation, which inevitably also means understanding the roots of conflicts and problems in order to be able to resolve them. The role that technology can play in these processes is obviously central. This is why under Goal 18 (Develop a global partnership for development) of the *The Millennium Development Goals* (MDG) to achieve reduction of poverty and hunger one reads: "In cooperation with the private sector, make available the benefits of new technologies—especially information and communications technologies" (<http://www.un.org/millenniumgoals>). If making technology available to the third world is considered instrumental for development and for closing the gap, then it is imperative that we devise instruments and methods to measure, assess and monitor this process.

### *The Digital Access Index (DAI)*

Information societies need better tools to set and monitor targets. The International Telecommunications Unit (known as ITU), headquartered in Geneva, Switzerland, is an international organization within the United Nations System where governments and the private sector coordinate global telecom networks and services. The ITU has put forward the Digital Access Index (DAI) as a quantitative measure of the fundamental step of creating actual connections between people and the Internet (ref. DAI: World's First Global ICT Ranking; Education and Affordability Key to Boosting New Technology Adoption, press release on ITU's page). The ITU's efforts to identify indicators for measuring ICT access reflects a growing trend by the international community toward the use of transparent and concrete measurements for monitoring country performance. The DAI combines eight variables, covering five areas, to provide an overall country score. The areas are availability of infrastructure, affordability of access, educational level, quality of ICT services, and Internet usage. The results of the Index point to potential stumbling blocks in ICT adoption and can help countries identify their relative strengths and weaknesses. The DAI overcomes other limitations of other ICT indices. Besides its global scope, its carefully chosen variables guarantee transparency. The DAI concentrates on factors that have an immediate impact on determining an individual's potential to access ICTs. It deliberately omits variables subject to qualitative judgment such as the regulatory environment.

The Europe Union, the world's largest multilateral donor, has stated their commitments to meet their obligations for achieving the Millennium Development Goals (MDGs; see UN Millennium Development Goals) and other UN targets (including 0.7% of ODA / GNI) by 2015. The EU to promote Development Education<sup>2</sup> has announced generous grants.

What still remains an open debate is the capability of an individual or a nation to actually utilize and benefit from all the fruits that technology has to offer. For example, it is disputable whether wide availability of technology alone is sufficient to close the gap. Indeed, two of the DAI indices point toward this direction: Educational level, and quality of ICT services. Both of these parameters are not only difficult to measure, but also hard to improve by higher availability of technology. The reason is because both the educational level of a country and the



quality of all its services depend on its history of civilization, democracy, and of course macro-economic indices. The authors suggest that there are determining differences between creator and user, between producer and consumer, that make the process of closing the gap more difficult.

Technology does not come in a vacuum. It takes a place in our lives and it can only be applied within the context of our daily priorities. For example, people will search the Internet for issues of their daily concern. The quality, the depth, and the purpose of an Internet quest will heavily depend on prior knowledge, educational level, and exposure to contemporary thinking. A person who is conditioned to be a “user” will always search for applications or for information that she or he can apply. In contrast, a person who is exposed to contemporary scientific thought, who is aware of current research priorities and “hot topics” in the context of different scientific communities, and who has at his or her disposal sound production paradigms, will search the Internet through a “creator’s” or a “producer’s” eye. The digital divide will therefore only be eliminated when we manage to eliminate the creator–consumer divide.

How do we achieve this? How do we create the necessary context and the environment to stimulate thinking that is geared toward *creating rather than using* technology? These questions point to the determining role of *meta-knowledge* about technology. It is not sufficient to train people to use technology. *The context within which innovative technologies are originally envisioned, the knowledge of how such technologies are created, developed, and advanced is a necessary ingredient of what needs to be handed over to the third world if our intention to close the gap is honest.*

The implications of these arguments are multidimensional. At the level of the country, governments must encourage local innovation,<sup>3</sup> must praise local successes and initiatives, and must provide incentives for pioneer work even when it is not world class. At the international level, the current focus on Development Education is our best bet.

## **TECHNOLOGY IN THE SERVICE OF PEACE; PRACTICAL ASPECTS**

In the following paragraphs we summarize some of the most important roles that technology can play. Practical examples, given both here and in Appendix 2, highlight options and challenges for the application of technology toward strengthening peace.

### *Technology as the Gate to Global Information*

Students, researchers, laymen, government servants, and so on may use technology to access any type of information. This enables them not only to stay informed, but moreover, to double-check the validity and correctness of information accessed locally (through their educational system, media, politicians, etc.). Thus, liberalizing them from possible attempts to be brainwashed (i.e., flawed democratic systems and dictatorships typically restrain access to information). This eventually creates informed global citizens. The merging of technologies such as radio, television, and wireless Internet within an affordable mobile phone makes access to global information even simpler.

*Technology as a Communication Tool to Reconcile Regional Conflicts and Misconceptions*

We have discussed earlier how mechanisms underlying and/or sustaining regional conflicts usually amount to differences in educational experiences, ethnic, religious, or other stereotypes, misconceptions, and myths about the other, absence of interactions and communication, and so on. The use of technology can help remove many of these aggravating elements. For example, even the mere use of telecommunication technologies may contribute significantly in promoting a culture of transparency and create opportunities to meet, interact, and learn about the other. However, real tangible results will be reached when technology is specifically utilized to serve the aforementioned purpose. Examples include: Web portals developed in collaboration between people from conflicting communities that provide relevant, balanced, and objective information; government incentives for joint e-based businesses.

The most important role that technology can play, however, lies in supporting stakeholders to achieve shared understanding of a problematic situation, jointly develop vision and obstacle maps, and reach consensus regarding actions. The “Peace and Conflict Resolution Group” in Cyprus has accumulated more than 10 years of experience and expertise in applying technology toward this end (Wolleh, 2001). They used a methodology known as Interactive Management (IM; Banathy, 1996; Warfield and Cardenas, 1994) that is specifically designed to assist groups in dealing with complex issues, in a reasonable amount of time. IM promotes the integration of contributions from individuals with diverse views, backgrounds, and perspectives through a process that is structured, inclusive, and collaborative. A group of participants who are knowledgeable of the situation are engaged in collectively developing a common framework of thinking based on consensus and shared understanding of the current state of affairs (Alexander, 2002; Christakis, 1973; Christakis and Brahms, 2003; Hays and Michaelides, 2004). To read more about the Cyprus example refer to Broome (2002, p. 15). For a detailed application of the methodology visit “Agoras of the Global Village, 2005” or refer to Christakis (1996); for recent applications, refer to Laouris and Michaelides (2005), Laouris and Christakis (2007), and Laouris et al. (2008).

This technology has been applied to dozens of bi-communal groups, especially in the years 1994–1997. A summary map of these groups is given in Appendix 3. More than 2,000 individuals went through the process of developing a shared vision as well as a shared understanding of the obstacles preventing the materialization of that vision and options for their removal. This work has contributed enormously toward the formation, for the first time in the history of the island, of a bi-communal peace movement. The movement is characterized by a clearly stated vision and clearly stated goals. In this venture peace builders were furthermore supported by the electronic infrastructure of the [www.tech4peace.org](http://www.tech4peace.org) peace portal. The portal did not only serve communication needs, sharing of resources, and experiences. It also provided a transparent platform that contributed toward the demystification of the process and removal of any distrust, took care of many logistics, and invited newcomers to quickly catch up and participate.

### *Technology as an Adjuvant that Boosts Education*

Our children are not simply attracted to computer and video games. They grow up with them and video games claim a significant part of their lives. At the same time, our children demand a more active, more equal and participatory role in our society. One of the reasons they are so attracted to computers is because the computer is the first human creation that amplifies brain abilities (in contrast to all previous creations that mimicked and amplified physical powers; see Laouris, 1992; Eteokleous and Laouris, 2005). Therefore, the integration of computers in education is not only a must but also a natural consequence.

The recent penetration of mobile devices has added new dimensions to our effort to bridge the gap between different learning styles and learning abilities. Children who are disadvantaged, and also gifted children, may benefit from individual attention (for example, the authors have developed an SMS-based system to support dyslexic students in managing their time more efficiently; Laouris and Eteokleous, 2005b). The EU is also promoting the use of broadband technologies to enable equal access to information and services for all (see Cost219ter at [www.cost219.org](http://www.cost219.org)). The advent of distance learning brought education closer to all ages independent of their geographical residence or prior background.

Today, when satellite-based telecommunication connects the continents, and mobile learning can reach learners even where there are no infrastructures, an even more promising playground is at hand. Some authors (e.g., Mostakhdemin-Hosseini and Tuimala, 2005; Georgiev et al., 2004) consider mobile learning as the natural evolution from d- or e-learning. However, the transition from the e-learning to the m-learning revolution is not characterized only by a change of terminology. For example, the dominant terms in the e-learning era were: multimedia, interactive, hyperlinked, media-rich environment, and so on. In the m-learning era, terms like spontaneous, intimate, situated, connected, informal, lightweight, private, personal and so on are used to characterize the mobile context. While e-learning was still compatible with the classroom paradigm, m-learning called for environment- and time-independent pedagogy. This opened up possibilities and opportunities never imagined before. The importance of these differences is even greater when we consider the needs of those who are disadvantaged because of where they were born. It is within this context that one of the authors defines mobile learning as “an evolutionary opportunity to reconsider the role and the methods of education, in light of relevant technological advances and pressing social priorities” (Laouris and Eteokleous, 2005b). In sum, mobile learning can play a very significant role in our efforts to bridge the literacy gaps in the third world.

### *Modest Investments in e- and m-Based Technologies Support Development*

Technology must not always be seen as a *product per se*. The mere application of the Internet and related services such as e-commerce opens new pathways to markets. They enable the global distribution of local products, services, and ideas. Such simple applications must be given priority in third world countries when

they devise their national policies. They are the easiest to exploit because they require little infrastructure and very low investment. In contrast to 20th-century economies, in the IT era, businesses may operate on very light infrastructures. Thus, IT-based economies require very modest initial investments. This brings closer the possibility for young entrepreneurs who are based in the third world to compete with colleagues globally. However, as exemplified in the previous sections, for innovation and new product initiatives to be stimulated, a society needs to develop an appreciation and a *meta-understanding* of the role that technology plays.

A very powerful tool for local governments to develop is a mindset that encourages innovation and entrepreneurship by means of technology incubators. The concept of subsidizing and supporting pre-mature ideas to evolve into products has resulted to economic miracles in the United States (e.g., Silicon Valley), Ireland, and Israel. Developing countries need to explore the reasons for successes and failures of incubators in changing economies (see Laouris, 2003b) and design their own schemes to support entrepreneurs. They must also draft an aggressive strategy to accelerate not only technology penetration, but also its efficient utilization, and thus, economic growth.

The e- and m-era opened new challenges for cross-national collaborations at a fraction of the cost utilizing the concept of virtual communication and virtual incubators (Laouris, 2002, 2003a). It is not simply possible, but it is a must, to create links between entrepreneurs across different countries. The sharing of ideas, experiences, and actual physical resources, as well as shared access to services and markets, serves the creation of a larger and enthusiastic community that reaches a critical mass to facilitate win-win interactions with mutual benefits.

### *Technology as a Means to Combat Brain Drain*

About twenty years ago, European (mainly German, Italian, and French) governments were rushing to change many of their policies regulating research, academic, and industrial activities and to shift funds from theoretical basic research to applied and industrial research. Some countries went so far as to also reduce the number of foreign students and visiting scientists. At about the same time, universities in the United States were overcrowded with Chinese, Japanese, and Indian students. During the same period, high-tech companies in Singapore, Hong-Kong, China, Malaysia, and the like, were exploiting the United States' and European research results, putting them directly into practice and then floating global markets with cheap electronic devices, appliances, computers, and so on, completely bypassing investments in R&D and disrespecting copyrights, trademarks, and patent laws. However, the exploitation of applied technology in these countries enabled many of their young educated, talented brains to return to their homelands.

Today, the same enterprises have reached a financial strength that enables them to invest in R&D as well. In parallel, their governments are adopting forward-looking strategies that encourage the industry to shift its attention to basic advanced research. Such policies do not only reduce, and, to some extent, reverse "brain drain," but they also attract world class, top rank scientists.

We can conclude by focusing our attention to the important lessons that must be learned out of this analysis. We would argue that the development of the industry and the economy does have the power to reverse “brain drain.” But at the same time, in the aforementioned examples, it was indigenous people educated in the West who launched the businesses in their home countries. They exploited within their own countries the know-how, which they acquired abroad. This is a most important observation. It means that to replicate this process, developing countries need to create attractive conditions for their young scientists to return. At the same time, they must put in place a supportive legal and economic infrastructure that is designed to facilitate their efforts and initiatives.

## DISCUSSION

According to “The African Internet-status report” (ICT in Africa: A Status Report; Chapter 6), only 1 in 4 people have a radio (i.e., 205 million), 1 in 13 have a TV (i.e., 62 m), 1 in 35 have a mobile phone (i.e., 24 m), 1 in 40 have a fixed line (i.e., 20 m), 1 in 130 have a PC (i.e., 5.9 m), 1 in 160 use the Internet (i.e., 5 m), and 1 in 400 have pay-TV (i.e., 2 m).

The merging of many of these technologies (e.g., digital arm watches, radio and TV hand sets, MP3 players, PDAs, portable computers) mostly within contemporary mobile phones, translates into a “convergence” of telecommunications, computing, and the media. Moreover, it translates into an unprecedented opportunity and challenge for propelling the developing world forward. The all-in-one device costs one-tenth the price, it is portable (and thus easier to transport and share with others), and is connected to all digital assets and knowledge that humankind has ever produced. Thus, looking at development from within the UN’s Millennium Goals, one could easily recognize the central role of Internet access.

This is how Nyiri’s thesis must be interpreted when he insists that the digital divide is a myth claiming, “. . . give a kid a keyboard and a screen, and illiteracy becomes a thing of the past. Provide a disadvantaged, barely literate person, with access to the Internet, and soon s/he will run a small virtual business enterprise” (Nyiri, 2005). Of course, we all know that there is considerable distance between a “potential” and its “materialization.” Our ten-year-long experiments in social intervention and change have scientifically documented that technology alone cannot serve our purpose. It needs to be accompanied by vision, strategy, scientific theory and methodology, and a great deal of commitment (Laouris and Anastasiou, 2005). Additionally, nations must put in place the necessary technological and legal infrastructures.

## SOCIAL RESPONSIBILITY OF SCIENTISTS; A CRITICAL THESIS

It is not an exaggeration, if we dare to say that more often than not, the world of science and technology has behaved as if it were somehow operating in a social and moral vacuum. One can think of countless examples in which advances in science and technology have actually not only endangered the overall security of human life on earth, but even worse, they have contributed toward the global

deterioration of human dignity. It is, for example, intimidating that the advent of the Internet is accompanied with such projects like the echelon (Duncan Campbell, 2000), which have the potential to invade our personal spheres and privacy. Or to think that research in microbiology and genetic engineering may result into deadly viruses, which can be used by terrorists. It is thus imperative that present and future scientific research is undertaken from an integral perspective that is reframing it within a context of co-operative efforts between the natural sciences and disciplines that include both the humanities and the social sciences. As a modest contribution to initiate a dialogue along these lines we offer the following ideas:

1. Provide incentives for joint research projects between the natural sciences, the humanities and social sciences, engaging scientists from the third world. Incentives may take many different forms (beyond financial) like awards, recognition, and other forms of honouring their work.
2. Scientists should be "forced" to become aware of the potential hazards posed by their own research and achievements. Moreover, they must also be given incentives to direct their research toward a positive contribution in closing the gap as well as to the elimination of possible new threats to peace (Developments in science-technology and new threats to peace, 1999).
3. Promote and support initiatives that serve the creation of new and/or the revitalization of existing "peace movements" that include scientists also from the conflict zones. Applaud and award those scientists who are also active outside their labs actually giving the cause their own personal support.
4. In the process of restructuring our educational systems integrate concepts of Development Education across our curricula. Ensure that students gain knowledge in interdisciplinary fields transcending the conventional distinction between the natural sciences on the one hand, and the humanities and social sciences on the other. At the higher education level make sure that those engaged in one discipline develop a genuine sympathy, respect, and appreciation for the other.
5. Those involved in international aid such as the UN, the G8, the EU, the World Bank, and many other international organizations and social entrepreneurs need to realize the importance of providing the know-how together with the actual goods. In the case of technology, the challenge for those who engage in strategizing positive interventions is to also create relevant contexts within which the given technology can be fully utilized. The best indicator of success is when entrepreneurs in developing countries manage to cross the bridge and become also creators.

Let us conclude with a visionary role for technology: Technology can contribute toward escalating the peace movement, in its political and institutional aspects, and replace the emotional war system with a reinforced, rational system of peace. To achieve this goal, developing nations need an aggressive strategy based on three axons: (1) Policies that aim not only to increase IT penetration, but moreover, to integrate technologies in the lives of growing children, and to create the context and the environment in which technologies can be fully utilized; (2) Policies that discourage brain drift and provide incentives and opportunities for young

educated entrepreneurs to start IT-related businesses of international scope and quality; (3) Transformation of the legal and financial infrastructure to facilitate fast/efficient proliferation of new businesses and protect innovators from unfair local and international competition.

## NOTES

1. A friend from the United Kingdom once explained to one of the authors that the small gap between the trains and platforms is necessary to account for train vibrations and errors in alignment and that users of the London Underground must learn to live with and *mind the gap*.
2. Development Education is an active learning process, founded on values of solidarity, equality, inclusion, and co-operation. It enables people to move from basic awareness of international development priorities and sustainable human development, through understanding of the causes and effects of global issues, to personal involvement and informed actions of European citizens and public institutions (*CONCORD*).
3. An example from the case of Cyprus is the organization of Innovation–Technology–Social Progress Fairs in which finalists are honored by distinguished personalities such as Ministers of Commerce, of Education, or of Labor (e.g., visit [www.cnti.org.cy/CNTI\\_Album/1993/1993\\_KTK\\_A/index.html](http://www.cnti.org.cy/CNTI_Album/1993/1993_KTK_A/index.html)). Another vehicle to promote creativity, were Electronic Art Exhibitions, organized in the context of introducing modern technology and innovation in the lives of growing children ([http://www.laouris.com/CYBER\\_KIDS/2000/2000\\_CK\\_EAF/index3.html](http://www.laouris.com/CYBER_KIDS/2000/2000_CK_EAF/index3.html)). Many of the theses presented here were derived from a 15-year-long national experiment, which is described briefly in Appendix 2 (see section on CYBERKIDS) and in greater detail elsewhere (Laouris and Anastasiou, 2005).

## REFERENCES

- Agoras of the global village. 2005. Home page of ISSS 2005. <http://www.iss-conference.org/> (10 July 2005).
- Alexander, G. C. 2002. Interactive management: An emancipatory methodology. *Systemic Practice and Action Research* 15: 111–122.
- Anastasiou, H. 2000. Negotiating the solution to the Cyprus problem: From impasse to post-Helsinki hope. *The Cyprus Review* 12(1): 11–33.
- Banathy, B. H. 1996. *Designing social systems in a changing world*. New York: Plenum.
- Boutros Boutros-Ghali, An agenda for peace: Preventive diplomacy, peacemaking and peace-keeping document A/47/277-S/241111, 17 June 1992 (United Nations Department of Public Information).
- Broome, Benjamin J. 2002. *Building bridges across the green line: A guide to communication in bi-communal settings in Cyprus*. Phoenix: Arizona State University Press.
- Christakis, A. N. 1973. A new policy science paradigm. *Futures* 5(6): 543–558.
- . 1996. A people science: The CogniScope system approach. *Systems: Journal of Transdisciplinary Systems Sciences* 1(1): 16–19.
- Christakis, A. N., and Brahms, S. 2003. Boundary spanning dialogue for the 21st century agoras. *Systems Research and Behavioral Sciences* 20: 371–382.
- CONCORD Statement on Development Education and Awareness Raising*. Available at: <http://www.deeep.org/english/europe/concord/statement/index.php>
- Cost of war 2006. Available at: [http://nationalpriorities.org/index.php?option=com\\_wrap-per&Itemid=182](http://nationalpriorities.org/index.php?option=com_wrap-per&Itemid=182) (accessed September 2006).
- Duncan Campbell. 25 July 2000. The history, structure und function of the global surveillance system known as Echelon. Available at: <http://www.heise.de/tp/r4/artikel/6/6929/1.html>

- Denktash, R. R.* 1982. The Cyprus triangle. London: Allen & Unwin.
- Developments in science-technology and new threats to peace. September 1999, Science Council of Japan. Available at: <http://www.scj.go.jp/info/pdf%5Ckoho-17-t924-4e.pdf>
- Eteokleous, N., and Laouris, Y. 2005. Are we moving too fast towards integrating mobile devices into educational practices? *Proc. Seeing, understanding, learning in the mobile age*, Budapest, April 28–30, 197–205.
- Georgiev, T., Georgieva, E., and Smrikarov, A. 2004. Me-learning: A new stage of e-learning. *Proceedings international conference on computer systems and technologies, CompSysTech' 2004*, IV.28, 1–5.
- Gumpert, G., and Drucker, S. 1997. The question of identity in a divided media landscape: The case of Cyprus. *Res Publica (Belgian Journal of Political Science)*, XXXIX(2): 281–292.
- Hadjipavlou-Trigeorgis, M. 1993. Unofficial inter-communal contacts and their contribution to peace-building in conflict societies: The case of Cyprus. *Cyprus Review* 5(2): 68–87.
- Hays, Paul R., and Michaelides, M. 2004. Constructing agoras of the global village: A laboratory of democracy on the conscious evolution of humanity. *Systems Research and Behavioural Science* 21, 539–553.
- ITU Digital Access Index: World's First Global ICT Ranking; Education and affordability key to boosting new technology adoption. Available at: [http://www.itu.int/newsarchive/press\\_releases/2003/30.html](http://www.itu.int/newsarchive/press_releases/2003/30.html)
- Joseph, J. 1997. *Cyprus ethnic conflict and international politics: From independence to the threshold of the European Union*. London: MacMillan Press.
- Laouri, R. 2005. Youth initiatives across the Cyprus Divide; The evolution of youth groups during the bi-communal movement. Master of Arts Thesis, Department of International Relations, University of Chicago.
- Laouris, Y. 1992. Computer: The first human construction that amplifies mental abilities rather than physical. *Cyber Kids Reports*, Vol. 1992.
- . 1998. Innovative education for the new millennium. A leap into the new millennium. Hilton, Nicosia, December 1998, Organized by IMSC Nikias Max.
- . 2002. Towards virtual high tech business incubators. *Proc. Creation of innovation-based economies through technology business incubators*, Paphos, Cyprus, May.
- . 2003a. Sharing experience on reasons for successes and failures of incubators in changing economies of developing countries. *Proc. Workshop on technology-based business incubators in SADC countries*. International Conference Centre, Grand Bay, Mauritius, 24–28 February.
- . 2003b. Introduction of an on-line incubator database for developing and developed countries; A basis for exchange of resources and knowledge. *Proc. Workshop on technology-based business incubators in SADC countries*. International Conference Centre, Grand Bay, Mauritius, 24–28 February.
- . 2004. Information technology in the service of peace building: The case of Cyprus. *World Futures* 60, 67–79.
- . 2005. How can mobile technologies serve to close the digital gap and accelerate development? *Proc. 4th world conference on mobile learning, mLearn 2005*, Oct 25–28, Cape Town, South Africa.
- Laouris, Y., and Anastasiou, H. 2005. Experiences from a nation wide experiment introducing IT in lives of children; Fifteen years after. *Proc. 4th world conference on mobile learning, mLearn 2005*, 25–28 October, Cape Town, South Africa. Available at: <http://www.mlearn.org.za/CD/papers/Laouris%20&%20Anastasiou.pdf>.



- Laouris, Y., and Christakis, A. 2007. Harnessing collective wisdom at a fraction of the time using structured design process embedded within a virtual communication context. *International Journal of Applied Systemic Studies* 1(2): 131–153.
- Laouris, Y., Laouri, R., and Christakis, A. 2008. Communication praxis for ethical accountability: The ethics of the tree of action: Dialogue and breaching down the wall in Cyprus. *Systems Research and Behavioral Science* 25, 1–16.
- Laouris, Y., and Eteokleous, N. 2005a. An educationally relevant and socially responsible definition of mobile learning. *Proc. 4th world conference on mobile learning, mLearn 2005, 25–28 October, Cape Town, South Africa*. Available at: <http://www.mlearn.org.za/CD/papers/Laouris%20&%20Eteokleous.pdf>
- . 2005b. Time management for dyslexic and/or ADHD adults using mobile technologies. *Proc. 3rd international multilingualism and dyslexia conference: Multilingual and cross-cultural perspectives on dyslexia*, Limassol, Cyprus.
- Laouris, Y., and Michaelides, M. 2005. What are the obstacles that prevent us from producing practical applications considering the availability of powerful broadband technologies and the development of relevant scenarios? *Proc. Cost219ter workshop: Accessibility for all to services and terminals for next generation networks*, Ayia Napa, Cyprus, 7 October.
- Nyiri, K. 2005. The mobile phone in 2005: Where are we now? *Proceedings Seeing understanding, learning in the mobile age*, Budapest, 28–30 April.
- One laptop per child. Available at: <http://laptop.org> (accessed 20 June 2007).
- Pask, A. G. S. 1976. *Conversation theory: Applications in education and epistemology*. Amsterdam and New York: Elsevier.
- Sharples, M. 2005. Learning as conversation: Transforming education in the mobile age. *Proceedings Seeing understanding, learning in the mobile age*, Budapest, 28–30 April, 147–152.
- Shiller Robert. The next bubble (or bust). Available at: <http://www.globalagenda.com/2005/robertshiller.asp> (accessed July 2005).
- The African Internet—A status report. Available at: [http://www.weforum.org/pdf/Global\\_Competitiveness\\_Reports/Reports/GITR\\_2002\\_2003/ICT\\_Africa.pdf](http://www.weforum.org/pdf/Global_Competitiveness_Reports/Reports/GITR_2002_2003/ICT_Africa.pdf) (accessed September 2006).
- The Danish Board of Technology Teknologirådet and The Society of Danish Engineers. 2004. Review on “Oil-based technology and economy—Prospects for the future.” Available at: [http://www.tekno.dk/pdf/projekter/p04-Oil-based\\_Technology\\_and\\_Economy.pdf](http://www.tekno.dk/pdf/projekter/p04-Oil-based_Technology_and_Economy.pdf).
- United Nations Global Teaching and Learning Project. Cyber school bus. Available at: [www.un.org/cyberschoolbus](http://www.un.org/cyberschoolbus)
- UN Millennium Development Goals. Available at: <http://www.un.org/millenniumgoals>. See also <http://ddp-ext.worldbank.org/ext/MDG/home.do>
- Vygotsky, L. 1962. *Thought and language*. Cambridge, MA: Harvard University Press.
- . 1974. *Mind in society*. Cambridge, MA: Harvard University Press.
- Warfield, J. N., and Cardenas, A. R. 1994. *A handbook of interactive management*. Ames: Iowa State University Press.
- Wolleh, Oliver. 2001. *Cyprus: Citizen's rapprochement by the bi-communal trainer group*. Berghof Report No. 8, Berghof Research Center for Constructive Conflict Management. Available at <http://www.berghof-center.de>
- Yaffe, David. Global crisis, plunging stockmarkets and corporate swindles. Available at: [http://www.revolutionarycommunistgroup.com/frfi/168/168\\_eco.html](http://www.revolutionarycommunistgroup.com/frfi/168/168_eco.html) (accessed August 2005).

## APPENDIX 1: IMPORTANT INTERNET LINKS

These links are for projects, case studies, and articles directly related to using technology for peace, along the definition adopted by the authors. They are given here as an aid to those wishing to explore the issue further.

- [http://www.bostonphoenix.com/boston/news\\_features/this\\_just\\_in/documents/02622033.htm](http://www.bostonphoenix.com/boston/news_features/this_just_in/documents/02622033.htm)  
<http://www.carnegieendowment.org/publications/index.cfm?fa=view&id=517&prog=zgp&proj=znpp>  
<http://www.computeruser.com/articles/daily/8,6,1,0819,02.html>  
<http://www.Cost298.org>  
<http://cpnn-usa.org/cgi-bin/read/articlepage.cgi?ViewArticle=147>  
[http://www.crossingborder.org/newspaper/no10/a\\_tool\\_for\\_peace.htm](http://www.crossingborder.org/newspaper/no10/a_tool_for_peace.htm)  
[http://www.defencetalk.com/news/publish/article\\_002046.php](http://www.defencetalk.com/news/publish/article_002046.php)  
<http://www.discover.com/issues/jul-92/departments/atomsforpeace84/>  
[http://www.dopcampaign.org/read\\_bill.htm](http://www.dopcampaign.org/read_bill.htm) *Dept. for peace in Congress*  
[http://www.dot-com-alliance.org/newsletter/article.php?article\\_id=76](http://www.dot-com-alliance.org/newsletter/article.php?article_id=76)  
<http://www.globalcommunityx.com/ourstory/peacecontent.html>  
<http://govinfo.library.unt.edu/npr/library/misc/peace.html>  
<http://ipadventures.com/?p=170>  
<http://www.infinisri.com/TIP/>  
<http://www.jetpress.org/>  
[http://www.ksg.harvard.edu/news/opeds/2005/011205\\_juma\\_kenya.htm](http://www.ksg.harvard.edu/news/opeds/2005/011205_juma_kenya.htm)  
[http://www.lentz.org/technologyofpeace/peace\\_politics.shtml](http://www.lentz.org/technologyofpeace/peace_politics.shtml)  
<http://www.losgatosx.com/story/jstory/5/> (beautiful interface)  
<http://www.mtnforum.org/emaildiscuss/discuss02/022002156.htm>  
[http://www.mum.edu/m\\_effect/hagelin/](http://www.mum.edu/m_effect/hagelin/)  
[http://myhero.com/peacemakers/peacemakers\\_content.asp](http://myhero.com/peacemakers/peacemakers_content.asp)  
<http://www.myhero.com/myhero/hero.asp?hero=NickoleEvans>  
[http://www.nationmedia.com/dailynation/nmgcontententry.asp?category\\_id=25&newsid=23392](http://www.nationmedia.com/dailynation/nmgcontententry.asp?category_id=25&newsid=23392)  
<http://netcorps.org/news/PeaceLEAP>  
[http://olp.swlauriersb.qc.ca/integrating\\_technology.htm](http://olp.swlauriersb.qc.ca/integrating_technology.htm)  
[www.pa-inv-fund.com/download/241104/Reports%203/Reports%203/Peace%20Technology%20Fund.pdf](http://www.pa-inv-fund.com/download/241104/Reports%203/Reports%203/Peace%20Technology%20Fund.pdf) (*Palestine case*)  
[http://www.peacediaries.org/4\\_news/4\\_1\\_press.html](http://www.peacediaries.org/4_news/4_1_press.html)  
<http://www.peacetour.org/ver1/peacetouroverview.html>. *Press coverage at:*  
<http://www.csrwire.com/article.cgi/1089.html>  
<http://www.dimension7.com/peacetour/bottom.htm>  
<http://permanentpeace.org> <http://www.worldpeaceendowment.org/endowment1.html>  
<http://policy.rutgers.edu/andrews/projects/ssit/>  
[http://www.readwritethink.org/lessons/lesson\\_view.asp?id=93](http://www.readwritethink.org/lessons/lesson_view.asp?id=93)  
<http://www.rta.nato.int/pfp.htm>  
[www.scj.go.jp/ja/info/kohyo/pdf/kohyo-17-t924-4e.pdf](http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-17-t924-4e.pdf)  
<http://www.seedsofpeace.org/site/PageServer?pagename=TechProjects>  
[http://www.smartmobs.com/archive/2004/12/24/ict4b\\_peace\\_c.html](http://www.smartmobs.com/archive/2004/12/24/ict4b_peace_c.html)  
[http://www.ssp.ca/Angelus/2000\\_April/On\\_Modern\\_Technology\\_and\\_Peace.htm](http://www.ssp.ca/Angelus/2000_April/On_Modern_Technology_and_Peace.htm) (*Paps: technological progress comes from God, and leads to God*)  
<http://www.stolaf.edu/nppf/2000/peacetech/>  
[http://www.tech4peace.org/nqcontent.cfm?a\\_id=1](http://www.tech4peace.org/nqcontent.cfm?a_id=1)

<http://www.techbridgeworld.org/tpc/>  
[http://www.theexperiment.org/articles\\_printer.php?news\\_id=1715](http://www.theexperiment.org/articles_printer.php?news_id=1715)  
<http://www.tiresias.org/cost219ter>  
<http://www.tue.nl/vredescentrum/education.htm>  
[http://www.un.org/peace/reports/peace\\_operations/docs/part5.htm](http://www.un.org/peace/reports/peace_operations/docs/part5.htm) (*UN article*)  
<http://uninews.unimelb.edu.au/articleid.609.html>  
<http://www.unis.unvienna.org/unis/pressrels/2003/sgsm8757.html> The Ub must support  
<http://www.uow.edu.au/arts/sts/bmartin/pubs/01tnvs/tnvs00.html> (*Excellent citation Huxley*)  
<http://www.uow.edu.au/arts/sts/bmartin/pubs/99encyclopedia.html>  
<http://www.usip.org/virtualdiplomacy/publications/reports/13.html> full paper  
[http://www.watsoninstitute.org/project\\_detail.cfm?id=1](http://www.watsoninstitute.org/project_detail.cfm?id=1)  
[http://wired-vig.wired.com/news/technology/0,1282,34815,00.html?tw=wn\\_story\\_related](http://wired-vig.wired.com/news/technology/0,1282,34815,00.html?tw=wn_story_related)

## APPENDIX 2: INTERNATIONAL EXAMPLES OF TECHNOLOGY FOR PEACE APPLICATIONS

*Tech4Peace*. One of the largest peace portals with over 5,000 hosted pages and 4,000 hits per month (checked July 2005). It was launched by the authors' team in December 1997, to counteract the effects of the ban imposed to bi-communal meetings between Greek and Turkish Cypriot peace builders. The peace portal was born because it was needed. What led to its birth was neither the availability of relevant technology nor the availability of funding, because both were simply not there! (Laouris, 2004). The ban of bi-communal meetings imposed by the Turkish Cypriot Authorities following the EU's decision to postpone accession negotiations with Turkey (summit meeting in Luxembourg, December 1997) stopped face-to-face dialogues and threatened to nullify the peace building efforts.

It began by providing training services and creating e-mail lists and chat rooms for peace builders to continue their work. In collaboration with Dr. Hrach Gregorian of the International World Affairs and the International Communication and Negotiation Simulation Project (ICONS) of the University of Maryland special workshops on virtual negotiation were conducted with young political, community, and economic leaders, journalists, academicians, and students as participants. In year 2000 the portal in its present form was launched utilizing UN funding ([www.tech4peace.org](http://www.tech4peace.org)).

*CYBERKIDS*. A nation-wide experiment (launched in 1992 by the authors' team; see [www.cyber-kids.com](http://www.cyber-kids.com); Laouris and Anastasiou, 2005) based on a concept then called the "profitable dream." They envisioned that introducing advanced computer technology in the lives of a critical number of young children, using an educationally relevant and socially responsible, peace-enhancing curriculum, would allow them to "transcend" the country's educational and political life and move the new generation a decade ahead. The project was founded on a well-defined vision statement: "...to re-define the tools, methods and purpose of education, in light of relevant social change." The vehicle chosen to disseminate the impact of the project and its vision was the profit-making concept of franchising.

Within the first five years (1992–1997), 26 computer-learning centers were launched with an average of 50–150 students enrolled in each location. By 1999, the number of children who benefited from the CYBERKIDS curriculum exceeded 15,000. This is approximately equal to 15% of the country's youth population (ages 6–15). During the same period, the organization trained and employed 186 talented university graduates, thus combating brain drain while simultaneously spreading the CYBERKIDS philosophy and knowledge to many

more spheres of social life. The success of the project is attributed to many facets of its innovative curriculum. Of relevance in the context of this article are:

*Student-centered, role reversal, shifting control.* All projects follow the principle that control is not with the instructor, but with the student. Also, the student's peers assume a role to encourage and to monitor their fellow student. This shift of control is achieved through a process of role reversal by which the responsibility to choose, design, and implement a project is passed to the student.

*Project-oriented; Creators, not consumers.* All educational activities are project-oriented. This means that whatever the educational theme we wish to teach, the mental attributes we aspire to develop, the computer skills we plan to drill, the social relevance we assume to convey, children will go through a process of defining their own project, planning its implementation and successfully delivering (i.e., publishing, printing, presenting to the group) their product. There is an incredible amount of theory behind these concepts, but for the purpose of this communication we would like to focus attention to: (a) the importance of cultivating the attitude of a creator rather than that of a passive user or one who follows instructions and (b) the power of becoming accustomed to delivering a final product within an agreed deadline and in compliance to promised specifications.

*Technology Peace Corps.* Carnegie Mellon: "In the developing world, ICT is emerging as a powerful tool for promoting sustainable development and improving the state of public health, agriculture, and education. Yet, without skilled and dedicated practitioners, this potential will continue to go untapped, leaving billions of people to continue living in dire conditions. In response to this challenge, Carnegie Mellon is striving to create a new model of volunteerism. Having fielded the input and, in some cases, the active partnership of organizations ranging from the World Bank, Indian foundations, Sri Lankan government agencies, and Ghanaian universities to the U.S. Peace Corps itself, we are now leveraging unique institutional strengths in order to inspire, support, and coordinate the work of program participants as they apply appropriate technology to a wide range of ventures in sustainable development, thereby improving conditions in impoverished and underdeveloped areas the world over." (<http://netcorps.org>).

*The Peace Tour.* The Peace Tour is a travelling technology show that aims to educate and entertain its participants, while, at the same time, spreading a message of peace throughout the globe ([www.peacetour.org](http://www.peacetour.org)). Among their primary technological aims is to demonstrate mobile broadband networking and to develop mobile educational showcases (e.g., interactive learning seminars, large-scale demonstrations, broadcasts over the Internet). They provide an entire day of hands-on instruction and play between participants and thousands of virtual participants in cyberspace.

*InfoTechWarPeace.* The Watson Institute of International Studies: "In the twenty-first century, information technology (IT) has become an essential tool for the global circulation of power, waging of war, and imagining of peace. Since the 1990s, IT has taken a more potent role in the organization, execution, justification, and representation of violence worldwide as witnessed in the first Gulf War, Bosnia, Kosovo air campaign, and the terrorist attacks on September 11.

The recent war in Iraq revealed an unprecedented infiltration of IT into all aspects of war making. Whether in military technology and intelligence capturing, embedded journalist and 24/7 news making, or organizational strategies for peacemaking, the second Gulf War was the first, but certainly not the last, Web war. The Watson Institute's Information Technology, War, and Peace Project ([www.InfoPeace.org](http://www.InfoPeace.org)) was created three years ago to track and analyze IT's influence on traditional statecraft and new forms of networked global politics.

InfoTechWarPeace challenges the traditional discourse on world order, which is defined by state-centric, realist interpretations of power. Yet, in the past decade, and especially since September 11, very different global actors have emerged ranging from fundamentalist terrorists to peace activists, who gain advantage through the broad bandwidth of information technology rather than through traditional state-centered sovereignty. The Project interrogates how these individuals and groups make use of IT to influence world politics. The goal of InfoTechWarPeace is to produce, through rapid internet interventions, online forums, international symposia, video-teleconferences, and documentaries, the kind of networked knowledge, critical thinking, and ethical sensibility that will help raise public awareness and inform new policies on global technological issues in war and peace.”

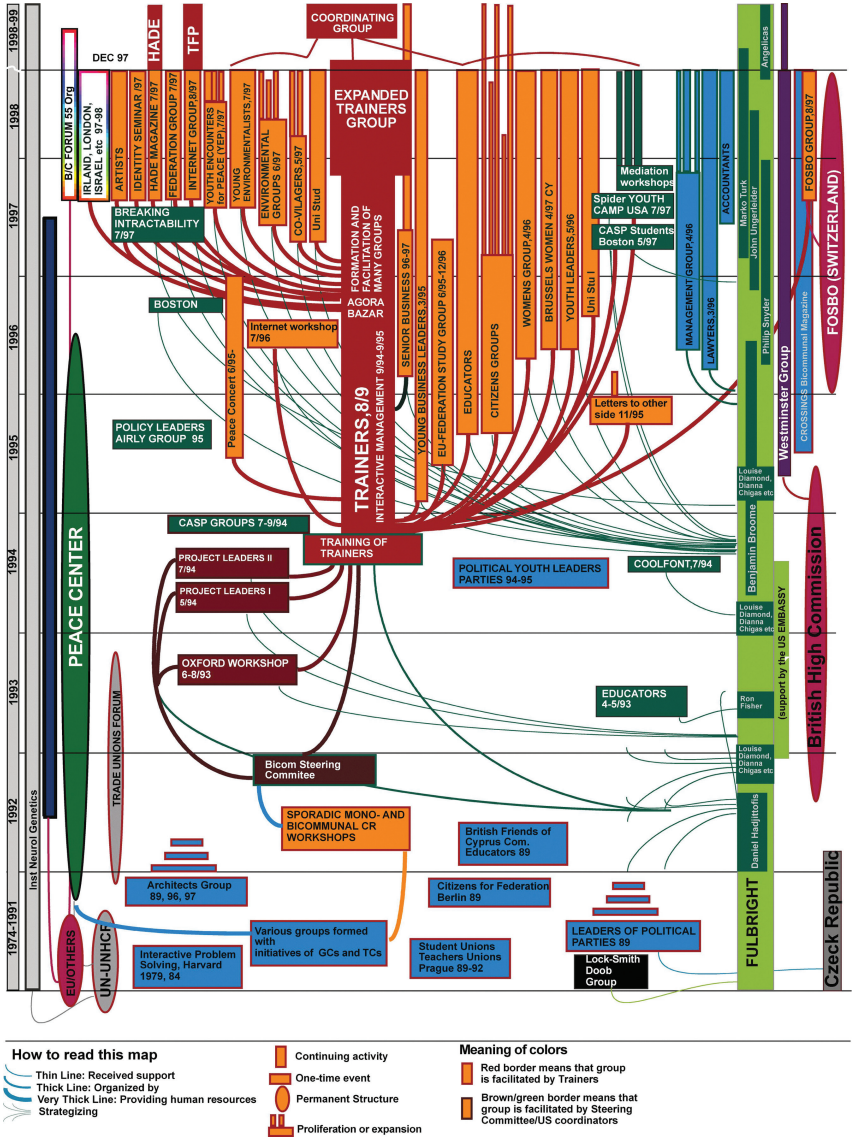
*Peace LEAP (List Enhancement Action Project)*. An effort started by the North Carolina Peace Action Education Fund to help North Carolina nonprofits use technology to be more effective advocates for peace and justice, it is now a project of NetCorps (<http://netcorps.org/news/PeaceLEAP>). Roger Manus, President of NC Peace Action Education Fund explains, “NCPAEF is proud to have founded LEAP and is thrilled to be entrusting the project in the capable hands of NetCorps.”

*SeedsNet*. Seeds of Peace uses state-of-the-art technology to unite teenagers across borders. A secure listserv, SeedsNet provides a daily forum for Seeds of Peace graduates to continue dialogue from coexistence sessions. It has become a key instrument in maintaining secure communication during periods of unrest and was supplemented by online coexistence sessions in a chat room environment ([www.seedsofpeace.org](http://www.seedsofpeace.org)).

Founded in 1993, Seeds of Peace is dedicated to empowering young leaders from regions of conflict with the leadership skills required to advance reconciliation and coexistence. Over the last decade, Seeds of Peace has intensified its impact, dramatically increasing the number of participants, represented nations, and programs. From 46 Israeli, Palestinian, and Egyptian teenagers in 1993, the organization still focuses on the Middle East but has expanded its program to include young leaders from South Asia, Cyprus, and the Balkans. Its leadership network now encompasses over 2,500 young people from four conflict regions.

### **APPENDIX 3: HISTORICAL OVERVIEW OF BI-COMMUNAL GROUPS FORMED UNDER THE GUIDANCE OF THE “TRAINERS’ GROUP”**

The Cyprus Bi-communal Peace and Conflict Resolution Trainers’ Group (CRTG; which became known as “Trainers’ Group”) has pioneered in the years 1994–1997 in the creation of more than 24 bi-communal peace groups in Cyprus. These groups were created in the process of 20–100 hour-long workshops. During these workshops modern technology (i.e., Interactive Management) was exploited to facilitate the process of reaching consensus and developing shared vision maps. Some of these groups were directly involved in the development of a comprehensive UN peace proposal, known as the Annan Plan. The Cyprus case represents probably the largest experiment worldwide in which technology played a central role in (a) facilitating the formation of a coherent peace movement driven by a shared vision and (b) supporting the development of a comprehensive peace proposal, which took into account the aspirations, desires, and fears of large numbers of citizens. This historical map was developed as a result of a workshop of the “Trainers’ Group,” which took place on 4 October 1997. The purpose of the workshop was to summarize the activities of the CRTG. The map demonstrates the activities of this group embedded within the larger context of



the emerging peace movement in Cyprus. The vertical grey column on the left serves as the time line. It is not linear. Time is compressed for years between 1974 (following the Turkish invasion) and 1993. It is stretched between the years 1993–1997 when most of the “Trainers’ Group” activities took place. The timeline, as well as the activities of the “Trainers’ Group,” is terminated abruptly in December 1997, following the European Union’s “Luxembourg Decision” not to approve Turkey’s application to begin accession negotiations. In reaction to this EU decision, Turkey and the Turkish Cypriot leader, Mr. Rauf Denktash, banned

all meetings of the peace community and totally restricted bi-communal dialogue. A major reason for this ban was CRTG's questioning of the long-standing argument that the two communities cannot live peacefully together (Denktash, 1982) backed up by an ever growing number of critically thinking individuals, who aspired to join the CRTG network of new bi-communal groups. This decision represented, of course, an almost deadly hit to CRTG's peace-building work. The work of thousands of peace builders went down the drain. The only way to keep the system alive was through the application of other innovative ways to allow people to stay in touch. This is when the tech4peace portal was created. This portal served for the next years as a means of structured communication, space for debating, and depot for information.

The vertical red-brown box in the middle of the diagram corresponds to the CRTG. It was composed of 16 Turkish Cypriot and 16 Greek Cypriot peace-builder pioneers. Between 1994 and 1997, the CRTG applied a computer-assisted structured dialogue methodology known as Interactive Management to introduce to conflict resolution and to promote reconciliation among about 2,000 individuals. The new groups are shown as vertical orange rectangles. Each group had approximately 40 members and was composed of an equal number of Turkish and Greek Cypriots. Twenty-four groups were formed, some of which produced later multiple spin offs (shown as smaller vertical orange rectangles). Primarily their members subsidized the training and all activities of these groups. The thick red-brown lines connecting the CRTG rectangle with the new groups' orange rectangles denote this heavy support provided by the CRTG. In some cases, Fulbright offered space, snacks, and organizational logistics. This is denoted with the thin green lines that connect the large green rectangle on the right of the diagram (which represents Fulbright) with the new groups' rectangles.

Groups represented by horizontal blue rectangles with red borders correspond to isolated initiatives of others. Most of these initiatives took place in earlier years (e.g., meetings of political parties facilitated by the Czech Republic, Students' and teachers' unions, architects, etc.). The British High Commission (vertical oval purple box on the lower right corner of the diagram) supported a bi-communal group known as Westminster Group. This group remained active for many years. The Swiss organization FOSBO supported together with the CRTG the FOSBO Group, which remained active only for a few months (September–December 1997).

Groups represented by vertical blue rectangles with green borders and groups represented by horizontal dark green boxes with green borders correspond to Fulbright initiatives without involvement of the CRTG.

The UN and many foreign diplomatic missions morally supported these efforts. It is, however, unfortunate that the international community at large was unable to make funds available to these groups when they desperately needed them, and when their movement was at its peak. A UNDP fund provided through their project UNOPS was first made available in year 2000 long after this whole movement was practically worn out. All meetings and activities were banned in December 1997. The lesson to be learned is that moral support alone is not sufficient. Moreover, those interested in peace must recognize and respect the importance of timing and provide timely support to pioneers and their emerging peace movements.