The Genie Goes South
Coping with Science, Technology and Globalization in the Third World

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In 2000, a new novel in Thailand received the prestigious SEA Write Award, which was an annual award given to the best literary work in each of the five original ASEAN countries (Thailand, Malaysia, Indonesia, the Philippines, and Singapore). The novel, *Amata* (Pali for 'immortal'), written by Wimon Sainimnuan,[1] an author whose works are imbued with the profound sense of Buddhism and are deeply critical of contemporary Buddhist society, tells a gruesome story of a business tycoon, Prommin, who has cloned several copies of himself in order to harvest their bodily organs so that he could live on indefinitely. Intending to preside over his ever expanding global business empire and not to let death derail his ambitions, he wants to become immortal through the exchange of his organs with those of his clones. In the end, however, his plan is foiled by one of his clones and there is an interesting ironic twist. One of his clones, Arjun, who had been raised by the tycoon as his son but later realizing the truth, was at first slated to be operated on so that his organs could be taken out and put in Prommin's aging body. He, however, managed to

[1] Wimon Sainimnual, *Amata* (Bangkok: Siam Prathet Press, 2000, in Thai). I have also written a full analysis of this novel in the context of the reception of biotechnology in Thai culture in "Human Cloning in a Thai Novel: Wimon Sainimnuan's *Amata* and Thai Cultural Attitude Toward Biotechnology," which was presented at the International

convince the tycoon's team of doctors and scientists that it would be better just to perform the brain exchange operation rather than putting all his other organs in the tycoon's body. Since what is assumed to be true in the novel is that the seat of personal identity lies at the heart rather than the brain, the story ends when Prommin's and Arjun's brains were exchanged, and in fact no exchange of identity took place. The scientists in the team, on the contrary, still believed that the body with Prommin's original brain was still the tycoon, but they were wrong. The real Prommin was bundled away in a frozen container, and what they took to be their boss was in fact Arjun, who ultimately won the battle.

The novel reflects how Thai people view the Genie produced by the power of science and technology. The fact that *Amata* received the country's highest literary acclaim and has become popular shows the level of concern Thai people in general have toward the power of science and technology. The Genie has come to Thailand, and the Thai people are deeply ambivalent about him. Prommin's scientific team was led by Dr. Spencer, a high ranking Western scientist. The message should be clear: Science and technology have become subservient to business interests. Instead of helping the poor so that they have better lives, science and technology are portrayed as instruments for the rich and powerful to extend their lives indefinitely. The religious overtone to the predominantly Buddhist Thai readers is that science and technology serve to

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satisfy the self-centered desires of the rich and powerful who have no regard to morality.

In this chapter I discuss the role of science and technology in the Third World, dealing particularly with the issues of how science and technology are intertwined with globalization of cultures and economies. Governing the scientific and technological transformations of the world in the twenty-first century requires, among other things, sustained and hard thinking about how their benefits are to be distributed justly among the world's cultures and population, as well as how they should form integral parts of the people's lives and cultural practices. Globalization does not merely mean the merging together of practices; it also means that anything happening in one place invariably affects others. Thus neglecting the majority of the world's population, who are yet to get the full benefits of science and technology, would be a cause for a volatile condition that will not benefit anyone.

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Amata shows how deep the concern of the Thais are for their cultural identity and values. There is a lengthy debate between Buddhism, represented by Arjun, and modern science, represented by Spencer. That Arjun eventually wins the battle testifies to the author's sense that Thai culture is being threatened by the onslaught of science and technology coming from the west. Wimon believes that the way for Thai culture to resist this is to rely on the teaching of Buddhism. We see here how a people respond to the influx of science and technology into their daily lives, and how the problem is a highly complicated one to which

there are no easy solutions. Thai people, at least as reflected in Wimon's attitude, seem to resent the influx of science and technology into their lives. They do not of course deny the obvious benefits that science and technology bring, but they are wary that science and technology could well be used in a way that is detrimental to their cultural integrity and values. Some Thais, it seems, might want to stop the tide of science and technology at the gate of their culture.

One might think whether such a stoppage is indeed possible, given the current situation. Indeed it is, at least theoretically speaking. The following episode from Chinese history shows that stopping the progress in science and technology was not only possible, but it actually happened. In the fifteenth century, armadas of Chinese navy swept through South China Sea and the Indian Ocean, projecting the power of the Emperor to far away lands. The armadas consisted of ships more than 200 meters in length, capable of carrying such exotic animals as giraffes and zebras in their decks. The ships boasted some of the engineering technologies which were unheard of in the West until the middle of the 19th century. The armadas, led by Muslim court eunuch Zheng He, were intended to proclaim the great power of his Celestial Emperor. The navy interfered with some local politics, deposing a local chieftain in Java and installed another of their own choosing. The ships were as far as the southeastern coast of Africa, where Chinese porcelains can still be found, and in Indonesia, Zheng He is still revered as a god.

The Chinese Imperial Navy was clearly much superior to what Europe had to offer at that time. The closest match that Europe had to offer was available

more than 50 years later, with the Portuguese ships that traveled to the southernmost tip of Africa. However, the largest of the ships that carried Vasco da Gama around the Cape of Good Hope was no more than 30 meters long. It displaced around 300 tons, whereas some of Zheng He's ships displaced more than five times that amount. The Chinese also used better sail material and their ships could said upwind far better than their European counterparts at the same time.

Zheng He organized the total of seven expeditions to the Indian Ocean, the first one in 1405 and the last one in 1433. However, after the last and the grandest expedition, the new Emperor issued an edict forbidding sea faring activities. In a few years after the last voyage, all activities related to navigation were halted. China, which could have sailed around the Cape of Good Hope and 'discovered' Europe, instead turned upon itself and went into a long period of decline. By the nineteenth century the Chinese had nothing to match the ships of the British marching along the Yangtze River.

The point of this rather lengthy illustration is that reversal of science and technology policy is not a logical impossibility. Viewed from the early twenty-first century, the Ming Emperor's decision to reverse the policy was very hard to believe, but what is even more difficult to believe for us now is the complete success of the policy. The Emperor could indeed stop science and technology dead in their tracks. This is different from our contemporary age, when it is already very difficult to find really effective measures only to govern scientific and technological advances. Some may even believe that governing of science

and technology is impossible. Nevertheless, this episode in Chinese history reminds us that nothing that is born out of human intention is unstoppable, for humans can always change their minds and start doing things differently. It may be difficult to imagine that the world, say, a hundred years from now will look more like the middle ages than the scenes from *Star Trek*, but at least this is not impossible.

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It is true that the knowledge and skills required in building and navigating large ships in early Ming China were confined only to a very few practitioners, which contributed to the complete success over time of the policy reversal. Since there was no equivalent in Ming China of a scientific society which disseminated knowledge to the wider public, isolated pockets of whole sets of knowledge and skills can then be wiped out easily. Nonetheless, what needs to be considered when we think seriously of how the scientific and technological transformation of society could be governed is just that science and technology are essentially human inventions and undertakings, born out of human beliefs and desires. Hence what we humans believe and value will invariably have a role to play when we decide which direction the course of scientific and technological advances should be heading.

Herein lies the complexity of the issue. The Genie can actually be tamed, or even stopped. But since he has done so much for us, how then can he be tamed? He is already out of the lamp, and we seemingly have lost the magic words which can put him back there again. So we have to learn to live with

him, to cope with him somehow. The recent experiences of the resistance toward agricultural products made from genetically modified organisms, where public opinions, notably in Europe and elsewhere, have become successful in influencing some direction of how research and development on the area, show that the course of the scientific and technological enterprise can indeed be influenced by society. For example, the US, the world's leading producer of genetically modified agricultural products, has announced in August 2002 that it may install a voluntary program to verify if the products have been genetically altered.[2] This action is a response to the growing demand of consumers in the European Union, China and elsewhere for a system of labeling which separates genetically modified crops from those that are not. There is also evidence that research and development on genetic modification of organisms and related technologies has been greatly influenced by public opinion.[3] In 1999, Monsanto, the world's most recognized company in this area, bowed to the pressure and announced that they would stop utilizing the technology that prohibits seeds from genetically modified crops from sprouting. This so-called 'terminator' technology would effectively bar farmers from saving their seeds for next year's

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[2] See "US May Set Guidelines to Biotech-free Crops, " available at http://www.reutershealth.com/archive/2002/08/06/eline/links/20020806elin039.html.

[3] An illustration of how powerful public opinion can be in shaping public policy can be found in the ongoing battle in Thailand between Biothai (http://www.thai.net/biothai/) and the National Biotechnology Center (http://www.biotec.or.th/). The former is a leading NGO group advocating against transnational corporations and what is represented by them, and the latter is a publicly funded scientific research center advocating more research and trying to lead the public to be more open toward the new technology. These two groups have been publishing web sites, pamphlets, books and articles, etc. aiming at influencing the public's attitudes toward the new biotechnology and its products. What is interesting is

planting and force them to buy more seeds from the company. Due to intensive worldwide reaction, this technology is now put on hold, perhaps forever.[4]

This influencing of how science and technology are done is a recent phenomenon. Once not so long ago it was believed that matters scientific and technological should best be left to the relevant experts to decide; many believed that the experts 'knew best' and should be let alone in their quests for more knowledge and better techniques. However, it is now widely believed that such a view is mistaken; science and technology are integral to society and culture, and the public have the duty to monitor how scientific research should be channeled according to established ethical guidelines. Society should have an oversight, not only on how funding is appropriated and distributed, but also on the future direction of research and development.

This change in the public's attitude in how science and society are related did not arise haphazardly; instead it arose as a result of the very rapid advances in science and technology in recent years, which have a direct impact on the bodies and the immediate environment of the people. In former times, advances in technology happened in areas which could be regarded as quite remote from the people's lives. Telephones, televisions and transistors do not have a direct impact on the bodies of the people. However, technologies such as GM food and cloning are directly related to the human bodies, and as such they

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that both agencies actually are talking about the same thing, but from totally different points of view.

[4] "Monsanto Drops GM 'Terminator,'" *The Guardian*, October 5, 1999. Available online at http://www.guardian.co.uk/gmdebate/Story/0,2763,201308,00.html.

naturally aroused strong reaction. Food technology, it is true, has been around for a long time, but the reaction against GM food is far stronger than, say, against food preservation technologies because in the former case it is the stuff of the food itself that is altered. In the case of cloning and other related technologies, humans are now standing on the threshold of being able to design how they look like at will. And this is understandably a cause for the strong reaction since the former technologies did not alter who we are nor how our bodies are constituted. Moreover, the relation between science and technology on the one hand, and global industries on the other is now much more closely intertwined than ever before. The experience from *Amata* shows that, when a culture is viewed from afar, the novel is then an expression of how the culture reacts to outside threats. This could lead to, or is an indication of, an organized awareness by the members of the culture that something needs to be done to counter these forces. The public have become much more organized in voicing their demands against those threats. With the help of the recent technologies of information and communication, communities are able to link to one another globally, which create a strong force able to influence the course of scientific and technological development in certain areas.

When the Genie is let out of the lamp, he naturally wanders about in the world, and naturally he comes across the lands and cultures where he was not born. Having been born in Europe and flourished in the west, today he is going south, to the so-called Third World. At first he came as the key instrument of the colonialists, empowering them to navigate the globe accurately, which led to

their overtaking of much of the world as their colonies. Later on the Genie became the power behind industry and commerce which forced open Third World markets and held them captive. Then during this globalizing era he came under the guise of such fashionable technologies as the Internet or the mobile phones, appearing to threaten not to overtake these former colonies by force, but, to change the mindset of the people. Taking the Genie as a metaphor for modern science and technology, which originated in seventeenth-century Europe and developed during the Industrial Revolution some two centuries later also in Europe, one finds him to be at first sight European in appearance and perhaps in his attitudes. In fact, however, he traces many of his ancestors back to the Islamic countries and to India and China, for the ideas which led to the birth of modern science in the west did come from these lands.[5] He is actually a hybrid, having many ancestors who hail from many different cultures. Nevertheless, after he was born in the west, he has been adopted by industry and commerce to become their powerful ally, and he apparently is threatening the very cultures of his own ancestors, for has become the source of the tremendous power wielded by the agencies of globalization in their quest for the satisfaction of their goals, which takes no heed of national or cultural boundaries.

Science and technology have produced an enormous amount of benefits for the human population; but at the same time a very high amount of damage

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[5] See, for example, Susantha Goonatilake, *Toward a Global Science: Mining Civilizational Knowledge* (Bloomington, IN: Indiana University Press, 1998), and Sandra Harding, *Is Science Multicultural?: Postcolonialisms, Feminisms, and Epistemologies* (Bloomington, IN: Indiana University Press, 1998).

has also been caused by them, such as global warming, environmental degradation, and so on. Moreover, the damage to the developing cultures caused by the alignment of science and technology with the global business forces is also a real one. Remember that in *Amata* science and technology are the villains precisely because they provide the egomaniac with the tool to satisfy and prolong his egoistic desire, an act which runs counter to the Thais' sense of cultural integrity and moral values. Science and technology have been at least perceived to be a key instrument by which the rich, developed countries continue to widen the gap between themselves and the poorer, developing countries find themselves increasingly at a disadvantage. This is one of the most serious consequences of letting the Genie out. The polarization between the forces of globalization and anti-globalization has indeed become explosive and lethal. The popularity of Amata shows that when science and technology are coupled with self-centered motifs and business interests, they are viewed negatively.[6] But the Genie is already out and cannot realistically be put back. Then what should we all do?

The spread of genetically modified plants is a good example of how the produce of science and technology coming from the West is threatening at least to change irrevocably the people's way of life. Currently the Thai government

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[6] Sakarin Bhumiratna also reports that GMOs are still unpopular and are perceived by the Thai public as an objectionable aspect of science and technology. See Sakarin Bhumiratna, "Report on Biosafety Policy Options and Capacity Building Related To Genetically Modified Organisms in the Food Processing Industry of ASEAN," p. 21. Available at

prohibits growing genetically modified cotton in open fields. Such cotton could only be grown in controlled laboratories for research purposes. However, there are reports that seeds of GM cotton have leaked to the growers, and tests of cotton in many provinces in Thailand have shown positive results for genetic modification.[7] Many rightly fear that the spread of GM cotton will make the growers dependent on the company that produces the seeds. Thus the growers will change from autonomous entrepreneurs to industrial workers whose work consists merely of processing the GM-seeds are gain only some added values when they sell the cotton wool. In another area, the spread of the Internet and other communication technologies has also threatened to change the outlook of Thai culture almost beyond recognition. Since diversity means that there be more things, more options to choose from, hence less chance for a complete disaster, then these homogenizing impacts on cultures are causes for concern. No one can ever be certain that, in the long run, the belief system that constitutes Thai culture might not be found useful in some way or another. It is better to have more different things around than just a lot of the same things.[8]

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http://www.binas.unido.org/binas/reviews/BiosafetyPolicyOptionsandCapacityBuilding.pdf.

[7] "An Open Letter to Farmers Groups and Allied Environmental Organizations Throughout the World: The Case of Monsanto Releasing Prohibited Cotton Breed to Thai Agricultural Areas," available at the website of Biothai, a leading environmental NGO in Thailand, at http://www.thai.net/biothai/cottonleak.doc (in Thai). The letter calls for Monsanto to be responsible for the leak of prohibited GM cotton seeds to many growing areas in the country. However, my interview with a scientist who has been working with cotoon growers revealed that most growers prefer Monsanto's cotton than the traditional breed because of its better resistance to pests.

The uneven spread of science and technology has let to many 'divides,' chief among which is the divide between those who possess knowledge or who can gain benefits from it, and those who do not.[9] More specifically there is the 'digital divide' between those who enjoy the benefits of information technologies and those who do not.[10] There are also talks on the 'genetic divide,' emphasizing the disparity regarding access to benefits of the current genetic technologies.[11] The digital divide takes place when the knowledge and benefits of science and technology are concentrated only among a few, and so is the case for the genetic divide. What needs to be done to help solve this situation? The Genie is perceived in Thailand to be a monster. If he is to be able to help these people, then how should we act so that he can be of real and lasting help?

The disparity between the First and the Third Worlds and the deep polarity between globalization and its resisting forces are mirrors of each other. The unequal power relation between the First and the Third World shows that

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[8] See my paper on "Cross-cultural Epistemic Practices," *Social Epistemology* 16(2002): 83-92 for more details on this argument.

[9] See Julian Cribb and Sari Hartomo, *Sharing Knowledge: A Guide to Effective Science Communication* (Canberra: CSIRO Publishing, 2002) for a discussion of the need to share knowledge equitably and farily in the world in order to maintain global security. However, the approach I am proposing in this paper mainly differs from that of Cribb and Hartomo in that the latter are more concerned with communicating the results of scientific and technological enterprises rather than with proposing a new kind of institutional model wherein science and technology should take place in order to reduce the divide problem.

[10] Soraj Hongladarom, "Hope in the Information Society," in Kuruvilla Pandikattu SJ, ed., *Hopefully Yours: Interdisciplianry Essays on Hope from Scientific andReligious Perspectives* (Jnanam: Pune, 2002); see also Mark Warschauer, "Reconceptualizing the Digital Divide" First Monday 7.7(July 2002), available at http://www.firstmonday.dk/issues/issue7_7/warschauer/index.html.

[11] Calestous Juma and his colleagues have set up a research project on biotechnology and globalization, in which thetopic of the genetic divide is discussed. See http://www.cid.harvard.edu/cidbiotech/projects/genetic_divide.htm. The web site is

the West already has an enormous advantage when countries in the world enter the globalized arena to play the same game of trade and development. No matter how much the West are saying otherwise, the fact is that the success of the West is resented by many factions in the developing countries, who argue that the global game of trade and commerce is where exploitation of the Third World is taking place. This globalized trading relation has become, in their eyes, the chief means of colonization in this age of late capitalism. It is true that globalization can also act on behalf of the poor countries. Indeed many poor countries will cry foul immediately if the United States or the European countries shut down their domestic markets from Third world products. This shows an ambivalent attitude of the poor countries toward globalization. Nonetheless, from the point of view of the unequal power distribution in the world, globalization does seem to be acting more in favor of the West than otherwise. Thus the task for us is not to shut down globalization, but to find ways so that it works more in the favor of the poorer countries.

In fact the forces of globalization and those resisting it are occurring together, creating a situation that Roland Robertson has termed 'glo*c*alization.'[12] Making beneficial use of science and technology requires that the community doing so needs to be involved in globalization in some respect. The threats of globalization on local cultures and economies are many, but so are the obvious

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advantages. Trying to achieve a level of development in the developing countries clearly require the instruments of globalization that could threaten their cultures. If science and technology are indeed part and parcel of the process of globalization, and if they are necessary for development and for achieving a level of quality of life, then a way needs to be found so that science and technology become part of the solution rather than the problem.

Science and technology have become part of the problem because, as we have seen in the *Amata* example, they are perceived, in many cases rightly so, to be allies of the globalized business forces which do not seem, at least to the eyes of those who are affected by globalization, to care for cultural identities and sensitivities. This bundling together of science, technology and globalization can be vividly seen in the attempts of transnational techno-agricultural corporations to market their products in the Third World, products which many poorer countries have no hope to match for a foreseeable period. The introduction and marketing of Golden Rice,[13] which is genetically engineered to include vitamin A, has sparked widespread resistance in the Third World, despite the possibly noble intention of the developers because there already exist ways of getting

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[12] Roland Robertson, "Glocalization: Time-Space and Homogeneity-Heterogeneity," in Mike Featherstone, Scott Lash and Roland Robertson eds., *Global Modernities* (London: Sage, 1995).

[13] Biothai has released a document detailing the story behind the creation of Golden Rice and its possible benefits and threats to farming communities in "Golden Rice: Vitamin A Supplemented Genetically Modified Rice," available in Thai at http://www.thai.net/biothai/gldrice.doc. The document is aimed at providing background knowledge to average Thai readers. The main argument in the paper is that Golden Rice should be resisted because it represents a threat to the diversity of species as well as an attempt by the western transnational corporations and scientific establishments to monopolize food production.

vitamin A without relying on the product and because the population of the Third World are seen to be almost indefinitely dependent upon these products manufactured in the West. And as if to rub more salt into the wound, these products are *food* products, which many countries in the Third World are supposed to be able to produce by themselves if nothing else.

Such a way would then start from decoupling science and technology from being the tools of encroachment and colonization (culturally as well as commercially) to the tools by which the locals are empowered in their struggles to maintain their identities and their valued ways of life. In other words, in order for science and technology to become real partners for development of the poor countries, they need to be distanced from the globalized businesses and become allies of the villagers themselves.

That science and technology have become key tools for developing countries to improve their conditions are beyond any doubt. In fact many countries in Asia are embracing the new technologies and are fast developing their capabilities to increase the level of competitiveness. India and China, for example, are fast developing their scientific capability programs in order to upgrade themselves to the level of the European countries. Furthermore, It is realized that the goals of development, such as the ones outlined in the Millennium Goals (http://www.developmentgoals.org/)[14] cannot be realized

[14] According to the Millennium Summit in 2000, there are eight goals of development which serve as benchmarks for development of the member countries of the United Nations. These are (1) to eradicate extreme poverty and hunger, (2) to achieve universal primary education, (3) to promote gender equality and to empower women, (4) to reduce child

without science and technology. However, this will not be realizable if the science and technology involved were not free from the interests of the multinational, globalized business. Instead they must cater to the local interests and needs. Science and technology must be integrated into the fabric of the cultures of the developing countries themselves. This does not mean merely that the products of science and technology should be made available to the population, but that science and technology should become parts of the normal lives of the population too. Science and technology do not subsist in a vacuum; hence the socio-cultural context in which they are necessarily embedded could be made to become more identifiable with local cultures. This is a complex issue that demands a much fuller investigation that is possible here; nonetheless, we shall be able to have a glimpse of what this really means if we reflect on how science and technology have hitherto been related to their socio-historical contexts and how a new institutional model could serve as their contexts in such a way that they become keys in creating a more secure world.

Such a way could start from recognizing that science and technology are a system of knowledge and application designed to answer to a particular set of needs, these needs then define how science and technology are or should be practiced within a culture. The commonly accepted belief among most scientists and policy makers is that science and technology are neutral and are exactly the

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mortality, (5) to improve maternal health, (6) to combat HIV / AIDS, malaria, and other diseases, (7) to ensure environmental sustainability, and (8) to develop global partnership for development.

same everywhere they are practiced. This belief appears to coincide nicely with the ideology of neoliberalism which aims at spreading globalization and the logic of rational efficiency to all areas of life. However, since cultural differences still remain very strong and powerful, the belief that globalization should spread in such a way as to obliterate differences among cultures is clearly not a well founded one. Science and technology coupled with neoliberalist ideology and globalization would then be a very volatile and potentially destructive mixture. Hence a new way of thinking on how science and technology are to be conceived and practiced. Science and technology should become more aligned with the local communities and cultures, answering their questions and serving their goals and values.

The Thai people's apparently negative attitude toward science and technology, as seen in the reception of *Amata,* would surely be detrimental toward any attempt to realize the goals of development. Science and technology would be in a better position to serve the majority of the world's population if they are localized and become more integrated with the actual lives and practices of communities conceived of in a smaller scale than just national groups. Such integration can be done by putting science and technology to work more directly for the benefits of the people and the communities. This issue may not be quite visible in the developed countries, where science and technology have been much more integrated into the normal lives of the people than in the developing world. However, I believe this is a very important issue for those whose daily lives consist of struggles for survival, those who are yet to reap

fuller benefits from the advances in science and technology. For this integration of science and technology to the lives and the cultures of the people in the developing countries to be possible, research and development should aim at solving the local problems and serving local needs. It will not do simply to lump all the poorer peoples in all regions together, pretending that they suffer from the same problem, and direct the goal of research and development under that assumption. The policies of the transnational agribusiness corporations have seemed to be to look at the world's population as if they were a monolithic whole. Put in the genetically engineered crop which is more nutritious anywhere there is malnutrition, and the problem will go away. Such a thinking ignores the vast differences among the many regions and cultures of the world, each of which may need more individual attention than such a thinking would allow. For example, a region may have a culture or its own system of politics and administration that does not allow greatest possible benefits to their own people should such a direct helping occur. Simply putting in the marvelous technological products to these regions would be tantamount to helping those who are already powerful in their own respective cultures and regions. Furthermore, introduction of any technological products would almost invariably brings in cultural baggage that is alien to the cultures at the receiving end, creating a clash which could be disruptive and counterproductive if enough care were not taken to insure these issues that are unique to each region and culture.

As the international agencies are obviously not able to attend to all the local needs, it is quite clear that the locals themselves need to be able to solve their own problems as they occur. And as these problems very often need scientific knowledge and technical skills, these latter should then be part and parcel of the lives and the cultures of the local communities. This issue is a very complex one, and cannot be dealt with in any detail in this paper. Nonetheless, we can have an overview of what needs to be done if we bear in mind that, as the *Amata* story has shown, one of the root causes of the feeling of alienation many in the developing world (and indeed many in the developed world too) are having against science and technology is that the latter nowadays are confined to the expensive and restricted laboratories, employing teams of scientists in white gowns and producing knowledge that is patented and is geared almost exclusively for profit purposes. It is quite understandable while even the urban poor or other disenfranchised groups in the West could also feel indifferent or possibly hostile toward science and technology because the latter do not seem to have helped them.

The way, then, is to find ways so that science and technology become integral to the local communities. The current model of science funding mostly through private businesses may not be the only workable model now, especially if it has created divides and feelings of alienation. But the older model of funding mostly through national governments (as well as the very old model of the lone, gentlemanly scientist working out of his own inheritance) does not work well in these days either. Moreover, the universities have been perceived

as places where independent research; however, since university research has largely been funded through governments or corporations, they seem to be dependent on these two earlier models. Thus, we stand in need of a new model , which is community-based. The idea is that, apart from science being directed by the national governments nor the transnational corporations, it should also lie in the hands of the communities themselves, with more impetus toward the latter. Details of this model have yet to be worked out, but the basic idea is that funding and direction of science and technology should increasingly be based on civil societies and communities. For example, rice farmers in the Northeast of Thailand, where there are chronic problems of drought and soil salinity, may organize their own research and development programs aiming specifically at solving these problems. Since in this new model science and technology are integrated tightly with the values and cultures of the rice farmers themselves, there is thus less chance for alienation and conflicts which have hitherto hampered many previous attempts by the Thai government to solve the same kind of problems by employing scientists from outside the communities, who often think that they are superior to the farmers, creating conflicts and resentments.

Funding for such research and development programs need not come only from the farmers themselves; instead it could also come from networks of communities suffering from the same kind of problems for which the programs are designed to solve. Alternatively the role of research and development in the communities need not be large scale, but at a scale small enough for the

communities to be to an extent independent in finding solution to their own problems. This can be seen, in the case of the rice farmers in the Northeast of Thailand, when the communities modernize and systematize their collective skills and wisdom so that there is an integration of modern and indigenous knowledge systems. This system is different from the nationally based model of funding since it reinforces the idea of self help and community strength, which is currently lacking in the Thai context.

In this sense, the model of how science and technology should be developed in the Third World that I am offering here differs quite significantly from the one proposed by Shahidullah.[15] Shahidullah proposes that the model should follow what he calls the 'innovative engagement strategy', which stresses development of modern social structure of science in the Third World rather than focusing exclusively on the peculiarities of indigenous knowledge cultures or on transplanting Western rationalities and mentalities onto the Third World countries. What Shahidullah has in mind is an integration of science, technology and development that is also responsive to the local needs of the Third World countries. He writes: "What is needed in Third World science and technology is a strategy of innovative engagement through which qualitative improvements in science and technology will be achieved with specific focus on the improvement of traditional and strategic development sectors. With this in mind, such a strategy of innovative engagement should be based on openness to

Western science and technology, dynamic integration among science, technology and development, and institutional innovations."[16]

What is missing from Shahidullah's model is the role of civil societies and communities in directing where science and technology are heading. In designing innovative institutional arrangements, one needs to bear in mind that, in the context of many Third World countries such as Thailand, development schemes have until very recently been exclusively top down. Decisions, including those concerning science and technology policies, are made at the top by bureaucrats and politicians, and the local communities are treated as if they were made of inert material. The universities cannot be of much help because they have traditionally focused much more on teaching and training rather than doing research. Hence the universities have been breeding grounds for the élites to reproduce themselves rather than for new, useful knowledge. This has created a sense of alienation as well as helplessness among the local communities, who are led to believe that they could not do anything on their own without expert help from the government. Hence if this situation is to change, one must then start from designing a model where activities that constitute science and technology originate from the local communities themselves. How exactly to accomplish that is a hugely complex task, but I

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[15] See Muhammad Shahidullah, "Science and Technology Development in the Third World: Competing Policy Perspectives" *Knowledge, Technology and Policy* 12(1999): 27-44.

[16] Muhammad Shahidullah, "Science and Technology Development in the Third World," pp. 41-42.

believe we can get going by looking for ways to decouple science and technology from the globalized business interests discussed above.

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Those who oppose to globalization usually cite the adverse effects that globalization has wrought in the world, such as the enormous control that the transnational corporations have on the local countries and communities. But if globalization is to be turned over so as to become an ally of the locals rather than the enemy, then a way could be found toward a more secure and equitable world that is less afflicted with the violent conflicts. The point is that, if the process of globalization, including that of modern science and technology, could be co-opted or integrated into the fabric of the local culture, then this will start things in the right direction. Globalization could be turned over to the locals when they derive benefits from it, through a global trading system that is fair and equitable, for example. Based on the fact that there are such glaring disparities in knowledge and power between the West and the rest of the world, a fair and equitable trading system just cannot assume that there exists a level playing field for everybody. The idea of affirmative action in the US is predicated on the belief that blacks and other disenfranchised groups do not enter the field with equal resources; thus in order to create a really fair system they have to be provided with some extra help in order to compensate for past wrongs. Analogously perhaps, the global trading system could do the same thing by providing the developing worlds with the same kind of push in order to create a fairer system for everybody.

An example of the co-option by the local culture of the global presence can be seen in how the Internet is being absorbed as a part of Thai culture without destroying what could be taken as its core identity. Observing the Internet also enables us to see how both unintended consequences and serendipity, as well as conscious, deliberate planning and design, play a large role in shaping up the world as we see it today. If there is anything that can accurately be described as the physical embodiment of globalization, that could be nothing rather than the Internet and its related information and communication technologies. Global exchange of information is now common place; funds are transferred across the globe in less time than the blink of the eye, and with no regard to national sovereignties. Words starting with the letter 'e' are ubiquitous, ranging from e-commerce to e-doctor to e-everything. This phenomenon does not restrict itself only to the West, but is now fast spreading everywhere.

The Internet originated as a military computer network designed to withstand nuclear attack. The nature of the network is such that when there is an attack disrupting a line of communication at one place, the communication will be rerouted to the available remaining lines so that the communication would not be lost. Later on it became the major tool of scholarly and academic communication, and only a few years ago did it become as ubiquitous as it is today. A huge literature has now sprung up detailing the impact of the Internet on society. Most of it documents how the Internet has created an impact on various aspects of society and culture. Mark Poster, for example, sees the Internet as crucial in transcending national boundaries, rendering them virtually useless.

What emerges is according to him a kind of 'postnational identity' instead of the traditional feeling of attachment to one's nation-state that is characteristic of nation building formed by the spread of print media.[17] Many, such as the late Michael Dertouzos, Nicholas Negroponte, and Bill Gates, see that the Internet will liberate workers from being tied up to their offices, increase productivity many times, encourage free flow of ideas and information which could topple governments and carry on the banner of individual freedom to every corner of the world.[18] Many, on the other hand, rather pessimistically see that the Internet has the power to change the way people think and believe. An example is Peter Hershock, whose phrase 'colonization of consciousness' characterizes this tendency of the Internet.[19] Wherever the Internet goes, so argues Hershock, it engenders a disruption in the way of lives of the local people. Their consciousness is 'colonized' by the media in such a way that they lose the ability to think the way their ancestors used to do before the technologies came to them.

Both of these optimistic and pessimistic viewpoints on the Internet share one thing in common, that they regard the impact of the Internet as linear and unidirectional. That is, they look at the impact of the Internet as irreversible. Once it is introduced, certain kinds of changes or impacts are inevitable, whether

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[17] Mark Poster, "National Identities and Communication Technologies," *The Information Society* 15(1999): 235-240.

[18] M.L. Dertouzos, *What Will Be: How the New World of Information Will Change Our Lives.* (New York, NY: HarperCollins Publishers, 1997); Nicholas Negroponte, Being Digital (Vintage Books, 1996); and also Bill Gates, *The Road Ahead* (Penguin, 1996). These are some representatives of for an almost boundless optimism for our digital future.

[19] Peter Hershock, *Reinventing the Wheel: A Buddhist Response to the Information Age* (Albany, NY: State University of New York Press, 1999), p. xii.

they are good or bad. However, in a series of research I have found that this belief in the autonomous and uncontrollable nature of the Internet is not tenable. When Thai people are connected to the Internet, instead of being taken away by the technology and losing their identity, they nonetheless largely retain many characteristics of their culture and find ways to adopt the Internet into their cultural horizon. This then seems to belie the claim that the Internet is an autonomous force bent on homogenizing the world's cultures. In a previous study my wife Krisadawan, who is a linguist, and I found that a pattern linguistic politeness strategy in Thai web chat fora bear many features that characterize the way Thai people interact linguistically outside of cyberspace. More specifically, we found that in threads of asynchronous discussions in a popular web site, the participants, who almost always use Thai language in their discussion, appear to be much more helpful to one another even though the discussion is very intense. There are many linguistic strategies being used in the thread which show that the participants care for one another's feelings and nobody wants anybody to be excluded from the group, even though they disagree vehemently about the topic they are discussing. The group thus appears to be much more cohesive than in an ordinary online group in the West. And in our informal but long term observation, we have found that Thai students tend to be much more deferential (seen in the frequency of their uses of deference markers in language) when they send an e-mail to their teachers. Writing their e-mails in English (which is not a normal thing to do in Thailand—but here we insisted that the students write to us in English), the students often end their sentences

with Thai particles that signify intimacy as well as politeness. This may contrast which a message of an average American student writing to her professor.[20]

These examples seem to show that the Internet may be homogenizing only at a certain level, and that there is a significant level of cultural integrity amidst the use of the technology itself. It is true that the Internet is homogenizing in the sense that people all over the world have to learn to use the computers, know how to type and perhaps share some common beliefs, such as computers need an operating system to work, in order for them to be able to be hooked up to the rest of the world. That, however, by no means shows that the Internet is changing the world's cultures in such a way that all people of the world would in the end think and behave the same way in all respects. Technology has a way of getting adopted and assimilated into the cultural milieu wherein it is introduced. Thus when globalization brings in foreign cultures, there is a reason for optimism when the local culture could actually co-opt the global culture and adapt it in its own way. The technology of gunpowder is well known to originate in China, but when it was introduced to Europe, its purpose changed dramatically. In China the gunpowder was confined largely for ceremonial and ritual purposes (the Chinese knew how to use gunpowder for military purposes too, but its use was rather limited), and in the hands of the Europeans it turned out to be a necessary ingredient in a variety of weapons of

[20] Krisadawan Hongladarom and Soraj Hongladarom, "Politeness Strategy in Thai Computer-mediated Communication," paper presented at the International Symposium on Linguistic Politeness, December 7-9, 1999, Faculty of Arts, Chulalongkorn University. Forthcoming in a volume edited by Robin Lakoff and Sachiko Ide.

mass destruction. This seems to show that it is culture that controls technology rather than the other way round. Having such a tremendously powerful means of destruction as the gunpowder in hand, the Chinese did not do much with it except for producing fireworks and firecrackers. Chinese culture does not see a serious point in exploiting the military and the destructive aspect of gunpowder because for millennia there had been actually no other cultures powerful enough to pose a threat to its dominance in its part of the world. Chinese culture became the model which other cultures in the region took as environment and imitated in earnest. In this sense there was little need to assert the military might and the destructive power brought about by the gunpowder because to the Chinese to show superiority in morals was far a nobler thing to do than to show superiority in physical power. However, when gunpowder came to the Europeans' hands, its use changed dramatically. In terms of globalization of culture, then, the way cultures adopt foreign technology helps us see that it is possible to maintain cultural identity amidst the globalization of cultures that is taking place. And if this is so, then my model of localized and community-based science and technology is not a far-fetched proposal.

If the Internet is indeed the engine of globalization, then what is happening in Thailand shows that the relation between the Internet and local cultures is not a one-way street. Local cultures have a way to adopt the Internet into their lifeworlds; systems of meaning peculiar to a culture taken the Internet into within their circles and the Internet becomes another aspect of the cultures. The Internet clearly changes the cultures, but the technologies themselves are

also changed in some way. At my university, the administrators are now proposing a new Bachelor of Science program in software engineering, which is to be conducted entirely online. The rationale behind the program is to open up opportunities for students in the remote areas, which could translate into economic growth in the countryside. This program, however, is facing stiff opposition from the faculty, who view that the program will compromise academic standard. The faculty fear that, if the plan went through, the online learning strategy will later cater to the more affluent students in the urban areas instead of those poor students in the countryside. The faculty are proposing that online learning should at best be a supplement to a traditional program, and they insist that the students would be shortchanged if they were to meet their teachers only 'virtually' but never in real person. They also insist that local educational institutions should be strengthened so that they could better serve their local clientele in the countryside, rather than relying on a single national university (such as Chulalongkorn) to do all the job.

The debate may sound universal, but in fact it centers on how the technology is used within the milieu of the Thai culture, which now is centered on the debate between those who want to change things fast, and those who are more cautious. In the same way as the analysis of the language of web chatrooms shows, this debate between the faculty and the administration shows that the influencing of the Internet and its related technologies is not a simple matter of adopting the technology and waiting for the inevitable change. Even though the plan of the administration were to be followed, it is never certain that the

outcomes of the program would be exactly as visualized by those who are promoting it. It is also uncertain what kind of graduates my university would be producing, and what kind of problems there would be when there were two kinds of students—the ones who have had the traditional campus-based education, and those whose educational experiences were entirely online—both of whom graduate from the same university.

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Viewed within the context of globalization, the debate between the faculty and administration of Chulalongkorn University looks very familiar. It is another expression, in another area of life, of the conflict between untrammeled globalization and the forces resisting it. As for the problem facing Chulalongkorn, its solution is clearly neither to shun all the technologies together, nor to follow them blindly without thinking through how they can best be used to promote the goals and values of the cultures or the communities. Thus a way needs to be found so that the technologies can be incorporated into the lives of the people and their practices without undue conflict. I have argued that science and technology need to be incorporated and integrated within the fabric of the lives and practices of the people in the local communities and cultures. What this means, in the case of this debate on online learning, is that the science and technology involved in creating the infrastructure that makes online learning possible need to be such that they are provided meanings within the overall system of meaning giving and interpreting activities that constitute a culture. More concretely, this would mean that the aim of the program is not to

turn students into drones working for the transnational corporations or for globalized business enterprises without any linkage with their communities. The technology can be used, and it must be, but only with the framework of community practices and belief systems in mind.

And the same goes for the use of science and technology in local cultures and in the Third World in general. As the tragic event of September 11 shows, the conflict between globalization and the forces resisting it can be very, very volatile and lethal. Fortunately perhaps, the examples on how the Internet is adopted into the fabric of Thai cultural practices alluded above may show that it is possible to find a way out of the dilemma, a way that could provide us with the benefits of the Genie's power without thereby being crushed by it. All of us are now standing at a highly precarious point in world history, a point where our collective decision will have a permanent repercussion on the course of the future. Now humans have the power that was once the exclusive domain of the gods. We now have the potential power to design everything, including our own bodies, at will. The future of the planet, including the lives of all the flora and fauna, lie entirely within our hands. This necessitates that we take very seriously our value systems and be absolutely clear of what kinds of values should be adopted. Whatever these value systems will turn out to be, they need to share this in common, that it will not let the power of the Genie benefit one section of the world's population only. The power needs to be shared equitably and fairly. I emphasize that this is one of the essential element in any value

system that informs human beings in their collection decision, with their tremendous power given them by the Genie, to shape the course of history.

Our terrifying prospect is that we humans are poised to become gods, if we are not so already. As gods we are obligated to act responsibly, justly and magnanimously; otherwise we will be nothing but monsters.