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The CADMUS Journal

The acronym of the South-East European Division of The World Academy of Art and Science – SEED – prompted us to initiate a journal devoted to seed ideas – to leadership in thought that leads to action. Cadmus (or Kadmos in Greek and Phoenician mythology) was a son of King Agenor and Queen Telephassa of Tyre, and brother of Cilix, Phoenix and Europa. Cadmus is credited with introducing the original alphabet – the Phoenician alphabet, with “the invention” of agriculture, and with founding the city of Thebes. His marriage with Harmonia represents the symbolic coupling of Eastern learning and Western love of beauty. The youngest son of Cadmus and Harmonia is Illyrius. The city of Zagreb, which is the formal seat of SEED, was once a part of Illyria, a region including what is today referred to as the Western Balkans and even more. Cadmus will be a journal for fresh thinking and new perspectives that integrate knowledge from all fields of science, art and humanities to address real-life issues, inform policy and decision-making, and enhance our collective response to the challenges and opportunities facing the world today.

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The Digital Era: Challenges for the Modern Mind*

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Abstract

The digital media are the new interface between mind and world. They enable us to gain instant access to an infinitely expandable collective memory system. This is an indispensable breakthrough, but has the potential to seriously violate the ancient co-evolutionary pact between brain and culture which has kept the rate of cultural and technological change within tolerable limits. Traditional cultures, with all their flaws, stayed well within the adaptive capacities of the individual brain. However, the recent explosion of digital culture has placed all forms of traditional culture under serious challenge.

The principal challenge is a cognitive one: the economic system is increasingly tethered to a machine-driven agenda that either ignores or downgrades the most basic needs of the human mind. The result is a governance system that is out of control, in which success depends upon fitting the individual mind to a largely machine-driven agenda, rather than vice versa.

Three especially serious concerns stand out: (1) how to maintain the autonomy of the individual mind in the context of massive and sophisticated external programming; (2) how to construct networks of trust in an environment of anonymity and manipulation; and (3) how to place the most basic needs of the human mind at the top of our list of governance priorities.

The digital media are the new interface between mind and world. They cannot be avoided because they have become essential for survival. They enable us to gain instant access to an infinitely expandable collective memory system. Every corner of the world has been reached by this system, through cell phone networks and the Internet.

This is an indispensable breakthrough, but it is also disturbing and disorienting. It represents a massive change in human interconnectivity that comes with intellectual and emotional baggage. All forms of traditional culture are under challenge. It is fair to say that our conception of human nature itself is also under challenge.¹

This is a revolution, perhaps one of the greatest in human history, and we are in the middle of it. But it is not so much a political or economic revolution as it is a *cognitive* revolution. The new media are aimed at the mind. They are interconnected with the sense organs. They

* Based on a keynote lecture to the Wallenberg Foundation Symposium on Technologies for Learning in Helsinki, Finland in August 2013

aim their sophisticated, carefully engineered messages directly at the memory systems of the brain. They actually restructure memory, changing both the storage and retrieval systems we depend upon, and they are addressed directly to the source of our experience, and aimed at consciousness itself.

Moreover, the digital media are omnipresent. The old religions and ideologies enforced influence by means of daily rituals, sermons of an hour or so once a week, and in small numbers of books and pamphlets, but their available means of influencing people were very limited besides the tools available to the new media. For much of humanity today, the media are present every hour of the day, in the bedroom, living room, and boardroom; on screens in subway stations, airports, and store windows; on buses and automobiles; and in schoolrooms and offices. Smartphones are in our pockets; laptops and tablets are in our briefcases and backpacks. Wearable devices are already appearing, and we are soon going to see flexible new micro-devices insinuated into the fabric of our bodies and clothes.

Politicians are using the new media for self-promotion, rather than seeing them as a serious challenge that might require a major adjustment to our political system. Educators are being forced to reconsider what they should be doing with the new media, but they have no visible plan at this point, at least none that is not tainted by self-interest, whether in the massive revenue-generation opportunities afforded by Massive Open Online Courses (MOOCs), or in fundraising and personal careerism.

The revolution has just begun, and counter-revolutions are inevitable. We should not be surprised if reactionary movements gain momentum. The new media are a central component in the rewiring of human society by machines, and the replacement of human work with robots that comply more easily with highly centralized systems of control. There will inevitably be pressure to decentralize control, in such phenomena as hacking, leaks, whistleblowing, and deliberately decentralizing Internet projects like Wikipedia. But there is also continuing pressure to privatize and monetize every aspect of the Internet, and bring it under corporate control.

1. Finding Context

If this is a period of cognitive revolution, it follows that cognitive science should have something useful to say about its significance. At the very least, what we know about the mind should be able to provide some context that might make the new media, and digital culture, more intelligible. A coherent theoretical framework might help us think more clearly about what these radical new technologies are doing to our minds, what this implies for the way we run the human world, and what we should expect of ourselves.

A massive cognitive revolution also implies an equally massive cultural revolution. Cognition and culture have been locked into a symbiosis for a very long time and, given the nature of the new technologies coming down the line, that relationship is leading toward a major cultural shift on a global scale: the importance of knowledge stored in the brains of individuals is shrinking, relative to the size of our communal knowledge bank. Where

individuals once held most of our collective knowledge in personal memory, knowledge is now overwhelmingly stored in new media, outside our biological systems.

Our minds and brains are living evidence of where we started the human journey: as animals living in the wild. Distant human ancestors evolved from African primates during the Miocene era, five million years ago, and this is evident in our anatomy; we are still very much cast in the primate mold. Our vision, hearing and basic emotional repertoires greatly resemble those of Great Apes. Human intelligence is somewhat more evolved than that of our ape relatives, but we should not exaggerate the size of the cognitive gap. Collectively, we may be very clever and able to achieve remarkable things; but individually, and especially when isolated from society, we are quite limited creatures. This applies even to our so-called geniuses, most of whom are more a product of their historical situation than they might like to admit.

Our particular subspecies of humanity has lived on this planet for only about 150,000 years, and for most of that time our way of life was very slow to change. During the last few millennia, the rate of change has accelerated; and during the last two centuries it has exploded into an exponential growth curve that has suddenly increased our numbers sevenfold, while our technology suddenly reaches every corner of the planet.

This has happened so fast that the speed of our ascent is difficult to place in historical context, and somewhat worrying for anyone aware of the typically slow pace of adaptation that characterizes most biological systems. There seem to be no precedents for the speed of our sudden rise to dominance of this planet, and for the stress this imposes on our capacity for adaptation. We have arrived at a point in history where our range of intellectual possibilities as a species has greatly expanded, mostly because of the new digital web encircling the world.

However, as might be expected, we have not all travelled at the same speed. Some societies have developed very fast; others very little, and some, apparently, not at all. Whether due to the accidents of climate, the vicissitudes of geography, or the availability of resources, human societies have not all developed at the same pace, nor arrived at the same cultural destination. Some societies discovered metal technology and writing very long ago, while many never reached that point. Moreover, the ones that got there first have tended to move farther and farther away from those still more or less stuck at the starting line, and they are constructing a globalized economy that is encircling the entire planet. This uneven race has left our planet with a wide variety of human cultures living side by side, colliding and interacting, while existing at vastly different stages of development. Even those few small groups that have remained relatively isolated are now inevitably influenced by the wider world.

Cultural collisions create tremendous stress. This is usually treated as an economic and political problem, but it is also, and perhaps even mostly, a cognitive problem. Societies on our planet do not all operate on the same assumptions, and do not share values and norms to the extent that they must. Our traditional bag of economic and political instruments does not seem to be working very well in resolving these stresses (if it ever has). Thus, it might help to examine the problem of cultural compatibility from the vantage point of cognitive science;

that is, by looking at the world as if societies were primarily systems for governing thought and memory, and only secondarily concerned with what we normally call government and economic growth.

We have good reason to believe that dissonance between cultures has much deeper roots than a mere mismatch of specific values and norms. The sources of disagreements between any two cultures at roughly similar stages of historical development, such as between the subcultures of Christian Europe, are fairly obvious, and attributable mostly to the pursuit of incompatible self-interests. So are disagreements between say, Russia and China, or between Pakistan and India. But the sources of disagreements between small tribal groups and the large national governments that exist in Asia, South America, and Africa, or between hunter-gatherers and any developed modern state, are so deep that one wonders where to start.

This may sound like the myth of progress: well, yes it is, but without any moral implications whatsoever. So-called developed societies are not necessarily more moral, nor are their citizens necessarily any more intelligent, in terms of innate potential; quite the contrary. But it would be foolish to deny that the president of, say, Citibank, or the chief scientist at CERN does not possess massive cognitive advantages over their counterparts in a Stone Age hunter-gatherer society in the Amazon, regardless of whether they would prove, on closer examination, to be on equal moral or intellectual terms.

The reason for this is that it is the larger cognitive *system* that matters most, not the individual. Collective cognitive power is more a function of the society as a whole than it is of its individual members. Intelligence, as manifest in such things as new technologies, and complex ways of life, is largely a product of a collective system that coordinates the intellectual resources of an entire society. The collective cognitive system even exerts influence on gene expression during development. By means of this kind of influence, social systems can profoundly influence the way individual brains develop, and the way growing minds allocate their inborn resources.

Before the twentieth century, societies that were very far apart in cognitive resources tended to be geographically isolated from one another (with some notable exceptions). We can easily forget how much of the Earth was still very difficult to explore a mere two centuries ago, and how little we knew of societies that were far removed from the hot spots of development. The globalization of economic activity has brought many of those societies, isolated from the mainstream in terms of collective cultural experience, into close proximity and inevitable collision with the mainstream. Like it or not, we all now share a common economic and communication space.

Moreover, that space is getting crowded and more complicated. Some small societies still live in the late Stone Age and continue to exist as hunter-gatherers, without writing, agriculture, or metal technology (as most humans did until 10,000 years ago). Others are locked into

“Collective cognitive power is more a function of the society as a whole than it is of its individual members.”

various historical prisons. Even some highly literate societies still maintain theocratic rule, living and governing as many societies did a few hundred years ago. A few secular high-tech states have completely broken with the past, and have come to dominate the planet, not through any superior moral force, but rather through their overwhelming success in merging technology with social organization to create a powerful new apparatus of thought and invention.

This recently achieved global power is cognitive power. Societies that master it dominate because they have an institutionalized system to merge technology and knowledge, and a collective apparatus of thought and memory incomparably more powerful than anything we had before. Moreover, this revolution is just starting. It will go much further.

“How can we design a system that will harness the collective intellectual and adaptive power of the human species?”

The question is: how can we design a system that will harness the collective intellectual and adaptive power of the human species? We cannot afford to underestimate the scale of the challenge facing us. The variety of human tribes, nations, and multicultural entities on the planet is truly staggering, and we are all now marching toward a kind of global forced marriage, largely because of the spread of communication technology and rapid transportation.

Technological change imposes challenges on society. The juxtaposition of so many disparate societies represents a historical convolution of human history and prehistory back upon itself that amplifies both the size and number of challenges. It is as if all periods of human history were suddenly present at once: all the migrations and diasporas, all the tragedies and victories and great inventions, all the strange ideas, all the different habits and customary practices, suddenly present at once, in a global collision.

All this complexity needs governance, and a governance structure is gradually emerging, consisting of a rather loose collection of institutions and governments, dominated by several large super-powers. There is a new elite emerging, as well as a ruling international culture. However, this new elite does not reflect the full complexity of world cultures, and it is questionable, first, whether it wants to govern at all; and second, whether it has the internal resources to deal with the difficult problem of world governance if it should choose to accept the challenge to try.

In fact, the new elite governing class is drawn from a fairly narrow sample, and reflects a fairly homogenous international culture, one that has been very recently developed in concert with a massive application of new technologies. This has entrenched a way of thinking that can be characterized by certain unique features, which have been institutionalized in the more elite schools and universities.

What I am suggesting is that the cognitive style of the new elite might well be regarded as its distinctive and identifying feature. I have suggested a label for this new cognitive style: “theoretic” culture, that is, governance by abstract theories and analytic thought.² International standards and control systems are now vested in non-biological memory devices. Examples

can be found in the vast archives of legal codices, for example, in the archives holding the documents spelling out the Law of the Sea, which far exceed the personal memory capacities of experts in the field; or in scientific instruments that anchor world-wide standards of measurement in physical devices (such as the atomic clock); and in complex human-machine networks that link the minds of human beings into a complex web involving computers and other electronic devices, as in the control systems for nuclear weapons. All of these examples show how dependent our society has become on system-level networks, rather than on the memory capacities of individuals.

“Plato famously complained that reading would make us mentally lazy.”

The theoretic mode extends to the sampling statistics and monitoring strategies of governments and corporations; they now rule by means of abstract models and large-scale analysis of metadata banks. Personal whim may occasionally override the theoreticians’ work, but for the most part the system is driven by abstract models and technologies.

This new system of cognitive governance stands out, when compared with governance systems from the recent past, let alone the more distant past. Whether we realize it or not, national and ethnic origins have become largely irrelevant, except inasmuch as such things may affect the way the new cognitive system works. The members of the new elite have been educated into a common culture more closely tied to the new digital media than to the traditional guideposts that once defined cultures. They are entering a unique cognitive-cultural ecology, which will have its own distinctive way of regulating the thoughts and memories of its members.

The graduates of the top universities in the world are moving into a world where knowledge is mostly out there, rather than inside the head, and decisions are made by hybrid social networks that merge humans and machines. They are entering an emerging new culture, and need to accommodate the novel demands of that culture. They need to develop new ways of allocating their personal cognitive resources.

A new ecology implies a new set of challenges, and three potentially serious flaws of the new theoretic culture stand out. These concern (1) individual autonomy, (2) trust; and (3) priorities: human versus machine-driven.

2. Challenge #1: Autonomy and the Externally Programmable Mind

The new media have made us more externally programmable than ever before. This means we are subjected to a constant bombardment of highly controlling messages and images. This situation is not new in principle; Plato famously complained that reading would make us mentally lazy. However, it is certainly novel in terms of the intensity, scale, rate of change, and sophistication of the new media.

The notion of external programmability can be traced back to the invention of writing. When a person becomes literate, whether in the limited sense of just learning how to read, or in the broader sense of reading widely and critically, the brain is permanently changed by

the experience. The scientific study of acquired dyslexia has shown that the brain of a person who learns to read acquires a new wiring pattern that creates a “cognitive architecture” – that is, a subsystem within the brain that automatically carries out the various complex sub-operations involved in reading.

The cognitive architecture of reading is interesting because we know the reading circuitry of the brain did not evolve as such; writing was not invented until about 5,000 years ago, very long after the modern brain reached its present form. Moreover, the vast majority of the world’s languages have no indigenous writing system, and yet any neurologically normal child from any remote corner of the preliterate world can learn to read. This is strong evidence that the neural architecture of reading is not innate; rather, it is installed in the brain by culture and technology. The corollary is this: in principle, *technology and culture can change the brain’s functional architecture*.

The same principle applies to the subsystems of mathematical skill, and other cognitive skills that depend heavily on external symbolic devices and scripts, such as those involved in musical performance, or the graphic arts, or computer programming. Recent imaging experiments have shown that the internal organization of several brain areas changes when a person acquires numeracy and literacy skills. Regions normally used for other purposes are “cannibalized” or redeployed, and as the brain becomes entrained to any new symbolic interface, it rewires its circuits accordingly, setting down new functional pathways and reallocating resources.

This ability to rewire internal functional circuits, is a reflection of the extraordinary plasticity of the human brain, especially of the cerebral cortex. However, plasticity renders us vulnerable to external programming. When we learn to read, the images of words in our native tongue acquire great intrusive power, because they can no longer be treated just as normal environmental stimuli; once the brain’s circuits are altered, these images tap directly into automatic neural circuitry. External symbols can thus evolve into “cerebral Trojan horses,” triggering automatic circuits in our brains, like it or not.

This makes us highly programmable, in the sense that, once our cognitive architecture has been altered, our minds can more easily be manipulated by people who are skilled at triggering those deep automatic responses in us – such as writers and film directors, or more dangerously, marketers who use explicitly cognitive techniques of persuasion. A good film, book or advertisement can quickly set up a mind-state that has been carefully designed and powerfully scripted, and which is very hard to resist; this is due to those Trojan horses planted in our brains, which continue to proliferate as we enter adulthood. This is the basis of present-day “cognitive engineering” by writers, film directors, advertising designers, and various other kinds of media producers, employed to manipulate our states of mind. The objective of cognitive engineering is to manufacture, not material products, but states of mind. It has enjoyed a great increase in relative power in recent decades, with sophisticated new media, supplemented by systematic psychological and social research.

Not all these influences are used maliciously or dangerously; most are not. However, some are, and the potential for mass manipulation is significant. Just as automatic weapons

make it easier to wage a war of terror, the new media open up new possibilities for mass cognitive influence. Regardless of the benign intentions of the majority, the fact remains that training in the use of symbolic systems opens the mind to outside influence and leaves it vulnerable; this is given of modern life. We are made this way by our bond with technology, and we have no choice in the matter, given the obvious cognitive benefits associated with developing such a powerful interconnected system for thought and memory. This connectedness can add enormously to our experience of life.

However, our increased vulnerability to intrusive cognitive engineering is a good reason to think very carefully about how we use our digital power over the growing brains and minds of children. Digital natives they may be, more skilled perhaps, but also more vulnerable, precisely because they are so wired into the system. We may campaign for open access to the Internet, and against censorship of any kind. This appeals to liberal values; but it also exposes the brain to an unstoppable plethora of powerful external factors, and renders the individual vulnerable to disintegrative forces that break up attention, and can prevent the formation of a coherent personal identity.

To mitigate this danger, students need to be trained in a new kind of cognitive guerilla warfare: how to see through, and resist, such powerful forces of persuasion. Professional training usually achieves the opposite, socializing the student into a pre-existing set of ideas and symbols, so that they fit nicely into a slot in a managerial flow-diagram, and are unlikely to insist on thinking for themselves. The ideals of education once emphasized the cultivation of personal autonomy and judgment, rather than specialized job training; never in history have these ideals been more important than they are now.

3. Challenge #2: Building Networks of Trust in a Digital World

This concerns the problem of how to construct and maintain networks of trust in an open digitally connected society where anonymity is easy, deception is even easier and much harder to detect, and influence can be far more subtle and devious than it is in traditional social life.

All humans, even those living in hunter-gatherer societies, live in communities in which the cognitive work of thinking and deciding is distributed across the members of the community, and supplemented by whatever symbolic technology is available. This kind of arrangement produces a space in which trust becomes possible between people who do not live in close proximity. It works best when the members of a community are in agreement regarding certain ideas and habits that make cooperation and division of cognitive labor possible.

Written documents were important in extending the range of trust, by aligning values and belief in large populations. Classical civilizations used writing to manage their larger-scale communities, and this was an important step that enabled rulers to extend their control far beyond the boundaries of relatively small kinship groups. Material artifacts such as monumental buildings, art, and libraries also served to maintain a zone of trust, and a

common universe of discourse, by defining a set of symbols and values over generations, and helping perpetuate the kinds of cognitive arrangements that make a large community of mind function effectively.

The cognitive arrangements that establish alignment, and control the flow of ideas and memory representations in a community may or may not correspond to what is conventionally known as “government.” In theocratic systems, the two were usually identical. In more complex societies, this was not necessarily the case. For example, in Medieval Europe military power lay in the hands of kings, whereas cognitive governance was mostly determined by the Church hierarchy, which controlled most legal and educational institutions. This separation of power probably aided the gradual breakup of old power monopolies in the West.

Religions and legal systems, usually backed up by military force, were the traditional vehicles, as well as products, of this alignment process. The digital world (backed by military and economic force, albeit more indirectly) carries the same process one step further, because individuals must enter into a far more intimate and personal embrace with the new technology, and thus with the ideas and symbols communicated by the media. Digital culture has much more sophisticated weapons to work with than traditional societies, and the virtual worlds created with technology can become subjectively hyper-real, and even more intense and persuasive than the “real” worlds of traditional social intercourse.

Of course, traditional communities of mind could also bully and coerce; they were not always benign. It would be naïve to expect that digital culture will be any different. To achieve any degree of effective cooperation and alignment in a digital community, the same ancient need for establishing reliable circles of trust will still be there. However, there are enormously complex challenges involved in establishing a satisfactory degree of trust in a digital environment; it is obviously not going to be easy to achieve.

At all levels of society, trust is paramount, because trust supports two of the human brain’s strongest preferences: predictability and familiarity. It also reduces stress; a perpetually vigilant, hyper-alert brain is a stressed brain. The shared machinery of cognition cannot function without a framework of predictability and familiarity. To achieve this, members of a community have to be in sync with one another, more or less as the gears of a clock must be in sync. Absolute universal trust is an impossible ideal, and all communities inevitably have cheaters. But circles of trust are essential in any functioning social-cognitive system, and a common universe of discourse is particularly indispensable in a democracy.

However, the Internet is wide open, to a degree that is historically new. A reasonable balance between openness and cognitive alignment has always been hard to find in human history. Educational systems have played a crucial role in preserving and transmitting cultures across generations; traditionally, they have provided and protected the shared visions that made communities of mind work. But the electronic universe is radically different, because it has multiplied the number of visionary options by many orders of magnitude, making circles of trust harder to rely on. Digital natives may figure this one out eventually, but in the complex world of the Internet, finding a solution will not be easy.

In the current world order, cognitive governance is very widely distributed, and there is no single center of ideational power. This may be seen as a weakness, because cognitive governance has always had a visionary aspect. Shared worldviews keep communities working reasonably well, because they are the basis of trust, encouraging altruistic behavior among the members of the community, and reducing the sources of violence.

The new cultural astronauts will need a home planet, like previous generations. They will need a common culture to unite them in a world they can trust. This means they will need a common culture offering a level of trust comparable to that of traditional cultures. It is not obvious where this will come from.

4. Challenge #3: Moving from Machine-centered to Human-centered Governance

The modern digital economy is increasingly influenced by considerations that are largely or entirely machine-driven. By machine-driven, I mean that the economy is dominated by algorithms and mathematical formulae that are linked directly to computers and the Internet, and dominate the context of decision-making, to the point where they are more important than the humans who are supposedly controlling the process. The theories that are fed into the system have come to dominate it, because the algorithms in question are now *causal*; that is, they are harnessed to various devices that search, analyze, and compress enormous clouds of data that are inaccessible to the human mind without further machine processing.

The intricate corporate and financial systems that dominate the global economy are run by highly focused distributed cognitive networks that co-opt a huge proportion of the world's resources (both human and nonhuman) for their activities, and routinely make major decisions independently of any consideration of the long-term common good, or of elementary human needs such as hope, identity, and a sense of purpose. Their resources are tied up in intricate political systems that are also digitally wired and economically tied to a machine-driven agenda. The competitive economic framework of human life is tied closely to short-term bottom lines, and those are not based on basic human needs such as the need for security, trust, and meaningful work. Rather, they are usually based on numerical calculations performed, for the most part, by robots and algorithms, without much human intervention.

Although many key decisions continue to be made by individual human beings, they are limited to devising personal strategies for surviving in a machine-dominated economy where data are seldom provided without machine support. The sheer speed of interconnectivity within the digital world, and the kinds of short-term incentives that shape so many corporate and government decisions, are creating an international decision-making apparatus that is determined much less by human needs (even simple-minded needs such as egotism, rivalry, and domination) than it once was. This is not all bad; the psychological needs of kings and potentates were not always a good basis for government. But if we assume, as we must if we are orthodox Darwinians, that human governance systems must ideally serve the long-term welfare and survival of the human species, the machine-driven modern world does not appear to bring us closer to the ideal; in fact, it may be drawing us further away.

Some political leaders genuinely wish to guide our shared cognitive system toward an agenda that is more human-friendly and less machine-driven, but the present system of economically-mediated control makes that extremely difficult. Moreover, the speed of technological change cannot easily be slowed, and has created unprecedented pressure on our collective intellectual capacity as a species.

Finally, a caveat: to reiterate a point made earlier, the personal cognitive capacities of human beings are highly over-rated (this includes our so-called geniuses). Some people may appear to be incredibly clever if they are fortunate enough to be functioning well in a coherent community of mind, largely because our digital networks provide them with such formidable resources. In other words, when married to an effective network, and in possession of the right combination of genes, we can be made to look, as individuals, much smarter than any of us would look if left entirely to our own resources. Geniuses are the lucky possessors of particular talents sought after in a particular historical context. Social networks function as search engines, and when they find what they need in the form of a relevant talent, they can shower that particular individual with great rewards.

“Our current educational system needs to be re-invented for a twenty-first century world where global governance and high technology are inevitable partners in setting a cognitive agenda that is more sensitive to the human beings it supposedly serves.”

Specific geniuses are wedded to specific cultural contexts. The hybrid system humanity has built over centuries, with its clever hardware and software, is extremely effective in exploiting such talent. It now has an endless supply of trained and well-supported specialists, and a seemingly infinite system of stored knowledge. But at the same time as the new cognitive ecosystem has produced such remarkable change, it also has the potential to stress the human species to an unprecedented degree, because the distributed system is stressing the brains that sustain it.

The modern mind is exposed to constant change. This in itself is a very large deviation from our historical preference for generational stability and familiarity. Modern consciousness is confronted with too many choices, too much information, and too much uncertainty, without a common world view. History tells us this will cause us eventually to fail, unless we find some way to tailor the system to meet the needs of individuals. One civilization after another has had to fight to establish some degree of stability and intellectual cohesion. We are no exception, but the stakes are higher. If our global system collapses under its own weight, it is not clear what kind of system, if any, will be in a position to follow.

5. Conclusion: The Need for a Post-theoretic Governance Strategy

The new cognitive ecology is exciting, creative, and potentially very dangerous and destabilizing, because we have made very little progress in addressing the concerns outlined

here. An out-of-control machine-driven agenda driving a global economy could bring out a fatal flaw in our system, stressing the human mind beyond its capacity.

Our world needs intelligent, sensitive governance as never before. The human brain is basically the same brain we have been using to construct communities of mind for millennia. Because of digital technology, it is being put to the test. Individual minds need protection from the potential dangers of this new world order, but they also have to be immersed in it. If the machine-driven agenda dominates policy, without taking into account the needs of its human component, the system will almost certainly fail.

“It is urgent that we promote the importance of subjects like history, and other value-related disciplines such as philosophy, art, literature, politics, and ethics in our educational systems.”

However, the signals emanating from our media do not reassure. Theoretic culture sails merrily on, oblivious to the human needs of the vast majority. This trend cannot continue without placing the human species in peril. Our current educational system needs to be re-invented for a twenty-first century world where global governance and high technology are inevitable partners in setting a cognitive agenda that is more sensitive to the human beings it supposedly serves. What we need is a discussion of strategy for a society that transcends the present form of theoretic culture: call it a “post-theoretic”^{*} strategy or a new variation on the theoretic, but in either case, it is urgently needed.

However, this will not happen unless the world directs its resources to prioritizing human needs over machine-logic. It is urgent that we promote the importance of subjects like history, and other value-related disciplines such as philosophy, art, literature, politics, and ethics in our educational systems. A new generation of digital natives will have to find a way to make the system work more effectively for the benefit of the people in the system, which can only be achieved by placing, and then keeping, machine-driven agendas in a subsidiary role.

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Notes

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^{*} A term suggested by Bhavna Hariharan of Stanford University.

Towards a Global Comprehensive Context-driven and Decision-focused Theory and Method for a New Political Economy

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Abstract

There is currently significant dissatisfaction with conventional economic theory. The unreliability of conventional theory as a predictor of future economic possibilities of catastrophes emphasizes the need for a new paradigm of political economy. This paper provides a capsule of some of the important limitations and consequences of the “old” paradigm. It proposes the necessary elements of a new paradigm and it seeks to locate the new paradigm of political economy in terms of its global reach. This requires a richer contextual approach, with the tools of contextual mapping. It has as well a focus on the global process of effective power and the emerging rule of law based constitutive processes. This is a key to the role of decision and the architecture of decision-making in political economy. We conclude with the global to local implications of the Vicos Experiment in Peru. Finally, we stress the wider lens of focus to identify the real and not the illusory generation of value. The implications here facilitate real global democratization.

1. Introduction

In giving this presentation, we start with certain trepidation. Both my coauthor and I are specialists in legal academic culture. Our interest in economics is incidental to that professional focus. However, in exploring the role of law in global society it has become more apparent that we need a better economics as a coequal partner in the central challenge that confronts the global rule of law. That challenge is how to improve the human prospect in securing peace, security, human well-being, and ultimately a global culture gravitating toward the universal ideals of human dignity. In exploring the ideals and possible promise of a new paradigm of both law and political economy, we must readily concede that there are many insights in the discipline of political economy that may have escaped our focus of concern. However, we hope to bring some perspectives and methods of advances in law that may enrich the promise of a new political economy for a new world order. Conventional

economics has rarely shed itself of the label that it is a dismal science. It has earned this label because its central weakness seems to be the continuing diminished expectation that it may provide perspectives and methods that produce reliable predictions. In short, it is an unreliable enterprise that occupies space of major global importance to the well-being of humanity.¹ It would be useful to provide an overview of the problem of radical inequality as an outcome of conventional economic theory and practice.

2. Overview of the Crisis of Economic Inequality: The Political Economy of the Drive to the Bottom

The most notorious fact about the American economy is that for decades we have experienced an inexorable drive to move the overwhelming majority of American citizens to the bottom of the economic system. In short, the expansion of inequality has been an extraordinary fact of the politically inspired economic policies of the Republican right wing.²

“The success and the genius of American civilization has been its belief in human capacity and the critical importance of human resources for national prosperity.”

Let us start at the top. Reputable economists tell us that one percent of our population takes one quarter of our nation’s income. One percent of our population controls forty percent of our nation’s wealth. One percent of our population has seen their incomes rise by over eighteen percent.

The central political question is whether this kind of outcome is desirable and in the national interest of the nation. If this is desirable, is there a sound reason to justify it? There have been marginal economic theories, which suggest that the one percent who have benefited so mightily are simply better than the rest of us.

Many people whom we consider talented and who have made enormous contributions and inventions to modern society have not necessarily benefited from this. The financial wizards who almost destroyed our economy were in fact rewarded with performance bonuses. Although to their credit, they saw the irony in this and changed the label to retention bonuses. Meanwhile, those at the bottom of the economic ladder were not candidates for any form of retention. They were candidates for pink slips.

One of the assumptions of right wing Republicans is that if we have a bigger economic pie there will be more to go around. Unfortunately, the arithmetic is the other way around. The bigger the pie, the less the American citizens share in its bounty. It would seem that our economic growth is essentially a growth that is downwards in the direction of inequality. This means we have an exponential growth in lost opportunity for the American people.

The extinction of opportunity for our people is a major social and economic loss because the success and the genius of American civilization has been its belief in human capacity and the critical importance of human resources for national prosperity.³ This means that when we depreciate human resources we are attacking the recipe, which was at the heart of American genius. There is of course enough blame here for everyone. However, I think most of the blame must lie with the Republicans. They have historically been the most frenetic defenders of economic monopoly. Additionally, they have been successful in hijacking rational tax policy debate. No new taxes means that the weaker members of the body politic still pay while the special interests, which fund the Republicans, the well-healed financial oligarchs prevail with outrageous tax holidays. Indeed, a recent survey about the fairness of the tax system showed only twelve percent believing it was fair and eighty eight percent believing it was unfair.

The consequence of these outrageous benefits to those who already have an excess of resources is that they also promote the idea that national investment in education and human resources, investment in technical innovation and sound infrastructure are a waste of scarce resources. Their version of appropriate national incentives is driven by an intense desire to discourage investment in the future based on basic research and the central importance of our transportation and infrastructure system. Essentially, Republican policies have hugely empowered the financial oligarchs while undermining the participation of the overwhelming majority of citizen stakeholders in the process. They promote no version of a national common interest and see only the vista of narrow special selfish interests.

Greed is king. They attack labor unions, promote the replacement of labor with technology and export jobs abroad because foreign labor is cheap. American labor is a liability. It is too expensive for the oligarchs. Hence, their mantra about jobs is “send jobs abroad.” The role of government in seeking to moderate the concentration of wealth and power in the few was well expressed by the political genius of the last century, Ronald Reagan. The government is the problem, is the enemy because it is the critical restraint on the unfettered power of economic oligarchs. Now at present the agenda appears to be clearer: do what we need to do to keep our wealth and get more of it. Demonize the government as a moderator between extremism and the people; extinguish the opposition such as the labor unions and the independent media and most critical of all, no taxes on the rich.

Probably the most impressive victory of the financial oligarchs was their promotion of the economic theories of neo-liberalism. The center point of this approach was to oppose any and all government regulation. The great success was the deregulation of the financial sector. With the financial benefits, which they acquired through a non-regulatory state, they could use their bounty of wealth as a base of power to control a good deal of law making, and they did. Their successes have permitted a huge scale of financial manipulation in a no-financial rules context – the context they in effect purchased. This was a good financial investment.

After the Citizens United case, a major Supreme Court blunder, the corporate sector could now begin the process of purchasing the government without spending limits. In short, the Supreme Court solidified the nexus between wealth concentration and its capacity to

control the government in an almost complete form. One illustration of many will suffice. Big Pharma was able to squeeze a trillion dollar boondoggle out of the government by the Republican drive to block the government from bargaining with Pharma about the price of drugs. The Republicans have their eyes on other temptations such as Medicare, Medicaid and Social Security. What is it that drives the Republicans to destroy highly popular social safety nets?

The answer to the above question is to be found in the longstanding Republican nightmare called the New Deal. The New Deal produced popular policies and its political success was reflected in Roosevelt being elected four times. After his death Republicans considered that the New Deal was popular and an important base of power for the Democrats. The problem they confronted was that the New Deal programs were popular and could not be directly attacked. Their agenda focused on foreign fears and anti-communism. However, the lingering fear of New Deal institutions was finally frontally assaulted by the brilliant Ronald Reagan. Reagan had the insight that the New Deal worked only so long as the government could pay for it. The critical Republican strategy would now be to run up huge deficits so that there would be no funds to pay for New Deal programs.

Moreover, if the Democrats came back to power, they would find that there is no money in the state bank to fund their programs. So fiscal conservatives like Reagan and Bush ran up huge deficits, and borrowed billions, which they could now distribute as governmental socialism to Republican business and defense interests. This left us with a deficit nightmare and a mighty recession.

With a great deal of political amnesia Republicans now proclaim the morality of living within our economic means. You can't spend funds if your bank account has no funds in it. They are the architects of this approach and the creators of the monumental deficit. Few heard from the deficit hawks during the Bush spending spree, fueled with money borrowed from China. We still do not hear the Republican leadership willing to acknowledge their budgetary scam. Meanwhile, our nation is in a spiral towards radical inequality and a diminishing of our national values. Perhaps our economic oligarchs should be reminded of the wisdom of Alexis de Tocqueville who saw the key idea behind the American genius as "self-interest properly understood." By this he meant that by taking care of your own self interests you simultaneously express a concern for the other person's self interest as well.

3. Other Dimensions of the Problem of Economic Theory and Practice

For a long time, conventional economics has entrenched itself in both academic and intellectual circles and in policy arenas. It has experienced sharp and trenchant attacks on its organizing theories, methods of analysis and more importantly, its unapologetic lack of concern for the undesirable outcomes for human society that it consistently generates. In our time, senior members of the World Academy of Art and Science had made the issue of the need for a new paradigm in political economy a prime concern. The new paradigm will require a serious revision of its fundamental premises, its failed methods and its lack of concern for the social consequences of its theoretical inadequacy. A number of specific issues

have been used to target the weakness of conventional theory. For example, the concern that the focus of economics should be on the value of the GDP is considered to be myopic and ultimately unrealistic.⁴ Others have stressed the limitations of mechanistic measures to realistically understand values. The methods of measurement are thought to be rooted in the fundamentals of a Newtonian universe in which matter and cause are exclusively used in cognition. Still other concerns stress the lack of understanding of productive forces and productive relations in the real world, which has gravitated to a post-industrial political economy. This development has tended to overlook the salience and the contribution to value of the dynamic service economy. This new context effectually requires a call for a new emerging paradigm of global economics in the global social process.

“Many economists liberated from the old paradigm had in fact anticipated the problems of the housing bubble. These economists suggested that the crisis was not rooted in meta-physical animal spirits, but in a financial sector devoid of meaningful regulatory standards.”

Conventional economics has tended to ignore insights and criticisms that are particularly trenchant and touch on the question of fairness and collective wellbeing. At the turn of the last century in 1899 for example, Thorstein Veblen, the American economist, published a book. The book is titled *The Theory of the Leisure Class*. This book may well qualify as Veblen’s insightful dig at the one percent at the top which constitutes the leisure class. Indeed, since Veblen’s time this class may well constitute itself as a global plutocracy. Veblen’s central thesis is that the activities of the successful leisure class amounted to “the winning of wealth by force.”⁵ But this form of winning wealth was sold as honorable and dignified. On the other hand, labor was denigrated and tainted with indignity. In Veblen’s view, the leisure class in the modern economy was not far removed from barbarian ancestors. Veblen’s detailed description of economic life at that time underscored the point that conventional economics served to justify and serve the taking class, and the leisure class.

Later, Veblen wrote another book, which has a curiously important message for our time. This book is called *The Theory of Business Enterprise* (1904). In Veblen’s view, the businessman is not the wealth creator but rather the saboteur of the system.⁶ One of the important insights in this book is Veblen’s description of the divorce of finance from manufacturing.⁷ He uses an example from US Steel. Businessmen came together to construct the manufacturing plant. Actually, their real interest was not manufacturing but how the plant could be leveraged in the financial markets. That was where the real profits lay. The company’s assets were \$682 million. Against this was sold \$303 million in bonds, \$510 million in preferred stock, and \$508 million in common stock. The financial company in other words was twice as wealthy as the manufacturing plant. In short, the investors made a vast amount of upfront money from the financial sector. The manufacturing sector was really only an incident of their interests.

Carrying Veblen's meditations into the contemporary context we find that these insights have a curiously contemporary relevance that are best illustrated in the context of the financial crisis of 2008. Alan Greenspan, a leader in the force of conventional economics and a powerful spokesman for its legitimacy, admitted publicly, "Virtually no one foresaw the U.S. financial crisis."⁸ He suggested that certain irrational "animal spirits" were the root cause of the crisis. In short, the real blame for the financial mess was not to be found in the conventional approach, which had not anticipated the crisis. Rather, the root cause of the crisis was some unaccounted external force of economic animal spirits. To this extent, the conventional theory itself is flawless and bears no blame for the financial crisis.

"The management of political economy is a matter of human choice and decision and not a matter of meta-physical speculation."

It should be noted that many economists liberated from the old paradigm had in fact anticipated the problems of the housing bubble. These economists suggested that the crisis was not rooted in meta-physical animal spirits, but in a financial sector devoid of meaningful regulatory standards. Therefore, we could explain that these so-called animal spirits were freed in the crazy financial world of unregulated derivatives. These derivatives are highly complicated financial instruments whose value is derived from an underlying asset somewhat analogous to the U.S. steel example cited above. It was in the housing market that the imaginative derivative innovations of paper value ran amuck. Financiers bundled millions of toxic loans using mortgage income as an ostensible stabilizer. They then creatively generated a second layer of derivatives based on the value they assigned to the first set of derivatives and continued the layering process. The outcomes of these layered packages of derivatives produced a distinguishing if incomprehensible nomenclature such as "synthetic collateralized debt obligations" and "naked credit default swaps." The paper of face value of these manipulations was in excess of \$35 trillion. In effect, fourteen times the value of the mortgages supporting them.

Warren Buffet, the billionaire, described these exotic financial instruments as financial weapons of mass destruction. Other economists saw these novel instruments of value as being created by perverse incentives. The thesis of the conventional paradigm is that blame rests with meta-physical irrational spirits. It is incapable of recognizing the flaw of radical deregulation. A process that contributed to the destruction of the financial markets. It avoids the importance of human choice in the financial mess. A new paradigm at the very minimum must be able to assign responsibility to finite decision makers and to clearly recognize that the management of political economy is a matter of human choice and decision and not a matter of meta-physical speculation. In short, a new paradigm must generate a method and procedure that lead to economic accountability and improved choices for the common good.

The central elements that implicate a new paradigm of economic thinking rest in the acknowledgement of the centrality of human capital as the prime concern of responsible economics. Second, there must be recognition of the facts and conditions of great economic transformations and an understanding of the balance between the freedom of contract and

responsible social regulation to guide the freedom of contract in constructive ways. By constructive ways we are talking about the fundamental values of liberty, equality, security, and social justice. Deep concerns are expressed at the great gulf that divides finance from productive economic processes. WAAS theorists maintain that “money is not the root of all evil that it has been blamed for. But the cancerous growth of unregulated speculative financial activity may be a good candidate.” They also insist that there is an important role for law in managing political economy, especially when law is based on human rights, human wellbeing and social justice.

The common challenges, which provide the challenges for a new paradigm, are generally speaking the following:⁹

1. They all transcend narrow disciplinary boundaries.
2. They are interrelated, interdependent and defy solution by partial, sectoral approaches.
3. They are all global in nature and cannot be fully addressed without coordinated actions by the international community.
4. Approaches to resolving these challenges are subject to conflicting claims, priorities and interests.

The central problems that are a current global priority and which cry out for new paradigm thinking include inter alia the following:¹⁰

1. *Economy & Employment*: How can global food security, full employment, and abolition of poverty be achieved within a decade?
2. *Energy & Ecology*: How can global living standards be raised to middle class levels without depleting or destroying the environment or depriving future generations of the capacity to sustain these achievements?
3. *Human Capital – Education, Health and Welfare*: How can global levels of education and public health be raised to OECD level?
4. *Money & Finance*: How can the necessary financial resources be generated and mobilized to achieve the goals described in the first three questions?
5. *Security*: How can we permanently eliminate war and WMD that threaten to destroy all other development achievements?
6. *Global Governance*: How can we design and implement systems of global governance capable of implementing necessary measures to achieve the other five goals for the welfare and wellbeing of all?

4. The Necessary Elements of a New Paradigm¹¹

If we are searching for a global economic theory important to the entire global community, there would appear to be three things that the approach to a new paradigm should develop.

These four characteristics are as follows:¹²

1. It must be contextual, i.e., it must perceive all features of the social process of immediate concern in relation to the manifold events comprising the relevant whole.
2. It must be problem-oriented.
3. It must be multi-method.
4. It must be interdisciplinary with a focus on the dynamics of global interdependence and global inter-determination.

A new paradigm must have a focus that accounts for the social process context of the global economy and contextualize an orientation to the global processes specialized to the generation of “wealth.” It should clarify the concepts of reciprocity, barter, and money and examine the process from the perspectives of the participators including their perspectives regarding capital accumulation, surplus and the fundamental myths surrounding capitalism, socialism, and cooperativism. It must examine the concepts of free market and command economies. It should clarify the base values, which underlie the wealth process. It should examine the strategies relating to the conservation, production and distribution of wealth, introducing particularized strategies that relate to finance, production development and research, procurement and services, as well as aggregate strategies that for example are required in a money economy which in order to operate smoothly must generate a stable monetary unit and an adequate monetary supply. It must account for particular and aggregate outcomes and effects. In particular, the indicators of national wealth. Attention is given briefly to the gross national product, net national income, money supply, and the role of the government sector.

As a background to the evolving international norms of political economy, it is useful to consider the crisis of the great depression of the early 1930s. One of the great myths of the period was that the market was a completely autonomous, self-regulating entity. The great challenge to this form of economic orthodoxy was that the Great Depression was caused by human choices and could be resolved by human choices. Additionally, one of the struts of the belief in an absolute market was that it was the only appropriate guarantor of liberty. Again, Roosevelt challenged this idea by suggesting that necessitous human beings experienced diminished liberty. The central role of law invalidating the invisible hand of the market was the law’s construction of the meaning of property and contract in particular. The question that emerged juridically was whether property was essentially an aspect of liberty and was juridically absolute. This required a deconstruction of the notion of property itself.

The role of the New Deal in regulating the legal foundations of its economic emphasis permitted government intervention to restrain the unlimited power of the private sector often validated by fundamental law. Two of the most important consequences of the victory of the New Deal were reflected first in the Atlantic Charter, which articulated the war aims of the allies. In the war aims of the allies was a future in which there would be freedom from want. These ideas found expression in post-war efforts to give direction to global economic

development. The economic foundations of international human rights were expressed in the Universal Declaration as well as several important UN documents culminating in the Declaration of the Right to Development. These developments confronted the emergence of neo-liberal political economy, with a claimed global reach.

One of the important limits on the conventional paradigm of political economy is its stress on excluding certain segments of reality that are generally seen as inconvenient externalities. This approach essentially is excluding the relevant social universe of human interaction which involves the broadest possible range of economic activity. Excluding such activity excludes its economic value and distorts the outcomes of economic inquiry. Let me provide an illustration from the fields of law and economics that provide some promise in bringing in the context to inquiry about the interrelationship of law and economics.

Professor/Judge Posner provides a model of economic social process based on wealth. He believes that wealth is a defensible value.* The model runs as follows: Human beings pursue wealth through institutions based on wealth to achieve more wealth. In this model wealth is a desired goal and wealth at the same time is a base of power to acquire more wealth. The problem with this model is that there are other social values universally identifiable based on either human needs or basic human claims. This is a model that would limit the focus of the economic inquirer.

Now let me recommend a more comprehensive model of social process that includes a comprehensive range of value institutional relationships. Here the model may be stated as follows: Human beings pursue all social values through institutions based on resources. We may now consider the relevance of the other values to a realistic theory of political economy. First, we have indicated that wealth may be sought as an economic value. We may have omitted the fact that wealth may serve as a base of power to acquire more wealth. Wealth may also serve as a base of power to acquire other important values in social process. For example, wealth as a base of power may be used to acquire power, to acquire respect as well as enlightenment, health and wellbeing, skill, affection, rectitude and aesthetics. However, all these other values may be used to acquire wealth. In short, power may be a base to acquire more wealth. Respect may be a base to acquire more wealth as might be the case of enlightenment, health and well-being, skill, rectitude and aesthetics. This picture of value processes interacting with each other to reproduce themselves or to reproduce other value processes is almost an indispensable focus for a realistic global foundation of a new paradigm of political economy. This is a useful way to underscore the relevance of both interdependence and inter-determination in the global social process.

We now provide elements of the context especially relevant to a new paradigm that is comprehensive and particular in its focus.

5. The Context of Ecological Values

There was a time when the conventional wisdom in economics was that nature and related environmental resources were unlimited. Today, the reality of climate change challenges this

* There are limits to this defense of wealth accumulation when we ask what wealth is for. Does it satisfy greed, or entrenchment of plutocracy?

earlier altruism. A new economics must consider both the potentials and the limits of the ecology of the planet. The ecology of the planet, therefore, is a crucial factor of context for a new political economy.

6. The Context of Global Social Interaction

Global social interaction involves the shaping and sharing of all values. The outcomes of this process generate the aggregate statistics of human development or the lack of human development. One of the most important problems that emerges from global social interaction is the problem of effective power and social conflict. However, the new economic theory must have a useable model of the global social process in order to fully appreciate the problems it generates on a global basis for all values.

7. The Global Process of Effective Power

The global social process reproduces the institutions and imperfections of the production and distribution of global power. It is well understood that the outcomes of global power represent conflict and competition. Additionally, the expression of global power in society is done through the process of decision-making itself. We can call this decision-making according to naked power. Since power expresses itself in terms of conflict, war and often violence, it will be obvious that peace and security are critical foundations for a social process that seeks to maximize its human capital resources. In short, war consumes human capital resources, and does not enhance or reproduce it. The new economic theory must, therefore, account for the global processes that generate and sustain human conflict, since these processes generate deficits in development.

8. The Evolution of Power into Behavioral Constitutional Processes

Conflicts about power do not always endure indefinitely. Indeed, there are periods when the power broker contestants in conflict may see that the continuance of conflict may only result in zero sum losses. This realization may generate the elements of inter-elite collaboration from which understandings may emerge about how to manage power in ways that avoid conflict and promote collaboration. If this happens, a society may emerge with a series of understandings about how power is to be distributed, indeed allocated among the power broker contestants. This level of institutionalization of power will reflect the emergence of the power dynamics constrained by distributions, which have the support of the authority of community members. When there is a form of constitutional process, we effectually have expectations about institutionalizing the forms of authorized decisions about decision-making itself. This is the foundation for the establishment of a system of public order in which all the values are distributed and produced via the authorized institutions of society. It would, therefore, be appropriate that the new economic theory develop and map the constitutive process (local to global) because it provides the framework of authorized decision-making regarding all the basic values in society including wealth. In this sense, a constitutional order that has a working capacity has an approximation to the idea of the rule of law. And the constitutive process is made operative by the constitutive functions

of decision-making. Thus, constitutive decision-making may both directly and indirectly influence development and progress. Additionally, a theory of economic novelty would have to account for the decision-making functions.

“New economic theory must ensure the termination of dysfunctional traditional standards and embrace new thinking.”

9. The Functions of Decision-making relevant to a New Economic Paradigm

1. **Intelligence.** Intelligence, which includes gathering information relevant to making decisions and its processing, storage, retrieval, and distribution to all participators performing decision functions.
2. **Promotion.** The decision-making function of promotion requires agitation and recommendation of certain policies, which in the form of prescription have the quality of law. In this sense, promotion is a critical component in decision for directly changing the common interest. It is in this sense that we cannot look at economics as value-free.
3. **Prescription.** This decision function implicates the formulation and adoption of certain policies as authoritative pronouncements in appropriate sectors of the social process.
4. **Invocation.** This function of decision-making is essentially a provisional decision function that characterizes behavior as incompatible with the law and goals of the community. Those who perform the invocation function raise the question of what initiatives enhance or violate community prescriptions.
5. **Application.** This is the authoritative characterization of conduct as lawful or unlawful. To secure lawful ends, the applier must use tools of some form of sanction to secure appropriate application. In terms of the objectives of development, the consequences of development may be critically related to the actual applicative performance. The new economic initiative must, therefore, give careful attention to the idea of application if development goals are to be real.
6. **Termination.** The decision function of termination means the termination of something in the status quo and its replacement by something that changes the status quo. New economic theory must ensure the termination of dysfunctional traditional standards and embrace new thinking.
7. **Appraisal.** The theory of decision-making as applied to economic policy requires that there be constant measures that may be appraised in terms of advancing toward progressive economic goals and avoiding the regression to the opposite.

10. New Economic Thinking, Development and Social Change

The new economic thinking has its focus on development in terms of human capital and its potentials for improving the human prospect. It would have to identify a plurality of commu-

nity systems that are inter-dependant and inter-determining and range from the local to the global. What we observe are territorial communities who know what they want and where they need to go but lack resources and skills. An extreme example is “cargo cults”. If placed on a continuum, we may see the socio-pathological condition of hyper development. There are a multitude of problematic circumstances in between. For us to develop an approach that permits us to identify where we are and where we want to go, we would have to measure development in terms of the existent state and potentials for transformation of at least the following nine values:¹³ power, wealth, enlightenment, skill, well-being, affection, respect, rectitude and aesthetics.

1. **Power.** The most important expression of power as decision is the understanding of the institution within which it expresses itself. For example, globally, power is significantly decentralized. This means an economic paradigm of global salience runs into the problem of the degree of lack of institutionalization of power. It is probably true that the most power-deprived are the least well off in global society. The new theory must be able to map global power and to appreciate its capacity to be mobilized for rational developmental objectives.
2. **Wealth.** In general, this refers to the aggregate volume and composition of what a society produces. It may refer to income in the community and also to the notion of an aggregate resource base. In general, when wealth is developed, the outcome is an increase in the volume and composition of products without depleting the resource base. $(P+I) \div R$
3. **Enlightenment.** What we mean by enlightenment is the prescription and application of education in social and economic development. The nature of enlightenment as a social capital is evident when education in a society leads to development. A society with an increased education-knowledge base uses enlightenment to extend development through informed decision-making. Decision-makers would make decisions based on informed enlightenment.
4. **Well-being.** Well-being including health refers to the state or condition of a society and its members. The well-being of a society is directly proportional to the level of “life expectancy” and indirectly proportional to the expectancy of disease occurrence in that society. The optimum level of well-being, however, is dependent on other values in that society.
5. **Skill.** Skill is the ability to perform tasks (especially employment or professional tasks), as a function of human capital development. The skill value is for the benefit of society. Skill development is a consequence of an increase in the strength of the “skill pool” in a society where skills are directed towards development. Skill is a critical component of individual and social capital.
6. **Affection.** Affection is a form of positive sentiment and underlines the loyalty of individuals and associations to the group. Being a basic value, it has tremendous

social capital. The increase in scope of positive sentiments in a society increases developmental achievements and goals.

7. **Respect.** Showing regard for other individuals within a society is crucial to development. A lack of respect gives rise to discrimination, which in turn becomes a direct cause of retarded development.
8. **Rectitude.** Rectitude drives moral behavior in society. When rectitude of individuals within a society matches its development goals, there emerges what we call rectitude development.
9. **Aesthetics.** Aesthetics is rooted in human creativity and in human creative capacity. A culture of strong aesthetics will inspire economic development objectives.

These values are the critical components of a theory of global political economy. They are also implicated in the development and enhancement of human and social capital. The system of mapping the global social, power, constitutive and public order processes represents the essential contextual background for a political economy that focuses its theoretical foundations on the development of human and social capital. Essentially, the repository of human and social capital should be focused on the value institutional context and the framework of decision-making that shapes this context in ways that maximize the human and social capital capacity in society. The values approach gives us a shorthand method of understanding that human and social capital are clearly implicated in at least nine values that a cross cultural world can be observed with appropriate tools of investigation. The challenge for theory is to understand the divergent institutions respecting the cultural values and their level of efficacy in practice. We could start with the first challenge of theory, which is to establish the appropriate goals of human and social capital development.

Here, the challenge is to generate procedures and practices, as well as a theory to explain and justify this, which has the task of maximizing the production, distribution and sustainability of every value institutional process in order to maximize the structure, understanding and deployment of human capital. As a consequence we want to maximize the production, distribution and sustainability of power, wealth, respect, skill, enlightenment, wellbeing, affection, rectitude and aesthetics. In developing this framework we will be alert to the interdependence and inter-determination of functioning value systems. This means that power may be sought for its own sake but it may also be used to maximize value shaping and sharing and sustainability with regard to every other value listed above. Wealth may be sought for its own sake but may serve as a base of power to acquire power and all other values. In short, every value may be sought for its own sake and may also serve as a base of power to shape, share and sustain every other value. This approach requires us to see economics not as a disembodied field from human relations, and if we see in the value processes the repositories of human and social capital, we bring a sense of realism required for a durable new economic theory.

It will be obvious that these value institutional relationships that we identify are sought to contextualize what happens in the context of the global social, power and constitutive

processes. The central feature of power and constitutive process is the centrality of decision-making. We can expand this idea further by suggesting that the centrality to the development and uses of human and social capital is the capacity for the human agents of capital formation and use, to be active and important decision makers in the very processes through which human beings generate value through human capacity. We therefore suspect that the mechanistic approach to economics represents a dramatic failure in its omission to understand the role of decision as a critical component of human and social capital. We now will proceed to provide a few practical examples of these theoretical possibilities.

11. Human and Social Capital in Development: The Vicos Experiment

The Vicos Experiment is a form of intellectual inquiry that also sought to induce a form of constructive, evolutionary social change in development. The inspiration for the experiment emerged from a view that peasants were incapable of modernization. An anthropologist, Allen Holmberg, and a former president of WAAS, Harold D. Lasswell, led the project. The project was located in the Uplands of Peru and included the village of Vicos. The project leader, Professor Holmberg, understood that the Vicosinos were the occupiers of land owned by an absentee landlord. Their position on the land was defined as the status of serfdom. With a small grant from the Ford Foundation, Holmberg purchased the land and the hacienda and essentially became the patron.

The farming practices of the village were unproductive because they had no incentive to produce crops that would be expropriated by an absentee landlord. This involved the project leaders in providing incentives to improve the village economy via farming. That also meant a movement away from near survival to a circumstance of modest prosperity. The incentive was that if the villages cooperated in farming operations, they could keep the profits for community purposes and if the profits were sufficient, they could purchase the land and become landowners. The project leaders found that the initiatives of the serfs with their intimate knowledge of farming capacity and climate, etc., supplemented by some technical expertise, essentially produced a significant sequence of crops and upon marketing, funds as well. It was important that the villages were participating in the decisions about agricultural production.

This initial initiative raised questions about how to exercise decision making in managing the profits from farming activity. This permitted the interveners to promote the idea that maybe decision making should be shared with the community and decisions eventually evolved to issues about healthcare, in particular, healthcare of women, schooling, including schooling for women, and the project evolved with a self-conscious direction of training in the processes of decision making and an awareness of appropriate goal values. One significant event was when the community decided they would invest in a truck to transport their products directly to the metropole and increase the value of their products by direct marketing.

The model pursued in Vicos attracted external attention. Some of the Peruvian elites were particularly concerned about what they saw as an incipient process of empowering the underclass. Other Indian communities saw Vicos as a model that they would try to emulate.

The Vicos leadership were willing to transfer skills to other Indian communities as well. Unfortunately, a delegation of Indian leaders on the way to Vicos to retrieve the recipe were attacked by hired goons. Several were killed. This gave the sovereign Peruvian state an excuse to terminate the project on the basis that it was disruptive of social peace. Although the project was ended technically, enough seeds of change and the processes of decision making to enhance human capital had been transferred. This village is still an example illustrating the importance of developing human capital on the basis that it is sustainable over time. The idea behind Vicos was recently of interest to the World Bank. One of the participants in the project presented the Bank with a broad prototypical framework of how this could be replicated elsewhere. The World Bank has also developed a more limited version of this idea in its projects that have dealt with micro-enterprise finance. It would seem that bank theorists would prefer to focus on a narrower framework of value institutional capital. The Vicos project combines elements of macro theory, intermediate macro theory and micro theory. The theoretical value of the Vicos experiment is that it can be simplified in terms of a useable development prototype. In this sense, it could have some value for new economic theory to focus on the multitude of possible prototypes that might be given operational effect worldwide. Several years ago, we discovered that there were several women from the village of Vicos who had completed advanced doctorates in the United States.

12. Indices of Value Accumulation in the New Paradigm

We have given an overview of the problems inherent in conventional economic theory and method; we have also proposed a radical new way of approaching a new paradigm for economic theory and practice. We have illustrated that a new paradigm must have a focus that is global and comprehensive and yet have the dexterity to be problem-oriented and solution-directed. In this sense, a new paradigm must also be decision- or choice-oriented in focus. To this end, we have outlined the architectural or decision functions, which could enrich the level of economic discourse and practice. We have also provided the Vicos illustrations of the comprehensive global and local fora.

We conclude with a more specific explanation of the evolution of wealth and capital in economic discourse to the challenges of a newer “wealth” epistemology, we would submit that the approach we recommend will be well-suited to properly account for the omission using conventional economic measures of such vital value generating indicators as found in the service sector of the economy in social process.

Hence, it may be useful to start with the problem of the housing bubble and the “\$35 trillion” of “value” generated by it. The critical questions are, are these new value instruments such as credit default swaps and related instruments a real indicator of value in social process, or are these really an illusion of real value? Adam Smith, for example, saw the production of value in industrialization. This represented a closer focus for the creation of real value, than the tracks of the financial markets have taken. In our time, importance of a framework of more realistic indices of value in social processes lies in Veblen’s thesis about the parasitical leisure class. Marx’s analysis of the importance of political economy and class stressed, inter

alia, the value of the building and control of capture, which facilitated the generation of the monetization process. This, in turn, facilitated the emergence of the states controlling the political economy (the command economy), by elites who controlled the state.

The rise of the new liberal economy validates the role of the private sector's control over the political economy. Here, the private sector corporately exercised, generates a tendency to plutocracy. Neither of these perspectives solves the problem of realistic indicators of economic value, how to measure it, and how to make it serve the common interests. In short, the old paradigm distorts reality. It does not help.

The important economic theorists insist that salient transformations are happening in a world of economic value and we need a more comprehensive focus of inquiry to understand their social process impact and consequences. For example, Orio Giarini has indicated that global economic relations today are largely shaped by the emergence of a global service economy.¹⁴ Giarini states that,

“At his time, rightly, Adam Smith underlined the priority of industrialization, which was in between agriculture (an important sector, but which of course had to improve) and services (depending on “dedicated” people, but with no recognized economic relevance).

The point is that services tend today to provide about 80% of all the “productive” activities. The higher levels of technology, in most cases, become more and more efficient every day and the tools are becoming cheaper. But they require more and more services to conceive, manufacture, distribute, finance, control etc.

Some economists (see those who were involved in the GATT discussions) tried to include in the “normal” economic theory, the evidence of the growth of services, saying that they are simply products that you don’t feel even when they fall on your feet.”

A proper appreciation of development of services in the nature of their real economic value is linked to the notion of risk management in time. This suggests that an aspect of value is linked to the future. This has profound implications for the science behind the notion of a service economy. According to Giarini,

“Uncertainty and probability are the rules of the game (a little like going from Newtonian physics to Quantum physics). The economic value depends largely on the period of utilization, which also includes costs. At the beginning of the whole process, research is also based on managing probabilities, as well as market success, maintenance and security up to disposal costs. Value is necessarily linked to the notion of performance (in time). Entrepreneurs know this.”

Unfortunately, conventional theory underappreciates the salience of service-related value as an indication of producing wealth in society. If our focal lens about epistemology of other wealth generating forms of activity such as the service sector were made a central indication

of the emergence of the new property, we would in effect be taking steps towards a new social reality, which implies a realistic optimization of wealth and a better distribution of it. A better distribution of wealth would also be an indication of social empowerment. Social empowerment would probably be in a progressive direction and the new property and its distribution would stimulate important developments for strengthening the global rule of law and global governance as processes generating a more enlightened regulatory scheme, which promotes and defends human rights law.

It would also be appropriate to examine important legal forms that new property might take.

Property as a form of wealth is one of the most enduring of legal institutions. Its chief characteristic has been its conservative nature. The legal myth is that stability mandates changes in the nature of property are slow and incremental. This myth still has vitality in legal culture. However, in the real world property is actually one of the most dynamic institutions in social process. The forms of new property are often far ahead of normal legal regulation of its creation, uses and termination. In fact, very few property lawyers would effectively describe the nature, functions and boundaries of the new financial property institutions. Additionally, new property forms are liberally incubated in the human imagination and emerge through complex social and technological processes into new forms of property such as intellectual property. A new paradigm must account for real conditions of property creation, duration, and termination no matter how contingent these processes are and also the value of human capital and its relation to social capital as well as the dynamic role of technological innovation generated by human and social capital and how it impacts on the social and economic consequences on society.

13. Conclusion

We conclude this paper encouraging the reader to appreciate the relevant economic and political markers and their interdependence and interrelationships. We have stressed that we need a comprehensive contextual approach that permits a focus on problem particularity and permits the use of multiple methods cutting across disciplinary lines.

The contextual map below represents the idea of a comprehensive global social, economic, and political process with the capacity to link a multitude of markers and pointers of relevance to economic theory and policy.

We hope our contribution facilitates the further exploration of the appropriate boundaries of political economy guided by the normative imperative of universal human rights and universal human dignity.

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Notes

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The Double Helix of Learning and Work*

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Editors' Note

The Double Helix of Learning and Work by Orio Giarini and Mircea Malitza is a report to the Club of Rome first published by UNESCO in 2003. It advances fundamental paradigm-changing ideas in the field of education. Drawing inspiration from the double helix structure of DNA, the authors seek to strengthen the relationship between education and employment in order to bring 'The Knowledge Society' within reach. This article is an abridged version of the second chapter of the report. Successive chapters will be carried in subsequent issues of *Cadmus*.

Chapter 2

The Modular Approach

2.1. Dismantling the Disciplines

Whenever knowledge experienced a boom following a scientific breakthrough or a dramatic assimilation of novelty in society and the economy, a feeling arose that the new acquisitions had to be ordered, controlled, and better organized for more effective use and broader distribution. Looking back, it seems that such moments of stocktaking tended to occur once in every century, always during the first half.

Without going too far back in history, it is possible to suggest that in the Eighteenth Century such a moment of truth was the project of the Great French Encyclopaedia (1750), which was preceded by the earlier English Chambers's *Cyclopaedia...* (1728). The era was that of the Enlightenment that followed Newton's spectacular achievements in science. In the Nineteenth Century, Auguste Comte engaged in a classification of all sciences (1830) in an attempt to cover the entire sphere of knowledge, with the resulting emergence of positivism. He also contemplated the project of an Encyclopaedia that would stand for a "philosophical system of all knowledge in general". The progress of education was also one of his concerns.

* All content being used from the book *The Double Helix of Learning and Work* – a Report to the Club of Rome – by Orio Giarini and Mircea Malitza, published in 2003, is copyrighted to UNESCO. The full book is available online for download at <http://unesdoc.unesco.org/images/0013/001307/130713eb.pdf>

In the Twentieth Century, starting from the same premises, the Vienna Circle initiated a daring programme comprising the preparation of a new comprehensive Encyclopaedia (only one volume was published at the time, in 1937) and the establishment of an International Institute of Unified Science (1936). Both projects had to be abandoned right before the outbreak of the Second World War.

It is to be noted that a philosophical approach took pride of place in all these projects. Comte represented the unity of science as a tree (all sciences having a common root). The Vienna Circle saw logical empiricism as the basis of a science that tended to apply a single unifying methodology and to eliminate those branches that they were not capable of being used.

Each of those displays of unlimited trust in the power of knowledge, as incorporated in the sciences, elicited reactions and gave rise to protests. *L'Age des Lumières* was contested by Romanticism. After Comte, the sciences of the spirit were separated from the common trunk of the natural sciences by the “great schism” of Dilthey. Historicism and the axioms of the Vienna Circle were challenged in their very logic by statements indicating the limits of formalization or the untranslatability of language (Gödel, Quine). What should be noted is that crises of overproduction in the sciences generate projects aimed at ordering and classification. It is as if people of vision were looking for systematic methods to store knowledge goods so that those goods could be retrieved easily and rapidly. In the Twenty-First Century, the problem has resurfaced with a much greater sense of urgency. No wonder that it has not waited until 2030 simply to be in harmony with historical experience.

The knowledge boom occurred in the second half of the past century. Its magnitude defies conventional description. Books become obsolete as soon as they come off the press. This phenomenon explains, at least in part, the emergence of thousands of learned journals devoted to a single domain, such as medicine. Even so, no sooner are the magazines printed than research may advance considerably. The Internet has provided a much more rapid vehicle for registering and spreading knowledge. And yet, not even the new science of “information retrieval” has been able to cope effectively with the growing mass of unordered information.

The problem is that classification methods are still rigid and antiquated. They have not changed much with the passage of time. Geometry, arithmetic, astronomy, and physics have stayed, each in one piece, ever since Aristotle. All they did was to multiply by division, but broadly they are the same. During the Middle Ages, universities taught liberal arts in two groups: the *trivium* (grammar, rhetoric, and logic) and the *quadrivium* (arithmetic, music, geometry, and astronomy). Auguste Comte also counted only seven basic sciences: astronomy, mathematics, physics, chemistry, biology, sociology, and ethics.

As soon as a science acquired more advanced methods, it was made into a model. According to the Neurath and the Vienna Circle, the unity of science was suggested by “physicalism”. Galileo in the Seventeenth Century and the school of quantitative models in the Twentieth Century chose mathematics. These days they seem to have been dethroned by biology.

“The classical education system was dominated by theory. Now, emphasis is being laid on learning through experience and on work-based learning.”

Broadly speaking, the administration of knowledge has been undertaken by individual disciplines for centuries, no matter how diverse and specialized their subdivisions may have become. The disciplines have been institutionalized in higher education institutions: a comprehensive area of knowledge has a corresponding faculty, while its sub-branches are covered by departments and chairs. The university provides a common roof for all and ensures the implementation of legal requirements. It awards graduation diplomas for accepted disciplines that are so

described under the relevant law or other act issued by the national educational authority. In some countries, degree diplomas (BA, MA, PhD) in international relations are not awarded. Very few countries award formal degrees in mathematical linguistics or bioelectronics.

Now that the file on the organization of knowledge is finally reopened, it becomes obvious that the approach, based on a strict compartmentalization of disciplines, is the most serious barrier to innovative solutions. Teachers as a professional group display the greatest amount of inertia; they fiercely defend their own disciplines with a dedication that reminds one of the way large predators assert control over their hunting grounds. The classical pyramidal scheme, school-teacher-disciplines-students, has endured for centuries.

It would still be unfair to regard the university of today as a medieval fortress. Spatial unity in a confined sanctuary of learning is no longer the rule. In a modern campus faculty, buildings are often scattered, sometimes even located in different cities. The teaching staff has become considerably more mobile than in the past. Guest lecturers or visiting professors are quite common in most universities. Students move to other countries for a semester and come back with credits obtained from other universities. Optional courses are advertised for those who may be interested in them. During lectures or seminars, students frequently ask for additional explanations on pieces of information they pick up on the Internet. Distance learning competes with day courses. Professors and students alike carry their auxiliary memories in their laptops. Lectures are given using PowerPoint multimedia techniques with visual demonstrations and even musical accompaniment. Mass education has replaced latter-day elitism: universities have become crowded places offering a variety of events, always dynamic and heterogeneous. Informality and casual dress codes are the latest fashion.

At least, that is what one sees from the outside. More importantly, one must note that, on the inside, the university, which used to be the most conservative of institutions of learning, is now engaged in a serious debate on innovation. Myriads of circles, associations, and groups are dedicating their work to innovative teaching and learning in order to absorb the impact of IT. From here to examining the very mechanisms of change there is only one step to take.

Networking has transformed the world's leading universities into a huge laboratory of experimentation, innovation, and change. Which issues are the most topical? The classical education system was dominated by theory. Now, emphasis is being laid on *learning* through *experience* and on *work-based learning*. The traditional school focused on the development of intellect; now, the spotlight is aimed at *skills* and the acquisition of *core skills* or *key skills*.

Such concerns are living proof of the fact that education is moving a step closer to the world of work.

These concerns are announcing further spectacular developments in the Twenty-First Century. Both *experience-based* and *work-based learning* and the rediscovery of the importance of *skills* have been the result of pressing demands from knowledge users in the social and economic environment. Satisfactory answers have not yet been provided. Which disciplines are able to meet those growing concerns? Who is going to teach them? The disciplinary teachers ponder.

The basic tactic that the universities have used in their approach to change is to adopt the new techniques while still retaining the disciplinarity structure. The least problematic were the audio-visual methods that have been on the agenda since the 1950s. Audiovisual laboratories were created, but they served only as additional teaching aids to supplement traditional courses, which remained unchanged. The same happened with the use of television in schools.

The challenge of interdisciplinarity was even more remarkable. A new generation of universities emerged in Europe, in the 1960s, mostly as a reaction of worried governments when confronted with student unrest. The modernity of such new universities was expressed in the first re-wrapping of knowledge. Interdisciplinary faculties and schools were established to cope particularly with complex environmental matters. The response of the universities to the challenge of interdisciplinarity was not the weakening of disciplines but their multiplication. Those new rooms added to the old building “rapidly began to behave like conventional subject departments with the traditional means to maintain boundaries and to discourage the permeability of the staff, students, or resources through them” (Bridges, 2000).

The same tactics were applied to the assimilation of information technology, even though it proved to be more difficult to tame. The computer was viewed as a useful, even indispensable, instrument in educational practice, but still no more than an appendix to the disciplines. That attitude was a mistake. As James Bosco (1994) put it, the new technology does not fit into the old picture as a touch of color, but as an active element that establishes connections with each and every component of the structure, thus altering it. We should remember the words of Marshall McLuhan (1965); “the medium is the message”. IT takes a central place among the issues brought forth by the innovative trend in education and learning.

Increasingly, the Internet is a working space within which knowledge can be co-constructed, negotiated and revised in our time; where disparate students from diverse locations and backgrounds, even internationally can engage one another in learning activities; where collaborative projects can be developed; where communities of inquiry can grow and thrive; and where simulations, models and visually based prospects can be created that allow real interactions within vivid and complex environments that span sensory experiences. [...] Such activities are not just supplements to the classroom experiences; they are unique and irreplaceable learning opportunities themselves; and often they exist only online, not in real classrooms (N. C. Burbules and T. A. Callister, “Universities in Transition”, 1999).

There is an item in the innovators' programme that not only provides solutions for the others but also becomes the kernel of the new structure of educational systems: *modularity*. It has the appearance of a most benign and technical methodological approach, but it is the first-ever coherent attempt to break the compact block of the disciplines. Shy and prudent, experimental and local, it has come up with the best way to alleviate the suspicions of disciplinarians: it looks like a mere method to emphasize the individuality of various chapters in a discipline-based course. Modularity actually behaves like the computer: once seen as an instrument, it becomes the generator of total reform.

2.2. Modularization: The Era of Beginnings

Our definition of a *module* describes a unit of knowledge that has:

- i. coherence;
- ii. reduced dimensions and is easy to handle;
- iii. the capacity to be part of a general system;
- iv. the possibility to be classified and retrieved from the stock;
- v. the ability to combine with other modules and to form a strictly consecutive string with them;
- vi. the capacity to provide a content link with the other modules in the string and to provide support for independent learning;
- vii. the quality of clearly indicating what other modules have to be consulted in order to assimilate it and to which other modules it may lead
- viii. the quality of being selected by the user from several possible options according to an individual strategy aimed at a professional goal or at acquisition of new knowledge (research).

The modules may have different levels of development, most often (i) and (ii), but the number of these levels is not limited. Owing to the general and introductory character of the first level, it will register the highest degree of connections and will be resorted to in many variants of the personal curriculum. Interdisciplinary and applied modules follow suit. Here are some examples of modules: "Graph theory" (i), (ii), (iii), and (iv): "Graph theory in the Social Sciences"; "Graph Theory in Management"; "Graph Theory in Transport", the latter primarily involving "Graph Theory (i)" or "Graph Theory (ii)".

As seems to be the case for all great modern ideas, it is difficult to determine with certitude when and where the notion of modularity actually originated. Having followed with interest the constructivist pedagogical experiments of Weizsäcker (2000) in Germany who used the notion of "bricks", Botkin, Elmandjra, and Malitza, the authors of *No Limits to Learning: Report to the Club of Rome* (1979) wrote: "To encourage innovative social learning, true participation must enable people to open and inspect the 'black boxes' of knowledge, to question their relevance and meaning, and to re-design, re-combine, and re-order them when necessary". They also called for a reorganization of academic structures, "to combine university departments according to issues rather than only and always according to disciplines".

The term, “module”, came to be used in non-formal education, upgrading courses, summer courses, and evening courses, in which, to a great extent, interdisciplinary issues and applications were tackled. Those who organized such courses responded to the needs of the users (industrial units, company managers, etc.) by producing *ad-hoc* packages of modules, each comprising several lessons. Before becoming part of the formal education system, modularity amounted to simply walking around several workplaces along the production line.

The best known and the most dynamic of distance learning universities is the Open University of the United Kingdom. It involves more than 200,000 people of whom some 160,000 are enrolled in programmes lasting three to six years leading to undergraduate or graduate university degrees. Although the need to secure acknowledgement for these degrees still compels the University to observe traditional curricula, the number of innovations is considerable: virtual tutorials, discussion groups, electronic submission of assignments, computer mediated conferences, and more.

The following is a successful sample of a module, or “unit”, as it is called at the Open University: a one-hundred-page booklet comprising two modules titled “Towards a Mechanistic Philosophy, Block 1 I, Units 4-5, Science and Belief: From Copernicus to Darwin”. It is included in the chapter on Arts/Mathematics/Science/Technology as an Inter-Faculty Second Level Course in the History of Science. The topics suggested for discussion, the quotations and bibliographical references, the required comments on excerpts from classical works, the images and illustrations, the scientific rigour and elegant style – all these are qualities that make the two modules examples of excellence.

The turning point for modules was reached when they had to face the established structures of disciplinary institutions. In the current era of beginnings, one witnesses the emergence of a host of varied and uncoordinated experiments. Their goals and languages may still be insecure, but they are all brought together by their avowed intention to build curricula on modules rather than on disciplines.

In all cases, modularization began in the final stage of a given educational programme, at the point at which goals were established. It invariably went backwards, from the complex to the simple, up to the starting level of introductory or basic modules. The occupational profiles pursued by the students (*i.e.*, the answers to questions like “What would you like to be?” or “What would you like to do?”) were the most powerful magnets that caused the modular filings to settle in the map of knowledge. The concerns of those who want “knowledge for the sake of knowledge” would be met by resorting to the numerous terminals indicated as “research” in various fields. There are fewer reservations today about asserting the importance of the profession and its requirements, once educational authorities have set “enhancing employability” as their top priority.

The exploration of the theoretical aspects of the modular approach has been the object of several praiseworthy works. Warwick (1987, 1988) provides a concise definition: “A module is a unit of curricular material, complete in itself, to which further units may be added for the achievement of larger tasks or more long-term goals”. He emphasizes two broad tendencies, one “which begins with the established subject matter of a course” and the other that

“takes the students as its starting points”. The students would thus build programmes for their individual needs by choosing modules from a larger menu. The next steps are “the complementary approach (no predetermined order, complete freedom of choice), the sequential modules (minimal amount of modular prestructuring to ensure progression towards specified goals), the concentric model (integrity of subject matter maintained through linking modules to a common core), and modular stratification (precise order to be followed). Even the designers can be identified by their different styles.

Traditionalists, for example, give direction to their work by breaking its contents down into cognitively meaningful sections. Progressives permit students to construct personnel programs from a large number of free-standing, independent modules or even to generate epistemological patterns of their own. The behaviorist shapes the learning process by a gradual progression through carefully sequenced units, rewarding success with a series of credits whilst the devotee of experiential learning looks to modules to rescue creativity from the tyranny of the timetable.

All these distinctions are pertinent insofar as modules, especially in the experimental phase, are created for specific, immediate, or short-term purposes. Most of them originate from the applied, vocational, and technical sector; they are extracurricular and non-formal, especially designed for small and *ad-hoc* tasks. However, when dealing with an all-embracing pattern of formal education, all approaches are valid and non-exclusive. The approach of the main programme combines “core modules” (which are indispensable), direction (even though it may change), personal constructions (that pursue further linkages), and contents sequence constraints together with the advantages of a series of successes that are easier to obtain by taking smaller steps.

2.3. The Double Helix of Learning and Work: A Major Project

While the cumulative and gradual pace of science and knowledge is a datum, there are times when the pressure of problem-solving requires a focused effort, based on a plan and consistent guidance, spanning a long interval of time, and involving numerous research centers and considerable investments. In the area of the physics of particles and of nuclear physics, CERN (Geneva) is one such international center. In recent years, the Human Genome Project (HGP), which was developed in the 1990s, was a most spectacular and ambitious venture. It also had the structure, organization, and other characteristics of a major project.

The Human Genome Project overlaps partially, at least metaphorically, and for the second time, with the topic of this study. At first, the joining of the two complementary helixes – Learning and Work – suggested the double helix structure discovered by James Watson and Francis Crick. In the second instance, both the Human Genome Project and Learning and Work use the same key word to define their stated goal: *mapping the genome* by resorting to DNA markers and *mapping knowledge* in terms of its constituent parts. Both cases involve daring attempts to master complexity.

For quite some time, the human genome has been estimated as consisting of 50,000 to 100,000 genes based in 23 pairs of chromosomes. Two reports published in early 2001 came

up with smaller figures (31,000 and 26,000 respectively), but some biologists are still convinced that further research will show that the stock of genes that it took to carry the blueprint for human beings is something between 65,000 and 75,000.

Each chromosome contains a DNA molecule, in which four bases – A, T, G, and C – form opposite couples. The order of the four bases on a strand is what determines the information content of genes, which are nothing but pieces of DNA of different lengths made up of 2,000 to 2,000,000 base pairs. When the project started, only 2 percent of the human genes had been mapped. The chromosomes were numbered, and every time the physical mapping of one of them was accomplished (no. 3 or no. 4), the media hailed the event. In genetic mapping, the idea is to determine the position or spacing of genes on the chromosome, thus obtaining clues concerning those genes associated with genetic diseases. A matrix was introduced into the physical maps. At the beginning, the complete DNA sequence was determined for a virus (170,000 basic pairs). A bacterium has 4,500,000 basic pairs. The human genome consists of 3 billion DNA base pairs, about 1,000 times larger than the bacterial genome.

One might be tempted to say that there is hardly any basis for comparison, in terms of complexity, between the genome and knowledge as expressed in the disciplines that are taught at a university. We still remember the timetables that we used to pin on the wall when we were children. The picture is no longer that simple when we open the course yearbook of a university. Let us take, for example, the *Annuaire général*, Vol. 2, (Faculté des études supérieures de l'Université de Montréal, 1998-1999). The 167 programmes listed there offer more than 6,000 courses (or other activities such as seminars, brainstorming sessions, tests), each indicating the credits awarded. The courses are grouped according to major disciplinary categories, from *Aménagement* to *Art et Science*, to Educational Sciences and Theology, to High Medical Studies, to Music and to Polytechnic studies. The yearbook is remarkable in its attempt to offer optional or *à choix* courses, to focus on practical work and laboratories, to invite lecturers from outside the University, to provide openings towards other fields.

In most universities, such a drive for innovation is at work. Buildings are enlarged or subdivided; new halls are opened, with new corridors to connect them, and wings and laboratories are added. Only the disciplinary structure remains untouched, even though it may now look like a labyrinth.

But, one might argue, will the complexity not increase when a far larger map of modules replaces the disciplinary courses? For a cautious experiment in a technological faculty, 160 modules will have to be introduced instead of 40 courses – four times as many. Since a student has to cover 100 to 200 modules in order to qualify for graduation, the choice of modules is limited by content and sequence constraints. In other faculties, the module/course ratio can exceed a factor of 10.

Moving from disciplines to modules does not amount to discarding the merits of an educational system that has functioned for centuries. Rather, it aims at introducing some radical measures in order to enhance the existing parameters and to improve results. The forty-hour week of a student, now generally divided into twenty-four classes and sixteen hours of individual study, is maintained in reversed proportion: sixteen classes and twenty-four

hours of individual study. If we consider part-time or distance education, this proportion is but a minimal indicator. Given the variety of practice in higher education, let us give another example of a comparative diagram. Five courses per semester would correspond to twenty modules. In terms of reading material to be covered, a one-semester course would normally have around 200 pages. A module averages fifty pages. One course would then correspond to four modules. The figures add up nicely.

Complexity only becomes obvious when we take into account the number of distinct itineraries that may be covered in a modular system. Theoretically speaking, there are quite a few ways of choosing 100 modules out of 1,000 that are on offer. Of course, the number of choices will become smaller when we consider the conditioning that is inherent to a network of constraints: access to a module essentially implies covering some others.

The Learning and Work project introduces the second phase of modularity, following the experimental phase. It may take a decade for the educational system to introduce the modular method into this first phase, to build it up to a critical mass, and to become aware of its benefits, which multiply in relation to the growing number of applications. Thus, a large university that offers degrees in both medicine and technical sciences will receive more benefits than a smaller one. And a consortium of universities will score even higher. Also, in the experimental phase, it is crucially important to elaborate modules that are tailored to suit the entire active life scale. Such modules can be offered early on to adult users who either turn intermittently to educational cycles or cover them while working.

The Learning and Work project has as a main goal the mapping of knowledge according to the practical criteria of education distribution and use, learning, and training, for which it attempts to produce a modular sequencing operation. The project tends to cover everything that an individual can and must know in order to perform professions and roles, while also accomplishing the traditional goals of education (personal fulfillment, dignity, productive activity, social roles, conscience).

The Learning and Work map starts at the points at which the educational system transfers individuals to the sphere of work. Those, obviously, are the terminus points of job-oriented education, technical schools, and higher education. However, the map is built according to the principle that an individual can join the sphere of work at any point and then return from the helix of work to the helix of education at any time.

In an ideal university, as I conceive it, a man should be able to obtain instruction in all forms of knowledge, and discipline in the use of all methods by which knowledge is obtained. In such a University, the force of living example should fire the students with a noble ambition to emulate the learning of learned men, and to follow in the footsteps of the explorers of new fields of knowledge. And the very air he breathes should be charged with that enthusiasm for truth, that fanaticism of veracity, which is a greater possession than much learning; a nobler gift than the power of increasing knowledge; by so much greater and nobler than these, as the moral nature of men is greater than the intellectual; for veracity is the heart of morality (Aldous Huxley, *Brave New World*, 1933).

Still, where is the epistemological debate? It is all about knowledge, and we first need agreement on its definition. It may well be that knowledge can no longer be represented by a single tree. But it then becomes a forest, as each discipline advances according to specific laws. How can one account for the intermingling branches since the roots are distinct? The issue is deeper than such metaphorical interrogations may suggest.

It is an acknowledged fact that the ages-old philosophical questions regarding the nature and uniqueness of science, which defied classification and allowed the answers to emerge from free practice, have a certain justification. One way to produce a comprehensive mapping of science might be suggested, from time to time, by the methodological approach. Another way might be offered by logical criteria. But the need for a practical scheme is so compelling that, at the start of the Twenty-First Century, there is no time to wait for complete answers.

It is difficult to visualize the completion schedule for an enterprise such as Learning and Work in concrete terms. For one thing, global educational authorities do exist. The most active and productive one is UNESCO. Next to it, the International Labour Office (ILO) is equally busy insofar as work issues are concerned. The two of them initiated the EFA (Education for All) programme together with the United Nations Development Programme (UNDP). Regional organizations should be vitally interested in the project. Some also have considerable means such as the European Union and the Council of Europe.

Powerful nations support major education programmes that reach far beyond their borders. The United States, Japan, France, and the United Kingdom have dynamic and open educational systems that can yet play an important part in the launching and development of the Learning and Work programme. These countries can be assumed to be very sensitive to the Learning and Work potential, for their policy statements frequently mention unemployment, the aging of the population, the knowledge economy, and competitive pressures as their major areas of concern.

The envisaged programme largely depends on meaningful international co-operation. Mixed groups of experts with related profiles and then intergroup teams will have to do most of the job. The largest groups will be those on medical, technical, and natural sciences, on economics, law, literature, arts, and other humanities. Those enclaves of experts will keep their doors open to representatives of commerce and industry, public authorities and services, human resources managers, and NGOs. The media will need to keep the public informed. Permanent centers and periodical meetings will examine developments in the area of relevant technologies. The software industry will need to encourage a more extensive use of artificial intelligence methods. The lead partner, or perhaps the owner, of the programme will possibly be a consortium of several ICT companies that are the engine of today's exponential development of this industry. They owe everything to knowledge and training, so they are in a better position to understand their value.

One effect of, and also a condition for, the implementation of Learning and Work will be that of changing most of the existing legislation on education, work, insurance, and social services along with possible constitutional adjustments. Legal experts and legislators will be

kept busy for almost a generation. They are likely to take pride in breaking new ground in the development of adequate doctrines and procedures.

The map of knowledge or the module scheme differs from that of the genome at the point where the latter strives to master a set, albeit a large one, of fixed mechanisms. Knowledge, however, is perpetually moving. Among other reasons, modules are created because they can be refreshed. The fact that they will always compete is the best way to keep them awake. Will a student choose a module suggested by his tutor if he can find a better one on the Internet? The observance of certain standards must still be provided by people of acknowledged competence. That is why the administration of the worldwide system of the map of knowledge will require new global institutions. At least three will be needed, not necessarily as central institutions but rather as peer networks: *(i)* to supervise quality; *(ii)* to ensure compatibility with the existing systems; *(iii)* to acknowledge credits.

The evaluation of studies and the issuance of appropriate certification are more complicated tasks, but ones that are not insurmountable for the modular system. The association of the modular system with the system of credits is organic from the very beginning. Without such a link, the cumulative character of learning could not be maintained. There are several crucial points that should not be overlooked: the social value and prestige attached to a diploma or to a learned title; the “label” resulting from a certain type of education, which will eventually stick to one’s visiting card and private identity; the avenues it opens into the world of employment and practical activity.

An individual accumulates credits throughout a lifelong learning system. At each moment in life, one does not rely on compact years of study at a precise university or college but rather on the credits that one may have obtained in a genetically indicated direction (engineering, medicine, education, arts, etc.). If during studies that correspond to today’s higher education one earns about 300 credits, in the following years, one might earn about 30 additional credits per year, which leads to over 1,000 by the age of 76.

What happens to diplomas? Our suggestion is that for every 200 credits earned, an individual should be awarded a “star”. According to that system, a high school diploma would be equivalent to one star; college, to two stars; university, to three; the PhD, to four; further specialization and applications to five or six stars, respectively, and so on. Today’s PhD, which entails the obligation to make an original contribution to knowledge, and hands-on experience in scientific research might be assimilated to bonuses. In any case, prestige incentives or rewards should not be inferior to those awarded under the existing system. One of the goals of modularization is to keep alive and to motivate the effort of going a long way toward the acquisition of useful knowledge.

2.4. The Computer as Consultant and Provider

A project that pursues goals of the magnitude of the Learning and Work project could not be imagined or accomplished before the ICT revolution. Without the computer, the mapping of knowledge in the form of learning modules could not be undertaken. The computer provides the necessary programmes for the listing, positioning, and stockpiling of the modules in

a huge database. The retrieval and combinatorial techniques are already familiar to most users. But here comes the big surprise! The map of knowledge cannot be represented as a linear text. Commonly used texts and graphics cannot accommodate its complexity. Computer screens can reveal only partially the multitude of the links, and, at best, three-dimensionally. The structuring technique has to be that of hypertext, already used in the building of a homepage.

The map of knowledge has nothing to do with a geographical map one can hang on a wall. Neither is it a projection of some physical area. It is a list of links among entities represented by terms pertaining to each of those entities. The programme provides access to those entities and the possibility to select one and to establish further possible links. The entire process is subordinated to a goal that only the user can determine. The final result of the selection procedure can be represented as a linear or bi-dimensional sequence of modules connected in series or in parallel. This itinerary is the final one that resulted from a succession of numerous selections. Several possible itineraries can be provided as the menus for an ultimate choice. However, even a deliberately final choice is still, in essence, tentative. After going part of the way (one or several modules), the user may revise his or her itinerary and choose new paths.

The technique of the hypertext goes beyond the familiar techniques used in advanced libraries for the indexing of an enormous number of books or scientific periodicals that contemporary readers must consult. If one needs to know which modules refer to a particular issue or use a certain method or even connect to other issues and methods, one will receive one's answer after performing a series of clicks.

What follows is the first sample of a computer at work in the Learning and Work scheme. It draws up a map of knowledge in its own style and then administers it. Since one of the main goals of the system is to create a personal learning itinerary (*i.e.*, the string of modules to be covered), the computer becomes the personal consultant and the monitoring tool of the covering process. The modular path is a twisted one, with many crossroads and turnings. It is not like the disciplinary road, with no turns or side streets, which once embarked upon cannot be abandoned before the final destination is reached. For all the paths that open at the end of a module, the computer is both a guide and an adviser for decision-making.

Meanwhile, the computer demonstrates its effectiveness by searching for, and finding, the basic sources of learning. It opens unimagined possibilities to consult library catalogues and great collections, even to identify the necessary chapter or passage in a book or an article. It is now possible for a student to browse through the rare manuscripts of the Vatican, to search the Library of Congress of the United States, to visit the exhibition halls of the Louvre or the Hermitage, to wander through the Forbidden City of the Chinese emperors, or to climb the heights of Machu Picchu – all from the solitude of a campus room. A laptop is the student's link to global science and to the infinite variety of cultures. The offer is so massive, so prompt, and so varied on the computer screen that the student has to master the art of orientation and selection.

For centuries, students and researchers alike had to work hard to gain access to the sources of learning and to pin down the current state of knowledge so that they could move on. It was

common in the old days for students to walk for months before they reached a university in Bologna or Paris in order to pick the brains of a distinguished scholar. Nowadays, updated information is readily available. All one has to do is to obtain the professor's e-mail address. The time-consuming and labour-intensive effort to search for sources has been replaced by the ability to discern the right ones – a superior intellectual quality. The measure of history is given by the progress from the ox-driven plough to the tractor, from the sweatshop to the automated production line, from the horse to the car or the airplane, from sail to steam to diesel. It is also illustrated by the monk writing on parchment *versus* a student reading and writing with his laptop.

When Marshall McLuhan wrote *The Gutenberg Galaxy: The Making of Typographic Man* (1962), he was correct in noting the watershed between a phase of civilization based on the linear and analytical writing of books and the other phase that is submerged in the synthetic and global television image. The immediate inference is that a culture that can use such devices has to be of a different kind, just as the human mind has to function differently in a changed environment. Several decades later, one observes that the written text has not gone out of use; the computer has not caused the total abandonment of paper; and books are still being published. It is only that children now can go to a *médiathèque* (which in France has almost replaced the *bibliothèque*) in the neighbourhood, where they can read onscreen, listen to recordings, and watch videotapes. We have entered the era of multimedia, a splendid mixture of text, sound, and image.

The written text seems to have won the battle after all. The computer has reduced it to a two-symbol succession. The digital revolution has made it possible to mesh sound and image in the same procedure, thus going beyond the analogue techniques. Images have become digital, and so has music reproduction: multimedia is *multi-* only in terms of expression, but it is *uni-* in terms of digital support. Digitalization has made it possible for the main general-use devices to converge: the computer, the telephone, the television set. The miniaturization of information technologies has made all of them portable. It is reasonable to assume that, when competition eventually prevails over the narrow specialization of major companies in the field, a single device will substitute for all of them. When that happens, it will introduce new elements of enhancement into the practice of computer-based learning. The reverse influence is also possible. The new market catering to the Learning and Work system might very well call for new technological and service requirements.

Orbital links via satellite and the hugely efficient optic fibers have caused the information technologies to also become communication technologies. Hence ICT. The past decades have focused on communication, and the improvement process has been subordinated to that particular function.

An immediate consequence has been the emergence of distance education, a new chapter in modern education. It questions the spatial identity of the university. Originally, it was developed to serve the needs of non-formal education that offered adults a form of distance learning using the available media (correspondence, radio, television). In time, distance education gained in efficiency and attendance due to the introduction of new technologies.

Large universities, which had opened far-off branches in the meantime, started to use distance learning as a means of making one and the same course available on several campuses. In Vancouver, Washington (USA), a complete set of distance learning equipment, donated by the Ford Foundation, allows Washington State University to provide courses for a campus in Seattle, almost 500 kilometers away. The 150-university network around the Baltic Sea broadcasts two-hour lectures by satellite, according to an established schedule, to the member universities registered at Uppsala, the headquarters of the Baltic University. In Madrid, a distance university functions according to a regular university scheme of faculties and disciplines.

However, distance education does not go beyond the “school-based teacher learning” formula in the current experimental phase. Even so, it has been welcomed with interest as a variant of the regular university, one in which physical attendance is not required. Universities that have created special distance-learning sections to replace or supplement evening, part-time, or low-attendance courses suddenly find themselves overbooked.

An attempt to define distance learning led to the following list of characteristics: (i) modular courses; (ii) courses privately funded by students or sponsored by an employer; (iii) part-time and flexible study; (iv) flexibility of entry requirements and levels of entry; (v) diversity of subject range inside degree courses (student-choice); (vi) independent but not necessarily student-centered courses; (vii) resource-based; (viii) limited face-to-face contact with the tutor.

The fact that modularization sits at the core of that list is not accidental. The inadequacy of block-courses in distance communication is avoided by means of the reduced volume and enhanced flexibility of the modules. Example: four major pharmaceutical companies initiated a modularly designed course that can be completed in one to two years on “Structure-Based Drug Design”. The complete course runs on the Internet with the aim of creating an “interactive learning community”. The students are all enrolled at post-graduate level and are gainfully employed. In Scotland, four universities launched a project on the reciprocal and collaborative authority of tutorial units exchanged via the Internet (MANTCHI – Metropolitan Area Network Tutoring in Computer Human Interaction). Each tutorial had a typical load of one week of work for the student, which corresponds to our definition.

How do students, who have been questioned about the use of ICT in the teaching and learning process, respond? They say they enjoy it. It enhances their responsibility for self-help. It opens new avenues to specialist subjects, to the use of experts, and to the latest scientific data. It broadens collaborative opportunities, and it provides a chance to enable others.

Once the “friendly” machine was created, its performances registered spectacular improvements. Consequently, it is possible to assume that, in the Twenty-First century, artificial intelligence will spread over the vital areas of reasoning, choice, analogy, and metaphor, thus becoming what it is meant to be: a thinking tool that produces reflection, creation, and knowledge. The Twenty-First Century is also expected to witness significant advances in understanding the mechanism of the human brain. What hidden operations of the “black box”

lie behind learning processes? Centuries of educational theory and practice as well as long series of learning concepts have failed to greatly enrich knowledge of the mental operations that produce learning. The progress of the machines that assist human learning and a better understanding of the mental processes involved in it will reveal the specificity, potential, and limits of these processes and will facilitate man-machine and man-man interaction.

The resulting learning and work environment will be different from the one in which people operate today.

The University could also develop models which show the universities solving global issues and problems, not only models which transmit the skills and knowledge necessary to be a global citizen. For example, an interesting model would offer a true vision of what the university can contribute to globalization and the language necessary to make this vision understood and accepted even by those whose major interest is not the breakfast, but the dinner menu preferred by Francis Bacon. In the eighteenth century, an age of exploration and discovery, Buffon, in his *Histoire naturelle*, wrote that the human mind has no limits and that it expands as the universe unfolds before it. Today our minds and our institutions remain strong, in part because of the stimulation of the global inquiry. The Bible reminds us that without vision, the people perish (Proverbs, 29:18). The responsibility for a vision for universities in the next century belongs not only to the students, the alumni, the teachers, researchers, and administrators, but to each one of us. The future is ours to share and to improve by our combined efforts (Roseann Runte, "Globalization and the University", 1999-2000).

2.5. The New Environment of Learning and Work

The United Nations Millennium Summit in September 2000 may have heralded the advent of a new era. The conventional rhetoric that is specific to such solemn assemblies was widely replaced by sound reflection and down-to-earth realism. The debates illustrated the new way in which the international community chose to rank its major issues according to their importance and the amount of anxiety they might cause. The report of the United Nations Secretary-General, Kofi A. Annan, began with three issues of special significance: (i) opportunities for the young; (ii) employment; and (iii) education.

The United Nations acknowledged that globalization "offers great opportunities, but at present its benefits are very unevenly distributed while its costs are borne by all" and that "the central challenge we face today is to ensure that globalization becomes a positive force for all the world's people". Good governance was presented as the only rational way to prevent and to manage the negative effects of globalization. And the very substance of good governance lies in the ability of societies, not just governments, to adapt flexibly to the necessary changes that technological advances have made inevitable. Rather than "adaptable", the word, "prepared", better describes that particular ability to cope with change in the new circumstances.

Education and employment are probably the areas that are the most vulnerable to increasing inequality. According to foresight studies, those areas are also the most exposed to negative developments, were we to pursue the track we have trodden so far. The United Nations report places education and work together. The chapter on employment states that “Education is the first step. Creating employment opportunities is the next”. Still, the barriers between education and work are not mentioned. The report does not suggest that the two areas should be addressed simultaneously with a view to providing joint solutions.

The message we are trying to convey in this study is that the next step is to consider education and work together. The Learning and Work approach aims at significant changes in the organization of education and work. In addition to the practical solutions that the new system offers to the two fields, it also enhances the preparedness of society to cope with the challenges of globalization. It is meant to bring an element of flexibility into the entire institutional structure of society, from legislation to finance.

The following combination of features characterizes the system outline:

- It brings knowledge acquisition and its use closer together;
- It provides a unitary vision of life by combining lifelong education and lifelong work;
- It suggests an individual-centered single lifetime Learning and Work strategy, with plenty of opportunities to choose new paths according to one’s own evolution and aspirations;
- It shifts the main activity of the university as a manager of discipline-teaching to that of a custodian of module-based tutoring and lifelong learning;
- It offers everybody unlimited chances to enter the system, thus reducing the waste of human resources in the fields of both education and work;
- It enhances the incentives to learning and work, and it proposes a coherent system of recognition based on merits;
- It uses as inputs the most relevant strands of knowledge and continuously refreshes the content of learning, adding the skills and the worldview demanded by modern work;
- It gives to the two main spheres in which human life is spent, learning and work, the possibility to be not only complementary and in harmony with each other but also to stabilize and bring into balance the flow of people moving from one field into another.

All these features are acquired owing to the modular system, whereby units of learning or work have the capacity to combine in a meaningful way. They have connectors for branching inside the learning and working systems, and also between the two systems.

In this process, new professions are likely to be born. The designer of a module is different from its author (a professor, a scientist, or an expert). The planner of modules is different from the designer. Producing modules will become a booming industry, comparable in magnitude with the production of music CDs. The co-operative aptitudes and habits of various institutions and branches and the practice of teamwork and taskforces and of *ad hoc* and temporary synergies will undoubtedly increase.

We have to note that had the corporations had tighter links with higher education, their requirements would have been known and could have generated adequate responses in a system with sufficient managerial flexibility to avoid the rigidity of disciplinary blocks. The corporate universities are now better equipped and financed, freer of constraints, than their counterparts in the regular system, and they can undoubtedly be more innovative and more open to change. Still, are they not, at the same time, liable to enhance inequality of chances? The parent corporations will mostly hire graduates of their own universities, while other graduates will see their chances of employment diminish.

Another attempt to bridge the gap between the enterprise and the educational system was the initiative to create a “university for industry” (Ufi). Similar to the Open University, the university for industry accepts total flexibility. It aims to “tell you what learning is available and offer advice if you need it, and provide you with a course that meets your needs, whether full-time, part-time, or through study at home, at work, or at a local center”.

At this point, it is quite legitimate to ask ourselves: Should the polytechnic universities not be the industrial universities? Should they not make the changes that have already been assimilated by the industrial university?

In any event, the two initiatives – the corporate university and the university for industry – are clear symptoms of the perceived need to link the two domains of learning and work that are still separated and distant from each other.

For those who doubt the advantages of the Learning and Work project, it may not be such a bad idea to analyze the possible objections or even adverse attitudes to it.

First, scientists might say that, since it is the production of science and not its distribution that matters to them, the map of knowledge is not really necessary because it simply records what is already known. Science is interested in open issues that act as a magnet for the vocational profiles on the educational map. So far as research is concerned, the desired applications are also listed among the goals that would organize the knowledge units backwards. Theoretical or practical problem solving necessitates units or modules that exceed the scope of Learning and Work. The objection is valid and welcome. But it is still socially preferable that, instead of suggesting an alternative mapping, scientists should provide their advanced research modules to all those who are willing to join research activities. This can easily be combined with the present or future profiles of researchers. Scientists may wish to work on a parallel mapping of open issues. Such an attempt was already made by Ronald Duncan and Miranda Weston-Smith (1977) when they compiled and published their *Encyclopaedia of Ignorance*.

Another objection might come from the staff of the teachers of disciplines. Although their reticence may be caused by an immediate interest in keeping their jobs, they have to be listened to when they express concern about declining quality standards and loss of academic rigour or specific ethos resulting from the solidarity of the servants of a discipline. The answer lies in the established fact that the major divisions of knowledge (*i.e.*, the natural sciences, the social sciences, and the humanities; the medical and the biological sciences;

formal sciences such as logic and mathematics; and arts, music, and sports) will continue to provide the guidelines for the formation of researchers and for the first approximation of the areas of vocational profiles. The mathematician does not disappear either as a researcher and a competent author of modules or as a tutor for a large class of modules when mathematics is predominant.

“The systems of education and work are not those systems most naturally inclined to change. Provided they become more flexible and modular early on in this century, they still have a chance not to miss out on the future.”

The third category of persons who might have reservations about the modular system is represented by those who warn about the overwhelming responsibilities we may prematurely place on the shoulders of young people. A young person is likely to be faced with the lack of preparation of society itself to function in an environment of greater uncertainty and risk. Much of that situation can be blamed on the bankrupt determinism of the past. The market economy requires alert and mobile people, capable of coping with increasing competition. The image of a young person sitting comfortably under the roof of a discipline as his or her only way in life, complacent and indifferent to the opportunities of choice or change, is being replaced by the picture of a new young person who moves along the channels linking the modules, heading towards a promising star and suddenly changing course as he or she sees another, even more attractive, target. This effort will offer a much higher probability of living a rewarding life compared to the prospects offered by the rigid systems, which are already cracking under the strain of change.

To all of the above, one can add the inertia of those systems in which stability is translated by immobility: bureaucracies, institutions, legislation, and conventional and conveniently smug thinking. Such bastions of procrastination are unlikely to survive the sweeping changes that are being brought about by the new century. Human society discovered the merits of flexibility decades ago. Long before flexible approaches were included in Learning and Work, enterprises were using them in industrial production.

Meanwhile, most industries have adopted the modular method using subassemblies that enter different combinations to produce a broad range of finite products, which can be rapidly harmonized, with the demands of customers. Tailor-made or customized products are now being turned out at mass industrial speed.

The systems of education and work are not those systems most naturally inclined to change. Provided they become more flexible and modular early on in this century, they still have a chance not to miss out on the future.

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Towards a New Paradigm in Education: Role of the World University Consortium*

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Abstract

A new paradigm in human development must be founded upon a new paradigm in education. A human-centered educational system is needed whose aim is the fullest development of the capacities of each individual. Today humanity is on the cusp of a major transition in education, our most powerful instrument for conscious social evolution. Quality education can now be made universally accessible and affordable. Equally important, future education must be made relevant to the rapidly changing needs of society, the increasingly sophisticated demands of the labor market, the growing shortage of attitudes and skills need to promote entrepreneurship and full employment, the values needed for social harmony and problem solving, and the individuality needed for leadership, independent thinking and creativity. The coming revolution in education spurred by the breakthrough in online learning has made all of these goals achievable. New technology can facilitate a shift from the drudgery of passive knowledge transfer and memorization to the exhilaration of active learning that fosters curiosity, discovery and original thinking. It can also help break down the intellectual boundaries between disciplines, making possible a more comprehensive, transdisciplinary, integrated approach to knowledge. A revolution in higher education is upon us.

Education is the most sophisticated instrument yet fashioned by society for its own conscious social evolution. Yet, ironically, evolution of the instrument itself lags far behind the evolution of the society it strives to promote. This lag is a natural result of the fact that human progress is largely a subconscious process occurring by trial and error. Conscious knowledge of the process usually dawns only after many repetitions of the actual accomplishment, just as great athletes acquire skills for proficiency long before they acquire the capacity to consciously transfer their knowledge to others. However, social change has now become so rapid that it is imposing severe pressure which the existing social fabric is unable to effectively absorb and assimilate, leading to fissures and fractures that retard smooth social transitions and threaten to undermine the stability of the existing structure. The multiple crises now confronting humanity during a period of rapid globalization are symptomatic of this widening gap. Therefore, there is greater need than ever before for conscious evolution of the instruments of education required to support the general evolution of society as a whole.

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Analogies are inadequate, but it may not be inappropriate to say that the current system of higher education is akin to driving 1914 Model T Fords down modern superhighways. The Model T was the first mass produced automobile in the world. Until then cars were assembled one at a time in workshops the same way horse-drawn coaches were made in earlier centuries. Ford was the first to automate the process on moving assembly lines to produce a million a year instead of a few thousand produced by the old method. But the capabilities and quality of the Model T remained largely the same as its hand-crafted, custom-assembled predecessors.

“The movement of rapid change in global higher education is already underway and it is unstoppable.”

The massification of education like the mass production of automobiles a century ago will transform global society in ways that are difficult to even conceive today. The democratization of motorized transport activated and energized all aspects of society, ushering in the rise of the Middle Class and the century of the common man. The democratization of education is having equally dramatic impact now. As the right to vote became the symbol of democratic freedom in earlier times, the right to education has become a symbol of the right of all to a life of opportunity and prosperity.

Since 1914 the dirt and gravel roads for which the Model T was designed have been gradually replaced by four and eight lane motorways connecting major cities and production centers around the world. In parallel, the automobile has gradually been transformed from a functional horse carriage driven by an internal combustion engine into a highly sophisticated, computerized, electronic vehicle providing a range of capabilities and a level of quality inconceivable during the early days of the automobile. In contrast, both the methodology and content of higher education remain largely unchanged since the 19th century. Granted that the range of specialized subjects has increased enormously and the range of information available to instructors and students has grown exponentially, the basic conception of education and pedagogy still closely resembles what it was in the universities of old. Today we have lightning fast superhighways for transmission of information and dissemination of knowledge, but we are plying these highways of cyberspace with pedagogical methods and concepts suited to a bygone age. Open access to lecture notes, audio and video on the web, and the production of highly fragmented, capsulized Massive Open Online Courses represent the Model Ts of future education. They are welcome pioneering initiatives and an indication of the vast opportunity that has emerged, but they are only rudimentary first steps in the remarkable journey of education that we have yet to clearly envision and have only just begun to traverse.

1. Challenge to Higher Education

Scientific knowledge and the technology for processing and transmitting information are not the only things that have changed during the last hundred years. Radical changes have occurred in all aspects of human life – the aspirations, knowledge, values, skills and the practical organization of society for production, commerce, finance, employment, healthcare,

governance, law, entertainment and recreation have evolved commensurately in range, variety, quality, interconnectedness, richness and depth. Each of these changes imposes new demands on higher education, if it is to continue to serve as an effective instrument for rapid, harmonious evolution of global society.

While it is relatively easy to imagine the next incremental steps that can be immediately taken to improve on what prevails today, envisioning the future of higher education is itself a great challenge and a great adventure with limitless boundaries and potentials. Indeed, the pace and range of innovation based on existing models are so rapid and varied that it is very difficult to even monitor all that is happening and likely to unfold in the coming days. It is easy to forget that the first really successful MOOCs are just two years old, and since then the number of universities offering online education as well as the number of courses available and students enrolled have grown exponentially. Disseminating information on these initiatives and facilitating multiplication of institutions, courses and students involved are valuable services to the field of global higher education. This was one of the objectives with which the World University Consortium's website (www.wunicon.org) was conceived.

But this is not the only challenge that needs to be addressed, nor perhaps the most vital and important for the World University Consortium (WUC). Regardless of what organizations such as WUC may do to support it, the movement of rapid change in global higher education is already underway and it is unstoppable. A more fundamental question concerns whether the present direction of the movement is the very best course for the future development of this field or whether present circumstances present both the need and the opportunity for a more radical change based on a new, wider and more insightful perspective regarding the potential contribution of education to the future evolution of human society.

For this reason, it is worthwhile pausing to reflect on the essential nature of education as a human activity and the fundamental role it plays in human development. A discussion of first principles may appear to be an unnecessary distraction or indulgence in intellectual speculation at a time when there are so many practical steps that can be taken to improve on the status quo. However, it may turn out that pausing to reflect on more fundamental issues at this stage may reveal the potential for catalytic actions that can radically accelerate and alter the trajectory of future progress to arrive in a few years at a point which may otherwise be reached only after many decades. Such critical tipping points are all too familiar. In retrospect it is evident that the end of the Second World War provided an opportunity for founding institutions for global governance of a more far-sighted nature than the UN system that emerged, which lacks the power needed to further the evolution of global society. Another great missed opportunity occurred in the early 1940s when US President Franklin D. Roosevelt laid plans to introduce immediately after the war a second Bill of Economic Rights in America, which included the right of every American citizen to remunerative employment; but he died before he could realize that goal. So too, at the time of the founding of the Bretton Woods institutions in 1945, a proposal was tabled by Keynes and seriously considered by both the USA and UK, before being eventually rejected, for introduction of a world currency as a common reserve fund for global development. Farsighted action then could have saved decades of global financial instability and dramatically accelerated world economic progress. Similarly,

we can now look back a quarter century and see that a great opportunity was missed at the end of the Cold War to completely eradicate nuclear weapons from the face of the earth. Instead, we have seen the proliferation of nuclear powers and the extension of nuclear doctrines to re-legitimize possession and possible use of these weapons for the foreseeable future. Therefore, in our eagerness to focus on the imminently doable, let us not overlook the possibilities of a quantum leap forward for a new paradigm in global education.

2. Motives for Education

Obviously our conception of education varies with the purpose for which it is intended. That purpose has changed radically since the time when only a handful of clerics and aristocrats enjoyed the luxury of more than a rudimentary education. After the Reformation, Protestant religious leaders in Europe recognized, as their Hindu and Jewish predecessors had many centuries earlier, that education is a powerful instrument for acquisition and dissemination of religious teachings. Therefore, many Protestant nations spurred the spread of primary education to impart reading and writing skills to every member of the community and encouraged the development of universities to train members of the clergy. The rise of commerce in Europe stimulated the spread of numeracy for accounting and literacy for entering into commercial contracts. The growth of scientific knowledge during and following the Enlightenment fostered development of new scientific disciplines. The explosive growth of technology during the Industrial Revolution gave rise to applied technical education in agriculture and various fields of engineering as well as technical training to impart vocational skills. The development of modern corporations and sophisticated markets drove the need for those with specialized knowledge in business and finance as well as for many more people with a broad general education needed to fill positions in government and business administration. Rising levels of prosperity stimulated demand for an ever expanding range of professional services. The increasing formalization and technological sophistication of modern economies have further increased the demand for educated and trained personnel, effectively converting the college degree from a symbol of social status into a passport for employment and higher income.

“Education is the process by which society consciously passes on the accumulated knowledge and wisdom of the past to future generations in a concentrated and abridged form.”

All these motives continue to drive the spread of education today. But beyond the obvious utility which higher education serves, it also serves two more fundamental purposes. First, the political, economic and social success of modern society depends to a very large extent on the education of its citizenry. The type, level and quality of education have become important determinants of the quality of the citizenry and its capacity to function in increasingly democratic social environments, where external authority and pressure for social conformity are replaced by greater freedom for individual freedom, choice and initiative. Second, the

capacity for individual achievement, welfare and well-being in modern society depends to a very great extent on education as well. The type, level and quality of education have also become important determinants of individual accomplishment – of the capacity to compete and cooperate with others economically, adapt to technological advances, and adjust mentally and socially to the challenges and opportunities of rapid social change.

3. First Principles

Education is ubiquitous in modern society – at home, in schools, in the workplace and in the media. It is one of the highest priorities and most prevalent activities of individuals, families, organizations and countries. Yet the essential nature of education, its rightful role in human life, the process by which it occurs, the most appropriate goals, methods, content, duration and applications are far from self-evident. Like the artists' conception of beauty, it is easier to recognize than define or explain. Like the proverbial six blind men who touched different parts of the same elephant and described very different discoveries, we each tend to see a part of what education is rather than the potential of the whole of what it can and should become. Therefore, it may be appropriate to start with the most fundamental of all questions on the subject: What is Education? What is its purpose? Who is to be educated? What is its process? These questions readily evoke a wide range of valid answers, appropriate to different applications and contexts.

“The essence of education is the capacity to learn and the fundamental process of education is the process by which human beings acquire knowledge.”

At the most fundamental level, we may say that education is the process by which society consciously passes on the accumulated knowledge and wisdom of the past to future generations in a concentrated and abridged form, so that the youth of today can start off at the furthest point that earlier generations have attained, rather than having to rediscover the same knowledge over and over again in each generation. In this sense, education is the social institution that most clearly distinguishes human societies from those of other species, whose acquisition of knowledge is confined to the experience of a single lifetime or passed on subconsciously through heredity rather than consciously through an ever increasing breadth and depth of organized knowledge.

The life of society evolves by increasing consciousness of the challenges and opportunities presented by individual and collective life and increasing organization of its activities to effectively channel its energies and capacities to meet those challenges and opportunities. Education fosters the awakening of consciousness in the individual and the internal organization of each individual's personality as capacity for accomplishment. Society provides the external organization needed to catalyze the spread of that awakening until it saturates the whole society and to organize all its activities to support higher accomplishment by the collective. The individual and the collective are two poles, two inseparable, mutually interacting and interdependent components of the process of social development. Education is a principal means for the integration of individual capacity with social needs and opportunities.

This definition describes the social role of education, but not the process of education itself. All too commonly we confine our conception of education to that which takes place within the walls of university classrooms and results in the awarding of a certificate of achievement. But education is not an activity confined to the classroom and the textbook. Nor does it depend on whether knowledge is delivered by a live lecturer, obtained from a textbook, acquired from an on-line course or newspaper or life experience. In its widest sense, all life is a field for education and every human activity provides opportunities to learn. *The essence of education is the capacity to learn and the fundamental process of education is the process by which human beings acquire knowledge.*

4. Dimensions of Higher Education

As there are many purposes and social applications for education, so too education can take place at multiple levels that are not directly dependent on the number of years spent in formal learning. There was a time when the basic skills for reading and writing were considered clear evidence of education, or even of genius. One principal aim of education is to develop a wide range of skills – physical skills for reading, writing and mentation; social skills for instruction, communication, relationship, teamwork and leadership; and psychological skills for understanding, judging and managing oneself, other people and social situations.

“True rationality only commences when we are able to set aside the prevailing beliefs and accepted wisdom, be it scientific or religious, to see and think freshly from first principles and new perspectives.”

The capacity to recall a wide range of memorized *facts* or to recite long passages from literature was a prominent attribute of the educated in previous centuries when both learning and scholarship were largely associated with the capacity for memorization. Memorization still remains a major component of education at all levels. The exponential growth of information combined with the exponential expansion of capacities for storage and retrieval have progressively shifted the emphasis from the capacity to memorize to the capacity to understand what one can recite. Understanding is a higher order faculty than memorization. It arises by coordinating two or more facts and relating them to one another as *thought*. At a more abstract level, the coordination and relating of two or more thoughts give rise to *ideas* that are several steps removed from observable fact. Most education today stops with analysis and evaluation of facts and ideas at the level of understanding. The development of other mental faculties such as observation, discrimination, comparison, and judgment is given less emphasis.

Beyond these, education can serve a still more profound purpose. It is the principal means for fostering the development of three characteristics that are essential for the future development of both society and its members – independent thinking, creativity and individuality. Although we may flatter ourselves that we are thinking all the time, most of what we are

doing is observing and coordinating facts or ideas and organizing them within the perceptive mass of previously accepted understanding. Real thinking is far more rare and rarefied. It arises from a fresh perception and inquiry into the validity of facts, concepts and perspectives that form part of humanity's commonly accepted body of knowledge. True rationality only commences when we are able to set aside the prevailing beliefs and accepted wisdom, be it scientific or religious, to see and think freshly from first principles and new perspectives, as Einstein did in challenging the reality of absolute space and time and Darwin did with respect to biological evolution. The capacity to question originally is a far more powerful form of mentation than to recite or understand with facility, a more difficult faculty to acquire but one that can still be prepared and consciously fostered through education.

The grades of purely mental education from memorization to understanding to independent thinking can be extended to include other capacities which are normally attributed only to genius, but which also can be actively fostered through education. The inordinate preoccupation of modern education with specialization, classification and analysis neglects development of higher mental capacities essential for effectively addressing the challenges and opportunities confronting individuals and societies today, including the capacity to view things as aspects of a greater totality, to perceive the complexities of interrelatedness, to synthesize and reconcile apparent contradictions and to integrate disparate aspects of reality within a greater whole.¹

"A truer measure of education is the awakening of the student's capacity to actively seek and acquire knowledge on one's own, to question and think independently, creatively and even originally."

The conscious development of individuality and creativity is also largely neglected by current educational systems. In practice we tend to regard education in a manner similar to mass production of goods, as a process of gathering together raw materials (people and knowledge), applying energy (physical and mental effort) and fabricating finished products (knowledgeable people). We tend to measure the efficiency and effectiveness of this process in terms of the quantity and quality of information transmitted from instructors to students, rather than in terms of enhancement in the capacity of students to learn. For most people education is synonymous with a degree, irrespective of what has been learned. But the acquisition of a degree may be a poor measure of the true quantum and quality of knowledge acquired. A truer measure of education is the awakening of the student's capacity to actively seek and acquire knowledge on one's own, to question and think independently, creatively and even originally.

The transmission of values has always been one of the central aims of education. Values relate to all levels and aspects of life – physical, social, mental, psychological, ethical and spiritual. They represent the quintessence of cultural knowledge for survival, accomplishment and harmonious living, which society has acquired over centuries. Family life, religious training, formal education, work and life experience all present opportunities for the trans-

mission and acquisition of values. The advent of modern secular, scientific education has increasingly restricted the conscious transmission of values to mental, organizational and work values, leaving the transmission of core human values to informal social learning. The effort to be purely objective has stripped education of its most valuable essence.

Education legitimately encompasses this full range of objectives – training of physical, social and psychological skills; absorption of factual information; understanding of subject-related knowledge; development of higher mental faculties for thinking and creativity; and acquisition of values for social accomplishment and personal fulfillment. Beyond them all lies the more fundamental objective of awakening and fostering the latent capacity of each person to fully develop his or her own unique individuality.

5. Person-centered Education

Education as it is conceived and practiced today focuses on the transmission of information, knowledge and skills from one generation and one person to another. Yet the century that is emerging is one in which information is ubiquitous and available at our fingertips (or eyelids). Technology is rapidly eliminating the demand for many physical and mental skills that were once deemed essential for survival. The compartmentalized, fragmentary knowledge of the past is increasingly inadequate to meet the needs of a society that is rapidly changing and multiplying in complexity. The essential knowledge, skills and facts needed for survival in the 19th or 20th century are insufficient for the 21st. The capacity to adapt has become far more important than the capacity to repeat what has already been learned. The capacity to innovate, invent and imagine is of greater practical utility than the capacity to retain and recall. The capacity to relate socially and organizationally to an ever-expanding physical and virtual network of others requires a shift in values from acquisition and competition to cooperation and sharing, from hierarchy and authority to freedom and equality. How far does the present and emerging system of global higher education answer the needs of humanity in the 21st century? Far less than is needed, far less than is desirable, far less than is possible.

The need for a new paradigm in education calls for a shift similar to that which is required in every other dimension of modern society, a shift from quantity to quality, from impersonal massification to personalized customization, from mechanism to live interactivity, from things to people, from collective conformity to individual innovation, from conventional wisdom to independent thinking. Fortunately, recent developments are creating opportunities to freshly conceive, design and orchestrate a radical shift to a new person-centered paradigm. The shift to a new paradigm in education involves a change in focus, emphasis and methodology in at least five dimensions:

1. **Development of capacities:** There needs to be a shift in objective and emphasis from the transfer or transplantation of information and understanding to the awakening and development of the capacity to inquire, search, learn and think for oneself.
2. **Active Learning:** As every good teacher knows, we learn most by sharing our knowledge with others. It is time to extend that privilege and opportunity to everyone.

There needs to be a shift in reliance from passive learning by listening and receiving to active learning that comes from sharing, communicating and teaching others. As Wikipedia shifted responsibility for encyclopedic knowledge from a few specialized experts to the reservoir of knowledge and experience possessed by millions of people, education should enlist the interest, release the energy and actively engage the faculties of each student to learn for oneself and also help others learn.

3. **Life-Centered Knowledge:** There should be a shift from the emphasis on narrow fields of specialized knowledge related to a specific career to a more inclusive knowledge that encompasses major dimensions of human life, including the social skills and psychological attitudes needed for adjustment and achievement in a networked society, knowledge of the increasingly complex organization which modern society has become, values that promote cooperation with others and harmony with the world around us.
4. **Integration:** There needs to be a shift in emphasis from classification and analysis to synthesis and integration, from studying the parts to discovering the interrelationships and interdependences between them, from contrasting apparent opposites to reconciling contradictions within a wider perspective and conceptual framework.
5. **Individuality:** The greatest, most important type of integration needed is to relate and integrate education and its accumulated knowledge with the real needs of society and the individual, to impart to each person capacities for wider adaptation, initiative, self-reliance, leadership, cooperation, innovation, independent thinking, imagination, creativity and harmony.

6. Conclusion

Society does not advance in a homogenous manner. New paradigms do not emerge in a day or supplant existing paradigms overnight. The new emerges under cover of the old and gradually grows in prevalence until it becomes dominant. The old persists long after it has lost its supremacy and may long continue to serve a functional purpose. Today we have arrived at a critical juncture where perpetuation and extension of the existing paradigm in education and other fields are grossly inadequate to meet the needs of humanity. Emerging technology has created the opportunity for a rapid extension of the existing paradigm in education to many who, until now, lacked sufficient access. That quantitative extension is both essential and inevitable.

“There is also a pressing need to move beyond existing concepts and models to conceive and implement a system more capable of tapping the rich human potential that remains largely undeveloped and neglected by the existing system.”

New paradigms build on the old, as Einstein built on Newtonian thought. Saturation of achievement at the previous level is a condition for evolution to a new level, as agricultural

revolution is an essential precondition for industrialization. Universalization of the existing system of education is a necessary basis for elevating the quality, content and nature of education, and can be of immense practical benefit. But at the same time, there is also a pressing need to move beyond existing concepts and models to conceive and implement a system more capable of tapping the rich human potential that remains largely undeveloped and neglected by the existing system. The World University Consortium can play an important role in promoting advances in both spheres, facilitating more rapid extension of the old paradigm while creatively catalyzing the emergence of a new one.

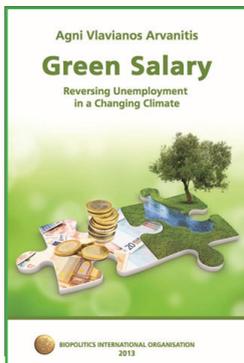
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Notes

1. Ivo Šlaus and Garry Jacobs, "Recognizing Unrecognized Genius", *Cadmus* 1, no.5 (2012): 1-5.

Green Salary – Reversing Unemployment in a Changing Climate – by *WAAS Fellow Agni Vlavianos Arvanitis*



Following the international success of the first publication of the Biopolitics International Organization (B.I.O) on “Green Salaries” issued in 2008, a new and improved edition is now ready to hit the press. *Green Salary – Reversing Unemployment in a Changing Climate* is now available online in e-book and pdf format. Addressing the dual problem of unemployment and climate change mitigation, the book presents a range of development strategies promoting new thinking for environmental stewardship.

The climate change crisis is above all a crisis in leadership. Decision-makers from all walks of life need to create new potential to reverse unemployment by engaging everyone in environmental action. The “New Deal,” introduced almost a century ago to transform America’s economy which had been shattered by the great depression, referred to employment as a fundamental human right. Employment in environmental protection is the vehicle with which to solve the dual environmental and economic crisis plaguing our planet today.

The new book aims to inform people everywhere of the endless possibilities for employment and job creation that environmental efforts have in store. It reviews the emerging face of environmental employment by providing examples of green job creation in areas as diverse as energy, information and communication technologies, architecture, finance, agriculture, forestry, the transport sector, tourism, arts and culture. Examples are drawn from around the world, and experiences from different sectors are reviewed and analyzed.

The book is available for download at <http://biopolitics.gr/green-salary-download/>

