

## Transition to a New Society

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Five scenarios are possible: one, no change; two, business as usual; three, incremental changes; four, revolutionary changes and five, paradigmatic changes (a concept introduced by Thomas Kuhn in *The Structure of Scientific Revolution* (1962) for development of scientific research. I will use it here in the sense of socio-economic-political development and in a narrower way distinguishing it from revolutions).

Changes are imbedded into our society, e.g. demographic transition and technologies built in our lives; they cannot be stopped even if dedicated efforts were institutionalized. There is no end of history as F. Fukuyama and Hegel, and option one is just not possible.

Last century witnessed major progresses: life expectancy increased by almost a factor of two, gross domestic product per capita (GDP/c) increased almost five times, freedom and democracy (one of the Kantian conditions for peace) now encompasses a large fraction of humankind and the international system of sovereign states has produced notable successes such as the UN system and Montreal ozone agreement. One could conclude that business-as-usual is a desired scenario.

It is not!

Ecological footprint is considerably larger than what our Earth can tolerate and if business-as-usual continues, in the year 2050 we would need two Earths. Since colonization of the universe is by no means as simple as discovery of the New World was 500 years ago (notwithstanding the fact that our mobile phones and GPS prove that we are already in the space outside of our Earth), the present ecological footprint is unsustainable. Much worse: our destruction of the Natural Capital has been considerably deeper (e.g. destruction of biodiversity, nitrogen cycle and climate changes as demonstrated in “Bankrupting Nature” by A. Wijkman and J. Rockstrom) and life on Earth is threatened.

The enormous, not fully realized human potential, the guarantor that humans could overcome most of the obstacles, is destroyed by business-as-usual. Low employment rates (now in many countries below 70% (particularly vulnerable are two groups: young and those above 50) and huge inequalities (hundreds and thousands times larger than recommended by Plato 1:5, and J.P. Morgan 1:20) lead to lower life expectancy, increased crime rate and deteriorate all socio-economic indicators (it is known that there is a window of desirable and acceptable inequalities). Human development index decreases because of inequalities. The loss is largest in education (e.g. 57% in Arab countries and 50% in South-East Asia)

and in health (45% in Sub-saharan Africa). Present economic structures and institutions are in conflict with current and developing economic realities as demonstrated by frequent and prolonged financial and economic crises. Business-as-usual led to serious destruction of trust and of social capital.

The number of different cultures (about 3000 different cultures, which we have to preserve) and a number of sovereign states (about 200) grossly differ, and subsidiarity concept that could overcome this discrepancy is hardly implemented. The very concept of sovereignty in the 21<sup>st</sup> century is not what it was in the 17<sup>th</sup> century. The *raison d'être* of sovereign states: to assure human security through maintaining order and justice internally and providing common defense is questionable: number of failing states increases and even more ominously: democratic deficit increases since barely about 50% of citizens vote and many polls indicate that about 70% consider that their countries are governed contrary to their will. Governance system of the current world is not adequate – both on the level of sovereign states (it is interesting that the author of the famous Incompleteness theorem K. Gödel while going to get the USA citizenship was barely prevented by his friend A. Einstein of saying to the clerk that the US Constitution has a logical inadequacy that could lead to dictatorship), on international level (UN system designed after WWII is not adequate for the current world and in several ways even deteriorated: UN Security Council with veto power of five permanent members, now established G8 or G7 or G20, and the fact that still there is no UN parliamentary assembly) and most notably, no global governance.

Nine sovereign states (but involving about half of world population) have detonated nuclear weapons, and though numerous treaties reduced nuclear stockpiles, about 20,000 nuclear weapons, a large fraction of them on trigger-alert status are threatening to destroy our world. Many times since the end of WWII world came very close to destruction – to list just two: the Cuban crisis and on September 26, 1983 when the USSR nuclear early warning system reported missile attack from the USA, Stanislav Y. Petrov, an officer on duty decided that it is false (and it was a false alarm) – and so saved the world. The Bulletin of the Atomic Scientists put a Doomsday clock on its front page. It was put at 7 minutes to midnight in 1947, and it was moved to 2 minutes in 1953 when the USA and USSR exploded their H-bombs, less than a year apart. At the end of the Cold War it was moved to 17 minutes. On January 14, 2014 it was put on 5 minutes to emphasize the danger of all weapons of mass destruction (WMD: nuclear, chemical and biological) and of human caused destruction of Nature. Superimposed on WMD – and they are actually weapons of the 20<sup>th</sup> century – new 21<sup>st</sup> century automatic robot weapons are being designed and deployed. Now I would put the clock again at 2 minutes before midnight, since current political actions are pushing the world toward a renewed cold war superimposed on terrorism and on all social, economic and political problems. Politics permeates everything, but as the 17<sup>th</sup> century Swedish chancellor Axel Oxenstijerna said “Politics is done with enormous stupidity.” It leads to strange results as now often stressed on the occasion of the 100<sup>th</sup> anniversary of the WWI that claimed to be an improbable war and yet resulted in then the largest casualties. The words of Ch. Dickens describing the time of the French Revolution: “It is the worst of time, it is the best of time” turn into “to be or not to be” – as underlined at our conference by W. Nagan.

Change is needed! Are incremental modifications, so often recommended at many international forums, adequate? Experience with revolutions demonstrated they do not lead to anything good. The Club of Rome organized on December 8-11, 2012 the conference “Change the course” remembering the April 15, 1912 sinking of the Titanic. Is it enough to change the course? The current world is substantially different from what it was, while the call implies that we would still be the same ship. Now we are a very different “system”, likely not going to the destination that Titanic – our civilization – aimed to go? It seems that a profound change is required, but not a revolution!

It could be interesting to analyze human activity dealing with systems that are considerably simpler than society. This is our physical universe that involves particles, forces and laws that apparently did not change for the last 13.8 billion years. Understanding of the physical universe considerably evolved during several millennia. It was and is based on observations, experimentations, measurements and common sense forming a multitude of prejudices. Technologies developed enabled us to change us and the world we live in and gave us the worldview fairly different from what it was when we were hunters/gatherers. At early time based on observations and measurements we believed that we are the center of the world, and that stars including our Sun move around us in perfect orbits – circles. When facts required more, circles were superimposed upon circles (incremental modifications!) until the Copernican revolution (!): Earth moves around the Sun, and with Kepler and Newton it became clear that orbits are not circular. Looking from the 20<sup>th</sup> century it is a minor change: basic concepts remained the same. Actually, it was not even completely new: it was proposed much earlier by Aristarchus of Samos in 3<sup>rd</sup> century BC. Nevertheless, we term it Copernican Revolution. It was not peaceful, actually it was bloody, and enemies were burned at stakes, much like the French and the October Revolutions. The end of the 19<sup>th</sup> century was a glorious epoch for physics: unification of electricity and magnetism resulting in predicting electromagnetic waves thereby incorporating optics, added to understanding energy and introducing entropy. Logically, Kelvin concluded that physics is complete and that two minor clouds will be clarified through more precise measurements. Minor clouds turned out to be Theory of Relativity and Quantum Physics. Everything has changed: time, space, certainty, common sense. As G. B. Shaw said “My dogma of infallibility is gone.” However, notwithstanding the fact that the uncertainty principle is the basic law of all natural sciences, quantum electrodynamics – marvelous merging of relativity and quantum physics predict results that agree with measurements to an accuracy of billionth of billionth. Th. Kuhn called this profound change a paradigm shift. Obviously this paradigm shift is much more pronounced than the Copernican Revolution. But, notwithstanding the profound magnitude of the change, the new paradigm reduces to the old paradigm when conditions for the validity of the old paradigm are fulfilled – so there is no conflict: old paradigm is just a subfield of the new paradigm. It seemed that quantum physics and theory of relativity would provide a definitive description of our physical universe, and that we have the answer to 2500 years old Thales’ question: How and from what is the universe made? In 1979 S. Hawking entitled his inaugural talk for the Lucasian chair “Is the End in Sight for Theoretical Physics?”, and an American science journalist J. Horgan argued (“The End of Science”, 1996) that nothing essential can come after quantum physics and theory of relativity. Though quantum physics and theory of relativity are not

superseded, our present understanding based on COBE (1992), WMAP (2001), ESA Planck (March 21, 2013) and BICEP2 (announced just few days ago on March 17, 2014) as well as on many accelerator data leads to the understanding that ordinary matter (stars, planets, radiation and us) accounts for 4.9%, while dark matter is 26.8% and dark energy 68.3% of our 13.8 billion years old universe, which may be just one of many universes in the multiverse. Our cosmos underwent cosmic phase transition (we are familiar with phase transitions as ice turns into water and gas). Phase transition could be even involved in the creation of our 3D space 10-12 seconds after the Big Bang. And this may not be the end of this marvelous story! Theory of relativity and quantum physics were full of surprises: Einstein rejected expansion of the universe (and it is experimentally proven), and with many others did not believe in singularities nor in black holes (and they are proven). Randomness and uncertainty were so unacceptable to many 19<sup>th</sup> century physicists, and antimatter and supersymmetry, not to speak of strings and “branes”. Different from revolution that claim to be the end, paradigm change in physics at the turn of the 19<sup>th</sup> to 20<sup>th</sup> centuries is a creative explosion of potential surprises.

Are any of these analyses relevant and useful for addressing the current issues characterizing our society? Physical world is just a very simple segment of the total world inhabited by life, humans in particular. Humans are rational, but also irrational, even stupid, self-modifying (though we are mainly determined by our life as hunter/gatherer, the humans today are vastly different from before Agricultural Revolution and already integrated some robots in themselves: pacemaker, implants etc). Humans are conscious and creative. Beauty plays a significant role in Nature and in human activity (possibly more that required by evolution), and wisdom appears to be scarce. Trying to apply reasoning derived from physical system to social systems is wrong and can be dangerous! Applying physics (albeit unfinished, but it is hardly ever completed) to calculate the age of the Earth and thereby prove or disprove Darwin’s theory of evolution led Kelvin to a totally wrong conclusion. Only when radioactivity was discovered and taken into account, it was possible to get the proper result for the age of the Earth both calculating and measuring it. Influence of physics, mathematics and model development was often detrimental to economic studies. However, parallels could be useful if applied with a grain of salt. So let us proceed gently.

We argued that for our world a static solution is impossible and that the business-as-usual leads to catastrophe. The change is inevitable. Contemporary world is global (it was never global to this degree), fast changing (now significant changes occur several times during human lifetime) and uncertainties are its integral part. All this is very different than it was centuries, even decades ago and lead to change. Change is inevitable! The world undergoes incremental and paradigmatic changes, some of them could lead to catastrophe. As G.B. Shaw’s Don Giovanni said “to drift is to be in hell, to steer is to be in heaven!” We have to steer – to select desirable changes and to avoid and suppress undesirable. And we have to select means of change. We argue that revolutionary changes are dangerous, superficial and produce incomplete and inadequate effects, and should be avoided. Soedjatmoko, former Fellow of WAAS and former rector of the UN University argued that future is an ethical category: we are responsible for the future, we make the future, we enforce and suppress some

changes and weave the paradigmatic shift. But how? Basic guiding principles are useful, just as in physics when Einstein was led by the requirement that in all frames physical laws are equal, resulting in the constant speed of light and no matter what we do we cannot catch it. Guiding principle to assure beneficial changes could be those centered on human beings.

Humans have rights and responsibility. Our basic right is to live. Therefore, the guiding principle is the human-centeredness. It seems very straightforward and one could argue that our entire history was human-centered (after all here we are). However, during centuries *raison d'état* were supreme over human values. Many today's laws are very far from human-centered, many policies, e.g. an austerity program severely affect humans). Now greed, narrow-mindedness, adherence to old now dangerous concepts and "tools", prejudices and deliberate underuse and misuse of human capital are leading to catastrophe, to our collective suicide. ("There is enough for human needs, but not for rich persons' greed")

What does human-centeredness mean?

While in studying physical systems one could make useful approximations and idealizations and treat many topics separately and independently, an essential feature of our society is interconnectedness: everything is interdependent. All problems have to be treated simultaneously. The current paradigm is rapidly leading to a catastrophe and so all problems have to be addressed promptly, since they are urgent. New economic paradigm has to be intertwined with new governance paradigm, and they all have to be sustainable and peaceful. The sources of the interdependence are individuality of human beings and yet integration of humans and Nature, integration of humans among themselves, as well as our values, identity, our aims, aspirations and expectations molding humans as historical conscious beings.

Humans are integral part of Nature, and preserving Nature is a vital aspect of human-centeredness. The present paradigm grossly violates Nature. Notwithstanding several successes, governance of the environment has been and is dismal. The economy maximized for profit and greed, as well as ignoring the commons is unacceptable in the new paradigm. New ecological economy has to maximize the use of abundant resources, and human and social capitals are abundant and underused, and it has to minimize the use of scarce resources as natural capital is. As in physics some "sacred cows" would have to be modified. Again, one has to be careful in assessing concepts (property, virtual wealth) and tools (e.g. money, banking). One should be careful that albeit appearing new, some of our albeit "revolutionary" ideas could be part of our old grudges. Adam Smith was a moral philosopher and economy started with concerns for humans. Becoming an independent scientific discipline it developed its own measurements. It took humankind millennia to develop the system of units that was finally codified at the time of the French Revolution and we got meters, kilograms and seconds. It is no wonder that indicators and measurements in economy: productivity, competitiveness, GDP, Human Development Index and many others all the way to happiness indicators are far from satisfactory, but some of them, when based on – at the time good theory – produced good policies and effects. It is often stated that the current age is the age of measurement, but we have to be careful and humble as we use these indicators and derive policies and actions from such measurements. The present disillusion in everything, sometimes including

science, leads to questioning results on pollution and climate change. Of course, there will be progress in climate models and even more in understanding that enormously complex climatic system, but as nobody would jump from a high story building arguing that we still do not properly understand gravity (it is absolutely true that we do not fully understand gravity), so humankind should stop violating Nature arguing that our current knowledge is not perfect and will be soon improved. We just have no time and the call “let us all have the standard as in highly developed countries” is not unrealistic, but senseless since that standard is not necessarily high and satisfactory.

Humans are social animals, and the Golden Rule is an integral part of all major religions and cultures, imbedded in our genetic code. Violence, arrogance and inactivity (sin of omission) have characterized the old paradigm and each and all lead to catastrophe. Violence is destroying human dignity, and all forms of violence – from individual violence to terrorism, to war, to state-terrorism (democide) and social suppression are part of an old paradigm unacceptable in a new paradigm. Part of an old paradigm was preparing for war, but contrary to any and all superficial analyses there is clear evidence that WMD are counterproductive, immoral and unusable, and through their enormous economic burden (it is estimated that the USA – within next decade – will spend 1 trillion dollars just to maintain its nuclear capability) lead to economic destruction. Arrogance is common to humans, and all “end of ...” show that at various times we believed we achieved complete understanding and a perfect structure. There is a joke that astrophysicists are often in error, but never in doubt. Since our world is so rapidly changing according to the “rules” we do not yet understand, such conclusions are wrong. As quantum physics/theory of relativity provided explosion of surprises, so the forthcoming paradigm shift can produce an explosion of even richer surprises. Possibly the sentence “There are more things in heaven and in the Earth, my dear Horatio, than are dreamt in your philosophy” has to be turned around: our creative power is supreme. We enter the age when we will share the Earth with robots – automatic and artificially intelligent robots, our economy and rule of law have to be modified (as discussed at our conference in the sessions Humans and Machines by Fiorella Battaglia, Lj. Kocarev, M.A. de Castro Junior, C.E. Lindgren, I. Djurovic and V. Zaporozhan), producing unforeseen and unimaginable integration of us and them. There is an old joke from communism when expert economists encounter two workers pushing a cart and they comment “why two of you push it, when it is easier for one to do it?” and the reply came “since the third one is ill.” Future will likely replace their work with robots. This does not imply unemployment, it implies that people will do much less manual work, and a lot of creative work – and that is badly needed, since as all our discussions show: we do not understand, we do not have answers, solutions to problems we face, and not acting will not solve any of these problems. Aristotle argued “That all men (he should have used humans) by nature have a desire to know.” Society has to assure education for all at all levels (including lifelong learning), research and creativity. This is what governments today are for since this is part of justice, prosperity and human security. Full employment is a human right, intertwined with human political rights. It is often emphasized that current economy is service economy. This is true, but beware that service do not overwhelm us through creating unnecessary and obstructive services (it sounds as oxymoron, but services, e.g. various over-controls can suffocate the system; each step of the mandatory



services involves an error and they add), just as Ivan Illich pointed out that unnecessary needs have been imposed on humans.

Humans are political animals, and though Aristotle stated that “politics” has a special position in scientific activity, it is true that research, science and politics were constantly in conflict as demonstrated e.g. by Justinian abolishing the Plato Academy. In a global world we do need global education and global governance. Present structure of sovereign states and present international regime should be constantly improved to include global dimensions and to add existing richness to the system of sovereign states. Some of this has been done long ago, e.g. ILO (first international labor organizations date from the 19<sup>th</sup> century and then immediately after WWI and through the League of Nations) having a tripartite governing structure representing governments, workers and employers (in 2:1:1 ratio) and it would be very useful to implement similar structures throughout the UN system. Proposals for establishing UN Environmental Security Council and UN Social Security Council are more than three decades old, but nothing has been done so far. There are other existing forms that could be implemented. For instance, referenda are integral part of a political process in several countries, but there global referendum was never tried. Referendum is a rather complex political process with many drawbacks, but it would be rewarding to contemplate referenda on basic human rights that would then force legal consequences in each and all sovereign states laws. Examples could be protection of basic human rights such as the abolition of WMD, abolition of war and full employment.

We showed that no matter what the world is facing major paradigmatic shift. In the world characterized by uncertainties actions of humans requires interplay of science, creativity and political actions and decisions. Collaboration and harmonious actions by independent structures such as the UN system, Club of Madrid, Club of Rome, Pugwash, European Leadership Network, World Academy of Art and Science, regional academies, national academies and many other organizations: research centers, sovereign states, various movements are necessary to implement leadership in thoughts that lead to action.

### **A new socio-economic-political paradigm!**

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