

# Information Communication Society - a Possible Ecology of the Future

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**Abstract** - As Henry A. Giroux recently stated, the situation caused by the present pandemic of the Novel Corona Virus (SARS CoV-2) is not only a medical crisis, but even much more a "Socio-Political and Ideological crisis", "crisis of Greed" "and Pedagogical crisis". Consequently it is now absolutely essential to develop our Collective Imagination to produce possible Visions of the Future in which a novel global system of ecological production, distribution and usage of long-life high-quality products will only by necessity support the basic economic local production, distribution and usage of human survival essentials. In this sense an Information Communication Society, heavily leaning on organisational "skills" of computer and networking applications, will have to be envisioned, developed, organised and implemented on the global scale. The Information Communication Technologies and Computer Science developments will have to heavily concentrate primarily on enabling such an Information Communication Society, a future global society of local societies based on Kairology (the science of the right moment) and Synergy (co-operation) and rooted in proper present and future developments of the knowledge of Cybernetics (the science of dynamic systems) and Ecology (the science of the whole).

**Keywords** – COVID-19; Information; Communication; Society; Ecology; Cybernetics; Computer Science; Dew Computing; Fog Computing; Cloud Computing; Rainbow Ecosystem

## I. INTRODUCTION

As my late professor László Bulcsú used to stress often when starting a lecture, first we shall analyse and understand the Title, as in the Title most is already said. And often he used to finish his lecture with this analysis. And that is quite a proper method, as once upon a time Confucius said: "If words do not mean what they mean, nothing can be established". It is quite essential that there is a common denotational and, as much as possible also conotational, understanding of particular terms used.

So what are the important messages we can mine from the title "Information Communication Society" and what is to be understood by "- a Possible Ecology of the Future". Here we have a lot of complex words all put together.

So, let us start from the very end, with the last word of the Title: Future.

## II. FUTURE

We all (would) like to "look" at, or even "into" the Future, trying to see what is in "front" of us, where are we going, what will happen, or even how to continue...

Ancient Greeks had quite a different view on the notions of Past and Future. When our civilisation talks about the Future, we always imagine it in front of us, the Past is past, somewhere behind our backs. But they, and quite correctly, regarded the Past to be in front, and the Future behind their back. And it is true. We cannot "see" an infinitesimal instant into the Future, but we can quite well "see" all of the Past (as much as our knowledge and memory allow us). The Future we can only wish, try to predict (based on what we "see" in the Past leading to the Now), imagine or visualise. To get a really physical feeling of how we step into the Future, stand up and try to walk backwards, but without ever turning your head.

Speaking in term of physics, we can only see (feel) something that already happened. The visual time distance of anything 1m away is approx. 3.3 nS. That actually means that a person we see is in that moment already 3.3 nS in her or his own future. And in that same moment when we are seen, we are already 3.3nS older then seen<sup>1</sup>. This is a natural law of existence (actually in Computer Science we like to call it Latency). This has the immediate consequence that each and every system with input (on any level of complexity) is always in its own, individual, unique Now, and all inputs reflect the Past of the other system/environment. Each and every one of us is actually living a completely separate individual Now, which is an infinitesimal jot of being. Consequently, it is impossible for any system to react in "real time", as any input disturbance of its self-organising stable state is already sent from the past of the other system/environment. Therefore there is no theoretical possibility of pre-emptive reaction, except based on the knowledge of previous similar conditions which led to a specific type of signal from the other system/environment.

The unexpected pandemic which was long time expected, the sudden emergence of the Novel Corona Virus (SARS CoV-2), which has shown to be very unpredictable, in its (a-)symptoms, viability, virulence and

<sup>1</sup> If we look at our Milky Way Galaxy Centre, for example, what we see now, happened there around 26 thousand years in the past from our Now, so the Centre is actually in our present 26 thousand years older than it is as we see it. This is quite close to the time of a full precessional cycle of our planet Earth.

lethality, attacks not only, as we would expect from a human disease, humans, but even in a much greater measure our general civilisation and its basic "working" principles. As prof. Tomislav Pletenac stated it recently, this Virus is like a robber who stands in front of you with a gun saying "Money or Life?!" [1]. And it gives you only one possible choice, whatever you try - preserve Life, forget Money. From present statistical data it is quite obvious that those countries which preferred Money lose both Life and Money, whereas those which preferred Life lose in the process much less Money. To cite Henry A. Giroux, the present Now is a "Socio-Political and Ideological crisis", "crisis of Greed" "and Pedagogical crisis" [2].

This sudden crisis did not in the first moment seem like something which would completely devastate our past's days "economic" habitus, almost completely stop the global moveability of people (and goods!), clear up the skies, giving Earth a moment to recover, and drastically change the general view on what is actually essential – the basic human needs for food and shelter; showing that local production is essential for the survival, and always newer and fancier products completely unnecessary.

There is an interesting story that happened in Croatia when the pandemic started and the borders of all nations suddenly closed, and essential goods, like alcohol, were not exported any more. It came out that there is no local (i.e. in Croatia) production of alcohol, necessary for the production of disinfectants, as due to "market economy" reasons the production stopped several years ago, and "cheaper" alcohol was imported. So, fortunately, a sugar company which used to produce it remembered that they did not throw away the necessary machinery, they have stored it away. So they rebuilt in several days the production line, and even pulled back some people who knew how to run it from retirement. The next problem suddenly was that in Croatia there was (almost) no production of yeast. Fortunately, after searching for a while, the company found a yeast producer in Croatia, and started, in extremely short time, alcohol production again [3].

This is a striking example of the necessity to have local economy, while keeping a balance with the global ecology. We will have to organise our civilisation differently, and take into account the "time- / effort- / energy- / availability- distances". The whole global system of delivery of goods, the system of "having something" and "not having something" suddenly looks like travelling through the Galaxy. At once things started being very, very far away.

So here we are, standing with our backs towards the Future, looking at the past and trying to imagine what possible path to take into the Future. And it is very obvious that the only possible paths for our common survival have to be those which take into account and *understand* the Ecology of our individual and collective environment(s).

### III. ECOLOGY

So we come to the second to last word of the Title. Ecology. Οἶκος is the ancient Greek word for 'home', 'house', 'estate', 'whole'. Therefore Ecology is the science about the balance of all elements and subsystems of a 'home', 'estate', and the 'whole'. Actually Ecology is per definitionem Holistic, and cybernetically recursive. That means that it regards each and every of the individual systems, down to the smallest (sub-)system, and up to the largest (supra-)system, actually the Universe, as being a "viable system". What is a Viable System? Let me cite the words of Stafford Beer: "a viable system is a system capable of independent existence", but "no living being is absolutely independent" [4]. Or even further, there is nothing in this Universe which could exist independently. So a viable system is a system which can survive in its environment, and which is as self-standing as necessary to survive in that environment.

So if we try to look at some possible 'whole', οἶκος, it is something like we can see in Fig. 1. It consists of a huge amount of little "dots", which themselves are self-organising and viable systems. So in this global picture of an Ecosystem, regarding Ecology, we have a real problem, as many of the individual viable systems, on each level of recursion, are quite remote from each other. The specific interests, in this global whole, are completely different, and it is necessary to balance all those interests in such a way that they do not destroy the viability of other (sub-)systems and specifically not the viability of the whole!

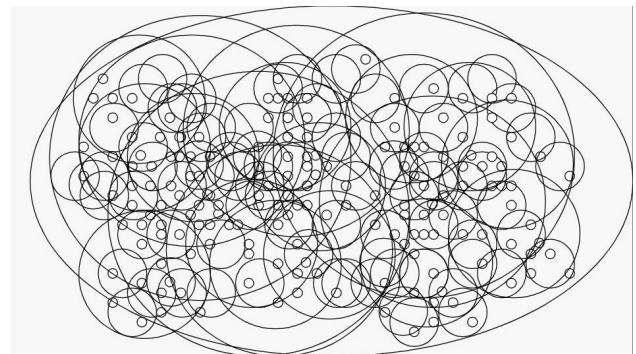


Figure 1: "Ecology": Science of a recursive viable system of viable systems

It is important to stress again, that we have to think about Ecology, as a science of the Whole, in a global way. Ecology should be global, no partial Ecology may be used for global aims, because we have to look at our survival as a civilisation, and even as bare humans, on this planet Earth.

But what is then the Economy? Economy also comes from the οἶκος, from the 'home', 'estate', 'whole', and the other part is from ὄνομα, 'name'. So actually Economy is the science which tries to see what we have, where we have it, and how to organise that what we have into something which is essential for our survival, and, if survival is not endangered, for the quality of our life.

It is obvious, looking at Fig. 1, that all of these systems are parts of higher systems, but not all of them are parts of the same higher systems (except all being

elements of the global supra-system). What normally any system “likes to do” is trying to find a kind of equilibrium, a state-space of relative stability. With such complex interrelationships of different sub-systems, a state of dynamic equilibrium in the supra-system can easily be strongly disturbed by introduction or realignment of its individual elements. The supra-system will certainly “find” its new dynamic equilibrium after a certain time, but that adaptation may not be “inhabitable” by many of its previous sub-systems (depending on their adaptability and severity of the necessary change of their environment). For our civilisation to survive, as it seems, it will be necessary to attain a new equilibrium on our planet. We will have to adopt ways of living which will have to be based on as much as possible local economy, and much, much more global ecology.

In [5] a recursive model of balanced functioning of a person is given, which can also be regarded as a (possible) model of a much wider ecosystem, based on four dimensions: Spiritual harmony, Mental harmony, Strategical harmony and Operational harmony. For the discussion in this Article we are specifically interested in the central point, which represents the balance of all recursive sub-systems, and is actually what Gerd Sommerhoff would call the “focal condition” [6], the point of equilibrium, dynamic stability. (Note that all the recursive sub-systems have their own focal conditions, i.e. dynamic stability points.) This point of balance is actually constantly pulled by each of the dimensional sub-systems, to move that central point of equilibrium towards some direction. Being able to homeostatically keep the focal condition (focal point) of a system will actually make that system viable.

So, cybernetically speaking, what a global ecosystem has to do is to keep all those myriads of elements which are existing around us in a viable balance. And if we intend to survive on Mother Earth, our Ecology has to be developed strong enough at least not to move the Earth's ecosystem into a focal condition which would not include us as members of this new global system dynamic equilibrium.

We are really not at all powerful over the forces of nature. It is interesting, and probably very important, to note, regarding the global ecosystem at the level of our planet, that if Earth would be as tall as we are on average (adult male and female), that is cca. 1.65 m, our size would shrink to some 129 nm (nano-meters)! The present CoViD-19 pandemic is caused by the SARS CoV-2, whose size is measured up to 140 nm [7]. So, looking at our host, the Earth, we are actually just as small, and just as nasty as the Novel Coronavirus is to us!

We can see and we can feel that the system which is presently the *oikos* of our civilisation is not really viable, which this virus has very well additionally exposed.

#### IV. POSSIBLE

The next previous word of the Title gets us to the notion of possibility. However, it is not that we can accept any possible future, as we do not want to destroy the environment to the point human life will lose its dignity,

or even to the point that human life will cease to exist. We even do not want to lose many of our civilisation's attainments. But we will have to get rid of many of our civilisation's “attainments”! It is a matter of essential ethical values.

Some possible things are very hard to attain, like balancing on a ball. In this moment of history we are really trying to balance on a jumpy ball, not only because of the pandemic, but primarily because of the whole bunch of global ecosystem equilibrium problems we produced by completely conscienceless exploitation of all kinds of natural viable systems (what we euphemistically like to call “resources”), up to the point that we presently live in the Sixth Mass Extinction [8]. Mass extinctions do happen from time to time. The previous, fifth one, was the Cretaceous–Paleogene extinction event, around 66,000,000 (66 million) years ago. But this one, the sixth, was not caused by some natural processes, but by our own greed, our consumeristic ideology, our constant fight for “growth” and “expansion”, our tragically flawed philosophy of “bigger – better – faster”, deeply ingrained in the lack of ethical and ecological conscience, education and promotion on all levels.

So much about Possible. Though it is, and must be, possible to develop a new civilisation ecosystem which will enable us to survive, and heed all ethical rights of humans, animals, plants..., and the nature as a whole.

So what can we do? Let us look at the next word: Society.

#### V. SOCIETY

So what is a Society? (See Fig. 2.) A society is an ecological sub-system with a huge amount of different people, which have different ideas, which have different wishes, which have different hopes, different needs, wants, skills, knowledge..., who all try to build one big global system. And this is not possible without proper education and without proper organisation, which should not be a kind of “up → down” organisation, as is much the case in modern world, but a “bottom → up” autopoietic organisation [9]. It is very obvious in the nature and it is very well known in cybernetic systems that all the more complex dynamic systems organise from bottom upwards. Consequently it is extremely important

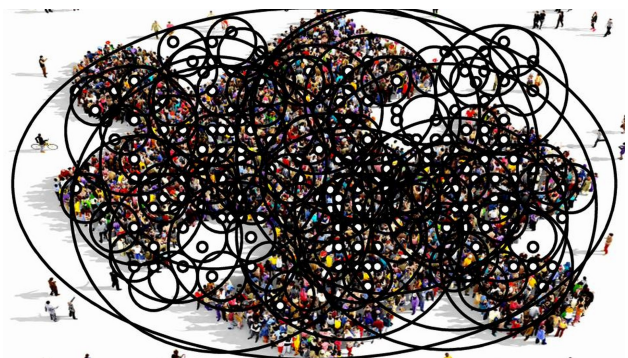


Figure 1: “Society”: a recursive system of individuals trying to build a collective

to have the lowest (smallest) system well organised to be able to build up a system which is then also well organised.

In this sense, what is very important in the society, is Identity. Each of those little circles has a specific identity of a specific social environment in which the specific individua are living, in the same way as each specific individuum has its own ecosystem inside, in which all the elements which make us viable human beings live, all our cells, viruses, bacteria etc. So identity is very, very important for the notion of viability of a system. Now, what is the systemic identity of each of those (sub-)systems? To cite Stafford Beer again: The systemic identity “is a highly complex ethos of self-recognition, deriving from the interplay of many components – and in particular of the observed system with the multiplicity of its environments which, indeed, are major forces in formulating that ethos and forging that identity” [10]. Individual identities are in constant flux, adapting to the immediate and wider environment of that individual system. For us, humans on the planet Earth, it is really essential to start identifying ourselves with the “top” human identity level, the level of realisation that each of us is *just* a human, and nothing more nor less, and that each of us is an unseparable part of the nature and our planet's ecosystem. To be able to attain this urgently needed global identity, without which we can not act as humanity, it is really essential to introduce this identity into education and promotion all around the world population.

It is worth here, again, to remember the Ancient Greeks, and their principle of democratic “election” of those who will temporary be the main “political” force, based largely on sortition, that is being randomly chosen by a “lottery” principle from (electable) population (they even had a machine to help this randomisation, the Kleroterion [11]). Though in Ancient Athens only certain portions of the population were “electable”, i.e. had the right (and obligation) to participate in politics, the system itself is very democratic (that's why they call it democracy), as it allows a cybernetically sane diversity (variety) of individua (identities) from all drives of life to actively participate with their knowledge and viewpoints. A random sample of population solving political issues, specifically if re-chosen for each issue to be discussed/solved, will statistically give a much wider spectrum of opinions and solutions existing in the population, as the variety of possible states of the whole society will not be so drastically lost to higher hierarchical solution/decision levels, as when using non-random systems.

As opposed to Athenian Democracy, all of the present-day existing socio-political systems<sup>2</sup> are, whatever their name and ideology, based on either top-down methodology (dictatorship, monarchy, führer-ship, technocracy, bureaucracy, meritocracy...), or on Roman republican (Lat. *res publica*, denotationally meaning 'public thing') systems, where an election of

<sup>2</sup> Excluding small(ish) self-standing self-sufficient isolated populations, where a number of differing traditional systems are in place.

“representatives” or “delegates” is in place, choosing particular (known) people into a purely hierarchical political “machine”. (Additionally, many of those systems contain non-systemic combinations of different structures and procedures.) Note that both the “representatives” and the “delegates” system have the same systemic problem – individuals becoming politicians. And there is a general (purposeful) lack of *obligation* to be active part of the socio-political life.

William Ross Ashby stated a very important law, the Law of requisite variety: “If a system is to be able to deal successfully with the diversity of challenges that its environment produces, then it needs to have a repertoire of responses which is (at least) as nuanced as the problems thrown up by the environment.” [12] In other words, the variety (number of states of a system) needed to properly control another system must be either same or greater [13]. Therefore, it is quite obvious that in a hierarchical system each hierarchically higher level would have to cope with exponentially growing variety of possible regulation responses. Therefore variety attenuation measures are introduced (like statistics, specific measurements tracking etc.). This in turn disables the higher system, due to the lack of variety, to control (organise, lead) the lower (wider) system(s). So, for example, the extreme lack of variety in the system of labelling everything with an amount of “money”, and the “monetary system” raised from this labelling, actually contort the underlying economic and ecologic system to the point of extremely high stress at the edge of viability.

## VI. COMMUNICATION

Now let us look at what Communication is. In Fig. 3 we have two systems with their internal “elements” represented by small circles. It is obvious that those two systems would like to communicate, but there is nothing they can communicate about, because their internal system organisation is so much different that there is no possible common “understanding”.

In communication that is a major problem. To be able to communicate, there is a requisite of having some basic common “understanding”, or, in other words, to have at least some isomorphic or nearly-isomorphic subsystems, which would be “recognised” as the receptor(s) (context) of the communication transfer.

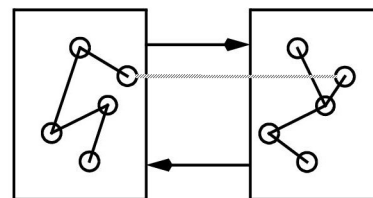


Figure 3: Two systems which can not communicate

On the other hand, looking at communication, there is another problem. Let's imagine a Viable system 1 (VS1) and a Viable system 2 (VS2), and they want to communicate. The basic information theory defines that there shall be a bi-directional communication channel

between them. But what is actually important here is the Latency of the communication transfer from VS1 to VS2 through the Channel. How long will it take for VS1 and VS2 to mutually exchange enough information to “rectify” the amount of non-isomorphism of their structures, as to finally be able to understand each other?

Normally you have statistics of a state (global systems and their smaller sub-systems). However, the major problem with statistics is that you get it once in a while (like once in a year). So how can you, with such a huge latency, between, for example, a government and an economic process, regulate it? You can not. Because you are very, very late. We can see the same with specific pandemic reactions around different world countries.

How we could have regulated the pandemic spread, and what we had used in Croatia, thanks to the excellent organisation of the Croatian Crisis Headquarters, in regulating the epidemic, is the fact that at one-day intervals all the data, all the information (because we understand what that data means) needed to make very quick adjustments in the response was available.

So one of the important things in the future, and in these efforts Information-Communication Technology and Computer Science can give a huge obol, is actually the shortening of the time necessary to react to a specific emergence. If you know that some of your resources are approaching a low level of availability in time, you can try to replenish them, and you have still enough time to try to do something about it. You are not any more dependent on a last minute resort, or distortion of your system. Unfortunately, in many of the economic crises we saw, we can perceive the same problem: that the data did not transform itself into information to come to some place which could react in time. As a consequence of that, you have a phase shift, a delay between the actuality and the perceived situation. A phase shift between what you know is existing and what actually is existing, at a specific moment. Now reacting on the perceived situation after a delay during which the actuality already changed, gives a wrong control impulse, and consequently generates resonance, when problems start to come in reasonably regular waves [14]. It is known and obvious that long latency regulation is extremely complicated, very much harder than short latency control, like in robotics<sup>3</sup>. The latency of the Novel Coronavirus is one to two weeks (the incubation period), and than it is very hard to control the happening without an a priory experiential model which will allow you to react reasonably pre-emptive.

## VII. INFORMATION

And finally the last (actually the first) word of the Title: Information. So first let us look at some data: (Fig 4).

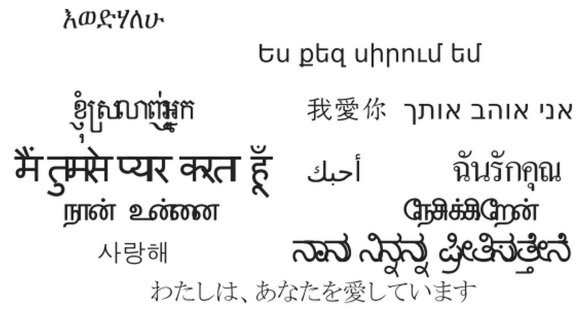


Figure 4: Some data

It is important specifically to stress that most modern-day Computer Science is talking about and concentrating on *Data*. But the problem with data is already explained through Figure 3. Data – what do they mean? What do we want to tell with them? Namely, to be able to establish communication it is essential to have some common pseudo-isomorphic substructures, where the non-isomorphism of those approximately common (similar) structures of both communicating systems is actually the information to be transferred (in both directions).

Information is indivisible from the common context, and can be defined as sub-structural non-isomorphism of two communicating systems with common pseudo-isomorphism, i.e. partial isomorphism. This general principle is very obvious in any kind of inter-human communication, as much common knowledge / ideology / frame of mind is necessary to properly understand each other.

To enable further development, the connotation (common meaning) of Information Communication Technology has to be expanded to the full denotation (explicit meaning) of that term, i.e. the Technology (science of attainment) of communicating information has to be well expanded into different non-machine based communication channels, which implies development of (novel) educational and promotive activities, based on advances in the understanding of societal and interpersonal communication principles (i.e. linguistic skills necessary) and channels, of their proper use, and of their ethical values.

## VIII. DEW – FOG – CLOUD

In a way we, as global and local societies, had a kind of luck that the CoViD-19 pandemic came during an era of highly developed communication structures and reasonably developed computer science. Much of the everyday life, conversation, exploration, study and work was suddenly transferred into the virtual space of modern information-communication and computing technologies.

However, to actually develop a computing and communication assisted global viable ecosystem, which we, due to our own gradual destruction of our social and natural environments, necessitate quite quickly, it is important to have a Computer Science model of communication and computing hierarchy in which particular recursive elements of the larger viable system

<sup>3</sup> Imagine moving your hand if you would get the necessary information about its “present” position an hour later than it already was in that position. The same problem applies, for example, also to spaceship remote control.

can be implemented on the level of machines, taking into account all the necessities of natural and human well-being. In recent years such a hierarchical architecture consisting of three major conceptual paradigmatic (and architectural) levels started being developed: the Dew – Fog – Cloud computing dynamic system [15].

At the lowest level, connected directly with the immediate human and natural environment we recognise the level of Dew Computing. This is the area below the Edge of Internet, consisting of a vast number of self-organizing Dew Droplets, information gathering, processing and distributing elements which directly control our Physical Environment, from energy supply and distribution, heating, cooling, lighting to traffic flow organisation and health monitoring/assistance. The major prerequisite of these systems is that they must be self-sufficient, but can be coordinated, inside fixed limits set by the environmental process they regulate. This level, as said, is not part of the Internet, but has diverse means of coordination-communication, and is able to communicate with higher paradigmatic levels through Internet-included specific Dew Droplets. The Dew devices are not supposed to be user-programmable, but are specific fixed hardware / software entities with inbuilt self-organizing principles allowing them to “behave” in the specific environment for which they were made.

The second level up the paradigmatic computing hierarchy is the level of Fog Computing. This is actually the layer on the “Edge of Internet”, the more or less able generic programmable devices primarily oriented towards Human – Computer interaction. This level is a kind of “gateway” between the stubbornness of computers and the wilfulness of humans, and between the basicity of Dew and the vastness of Clouds. Adaptive network reorganisation, local computing and services support, as well as human interaction are essential parts of the Fog. At this level it is extremely important to design proper ergonomic information exchanges between humans and machines, by using knowledge and understanding from psychology of human perception, to be able to present the vast variety of the global ecosystem in a human understandable form, with as much variety preserved as possible.

And finally, on the highest paradigmatic architectural level we have Cloud Computing, where huge amount of information (and still, unfortunately, data) is preserved, and can be used in global self-organisation, and future prediction based on past knowledge. It is at the core of Internet, caring about information, knowledge and intelligence. Of these three layers the Cloud Computing is presently architecturally the most developed, but it will have to be quite drastically adapted to enable seamless integration of information processing as a constituent part of the Dew-Fog-Cloud System.

Development of the Dew-Fog-Cloud system will enable us to solve a lot of problems in viable distribution of goods and resources, starting from local economy, by keeping the distribution necessary as local as possible, and than, over the higher Cloud level, recursively in wider areas, as the need may arise, and finally, as the last resort,

up to the global planetary space; therefore keeping the economy local and the ecology global.

## IX. RAINBOW ECOSYSTEM

From the philosophical and pragmatismal points of view it is important to envision a reasonably simple model of a global ecosystem, which would allow proper integration of the extreme diversity of the future Nature-Human-Machine cohabitation and cooperation into a human understandable and manageable viable system, without the necessity to significantly impede (attenuate) the requisite variety. The wise use of information processing equipment as an integral part of the global ecosystem gives us a possibility to surmount the ecological and sociological obstacles we have been building up so fervently. The use of colours as symbols is ages old. Therefore the whole is divided into 9 colours, and each of them is assigned a symbolic meaning. The Philosophy of Computing view of such a system is given in [16].

Here the Rainbow Ecosystem is presented in short, as a final integratory factor of the elements discussed in this Article, from a viewpoint of general philosophy and pragma regarding the development of a viable nature-human-machine ecosystem. It should be noted that Green, the Nature, is in the middle, flanked by the “production” side, from bottom (Infrared) up, by Energy and Matter, transformed through Creativity and, extremely important, the Appropriateness Filter, into Nature, and flanked on the other side by the self-“organisation” path from top (Ultraviolet) down by Visions, Interference, Cooperation and Communication, balancing the whole, and making it a recursive viable system.

The following short paragraphs name some of the various notions symbolised by the colours:

### A. *Ultraviolet – Visions*

Wisdom, Prudence, Conscience, Responsibility, Holism

### B. *Violet – Interference*

Security, Limits of Expansion, Nature-Human-Machine Interference

### C. *Indigo – Cooperation*

Ethics, Information Use, Redundancy, Knowledge Gathering and Preservation

### D. *Blue – Communication*

Information, Knowledge, Interaction, Languages

### E. *Green – Nature*

Environment, Health, Well-Being, Backup Systems, Global Ecosystem

### F. *Yellow – Appropriateness Filter*

Consequences

G. *Orange – Creativity*  
Stimulation, Ideas, Education

H. *Red – Matter*  
Resources, Products

I. *Infrared – Energy*  
Efficiency, Garbage, Quality

## X. CONCLUSION

So, what should be the first steps we ought to take? What is immediately obvious, specifically after the onset of the CoViD-19 pandemic, is that we have to radically (and drastically) change our global civilisation aims and methods. The global and local response on this pandemic has shown a completely uncoordinated and much ideologically influenced, often panicky, reaction, which succeeded to completely destabilise our social and economic habitus. Or, better to say, this pandemic has hard hit an already long time unstable socio-politico-economic (and cybernetically obviously unviable) system. But what it also succeeded to do is to blatantly uncover a huge amount of “rotten” points (sub-systems and their interactions) of the pre-pandemic global and local systems.

In many such historical situations of great destabilisations revolutions would arise, and impose a new ideological system. But as revolutions, in addition to “eating their own children”, always like to disregard the knowledge of the past, they blindly stumble backwards into the future. And it is true that already in certain areas of the world we perceive the first signs of revolutions (and the counter-revolutions which are their lasting companion).

Therefore we need to act quickly but prudently, because we need Evolution, and not revolutions. But evolution is a slow viable process, and it is hard to act quickly. However, we already have developed a huge amount of tools which can help us, and we already have the Internet, and we already know much about how to use its services in a vast field of our endeavours.

So the first steps we have to take is to think out a viable cybernetic system which would gradually incorporate many of the existing computer based solutions, primarily in the localisation of economy and drastic shortening of the supply chains, and the “reshuffling” of goods and resources (e.g. food, water, energy...) around the whole planet, to get to a reasonably equilibrated state of the global social aspects of basic human rights (like the right to survive). A strong incentive (primarily educational and promotional) has to be made to enable the world population to understand the need for, and principles of, self-sustainable local economies providing for essential human necessities, and the need for all of us to internalise the global “Earthling” identity<sup>4</sup>, together with basic principles of global ecology. The information-communication network has to be available to (but not forced onto) each and every citizen of Earth, and we already produced so many high-tech and quality-of-life

enhancing “gadgets” that we all have (can have) everything.

The next step shall be a form of active *democratic* participation of the global Earth population in all matters of common interests recursively up, from the smallest ecosystems of home, neighbourhood, village, to the level of planetary decisions. The present day information-communication and computing technologies open up unprecedented cooperation opportunities, but if we do not actually start to cooperate, our future could be a fall backwards from a cliff.

And finally, we will never succeed in the evolution if we do not think about long term development. And a long term development can be obtained only by proper and all-reaching Education, primarily the education on Ethics, Viability, Ecology, Synergy and Kaiology.

Note: A supplemental video of the on-line ICT-20 @ COVID-19 conference presentation of this Article can be found at [18].

## ACKNOWLEDGMENT

The Author wishes to give special thanks, for invaluable scientific input, support and ideas, to Gordana Gredičak Šojat and Karolj Skala, the Croatian MIPRO Society for organising the ICT-20 @ COVID-19 on-line Conference, and also to the myriads of scientists, artists and thinkers who enabled the existence of our present day knowledge.

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<sup>4</sup> Internalising the “Earthling” identity does in no way de-internalise the existing necessary variety of local individual and social identities (cultures, habits, languages, traditions, methods, faiths, nations...). However, if some of those “local” identities lack a certain element of Ethics (ethics can be defined as “a set of concepts and principles that guide us in determining what behavior helps or harms sentient creatures” [17]), to sustain global Ecology it will be necessary to try to (again through education and promotion) viably adapt those identity-related views and standards of conscientious behaviour.

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