

SEARCHING THE RIGHT TRACKS OF NEW TECHNOLOGIES IN THE EARTH RACE FOR A BALANCE BETWEEN PROGRESS AND SURVIVAL

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Abstract

The paper presents an analysis of the actual World major challenges, which could require priority technological solutions from the information and communications technologies (ICT) field, but not exclusively from this area.

The main point of the paper is to emphasize the importance, for the actual information society (IS) and for the following Knowledge Based Society (KBS), of perceiving the gravity of these challenges, which appear as a companion of the general race for progress, as they put in danger the Earth civilization in a progressive way and as a consequence, of using the huge potential of ICT and complementary technologies to overcome as much as possible this trend and generate this way an other kind of race, for survival solutions.

As concrete solutions, the paper identifies some of the main ICT areas which could contribute to solve critical problems as climate changes (CO₂ generation), over-population and Earth resources (food, water, minerals etc.) fading, but including also internal progress risks (as nuclear incidents like Fukushima) or external credible menaces, as sun storms. A remarkable example is given by the biggest project, ever made, of using ICT in order to organize, from the identity point of view, a huge number of individuals, accounting about 1 billion at the end of 2011, in India.

The paper concludes that the analyzed issues have a common point, in the World progressive dependence on electricity and soon of ICT products and services, which must lead to a mature control of this dependence.

Keywords: *green technology, network centric, information/knowledge based society, information and communications technologies, biometric identity, social assistance.*

JEL: D8, L 86, M15

1. A race for progress or survival?

We already used to see the dramatic evolutions on our unique Earth: from breath-taking new technologies to hopes-taking conflicts or catastrophes. But more than this, we hardly observe the dramatic changes of life conditions, although very diverse on Earth. Neither we can perceive, at real scale, all the changing factors which in fact put a shadow on our daily spectacular progress. Of course, it is a matter of philosophy how we see the environmental processes and how we enjoy the positive side of progress.

Still, a question remains: do we *all* habitants **hear** the ticks of Earth clock which seems to measure our race, but sometimes it seems to be a bomb clock?

So, we may let, for further, the metaphoric approach and focus on a single, real, but not less complicated issue from above: ***the race***.

As a natural evolution, the mankind pace changed from the simple primitive life, to the dynamic, time-money measured today life, which is a continue race for progress and prosperity. One could say: this race is the essence of our life, the key to progress. We may agree and go even further: this way of thinking could be extended for companies, communities and states, but ***before*** doing that, we must see the whole process, i.e., all the implications of such *multiplications*.

Jorge Luis Borges said: “mirrors and copulation are abominable since they both multiply the numbers of men”. Keeping the differences, we must observe that multiplying the individual prosperity actions at planetary scale will not necessarily produce only prosperity. As examples, the climate changes and Fukushima incident [7] are only 2 relevant (but sensible different) classes.

Now we may conclude that the today world, featuring an explosive development of all activity fields, of all business and especially of information and communications technologies (ICT) and services, is a real race, with billions of participants, but we are not sure if, today and tomorrow, the goal must be the same general progress, or a very elaborated combination of stable progress and survival objectives for the Earth and the next generations.

We also need, for each “competitor”, to carefully choose ***the right tracks of the race*** and perhaps ***the pace***.

2. Choosing the right tracks of the race

As we already mentioned, ***the race*** is a very complicated term, including, obviously, many processes.

First of all we have to observe that ***the race*** will have more than a single meaning, referring to the usual one: the competition (for profit).

Unfortunately, it is very probable that sooner or later, as depending on the field (goal), the ***race*** to become a “counter-time” one, a desperate struggle to save (at “last minute”) the Earth, or one of its unique and priceless values, as climate, water, food, air, minerals and more, including (why not) THE LIFE.

Without dramatizing, this large imagine of ***the race*** is necessary in order to have the real dimension and importance of this approach, enabling this way the right evaluation and solving of the global challenges.

Of course, this approach, even focusing on ICT and conceded technologies, is not supposed to optimize all the World activities, but it could offer a way of thinking and acting, with powerful instruments and methods, which has the potential and the information impact to crucially influence the World, as we all share the preoccupation about the future evolutions and the present decisions for all economical, financial and social layers, which globally affect the Earth.

Defining the tracks (directions and fields) and then choosing the right ones is obviously an optimization process in general and the ICT fields are enough extended in

the actual information society (IS), with a crucial influence on the future knowledge based society (KBS) [6].

These premises of ICT are the basic mechanisms to make operational any improvement to the complex process of optimization regarding a continuous refining of the directions and pace of development, the strategical applications and the IS/KBS impact evaluation.

On the other hand we have to face the realistic approach, observing that the actual World is more and more difficult to rule (optimize), although globalization, international organizations and institutes for standardization (IEEE, ETSI, ITU) have a crucial role in harmonizing a mess of crossing interests.

So, let's search the right tracks, at least among the existing ones, with the hope that, step by step, they could have a higher influence (and *pace*), promoting their new extensions and slowing their negative effects.

It is important to notice that the criteria we suppose when choosing "right" options must be first linked with the most stringent challenges for the Earth and mankind: climate changes (CO₂ emissions), ecological development (power and material saving), food, water and air preservation, social security and... PEACE.

The main track of ICT evolution will remain for a long time its "network centric" (NC) influence and action, at IS/KBS level, consisting of both hard (physical) and soft (information and knowledge) elements [4].

Again we must emphasize the less observed elements of NC, which could have a crucial role in the future, as innovation and knowledge remain the main factors of mankind stable progress in the future KBS.

This new paradigm is true as NC is the main vector of knowledge in our present and future World, where innovation will be enabled by all ICT/NC elements, which will stimulate and acquire all creative potential from the large "network" of people on Earth.

Perhaps the best evidence of this trend is the rise and rise of the new powers of the World: China, India and other.

It is no doubt that the main potential and secret of the impressive development of these countries is close linked with their huge population, but one could ask:

Why now, since they have the biggest populations for decades?

Of course the answer is not very simple, but we may consider at least some relevant reasons, as the cumulating effects of wise decisions on exploiting the new opportunities of globalization, ITC and...NC!

Notice that, among other, NC results are impressive, when the "network" has billions of individuals, so it is no wonder that we see, in most scientific ICT journals and conference proceedings, more and more names from China and India.

Completing the above answer, we also must point now that the "learned lessons" approach became more actual than ever been.

It is obvious that China and India had to "learn" a lot from the main powers (USA, Europe, Japan), from technology to social management, but they also added their specific values, where individual loyalty is prominent (in general in Asia).

An important issue, in the paper context, is to observe now that our World already has to learn from this Asian miracle, especially in the crisis period but not only.

A good and refreshing example, on the above line, comes now from India and reveals a "right" track of ICT and beyond.

In India is going to be finalized the biggest project, ever made, of using ICT in order to organize, from the identity point of view, a huge number of individuals, accounting about 1 billion at the end of 2011. Notice that in India, 2% of GDP is dedicated to the social programs, but 59% of the spending fails to reach the target (the poor) [1].

Once again we stress that this project (*Aadhaar* = Foundation) is more than relevant, it is a model for the today world, for many right tracks it covers.

First of all *Aadhaar* is the best trial for ICT potential to implement the advanced technologies of biometric identity (security) in a very complex and adverse environment, considering the average level of education, the precarious conditions of living, transport infrastructure and administration, at the huge demographic and geographic scale of India.

In spite of all these, the commitment of the organization which implemented the project (UIDAI – Unique Identification Authority of India), with the financial support of authorities, succeeded to obtain impressive concrete results, but perhaps the decisive support came from the population (“the network”), which understood the main power (goal) of the project.

As we have mentioned, the general purpose of *Aadhaar* is “to organize” this population, not for a political, scientific or technical goal, but for the most stringent scope: their social assistance (food, health care, education and generally social support). Of course, the project achievement will also provide many other advantages and instruments for the state administration, from taxes to social security.

From a technical point of view, the project raised a diversity of challenges, taking into account the social and demographic problems (people with no identity, or multiple identities linked with family, no house etc.).

The most impressive technical problems were generated by the natural diversity and dynamic of individuals, which led to the necessity to have a dual technology biometric solution (fingerprints of all 10 fingers and iris scanning), finalized by a 12 digit ID number, which could be confirmed on line by a special terminal of test (scanning).

Even so, the potential of ICT was really tested, by millions of problems like finger mutilation (by hard working!) and multiple registrations (on vast territory, before the project final), so the data bases, the deduplication and other ICT resources proved now their NC power!

Not the last, we must remark the determination of all leaders and organizations to continue, when the project was blocked for many times.

All these represent perhaps the best lesson to be learned in all states on the entire Earth, because this is the kind of challenges they have to face today and tomorrow. Although the differences could come in goals, individuals and resources, one thing will remain common: the necessity to use NC/ICT power to find the right tracks and solve such stringent tasks, being sure every time that the “right track” is a reason “good” enough to be fully supported by all the participants, with all their potential, through NC/ICT, just like India did.

An other face of the learned lesson of India is that, in the same time, in India the explosion of development and modernization, where ICT is prominent, arisen among the large poor areas, the lack of infrastructure and other realities of emergent countries.

So, in hard times, we all have to learn how the progress is still possible and especially how the miracle of switching from very low to high can be made.

My opinion is that we will need unfortunately more and more such miracles and they could be done only refining our strategies, our way to treat the people and use the money in order to create more innovation and right knowledge, along with ICT/NC potential.

It is fair to observe that ICT already follows some of these ideas, but the challenges are still bigger, new ones appear and ICT is not the only involved in the decision processes, as the economical and financial power is so specially melted with politics [2].

Other right tracks of ICT could be observed in action and shortly listed as:

- ✓ A continuous design effort to reduce the power consumption (and then CO2 generation) is the way the “green technology” could strongly contribute to World CO2 reduction, by the NC gears. This way the processors and generally the ICT components, which are present in all industries and everywhere, from smart phones, cars to toys, will have a major impact on CO2 reduction.
- ✓ The computers speed and especially the supercomputers speed is driving, again through NC, many important scientific research, industry and medicine fields. Perhaps the most expectations are regarding the progress in simulating climate changes, brain activity, Earth reserves exploration and nuclear processes.
- ✓ The ICT global performances push all world applications and they are depending on Moore’s Law *race*, which is approaching now the physical limits of semiconductors. So Intel and other big companies have in 2012 some major tests for their revolutionary solutions:
 - a. EUV (extreme ultraviolet) lithography;
 - b. 3D-chips (TSVs – through silicon vias).It is enough relevant to mention that the implementation of TSVs will provide incredible increase of performance for DRAM memories as: +800% in bandwidth, -50% in power consumption and -35% in size [3].
- ✓ Smart grids represent a complex system of optimization of the national power grids, which provide remarkable savings of electricity. Their latest performance could be the equivalent of a “virtual power plant”.
- ✓ LEDs lamp will replace, at world scale meaning huge savings, both incandescence lamps and fluorescent (mercury) tubes, as their performance (versus the first) provides 1/6 of power consumption and 25 times longer life, with technological controls for the light “colour” (warmer or cooler) [8]. But the price has a long way to decrease!
- ✓ Plug-in cars, which, in perspective, could be an other planetary scale generator of savings, have important benefits from ICT (even not exclusively) and electric industry, in order to overcome the diversity of challenges on the long road to replace fuel cars.

Of course, the list could include many other tracks to be followed (as ICT remarkable applications are everywhere), like all alternative energy generators (first being the sun-cells) and the frightening challenges coming from the next sun storms (1989 could be only a joke) [5] and Fukushima incident [7].

3. Conclusions could be replaced by continuing to deeply think

The real challenge and right tracks for ICT will come from a general risk, which puts Earth community on the most stringent race (for solving, or at least to be best prepared for it), we may call the Achilles' Heal type of risk: our total dependence on electricity (see sun storms, nuclear incidents etc).

A very sad (but "lesson to be learned") example is that Fukushima incident will lead to a critical situation in Japan, where, from the tens/hundreds of nuclear reactors, from different reasons, all could be stopped (for shorter or longer terms) in the summer of 2012 [7].

Without dramatizing, going even further from electricity, it is realistic to observe **and learn** from the fact that, we will soon be almost total dependent on ICT products and services! The solution is far to be simple, but we must think to a mature control of this dependence.

So, we have, every day, to look for the right tracks we have mentioned before, while the whole Earth is in a hurry and everybody is in "his race", because we can not afford to forget that **the Earth race** is sure two-fold: to progress **and** to survival.

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