

THE INFORMATION MANAGEMENT – THE ESSENCE OF USING COMMUNICATIONS AND INFORMATION TECHNOLOGIES TO DEVELOP THE KNOWLEDGE BASED SOCIETY

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Abstract

The paper presents the role of information as the main „vehicle” communications and information technologies (CIT) use to leverage every activity fields and every individual life in the „information age” stage of the human being evolution. Then the information management (IM) is resulting as the logical approach for the systemic optimization of the complex processes humankind encounters in developing the information society (IS) toward knowledge based society (KBS).

For optimizing the economical and social environment on Earth and face the fast evolutions of CIT, IM must carefully use, step by step, 3 basic ingredients: accurate data, then relevant information and then refined knowledge.

The paper analyzes the most important and difficult to optimize added value of IM, as generating refined knowledge is the main target of the process that starts with creating data, then extracting information and eventually using this information in a complex process, where people, in a legal, economical and social context will use it, creating new/refined knowledge.

The paper emphasizes that, as a solution for stable growing, „learn and go on” is the way the humankind have to chose in the complicated context of such complex forces of the progress like CIT, resulting that the education remains the main ingredient, the key factor of exploiting these forces.

The paper conclusions are finding that simple education is no more enough in the IS/KBS context, when the humankind is at the „information age”, every human being must be school educated, but, beyond the already „old” term of „continue education”, he/she must be „educated” to learn every day from the IS/KBS context, in order to survive and grow. As CIT products and services became „ubiquitous as the water and electricity”, people must learn every day to use them and their useful optimization principles, like IM.

Finally it resulted that we need more and more IM every day, but it is important to notice that IM means much more than we already know about „information” and about „management”, even if we add as main ingredient CIT.

Keywords: *information management, communications and information technologies, information society, knowledge based society, education, big data.*

JEL Classification: *L63, L86, M15, O13, O33*

1. Learn and go on – a way the humankind have to chose for growing

Perhaps one of the most important phases in the humankind evolution was when the human being began to „learn” from the collective experience and generally to act after „thinking” in a correlation with the (social) environment.

Without analyzing the sophisticated branches of the transformation of the „homo sapiens”, we just notice the crucial implications of acting on a correlative thinking base.

These opinions are also confirmed by **Michael Tomasello**, the author of the book „**A Natural History of Human Thinking**”, from which it results that [3]:

„Humans had to learn to see the world from multiple social perspectives, to draw socially recursive inferences, and to monitor their own thinking via the normative standards of the group”.

Of course, there is a long way humankind made until the „information age”, but it seems the above truth is more actual than ever been.

Why learning is today more important than ever? This is a question that could appear strange.

Why the correlated/connected thinking is essential in the information society (IS) ? This is a similar question, but we feel it is not so strange and on contrary, it makes sense. More than this, the development of IS towards the knowledge based society (KBS) is a very complex process where the refined thinking, actual information and finally knowledge are the modern dimensions of learning.

Although those questions are not very complicated, the paper could not fully answer them, but we shall try at least to approach and analyze their main implications and some practical aspects.

Learning today should be easier if we consider the progress brought by the technology in general and especially by the communications and information technologies (CIT).

On the other hand we have to recall the challenges people have to face when living in the IS [6], where CIT transfers implications of their exponential pace of development to all activity fields, to entire IS [7], [8].

Adding the whole technical and historical evolution could complete the picture of „heritage” knowledge, but to be realistic we just remind that 90 percent of the world's data today has been created in the last two years [5].

With other words we may simply, but a little „shocked”, observe that *almost all humankind „history” in data volume is now replicated in the last 2 years!* So could be less impressive that every day we create 2.5 quintillion (10^{18}) bytes (2.5 exabytes) of data, actually referred as „big data” process [5].

Of course, there is also a way from data to information and then to knowledge, but we shall approach this too, as **the information management** is just in the middle of these terms.

As the amount we have „to learn” would not be „enough”, today we are facing perhaps the most difficult part: the speed or the pace CIT create by the exponential evolution of their products, services and implications.

We have to observe, for paper space reasons, that, as we advance in our analyze, things become more complicated, more complex correlated and so on.

In spite of the appearance, the above observation is not necessary pessimistic, because we have just arrived to the main point of the paper: ***the information management (IM) is resulting as the logical and necessary approach for the systemic optimization of the complex processes humankind encounters in developing IS towards KBS.***

It is obvious that the generic IM concept does not bring the answers to the above complicated questions, but it clearly points the systemic way they must be approached, step by step, from simple to complex, taking into account the appropriate set of rules and criteria.

As we already presented [12], these sets of rules and criteria, associated with IM, have an essential role in IS and further for KBS and they represent in fact a dynamic set of refined knowledges to be considered and then re-considered, as the evolutions in IS are quickly changing.

This way we may observe that the biggest challenges, for optimizing the IM and then the models in the IS toward KBS, include the „big data”, exponential CIT pace and their impact on the complex processes of humankind evolution on Earth.

To be more specific, we also recall [6], among other the dramatic dilemma of humankind actual stage of evolution on Earth: apogee or decline?

Anyway, avoiding the philosophical approaches, we may agree that CIT influence in IS/KBS is utmost positive, with the condition to carefully „manage” their pace and criteria of development and application, in order to have a balanced influence on Earth resources consumption and humankind social profile’s changes.

How this general and „generous” goal could be achieved, at every evolution step, is perhaps the most difficult question, but some answers could come if we analyze concrete examples of how IM could be correlated with the processes generated when people are creating or using the CIT products and services in actual Earth’s environment.

2. From simple counting to leveraging refined knowledge and more

Before analyzing some concrete aspects, it is important to point here the relevance of an actual feature of developing CIT for IS/KBS. This feature increased in importance with the CIT exponential progress and refers to the relative lack of performant algorithms, software and ***management solutions*** versus the explosion of ***very*** performant available technologies. With simpler words, we often hear: „getting better results is rather a problem of management, than of technology”.

The above observation reflects the priority to approach and implement IM in order to optimize CIT contribution and generally IS evolution toward KBS. But the IM itself does not better solve the complex problems of the humankind at the Information Age.

The effectiveness and efficacy of IM highly depends, among other, on how innovative is the way it is applied in every context.

Today more than ever, inspite of the fast evolutons of CIT, the economical and social environment on Earth is asking to carefully use, step by step, 3 basic ingredients of IM: accurate data, then relevant information and then refined knowledge.

All 3 phases suppose complex processes when they are created, transmitted and eventually used, but it is expected that refined knowledge should include the most important and difficult to optimize added value of IM.

A realistic image of the refined knowledge process could be revealed when we observe the planetary diversity of people, culture and economical/technological levels.

These are the premises which lead to the important conclusion that now, more than ever, IM needs a deep approach of every step and generally „when innovating, go slow” [1].

As a matter of fact, the essential role of refined knowledge and innovation, with a pace and deepness which must balance the „explosion” of CIT and data deluge (called „Exa-data” or „Big data”), was already approached and analyzed in [6], [13].

Among the reasons for „slow” innovating, we may count the complexity of criteria which must be considered for wise development when the Earth (and the humankind) are at apogee/declin (extreme performance/resource fading) [6] and the time needed for getting life confirmed refined knowledge – as a base of KBS.

How life could apply and confirm innovations and IM efficacy, either in CIT or in connected fields, it is esier to assess by some relevant actual examples.

If „slow” innovating seems not an appropriate strategy, just notice that in the middle of CIT explosion [9], for introducing CDMA in the actual wireless communications networks (i.e. 2G; 3G; 4G), Jacobs and Qualcomm had to „fight” more than 10 years (1985-1995) to apply their „innovation” based on Shannon’s 1945 theory. A similar evolution and „fight” was supported, keeping the scale, by us in Romania for the same main model of Shannon’s Spread Spectrum Systems/CDMA principles, this time for military use [9].

These days we assist at the development of drones by USA (and recently agreed by EU military specialists), after 100 years from their first „innovation”.

An interesting example, although not coming from CIT, perhaps the most relevant for the complexity of its implications is the bio-fuel, a promising inovation, having a future depending, among others, on the negative implications to Earth’s food reserves.

One could say that „counting” (no matter what) is an application too simple for today CIT, but lets observe the implications, for IM, of e-mail and other un-structured data (files), at enterprise (why not person?) levels.

If we make the next step (the actual document management software systems do) on the same way, we may find the benefits of counting, sorting, de-duplicating, archiving, marking, securing or certifying documents and generally data, for time, space, money, energy and all other implied resources.

It is interesting to note in this case, as in other cases of progress benefits, that we may have all these advantages due to CIT, but it is worth to remark that some of them would not be necessary without the „problems” created by ... CIT (e-mail being only one!).

If the above IM benefits and implications were too general expressed, we may notice their direct connection with the top of CIT development, as in the top of most powerful supercomputers of the world, in may 2013 China – „Tianhe 2” got the first place, over Intel, with their 34 peta (10^{15}) flops/sec [4].

As a „strike back”, Intel is developing a hybrid supercomputer, with 32000 multicore CPU-s and 48000 ”coprocessors”, using its 22-nanometer technology, which is still a generation ahead competition (AMD) [4].

The challenges that link these apparent disparate aspects are the main purpose of the World supercomputers: forecast of climate changes, brain wiring diagram, data deluge (for example: Large Hadron Collider- Geneve, Human Genom Decoding and so on) [10].

Now things began to be more convergent as we have seen that IM is important for „wise” counting anything, but when huge and complex projects, as the above mentioned ones, are dealing with the future of humankind life on Earth, we may agree that there is nothing more important to optimize than when achieving these goals.

How to optimize these complicate projects/processes?

Obviously, the answer could not be found so simply, but we may continue the analyze in order to find some mechanisms which involve IM in these processes.

In fact here we found the most important context and concrete areas where the above 3 basic ingredients of IM (accurate data, relevant information; refined knowledge) are processed.

The refined knowledge, which include the most important and difficult to optimize added value of IM, is also the most relevant process for the paper's point.

We have to observe that the generation of refined knowledge is generally the essence of developing IS towards KBS as whole on Earth, but there are some areas and phases where the IM impact is overwhelming and we just pointed them: life on Earth survival (including the reduction of climate changes and resources fading), humankind health and controlling data deluge/CIT for IM best results.

To add value when generating refined knowledge is the main target of the process that starts with creating data, then extracting information and eventually using this information in a complex process, where people, in a legal, economical and social context will use it, creating new/refined knowledge.

Although in the above process CIT products and services are ubiquitous and fully used, today with amazing performances (speed, memory, connectivity), the multi-criteria complex decisions and the political/social context, where the subjective human mind is still the key, are factors that create premises to have non-optimal solutions or development evolutions.

Now we can understand why „*learn and go on*” is indeed the way the humankind have to chose for stable growing, as we have seen that, in the complicated context of such complex forces of the progress like CIT, *the education remains the main ingredient*, the key factor of exploiting these forces.

The simple education is unfortunately something absolute in IS/KBS, as simple „knowledge” also is.

The paper's point, as we above mentioned, is to emphasize the complicated way of creating the refined knowledge, its new components and added value, by a multi-criteria optimization process, where „education” is fully included but from a large and dynamic perspective.

In fact, here we are considering a logical approach of processes, where IM is the main rule, but the criteria and the algorithms are very diverse and dynamic, depending on the application area, the scale and generally the context of the process.

To be more specific, for example in the case of education, in the IS/KBS context, when the humankind is at the „information age”, every human being must be school educated, but, beyond the already „old” term of „continue education”, he/she must be „educated” to learn every day from the IS/KBS context, in order to survive and grow.

With simpler words, people must understand to use IM every day as they use the air to breath, if they want to survive and grow in a world at „apogee/decline”.

On a parallel plan, as CIT products and services became „ubiquitous as the water and electricity”, people must learn every day to use them and their useful optimization principles, like IM or „network centric” [12].

Speaking about „apogee/decline”, the core of today's IS, the Internet, is preparing „itself” to learn for stable grow.

In fact, again the human innovation/creation, as we earlier mentioned [10], [6], when arriving at difficult cross point, has to learn from the past, from the nature.

Here it is very interesting to observe that, in spite of CIT actual „apogee”, when we get to the edge, we have to learn from the „research” made in thousands of years by the mother nature.

This is the case of Internet, which, from the point of view of the communication/routing support at least, is going to a „bottle neck” and the solution seems to be „the cognitive network” – a biologically inspired routing [2].

The last challenge is only the tip of the „iceberg” and the „information centric” (that sounds very close to IM!) seems to be just another „lesson” we will learn from CIT, after „network centric” [14].

The „iceberg” is nearly predictable if we notice that a CISCO report made a forecast for 2020, when about 50 billions of devices will populate what we already call „Internet of things”, starting from the kitchen refrigerator/robot, health personal assistant/sensor device, mobile smartphone/TV and so on [2].

3. Conclusions

After analyzing the role of information as the main „vehicle” communications and information technologies (CIT) use to leverage every activity fields and every individual life in the „information age” stage of the human being evolution, ***the information management (IM) is resulting as the logical necessary approach for the systemic optimization of the complex processes humankind encounters in developing IS towards KBS.***

In order to optimize the economical and social environment on Earth and face the fast evolutions of CIT, IM must carefully use, step by step, 3 basic ingredients: accurate data, then relevant information and then refined knowledge. It is expected that refined knowledge should include the most important and difficult to optimize added value of IM.

Adding value when generating refined knowledge is the main target of the process that starts with creating data, then extracting information and eventually using this information in a complex process, where people, in a legal, economical and social context will use it, creating new/refined knowledge.

For stable growing, „***learn and go on***” is the way the humankind have to chose in the complicated context of such complex forces of the progress like CIT, resulting that ***the education remains the main ingredient***, the key factor of exploiting these forces.

Finding that simple education is no more enough in the IS/KBS context, when the humankind is at the „information age”, every human being must be school educated, but, beyond the already „old” term of „continue education”, he/she must be „educated” to learn every day from the IS/KBS context, in order to survive and grow.

As CIT products and services became „ubiquitous as the water and electricity”, people must learn every day to use them and their useful optimization principles, like IM.

Finally it seems that we need more and more IM every day, but it is fair to observe that IM means much more that we already know about „information” and about „management”, even if we add as main ingredient CIT.

We feel that the best taste we can get (for the future life on Earth), although probably we do not know it yet, could be given by always adding ***something from the real world (from the context) – something that we will have to learn to find IT every day!***

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