

Information and Communications Technologies Drive Digital Disruption from Business to Life on Earth

-Part 3-

Prof. Eng. Ph.D. Victor GREU



Abstract

The paper details the analysis of the digital disruption (DD), in the context of the Information and Communications Technologies (ICT) exponential evolution as main driving factor of the progress of the Information society (IS) toward Knowledge Based Society (KBS).

The analysis starts with DD/ICT premises in order to identify some of the most important useful rules and advices to face DD consequences/challenges. Among the most relevant premises, IoT, the number of people of Planet versus connected devices expansion and the complex impact of ubiquitous connectivity are included.

A DD rules identification incentive is the fact that digitization is closely linked with disruptive innovation and consequently DD could have a significant impact on organization growth.

From these basics, the rules follow the aim of maximizing the revenue growth in the dynamic DD/ICT context. This way, the general rule, also largely agreed by the literature, is to use the power of combining the main three directions of investments in digital skills, digital technologies and digital accelerators with the corporate strategy.

A deeper approach reveals the useful and extended leveraging role of analysing and adapting organizations to new concepts/rules as interfacing, removing the friction, address non-linearity and transparent thinking. Last but not least, being open to news is crucial in the ever changing digital context. Linking these rules, author opinion is that Descartes' rule of methodical doubt is again relevant along with the surgical precision of the new ICT.

The DD/ICT analysis included, beyond their support for digital economy, their possible leveraging influence exceeding the direct benefits for economy, along with some limits and undesired effects.

Most of these unwanted effects could unfortunately come just from ICT exponential pace of expansion at Earth scale, in all areas of activity, as mass products and services.

The main causes of such withdraws include climate changes and Earth resources fading, but on the other hand some less visible issues, like the long term effects on humankind behaviour, thinking and evolution.

A relevant example is the education area, as the skills and knowledge required of people to perform their jobs could further raise the general level of technical or general education of individuals, useful in life outside the job.

On this line the paper revealed the ICT power to penetrate all humankind activity fields, by indirect ways (outside ICT main applications), due to the impact and multiplication power ICT products and services have by their logical, digital and optimized models which are present everywhere everyday ... in every person mind.

The indirect consequences lay in the processes of modifying humankind personality and adapting capacity, as a highly skilled person could have less capacity/chances to adapt and do other job or personal activities (from health or other reasons) if his personality is too much modified in the way of thinking.

Similar influences could be produced on life beyond human beings, affecting Earth environment including fauna and flora. All DD/ICT applications with mass proliferation (like IoT) could bring, along obvious huge benefits, possible challenges addressing issues like energy/materials consume (Earth resources fading), wastes, recycling, intensive exploit of Earth (soil, water, air) and natural habitat modifications.

All these challenges must be linked with the fact that ICT carbon footprint has an important rate of annual increase (exceeding aviation), which is highly linked with ... ICT exponential Planetary development, Big Data, IoT etc.

The main conclusion of the paper is that such challenges should not stop the general technological progress, but it is important to watch DD/ICT pace and evolutions in order to minimize these and other similar undesirable effects, by carefully timely evaluating them. In other words, we have to think deeper on present short term, in order to avoid less thinking on future long term.

Keywords: Digital Disruption, Internet of Things, information society, knowledge based society, digital skills, digital technologies, digital accelerators, digital abstraction.

JEL Classification: L63; L86; M15; O31; O33

1. Digital Disruption could still have rules and ... limits

Rene Descartes:

Dubito, ergo cogito; cogito, ergo sum.

When complex processes have to be analysed, a systemic approach is mandatory and this is more than appropriate observing the Digital Disruption (DD) in the context of the Information and Communications Technologies (ICT) as the main driving factor of the progress of the Information society (IS) toward Knowledge Based Society (KBS).

The known exponential dynamic of ICT needs also a continue re-evaluation of their processes and complicate consequences at Earth scale [4]. The literature largely confirms these challenges of DD/ICT, as DD generates, on short and medium term, some of the most important consequences by its potential impact on every industry and generally on humankind life and even evolution [1][2][3][5][4][7][11][12][14].

For the DD systemic approach, the ICT context premises are crucial and a very relevant observation is given by [2]:

"We claim 2016 to be the year of singularity. The year when the number of digitally connected devices equals the number of people on the planet".

We have already presented the emergent context of IoT [10], but here the point is on the significance of the number of people of planet versus connected devices expansion, as this confirms our above opinion on "complex consequences at Earth scale".

To be more specific, it is important to imagine how the ICT instruments could "explode" when every human could access their huge potential of changing ... the World (not only business!).

In fact, the mentioned premises are more complex that we could ever imagine, as they are very fast growing, being leveraged by the exponential ICT development.

Consequently, as we have already presented [13] we have to generally expect both positive and negative consequences, but the news is that **it is more and more difficult to distinguish these sides!**

Confirming this point, the above example [2] could be completed as:

"Digital connectivity is facilitating the process of digital disruption by reducing access to market barriers and reducing the cost of client or customer acquisition. Word of mouth becomes word of byte...There is of course a downside. Product life cycles become more truncated as the life time values fall in periodicity and value. "

Now it is the time to recall our motto, as the Descartes' methodical doubt is more actual than ever.

As a matter of fact we consider that, in addition to the systemic approach, the methodical doubt is needed in order to deeply analyse and validate the DD/ICT complex trends and potential consequences.

Step by step we have just arrived to the conclusion that even for the unpredictable DD we need some ... rules! Naturally, to be useful, these rules must be more specific than the good old Descartes axiom.

Fortunately, this approach found much attention in the DD literature, although the problem is far from being simple, with these fast changing evolutions and consequences of DD/ICT, covering all industries and further all human activities.

A good approach of DD must recognize, as we have already presented [4], the role of digitization or the reality of digital economy emergence [3]:

"For companies responding to the threat of digitization, an offensive corporate strategy with coherent digital actions has by far the largest pay-off and may potentially offset the depressive effect of digital disruption ... The best strategic reaction should either be no reaction, or one driven by offensive strategies embracing the disruptive innovation (Christensen, 1997). "

Since these rules could seem to be too general, their detailed mechanisms are also important to be noted as [3]:

"First, digitization is consistent with the concept of disruptive innovation ... On average, we find that digital disruption exerts a negative and economically significant impact on growth. For instance, profit growth is cut by 5 percentage points on average, and can be as dramatic as a drop of 15 percentage points in revenue growth for the weakest, non-reacting firms....

Second, bold at scale, offensive, strategic reactions, aimed at developing or acquiring new products or services rather than at defending legacy business lines, and complemented with larger investments than competition in digital technology, generate the most promising growth trajectory...

Third, such offensive reactions maximize returns when there is strong consistency, i.e. digital strategy and investments need to be strongly aligned and integrated with the corporate strategy and be placed at its heart rather than at its periphery. "

From this almost comprehensive approach it is clear that digital investments focused on disruptive innovation of corporate strategy could be the best way to react to actual DD challenges.

Because the real world is always more complex than the theoretical approach, the rules must be refined and carefully updated. More than these, humankind has priorities beyond revenue [5]:

"While organizations are taking advantage of digital technologies, many economies remain digitally immature... Understanding where to make those investments to realize the greatest improvement in gross domestic product is the subject of recent analysis by Accenture Strategy and Oxford Economics. We found that high-performing economies could realize better returns from the optimal combination of investments in digital skills, digital technologies and digital accelerators... "

It is obvious that generally the rules could be further detailed, but it is also well known that always the best practice rules must keep a reasonable level of generality in order to let enough space for the diversity of concrete approaches and innovations.

Still, we consider that the last quotation includes the roots for an even more general context when promotes the essential role of the mix of those three ingredients: digital skills, digital technologies and digital accelerators. Before pointing the mentioned *more general*

context, we consider that digital technologies were largely presented, so the relevance of digital skills and digital accelerators must be further discussed with priority.

When we are facing such huge picture, as **digital disruption from business to life on earth**, it is necessary to also consider those potential rules which fit as much as possible with it.

A step further seems to be presented when the rules are in fact some well-designed metaphors which cover a larger and deeper reality (again just like **the iceberg we often recall [5] for today's signs versus tomorrow's size of ICT development**), which is the brilliant case when Nigel Moulton focussed on transforming for the future[1]:

- *The interface is everywhere*
- *Remove the friction*
- *Embrace non-linearity*
- *Prepare for abundance*
- *Be honest*
- *Be curious*

We consider in fact that some of these six **well designed metaphors**, brilliantly commented by Moulton, offer reasons for discuss beyond DD and even ICT as they are relevant for IS toward KBS.

When pointing to *interface* we have to recall that much of recent evolutions of ICT are focusing about creating new interfaces between man and machine, but this is only an iceberg tip if we think, for example, about what IoT will be [10]. This does not reduce the relevance of Moulton examples, showing **the impact on user experience** of the transitions from “*keyboard to touch and swipe, pointing that Apple made a very significant interface change*” - *Siri*“.

Perhaps one of the hardest challenges of DD comes when “*A number of organisations that are going through digital transformation are doing so because their competitors are easier to do business with than they are*” and that is why the Moulton rule comes very simple: “*Remove the friction externally for your customers, and internally for your own employees*“.

The metaphoric perception seems to increase with the rule number in the above column, as starting from *fitness trackers*, when referring to *non-linearity*, a subtle and complicate advice to embrace deep analysis of the complex context of DD/ICT is given as [1]:

<<“*There are hundreds and thousands of people wearing these devices which are all sending data and generating noise. But out of this noise, I have to find the signal because the signal is the business process “... He says [Moulton] that we need to have algorithmic and data science approaches to how we figure out finding the signal that is buried in all of the noise. “We need to embrace non-linearity. We’re very good at straight lines; we’re not very good at exponential curves. “>>*

That is why we have above mentioned that some of Moulton rules invite to discuss beyond DD and even ICT, being relevant for IS toward KBS, i.e. he is confirming our repeated opinions [13] [15][22] that ICT/IS/KBS evolution is such a dynamic and complex context which is changing too fast, as we cannot evaluate **all its consequences** (*finding the signal that is buried in all of the noise*) even by deep and continue multi-criteria analysis and new models/algorithms (**but we have to try and obtain the best!**).

The idea of *preparing for abundance* covers an even more large sphere of IS/KBS, although it is linked with an old alarm flag about Earth resources fading (issued from consumer society features) - which was recalled by us in [13], it has here a positive message towards the necessity of new approaches to manage the data deluge we have to face along with the huge offer of ICT products and services [1]:

“Just think about the amount of data these cars will generate. You’re going to need a principle to define the signal from the noise. Look at the industries that you’re involved in - what are the fundamental changes that are happening? Because when you information-enable a technology, you fundamentally change its nature. We’re not going to build that world based on the principles of 20th-century industrial thinking”

Again the needed new models/algorithms for such complex challenges are confirming our proposals [19] [24] of adapting our approaches to the fast and profound changes induced by ICT in all IS/KBS areas and beyond ...in humankind life and Earth ecosystem.

It is obvious that any system of rules has to keep the perennial values of humanity, including to *“Be honest - Be curious”*.

Of course, these value principles must be applied in the actual IS/KBS technological conditions, where *transparency* and *curiosity* could mean **traceability and connectivity**, but the practical rule issuing from them is again covering more than the actual case: *“See it as an opportunity to educate yourself.”*

This last indirect rule could lead us to a higher level versus DD approach, pointing the role of education, but more than this it is a confirmation of the fact we repeatedly presented [15] [22], i.e. the multiplying role ICT have in IS/KBS when they are **lending their efficient and efficacious principles and models to all areas of humankind activity and ... thinking.**

Here we have to observe that the *opportunity to educate yourself* is just the result of DD/ICT context, i.e. it is an indirect offered service/model (beyond the apparent role of best practice rule for DD approach), with benefits exceeding the proper reaction to DD.

Although it could appear too far, here we may observe a good start for identifying some of DD ... limits.

First of all, although indirectly, when influencing education DD is revealing one of the highest limits or areas of impact, with consequences so complex that exceed paper space and objectives, but relatively easy to approximately evaluate as social importance.

Another limit, this time a lower one, is reflected by the fact that one of the above mentioned options for DD were to *“be no reaction”*. This could mean a good solution for some concrete cases and ... moments in time!

Here both area and time opportunities could reflect the DD/ICT coverage and dynamic, in combination with company/organization strategy, but it is difficult to forecast areas where DD/ICT, sooner or later, would not penetrate, considering either private or governmental entities [16].

Perhaps the most relevant DD limits lay in the amount of potential impact in function of the industry/activity area, as also resulted from the same above reference – where limits of *profit growth cut between 5 and 15 percentage points in revenue* were exemplified.

Coming back to the mentioned starting point, it is necessary to further analyse how far DD could influence humankind activity and ecosystem, beyond education and sometimes ... beyond our expectations.

2. How deep the Digital Disruption is transforming life

Life on Earth is a wonderful intersection of some incredible conditions that Planet provided and what evolution made in thousands of years providing the ecosystem where humankind was struggling first to survive and lately to faster progress.

Now we are in the most tremendous phase of this progress, as if this should continue with the same premises, many people believe that it could remain an apogee phase.

We also presented some analyses [13][24], showing that trends like climate changes and Earth resources fading could be considered real signs of a near decline.

There are studies that even try to evaluate how many years we would have before the point of no return of this phase, so any disruption, including DD, must be carefully analyzed from the point of view of its impact on humankind and Earth progress/apogee.

Normally, the actual DD/ICT evolution and its consequences appear, including the elements presented in the first section, to be globally positive for humankind, but only from the industry/economy point of view [23].

If we should analyze all the DD/ICT consequences it is possible to also find negative implications. Most of these unwanted effects could come unfortunately just from ICT exponential pace of expansion at Earth scale, in all areas of activity, as mass products and services [13][15][22].

Notice that the unwanted effects, i.e. the unsustainable development, could appear because of the too fast pace of development in combination with the lack of responsible analysis/decision, only partially justified by the too short time left to foresee all the consequences of such complex evolutions.

The arguments for a such worry lay in issues like climate changes and Earth resources fading, but on the other hand in some less visible zones, like the long term effects on humankind behaviour, thinking and evolution.

Perhaps it is time to return to some concrete examples in order to confirm and quantify these opinions.

Coming back to the mentioned relevance of *digital skills and digital accelerators*, we should connect them with the education impact of DD and with other new products or services DD could bring.

Indeed, beyond usual benefits, DD (when successful embraced) has the potential to indirectly provide for economy, along with challenges to be faced, added value in all areas of humankind activity by some subtle ways we intend to reveal through some examples.

In order to accurately assess the global values provided by the digital technologies (ICT), an updated approach/methodology is proposed in [5]:

“Our basic premise is that the value of digital technologies is not confined to any particular sectors, but pervades the entire economy. Our model recognizes digital goods and services add value not just at the point of production, but all the way through the supply chain. ... Our methodology takes into account the value created by the indicators related to:

Digital skills: the digital nature of occupations and the skills and knowledge required of people to perform their jobs.

Digital technologies: the productive assets related to digital technologies (hardware, software and communications equipment).

Digital accelerators: the environmental, cultural and behavioral aspects of digital components of the economy that support digital entrepreneurship or activities.”

Here we can observe the three mentioned indicators details, but beyond their support for digital economy it is natural to further imagine their possible leveraging influence exceeding the direct benefits for economy.

Now we can easier see the link with education, as *the skills and knowledge required of people to perform their jobs* could further improve the general level of technical or general education of individuals, useful in life outside the job.

This way we have just arrived to an older observation, we presented in [8] [15], which referred to the ICT power to penetrate all humankind activity fields, by indirect ways (outside ICT applications), due to the impact and multiplication power ICT products and services have by their logical, digital and optimized models which are present everywhere everyday ... in **every person mind (way of thinking)**.

Although these benefits are only a part of DD/ICT potential (we can add for example the contribution of digital skills in scientific research etc.), it is important to observe that exactly on the same indirect but ubiquitous ways some negative effects could influence humankind life and personality.

Starting with the digital dependence, the lack of physical movement or the decrease of intellectual/creative potential, we could add many others, **but some still could remain unobserved yet** – all generated by the excessive usage of ICT benefits, from computing to artificial intelligence (AI) and robots unprecedented proliferation and support.

Perhaps another example, which presents a higher level of the same trend of having impressive benefits for DD/ICT evolution, will bring light to deeper and deeper consequences which are not always desirable, or at least difficult to differentiate in the too fast pace of changes [6]:

“We experience the results of digital abstraction whenever search engines and websites tailor their content to customers’ past preferences. At one level the tailoring can be humorous — for example, purchasing a copy of Neil Stephenson’s book, , to give to a friend and suddenly receiving a recommendation from the website of every other book by that author, even those it should know you already own! At a deeper level, the reality is clear: digital technologies enable organizations to know more about customers and their own operations. As a result, they can build an increasingly complex and sophisticated situational understanding of behavior, preferences, conditions and intelligence. A range of technologies supports the Abstract model, including business intelligence, big data and predictive analytics.

Incorporating digital resources into any business generates information that represents a source of insight and value.”

In fact authors point the ways to reach a new edge for DD by using the incredible power of new ICT as:

“A digital edge based on abstracting information relies on sets of techniques and technologies that incorporate statistics, advanced mathematics and artificial intelligence with data management to determine the probability of a future outcome that may drive a business decision.”

If a shadow of doubt could still remain, it is sufficient to observe the privacy, security or ethical implications consequences of such “benefits”.

More than this, the next example leads us in a similar zone but with new implications [9]:

“There’s never been a better time to be a worker with special skills or the right education, because these people can use technology to create and capture value. However, there’s never been a worse time to be a worker with only ‘ordinary’ skills and abilities to offer, because computers, robots and other digital technologies are acquiring these skills and abilities at an extraordinary rate.” –Erik Brynjolfsson and Andrew McAfee, MIT Initiative on the Digital Economy (quote from their book The Second Machine Age).”

Of course, the first message is that DD/ICT are stimulating the digital highly qualified workforce and this is the main and positive trend of our days.

The challenges for this trend arise from the Planetary and social imbalance, because both could remain little changed over decades – but this could be considered a natural World evolution, **eventually ignoring that the fast speed of DD/ICT amplifies the imparities.**

The indirect consequences lay in the already mentioned processes of modifying humankind personality and adapting capacity, as a highly skilled person could have less capacity/chances to adapt and do other job or personal activities (from health or other reasons) if **his personality is too much modified in the way of thinking.**

In such scenario we have already ignored, as exceeding paper space and aim, the recognized modifications of humankind traditional values and ideals linked with humanism – **using too much ICT we tend to behave like robots.**

Last but not least we have to mention similar influences on life beyond human beings, affecting Earth environment including fauna and flora.

Also in these areas, DD/ICT provide amazing new applications and benefits, mainly by environment monitoring (flora, fauna, soil, water, air, wastes areas etc).

One of the most impressive monitoring examples include Internet of trees [17][10], rare species, agricultural plants optimization [4], without counting “industrial” cases of fruits/aliments, cows farms etc.

Globally, all these applications with mass proliferation (like IoT) could bring, along obvious huge benefits, possible challenges addressing issues like energy/materials consume (Earth resources fading), wastes, recycling, intensive exploit of Earth (soil, water, air) and natural habitat modifications.

It is also well known that some of the above main challenges could be approached by green ICT [20][21][24], but it is essential to mention that **ICT carbon footprint has an important rate of annual increase (exceeding aviation), which is highly linked with ... ICT exponential Earth development, Big Data, IoT etc.**

Although it is clear (and we also consider so) that such challenges should not stop the general technological progress, **it is important to watch DD/ICT pace and evolutions in order to minimize these and other similar undesirable effects, by carefully timely evaluating them.**

In other words, we have to think deeper on present short term, in order to avoid less thinking on future long term!

3. Conclusions

The paper presents an analysis of the DD/ICT premises and then identifies some of the most important useful rules and advices to face DD consequences/challenges.

Among the most relevant premises, IoT, the number of people of planet versus connected devices expansion and the complex impact of ubiquitous connectivity are included.

For DD rules identification it is important that digitization is closely linked with disruptive innovation and consequently DD could have a significant impact on organization growth.

From these basics, the rules follow the aim of maximizing the revenue growth in the dynamic DD/ICT context. The general rule, also largely agreed by the literature, is to use the power of combining the main three directions of investments in digital skills, digital technologies and digital accelerators with the corporate strategy.

A deeper approach reveals the useful and extended leveraging role of analysing and adapting organizations to new concepts/rules as interfacing, removing the friction, address non-linearity and transparent thinking. Last but not least, being open to news (*curious*) is crucial in the ever changing digital context.

Linking these rules, author opinion is that Descartes’ rule of methodical doubt is again relevant along with the surgical precision of the new ICT. As a consequence, the DD/ICT analysis included, beyond their support for digital economy, their possible leveraging influence exceeding the direct benefits for economy, along with some limits and undesired effects.

Most of these unwanted effects could unfortunately come just from ICT exponential pace of expansion at Earth scale, in all areas of activity, as mass products and services.

The main causes of such withdraws include climate changes and Earth resources fading, but on the other hand some less visible issues, like the long term effects on humankind behaviour, thinking and evolution.

A relevant example is education area, as *the skills and knowledge required of people to perform their jobs* could further improve the general level of technical or general education of individuals, useful in life outside the job.

On this line the paper revealed the ICT power to penetrate all humankind activity fields, by indirect ways (outside ICT applications), due to the impact and multiplication power ICT products and services have by their logical, digital and optimized models which are present everywhere everyday ... in **every person mind (way of thinking)**.

The indirect consequences lay in the already mentioned processes of modifying humankind personality and adapting capacity, as a highly skilled person could have less capacity/chances to adapt and do other job or personal activities (from health or other reasons) if **his personality is too much modified in the way of thinking**. So, **using too much ICT we tend to behave like robots**.

Similar influences could be expected on life beyond human beings, affecting Earth environment including fauna and flora. All DD/ICT applications with mass proliferation (like IoT) could bring, along obvious huge benefits, possible challenges addressing issues like energy/materials consume (Earth resources fading), wastes, recycling, intensive exploit of Earth (soil, water, air) and natural habitat modifications.

All these must be linked with the fact that ICT carbon footprint has an important rate of annual increase (exceeding aviation), which is highly linked with ... ICT exponential Earth development, Big Data, IoT etc.

The main conclusion is that such challenges should not stop the general technological progress, but **it is important to watch DD/ICT pace and evolutions in order to minimize these and other similar undesirable effects, by carefully timely evaluating them**.

In other words, we have to think deeper on present short term, in order to avoid less thinking on future long term!

References

- [1]Ilse van den Berg, *The six rules of disruption* (Nigel Moultonkeynote address at the Dell EMC Forum on Thursday, 9 March 2017), 10 March, 2017, <http://www.bizcommunity.com/Article/196/379/158887.html>.
- [2]John Ashcroft, *Six Things Everyone Should Know About Digital Disruption, six rules of disruption*, Published on Jul 6, 2016, <https://www.slideshare.net/jkaonline/six-things-everyone-should-know-about-digital-disruption-pdf>
- [3]Jacques Bughin, Nicolas van Zeebroeck, *The case for offensive strategies in response to digital disruption*, 2017.
- [4]Victor Greu, *Information and communications technologies drive digital disruption from business to life on earth -(Part 1)*, Romanian Distribution Committee Magazine, Volume 8, Issue 2, Year 2017.
- [5]Mark Knickrehm, Bruno Berthon, Paul Daugherty, *Digital disruption: The growth multiplier Optimizing digital investments to realize higher productivity*, Copyright © 2016 Accenture, https://www.accenture.com/_acnmedia/PDF-4/Accenture-Strategy-Digital-Disruption-Growth-Multiplier.pdf
- [6]Mark P. McDonald, *The digital edge*, © 2012 Gartner, Inc, <http://www.gartner.com/books>
- [7]Rita McGrath, *Fast Thinking: Reinventing Strategy for a Digitally Disrupted World*, Interview with Rita McGrath, Digital transformation review, no.07 february 2015, <http://ebooks.capgemini-consulting.com/digital-transformation-review-7/files/assets/basic-html/page12.html>
- [8]Victor Greu, *Developing information and communications technologies with more artificial*

- intelligence, using artificial intelligence, when internet of things is 'intelligence everywhere'-(Part 1)*, Romanian Distribution Committee Magazine, Volume 7, Issue 4, Year 2016.
- [9] ****World Economic Forum White Paper Digital Transformation of Industries: In collaboration with Accenture*, Digital Enterprise January 2016,
http://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/_pages/files/digital-enterprise-narrative-final-january-2016.pdf
- [10] Victor Greu, *The information society towards the knowledge based society driven by the information and communications technologies - from the Internet of Things to the Internet of ...trees (Part 1)*, Romanian Distribution Committee Magazine, Volume 6, Issue1, Year 2015.
- [11]*** *Digital transformation: online guide to digital business transformation*,
<https://www.i-scoop.eu/digital-transformation/>
- [12]****What Is Digital Disruption?*, Oxford College of Marketing,
<http://blog.oxfordcollegeofmarketing.com/2016/02/22/what-is-digital-disruption/>
- [13]Victor Greu, *Searching the right tracks of new technologies in the earth race for a balance between progress and survival*, Romanian Distribution Committee Magazine, Volume 3, Issue1, Year 2012.
- [14]Gareth Cuddy, *Digital disruption and innovation in brief*, 2015 Digital Book World.
- [15]Victor Greu, *The Exponential Development of the Information and Communications Technologies – A Complex Process Which is Generating Progress Knowledge from People to People*, Romanian Distribution Committee Magazine, Volume 4, Issue2, Year 2013.
- [16]Mike Shaw, *Digital disruption impacts every industry. Here's how to win in an era of constant change*, enterprise.next, 2016 Hewlett Packard Enterprise Development LP,
<https://www.hpe.com/h20195/V2/GetPDF.aspx/4AA6-7153ENW.pdf>
- [17]Kathy Pretz, *Environmentally friendly Information and Communications Technologies*, IEEE The Institute, Mar.2016.
- [18] Mark Harris, *The Internet of Trees*, IEEE Spectrum, Mar.2014.
- [19]Victor Greu, *Context-aware communications and IT – a new paradigm for the optimization of the information society towards the knowledge based society (Part 2)*, Romanian Distribution Committee Magazine, Volume 5, Issue4, Year 2014.
- [20]Prechi Patel, *Building a more eco-friendly telecom industry*, IEEE The Institute, Mar.2016.
- [21]Ana Carolina Riekstin,Bruno Bastos Rodrigues,Viviane Tavares Nascimento, Claudia Bianchi Progetti,Tereza Cristina Melo de Brito Carvalho, Catalin Meirosu, *Sustainability Information Model for Energy Efficiency Policies*, IEEECommunications Magazine, November 2016.
- [22]Victor Greu, *Tomorrow's paradox: refining knowledge by smarter information and communications technologies while humans tend to become a limited factor of performance*, Romanian Distribution Committee Magazine, Volume 7, Issue1, Year 2016.
- [23]*** *More Than 30 Billion Devices Will Wirelessly Connect to the Internet of Everything in 2020*, ABI Research,London, United Kingdom - 09 May 2013,
- [24]Victor Greu, *Information and communications technologies go greener beyond IoT - behind is all the earth - Part1*, Romanian Distribution Committee Magazine, Volume 7, Issue 2, Year