Report
DYNAMO 94
2/4 2017

# Digit

The world is impregnated with technology. The digital advances over matter and invades life. It spreads in space and devours time. Transformations are everywhere: in the social order, in the business environment, in the behavior of individuals. The theme became mandatory for any investor, anywhere in the world. Therefore, here at Dynamo, we attempt to better understand the nature of the phenomenon. This effort is of such importance that a part of it resulted in an extensive study, consubstantiated in three Reports, divided as such to facilitate the lives of our readers.

The script for this trilogy is set as follows. In this first Report (94 – *Digit*), we selected a few episodes in the recent history of digital technology that help explain its success. We deal quickly with the digitization of information, microprocessing and optical fibers that respectively confer immateriality, celerity and ubiquity, the main attributes of our current technological reality. In the following Report (95 – *Network*), we describe the structure through which digital technology is organized, that is, the network paradigm. We present some insights from network theory that clarify results in the business world as well as in other connected realities across diverse disciplines. We also present the elements that determine the economic performance of networks, and compare them to the analytical model of the traditional economy. With this infrastructure configured, in the third Report (96 – *Platforms*), we describe the business model that, by combining the two previous ingredients, technology and connectivity, has come to dominate several competitive niches.

We believe that the interest of our average reader will be better represented and addressed in the third Report, which brings the discussion of technology to the practical reality of business. The first two run through conceptual curiosities and provide for a more arid reading, given the nearly academic approach we use. They are justified by our fundamentalist approach of trying to know things by their roots, to seek at their origin the explanations of phenomena. But they can be perfectly deferred, according to the time and the convenience of the reader. Our suggestion, then, is that those who have no particular interest in the subject begin by reading our 96th Report and, if deemed necessary, go back to the previous Reports to understand the more theoretical basis of what they have read.

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- In 1990, there were 2.8 million internet users, about 0.05% of global population. Ten years later, the number rose to 1.8 billion, 26.6% of global population. Today, we are 3.6 billion internet users, almost half the world's inhabitants.
- The number of connected devices in IP networks in 2021 will be on the order of 21-28 billion, or about 3.2x the size of the world's population (Cisco / Ericsson)[1].
- The overall annual traffic volume in 2021 will be 3.3 ZB (zettabytes, where 1 zettabyte, or a thousand exabytes, equals $10^{21}$ or $2^{70}$ bytes). An exabyte is able to download the entire Netflix catalog three thousand times, a zettabyte is equivalent to about 250 billion DVDs. By 2021, one million minutes of video content will flow through the global network every second. A single individual would take five million years to watch the amount of videos at the limit of the network's transfer capacity.

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1 *As usual, we refer to the Library menu in our website for the bibliographic references used in this Report.*

- The average fixed broadband speed will reach 53 Mbps in 2021 (Cisco).
- Google receives 100 billion searches per month, or 38,000 per second.
- Statistics show that American high school students spend practically all their leisure time on so-called new media: 2¼ hours typing on their handsets, 2 hours on the internet, 1½ hours playing video games, and ½ an hour in video chats every day (Twenge, 2017).
- In Brazil, in a recent research among individuals of middle and upper-middle classes (*Classes A, B, C*), 100% of the sample owned a smartphone, and 74% of participants said they preferred to access the internet through their mobile device. The average time spent on mobile internet per day is 3:34hs (Media Report).
- Individuals spend at least five hours a week shopping online. The e-commerce industry is responsible for $2 trillion in sales globally. For every dollar spent in traditional retail, US$0.56 of it was influenced by some virtual interaction.
- Distance learning and online courses represented 30% of college entrants in the country in 2016. In traditional courses, computers and iPads invade the classrooms. In healthcare, the enormous amounts of available data have been increasingly used in the diagnostic process, either as an aid doctors' diagnoses or as an input to computer diagnoses. Clinical instruments give way to digital devices. Patients are monitored remotely and ostensibly.
- The adoption of already proven automation technologies has the potential to affect 1.2 billion jobs worldwide, or about $14.6 trillion in wages (McKinsey).

The world, as we know, is becoming frantically digital. The transformations are ubiquitous and profound. Changes in the daily lives of individuals reverberate into family life, professional relationships, and the social fabric. Urban transit is showing new configurations. The geography of cities is moving, bringing countless consequences for the transportation, fueling, commerce, and entertainment systems, interfering with secular real estate patterns, and touching unlikely areas, such as peak energy charging times in large cities.

Individuals are changing their habits and behaviors. There are those who go even further, suggesting changes in personality. In this reconfiguration of human identity, we are all now *"onlife"*. Brain imaging studies suggested that frequent internet users show double the activity of the prefrontal cortex, the region of the brain responsible for short-term memory and quick decisions (Small et al., 2009). Another study (Tatum et al., 2016) detected a "new and specific neurophysiological alteration" while individuals sent each other text messages. It is technology causing changes in the structure of our neural connections and in the biochemistry of our own brains, opening new paths in the field of neuroplasticity research.

Of course, all of these bring with them important repercussions on business' dynamics. Newspapers, book publishing, photographic films, video tapes, have all suffered hard blows. Entire industries were practically decimated, and others are attending the ICU. New corporate actors have emerged, displacing a pattern of secular dominance. Among the largest companies in market value are names such as Apple, Google, Amazon and Facebook, all under twenty years old. The combined market value of these four companies is equivalent to the GDP of the United Kingdom ($2.6 trillion). The speed with which these companies together have achieved their present boom is unprecedented in business history. A reorganization of entire industries, radically transforming the way wealth is created and distributed in society. Tectonic plates are shifting, we are witnessing a rare moment of important adjustments to the corporate competitive landscape. The diligent investor cannot shy away from facing this challenge of trying to better understand the nature of the technological phenomenon, running the risk of being suddenly and definitively dragged by a widening crack beneath his feet.

The basic premise of the fundamental investor is the conviction that the reality of a company can be reasonably understood if one has formed a specific qualification comprising analytical rigor, collective effort (in Dynamo's case), dedication, experience, critical thinking, humility, patience, unbiasedness and discernment. With this portfolio of attributes, the value investor believes that the analysis that centers around the company (bottom-up) offers a safer and more promising approach, by bringing the analyst closer to his or her research object or, from another angle, by attributing less relevance to macro-external circumstances, which depend on assumptions further away from his or her circle of competence, such as central bank decisions or the aggregate psychology of other investors.

A hypothesis underlying this construct is that companies have adequate resources and capacity to carry out internal projects that will potentially put them in the path of better future earnings. The more sophisticated the investor, in theory, the earlier he perceives these differences, and the greater his chances of anticipating the market[2].

The most emblematic image of competition in traditional industries – attributed to Warren Buffett – are the so-called moats. The leading companies are those that manage to establish obstacles (moats) that defend them from the competitive threats, and leave them resting absolute in their castles of overprices or sub-costs. The digital age brought about radical changes in the competitive landscape. Electromagnetic catapults project wall-crossing foes into the air. Tunnels of optical fibers give underground access to until now inviolable places. From supply to production, from logistics to strategy, everything has become achievable, leaving even the most entrenched incumbents vulnerable. The challenge for the long-term investor becomes obvious. It requires not only a deep understanding of these new military tools and their ballistic reach, but also a radical rereading of the internal competencies mentioned above, in order to discern the real chance companies have in adapting to this new competitive environment.

The task is inglorious for the investor because the great majority of companies do not know how to position themselves in this new digital reality: which priorities to define, which strategies to adopt, which resources to allocate to which initiatives, which talents to pursue, which assets to discard. Calibrating our research lenses to this new angle at this point becomes critical as it allows us to take the first steps in this decisive journey. As happens with newborns, much of what will be seen ahead – and what will not – is defined in these early stages. If it is true that technology will permeate all dimensions of companies' lives in the future, there's nothing more coherent for the long-term investor than to position himself right now at this privileged observation point.

We decided to spend some time looking more closely at the nature of these transformations. With the primary concern being preservation of capital, our investigative bias has been to look for potential threats to our investments. How, when and where can these new technology-driven business models lead to infiltrations in businesses in our portfolio? What skills and talents do companies need to develop internally to adapt to this new reality? As a natural consequence of this effort, in a more constructive though still embryonic way, we began to identify some apparently promising investment propositions in this universe.

Before we penetrate the business environment, we will to take a step back, in order to better understand the underlying phenomena that have brought us here. As with other themes we addressed in the past, we have again not been able to contain our fundamentalist veins, that is, the psychological bias of always wanting to investigate the root causes behind effects. Thus, once again, we suggest the following

2 *Here it is seen that an overly 'optimistic' market, dominated by the psychology of fads, or a market driven by liquidity flows, can disrupt the life of the fundamental investor. In this environment, opportunities are anticipated indiscriminately, without any analytical rigor, displacing value investors.*

script for this first technological trilogy[3]: in this more arid Report, we highlight some of the main advances in scientific knowledge that, transformed into devices, allowed this unprecedented invasion of technology in our lives[4]. In the following Report, we will leave the purely physical realm and turn to another element, of a diverse nature, that corresponds to the structural configuration of this universe of connectivity. It is the architecture and properties of networks. Finally, in the third Report, we describe the business model that synthesizes the virtues covered in the two previous narratives, namely, technology and connectivity. The so-called platforms.

The prodigy of digital modernism arises as something strange. Unlike other major technologies like the automobile that takes us everywhere, or the rocket that took us to the moon, the latest generations of smartphones have powers that are almost incomprehensible to its users. In Apollo 11, you could see the fire in the propulsion engine, in cars you can open the hood to get some idea about the mechanics of its gears. With digital technology, spectacular things happen yet we aren't able to see or understand their operation. The upgrades are daily, the innovations emerge all of a sudden. The digital floods our lives and we do not know its origin or destination. The more familiar the device, the more enigmatic it becomes.

The paradox can be explained. Although our natural reflection is to look for the hero myth, attributing technological advances exclusively to the creative merits of a particular innovator, the true root of this virtuous transformation lies in a secular conquest of the human spirit. A result of the cumulative effort of generations of thinkers, scientists, and researchers: the digital world we experience in awe today is, ultimately, the result of the domestication of quantum physics.

Major achievements in the evolution of technology in the last century have come from the advancement of human understanding about the atomic and subatomic realities. Behind each computer and smartphone, behind the optical fibers that carry connectivity everywhere, behind GPS navigation, or a simple MRI, are quantum-based devices such as microprocessors, lasers, and atomic clocks. In the last century, nothing has been more investigated, manipulated, and importunate than electrons in countless physical experiments. When electron pulses along cables could be controlled, computers started to become connected everywhere. With the control of the input and output of electron flows in capacitors, the memories of computers could be permanently read, recorded and retrieved. With instantaneous electron discharges in silicon, transistors could be switched on and off (Gilder 1989). From the understanding of its atomic properties, silicon became the crystalline, electric, and chemically inert medium that eventually allowed the large-scale production of integrated circuits and microprocessors. Semiconductivity is, therefore, a phenomenon of quantum mechanics. The advancement of electronics that brought us to our digital world was fundamentally brought by the manipulation of knowledge at the level of the structure of matter.

The quantum world is both fascinating and counterintuitive. Electrons are described as waves, and the waves described as probabilistic fields. By his Uncertainty Principle, Heisenberg declared the impossibility of specifying both the moment and location of electrons. Nevertheless, however contradictory it may seem, the undetermined becomes intelligible and capable of being manipulated. The behavior of quantum waves is incomparably more predictable than the waves in a bathtub, or the texture of shaving foam. And that precision of the atomic universe is what engenders the incredible efficiency of electronic objects as they become smaller. In this mysterious

3 *Given its nature, we believe we shall address the subject of technology from a variety of different angles in future opportunities. There are a multitude of technological developments that we will only gently touch on, if that, in this initial foray. Topics such as artificial intelligence, machine learning, augmented reality, internet of things, big data, among others.*

4 *Naturally, we have no pretension, no space, and mainly no capacity to narrate the scientific history of the technological advances that have brought us here. Our idea was to highlight some elements of this great mosaic, as an illustration and recognition of the legitimate foundations that underpin the new digital reality.*

reality, the tighter things are, the more space there seems to be. The smaller things are, the more efficient they get. The denser, faster, and more complex the electron flows, the lower the number of collisions, the fewer the defects, the lower the attrition. From the understanding of quantum realities, technology has moved in the direction of miniaturization. In 1971, the working memory (RAM), software storage, and central processing unit of a computer was bundled into the chip. Packing all of the processing on a tiny silicon chip has brought enormous cost and space savings. Reliability was also gained by eliminating countless wires, cables, and welds.

Already the first computers used a combination of electromechanical relays and diode tunnels, whose configurations depended on the ballistics of electrons, that is, it was already a device that involved quantum particles. The relays will end up having an important role in this story. In 1937, Claude Shannon demonstrated that Boolean algebra could be used for the design of relay circuits, inaugurating the era of modern computers. The use of the binary properties of electric keys to perform logical functions becomes the fundamental concept of any electronic computer architecture. The notions of "true" or "false", and of "one" or "zero", were represented as open or closed keys, and electronic logic gates began to be used to perform diverse functions such as making decisions, making calculations, and even creating language. The digitization of information was born.

The repercussions are unimaginable, radically transforming the potential of technology. Digital equipment are reprogrammable, that is, they perform numerous functions (such as calculating distances, finding positions, processing texts, editing videos, browsing the web, etc.) from the same physical basis. While in the analog world the data signals are linked to their respective equipment (text to books, photos to cameras, video to tapes), in the digital reality, signals are represented in binary, leading to the homogenization of all data. Audio, video, text, image, everything can be stored, transmitted, processed and arranged using the same devices and digital networks. Moreover, the data originating from different sources can be easily combined, generating new properties and dissolving the boundaries of the static concepts of products and services, and enabling reconfigurations of entire industries. That is the prerogative of digital technology: to be able to change the nature of objects by transforming them into components that are not limited to specific functions, giving them new attributes that transcend their material nature, which would later be called the internet of everything, or the internet of things.

Indeed, the representation of information as binary numbers confers unique characteristics to digital technologies. Instructions, tools, protocols, programming languages, and software are "simply" bits (binary digits), that is, immaterial objects. The same is true for the resulting "products" – email, web pages, chats, online shopping, etc. Devoid of physical limitations, they present practically zero marginal costs of production and distribution, which explains their expansion at dizzying speeds. We are in the universe of "exponential growth", with profound repercussions on companies' business environments[5].

In addition to the digitization of information, two other achievements were particularly impacting to the success trajectory of digital technology. The first was the extraordinary miniaturization of the computer – mentioned above –, captured in a notorious manner by Moore's Law. In 1965, before co-founding Intel, Gordon Moore published an article in *Electronics Magazine* claiming that the number of electronic components in an integrated circuit would double each year. Ten years later, Moore revisited his prognosis, adjusting the rate of growth to every two years. Subsequently, the average of the two periods was taken, making the now famous proposition that the number of transistors in a chip would double every eighteen months. An empirical estimate based on a small sample of only a few years of evidence would prove valid for (at least) the following 50 years, transforming an unassuming conjecture into one of the most spectacular predictions of technology and business. Such was its accuracy that it acquired the status

5 *We intend to deal precisely with these unfoldings in the next Reports.*

of "Law", as an upgrade, to make it analogous to the deterministic relations in the physics or mathematics universes. The power of compound exponential growth over such a long period has produced results that were unimaginable even for Moore himself, resulting in an unprecedented record of performance for the semiconductor industry.

Since the first Intel microprocessor in 1971, the 4004, until the latest generation of 14nm chips (nanometers, or 14 billionths of a meter), the performance of processors has increased 3.5 thousand times, their efficiency 90 thousand times, and their production costs have fallen by a factor of 60 thousand. Moore's Law enabled the establishment of entire industries, allowed for the success of giant companies such as Apple, Google and Facebook, and was, at the end of the day, responsible for the democratization of access to technology worldwide. It is estimated that about 40% of the global productivity gains of the last two decades derive from the advances in information and communication technologies resulting from the improvements in performance and cost in the microprocessing industry. A child today holds in his hands a computing power that would envy even the most cutting edge scientist a generation ago. A 1985 Nintendo video game station already possessed half the processing power that took man to the moon. An already "outdated" iPhone 5 contains billions of transistors possessing 2.7x the processing power of Cray-2, the super computer the size of a washing machine used by NASA for space simulations released on that same 1985.

There is a lot of discussion about how much longer Moore's Law can hold true. The joke today is that the number of experts who predict its end doubles every two years... Indeed, some suggest fundamental limitations for additional resizing of components, be they thermodynamic (heat generation and energy consumption), physical (size of electrons), chemical (properties of silicon) or even economic (required investments). Others suggest survival by recalling the possibility of new leaps in technological, as happened several times in the past, for example with multiprocessing or tri-gate design technology. There is talk of quantum computing or even the neuromorphic computer (which mimics the neural structure of the human brain). There is the possibility of travelling through the periodic table, replacing silicon with other elements (gallium, indium, arsenic) or other materials in the manufacturing of the components (graphite nanotube). It is said that today there are at least eighteen candidate ideas being monitored – none of which we are able to explain, or even enunciate in our home language, Portuguese (e.g. "bilayer pseudospin field-effect transistors" – Shankland, 2012).

The fact is that we may not even need many more years of Moore's Law. What has brought us up to here will not necessarily be what will carry us forward. If it is true that some technological trends, such as virtual reality, for example, will continue to require immense computational capacity, others will not. In the Internet of Things (IoT) universe, the number of connected devices scattered around every corner, as well as their price and basic functionality are more important elements than the size and speed of processors. Moore has already printed his fingerprints in the technology hall of fame, and his 'simple' conjecture about the pattern of change in the manufacturing process of one specific industry has proved capable of changing society's reality 50 years later. It is undoubtedly an important pillar of the digital world.

The second major achievement that has been a foundation on which digital society relies on, was the expansion of infrastructure for data traffic. The capacity of data transmission has also grown exponentially. In 1984, a modem could transmit 300bps (bits per second). Today, the average broadband speed in the United States is 25Mbps, representing an average growth rate of more than 40% per year. Data for IP traffic (IP is the main communication protocol of the internet) are even more abundant. According to Cisco, IP traffic in 1990 corresponded to 0.001 PB/month (petabytes, where 1 petabyte is $10^{15}$ bytes). In 2016, traffic reached 96,054 PB/month, or an average growth of 100%p.a. in the period. According to Cisco, global traffic in 2017 will be 1.4 ZB (zetabytes, $10^{21}$ bytes), larger than the traffic of the entire internet history from 1984 to 2012 (1.2 ZB).

In this field, we also had a visionary, his prediction, and a "Law". George Gilder was the main enthusiast of the power of instant communication and infinite bandwidth. A prolific and controversial writer, his works on economics show a libertarian tendency that would have influenced *reaganomics* in the 80's. When it comes to his views on technology, what stands out is a sharp visionary vein. In 1990, for example, Gilder wrote that the computer of the future would be as portable as a watch, as personal as a wallet, and able to recognize voice commands and navigate streets. He believed, however, that the power of transformation of optical fibers would outweigh that of chips, because communication, by interweaving individuals, families, businesses, and ultimately the world, is more essential to humanity than computing.

In 2000, Gilder claimed that combining optical fiber technology with wireless networks would enable universal and instant communication at almost zero marginal cost, postulating that the capacity of digital traffic infrastructure would grow three times faster than processing power (Gilder's Law). That is, if the processing power doubles every eighteen months (by Moore's Law), the power of communication would double every six months. Gilder was right about the direction, although he exaggerated the intensity. From the data above, reality has been half slower and traffic has doubled "only" every year, on average. Still, the effects were extraordinary. The infrastructure in 1990 allowed for the transmission equivalent of 3,000 DVDs per year, assuming a standard two-hour movie. By 2016, we would have enough equivalent capacity for 262 billion DVDs per year.

Analogous to processing costs, traffic costs have also fallen dramatically over time. In the period of 1998 to 2016, the drop in global prices per transmitted unit was to the order of 35%p.a., falling from US$1.2 thousand per Mbps and reaching US$0.63 per Mbps. The coevolution of the processor and optical fiber technologies has transformed the lives of people and the landscape of the planet. Curiously, the dynamics of the two isolated industries brought important lessons for investors. Both markets showed very high demand elasticities and required heavy upfront investments to secure a technological advantage. However, the fate of the two industries was quite distinct.

Chip makers were able to lock in their competitive advantages in innovation and translate market growth into earnings. Telecom companies, on the other hand, were astray. Predatory competition took place and spectrum auctions became a *winner's curse*. The benefits of market growth have flowed through to consumers. In the period between 2001 and 2004 alone, 216 telecommunications companies filed for bankruptcy in the United States. Gilder himself did not know how to separate his talents as an analyst from those as an investor. Due to his enthusiasm, he both invested in and recommended investments in the telcos.

The parallel histories of these two industries, with synchronized timings of growth, both winners in the Darwinian competition among technology frontiers, and joint protagonists of important transformations in consumer behavior, yet with bifurcated results for investors, invite us to reflect. They recall the fundamental lesson that the nature of investing requires extreme scrutiny in one's analogies. Our natural inclination to identify patterns and similarities, even if supposedly sophisticated, can turn into a fatal trap. The investment game is played on a different plane, with specific rules

*Dynamo Cougar x IBX x Ibovespa*
*Performance up to November 2017 (in R$)*

| Period | Dynamo Cougar | IBX | Ibovespa |
|---|---|---|---|
| 60 months | 86.2% | 35.2% | 18.1% |
| 36 months | 64.5% | 43.6% | 43.9% |
| 24 months | 45.0% | 57.7% | 59.5% |
| 12 months | 22.9% | 16.9% | 16.3% |
| Year to date | 22.7% | 19.9% | 19.5% |

*NAV/Share on Novenber 31* = R$ 751.0466257

## DYNAMO COUGAR x IBOVESPA
*(Performance – Percentage Change in US$ dollars)*

| Period | DYNAMO COUGAR* Year | DYNAMO COUGAR* Since Sep 1, 1993 | IBOVESPA** Year | IBOVESPA** Since Sep 1, 1993 |
|---|---|---|---|---|
| 1993 | 38.8% | 38.8% | 7.7% | 7.7% |
| 1994 | 245.6% | 379.5% | 62.6% | 75.1% |
| 1995 | -3.6% | 362.2% | -14.0% | 50.5% |
| 1996 | 53.6% | 609.8% | 53.2% | 130.6% |
| 1997 | -6.2% | 565.5% | 34.7% | 210.6% |
| 1998 | -19.1% | 438.1% | -38.5% | 91.0% |
| 1999 | 104.6% | 1,001.2% | 70.2% | 224.9% |
| 2000 | 3.0% | 1,034.5% | -18.3% | 165.4% |
| 2001 | -6.4% | 962.4% | -25.0% | 99.0% |
| 2002 | -7.9% | 878.9% | -45.5% | 8.5% |
| 2003 | 93.9% | 1,798.5% | 141.3% | 161.8% |
| 2004 | 64.4% | 3,020.2% | 28.2% | 235.7% |
| 2005 | 41.2% | 4,305.5% | 44.8% | 386.1% |
| 2006 | 49.8% | 6,498.3% | 45.5% | 607.5% |
| 2007 | 59.7% | 10,436.6% | 73.4% | 1,126.8% |
| 2008 | -47.1% | 5,470.1% | -55.4% | 446.5% |
| 2009 | 143.7% | 13,472.6% | 145.2% | 1,239.9% |
| 2010 | 28.1% | 17,282.0% | 5.6% | 1,331.8% |
| 2011 | -4.4% | 16,514.5% | -27.3% | 929.1% |
| 2012 | 14.0% | 18,844.6% | -1.4% | 914.5% |
| 2013 | -7.3% | 17,456.8% | -26.3% | 647.9% |
| 2014 | -6.0% | 16,401.5% | -14.4% | 540.4% |
| 2015 | -23.3% | 12,560.8% | -41.0% | 277.6% |
| 2016 | 42.4% | 17,926.4% | 66.5% | 528.6% |

| 2017 | DYNAMO COUGAR* Month | DYNAMO COUGAR* Year | IBOVESPA** Month | IBOVESPA** Year |
|---|---|---|---|---|
| JAN | 10.2% | 10.2% | 11.9% | 11.9% |
| FEV | 3.9% | 14.5% | 4.0% | 16.4% |
| MAR | -2.1% | 12.0% | -4.6% | 11.0% |
| ABR | 1.0% | 13.2% | -0.3% | 10.7% |
| MAI | -1.3% | 11.8% | -5.5% | 4.6% |
| JUN | -1.3% | 10.3% | -1.7% | 2.9% |
| JUL | 9.3% | 20.5% | 10.7% | 13.9% |
| AGO | 3.5% | 24.7% | 6.9% | 21.8% |
| SET | 3.2% | 28.7% | 4.2% | 26.9% |
| OUT | -5.4% | 21.8% | -3.3% | 22.7% |
| NOV | 0.7% | 22.6% | -2.7% | 19.4% |

Average Net Asset Value for Dynamo Cougar
(Last 12 months): R$ 2,935,522,360

*(*) The Dynamo Cougar Fund figures are audited by Price Waterhouse and Coopers and returns net of all costs and fees, except for Adjustment of Performance Fee, if due. (**) Ibovespa closing.*

and dynamics of its own. The trouble is that learning is usually only achieved through playing. Therefore experience is usually welcome in the field.

Moore and Gilder are not scientists, but they had the rare ability to understand early and definitive technological trends, as well as the privileged ability to synthesize them into simple and relevant conjectures. Predicting the direction and intensity of technological phenomena is a task so arduous that the success of these two lasting forecasts more than justifies the distinction that the two "prophets" have achieved.

The faculty of transforming information into bits, into fully reprogrammable and immaterial elements, capable of being manipulated, coupled with the incredible progress of processing power with the microchip, and the ability to transmit and communicate with optical fibers, were the 'physical' elements we identified as the main protagonists of this admirable digital trajectory. We now interrupt our narrative out of respect for our reader's time. In the next Report, we will add another ingredient, of a diverse nature, but equally fundamental in understanding the dynamics of this new digital reality.

*Rio de Janeiro, December 27, 2017.*

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