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# THE BIOHACKING MOVEMENT BY THE GLOBAL CROWDSOURCING AND DECENTRALIZATION IN THE NEW ECONOMY

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**ABSTRACT:** The sampling on a new drug it requires thousands of analytical tests, however, most run into ethics, regulations and bureaucracies. The hacker movement in computing also progresses, e.g. in the exponential movement biohacking, bringing new methods, informational and objective with high-level present potential. This is about an advanced and innovative movement around the world, contemplating the science and technology, with some involved keywords: biohacking, biotechnology, cyberpunk, decentralization, DIY, dystopia technologies with new mores, nanotechnology and higher science. Some initial questions are already being raised, as: *What Would Be the Best "Hello World" for Biosciences? Generating A Method for Biohacking*. Publicly exposed by (Lima, 2017:24) in some hacker's environments.

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## Introdução

**I**N a world increasingly with open and focused information, and with collaborative and networked systems, processes and methods, decentralization along with DIY do it yourself, came to contri-

bute and add more and more scientific progress. This has opened an innovative route for researchers, individuals and scientists linked to institutions to act independently. In addition to offering boundless chances for enthusiasts like biohackers. There are several new processes, methods, low-cost devices, software, high-quality applied research biosystems. In addition to binaural sequencers, with compact technology in a desktop model, workflow proofing, crowdsourcing technologies new matrix and arrangements. Together with this arsenal of new possibilities, scientists, researchers and large companies have a new possibilities route as high incentive in all history. Top searches have been carried out in hard War times and in record times. But, nowadays, it is not only the technological complexity that has been enlarged but mainly the bureaucracy, the excess of regulation and excessive oversight that has plastered the whole process. As we can see in Thomas Hager works, e.g. *The Demon Under Microscope* from 2008. The research followed its own rhythm without massive external interference.

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Nowadays, besides the complexity new sciences expanded enormously, with excessive complexity in an infinite matrix. Before this critical point, what we have nowadays is the search for alternatives. And the biohacking movement presents itself as an exemplary and unlimited opportunity for anyone who can use this new route to leverage *science by science* in technologies without limits.

## 1 Discussion

This article aims to bring to the knowledge the alternative to overcome the excess of regulations, bureaucracies and the persecution of ethics committees that delay the development in bioscience nowadays. Contemplating cutting-edge science along the common underworlds in cities, such as street and virtual movements, including the cyberpunk and biohacking ideology. An analysis, through a concise logical mathematical vision of disciplines that intertwine in a complex matrix in the world economic scenario. Considering this underworld, cyberpunk movement, biohacking and biohacking, these as an alternative and route for the formal surveys for accelerating the actual production and yield. This movement opens an alternative route, to include in this complex system real actions in the new alternative researches matrix. This complex scenario, involving hundreds of variables, incorporates a new matrix in the scientific environment including new agents in the high new cutting-edge technology. With ample interlaced content, generating logical chains linking classical science with new technologies. Following in the footsteps of traditional hackers, biohackers could be a bridge to the rapid advancement of research by large corporations and researchers in general. Against impositions, ethics committees, regulations and bureaucracies. An innovative route and infinite possibilities for the accelerated progress of research and new advances. To generate innovations in higher potential, as a biologic technology or independent decentralized machine, IoT Internet of things in machines and others high technologies. Against all controls, centralizations and regulations apparatus that are inconsistent with dynamics of new technologies.

## 2 Overview

The classical hacking movement over the years has been perfecting, had its heyday during the popularization of computer science, however, this movement along the time, has centred on corporations

and a large part in the clutches of the states, being largely centralized was corrupted, as it is said in the core. But a large non-centralized part, the so-called original movement, migrated predominantly to the deep-web, and in this environment, it is free from contact with regulations, states, and corporations. However, still largely in the virtual environment, however, a large mass of these hackers is being incorporating at its core the classic sciences such as biology, physics, chemistry and too nanoscience. With this new reach are emerging so-called biohackers and nanohackers who are enthusiasts using logic at the cutting-edge science to generate the new and high level of innovations, as e.g. performing in vivo tests on humans as a kind of bypass against excessive bureaucracy, regulations and ethics.

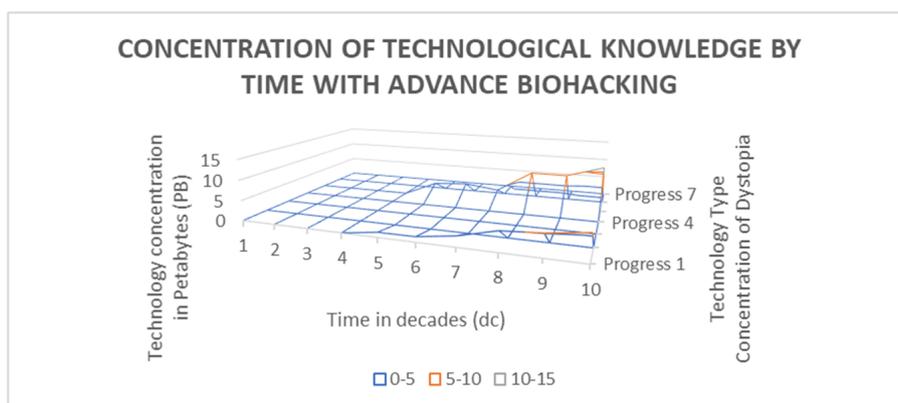
## 3 General Notes

The objective of this basic discussion is to bring the biohacking movement to a new level, besides collaborating with its popularization. As noted earlier, e.g. the Star Trek series was a source of inspiration for many technological innovations. Pictures of dystopian science fiction and several works that have escaped common sense. Including too music arts, e.g. books and music as Megadeth dystopia album paper scientific fictions, in which it presents in its lyrics a clear image of dystopic future coming. Hackers are a clear example of what it is to be outside the bureaucratic imposed rules and the world considered normal. The hackers in the pure sense of the term are pioneers of innovations. However, many of today's technologies are the result of a community of individuals who have worked hard to initiate small, unexplored changes on rooms and garages or with simple places and actions. Actually, much science that was done only in complex and expensive laboratories due to the technological barriers or the bureaucracy, but with new, the modern global trade, new sources of distribution, globally integrated logistics chain, the costs of complex experiments have greatly reduced. With the reduced costs, less bureaucracy, and feasibility with high-level equipment such as microscopes, cryogenic nanoscopes, low-cost imaging devices, automated DNA sequencers and many others low-cost analytical equipment. In addition to the Internet with the possibility in integrated communities, forums and chats on time, are examples of how much the complex has become possible and feasible. In this thinking bias, it is considered that hackers now

have the vanguard possibility to add to their functions new and innovative applications. By joining their expertise with the traditional sciences. From this point of view, we can imagine the reach of a global biohacking community specializing in plant biology, from basic prospecting to modifications in genes with complex genetic editing increasingly cheaper, alternative methods and innovations without restrictions. What would prevent a hacker group from sequencing a vegetable species, and in open source, to work on this, just to cite an

example? There is already a monumental volume of knowledge generated and possible cutting-edge technologies and new completely. Also, the issue now with decentralization lies in the result of more people thinking around the world questioning the same matters, and with that, more concentration and practical knowledge applications.

Take a look in study 1 – a view about the estimated concentration of knowledge along the time, through decentralization.



Study 1. The concentration of knowledge over time, based on the compression of new technology with the increase of dystopia and technological scientific advance

#### 4 New Perspectives for the Growing Decentralized Economy

The hacker culture is a creative generation as a potential generate new methods as scientific and technological a movement above all else, but with a detail that gives you uncommon power that is in the creativity and liberty in actions. What would be of the hackers without the creativity and the high analytical capacity? We have more to learn from hackers than from traditional science modes in some cases, e.g., the René Descartes in Discourse on the Method is a good case of high level in scientific methods, increasing and adding with the hackers the logic and high creativity. Nonetheless, we may dare to include the traditional sciences, beyond the current scope of computer science, engineering and to adding or enhancing biosciences, such as genetic engineering, and nanoscience for the biohackers actions. Resulting in a high concentration of knowledge for analytical concepts along the time, getting a real form,

towards the dystopia and high cutting-edge technologies.

#### 5 The Cyberpunk and the Gothic Movement as Inspiration Sources

The hacker movement by incorporating classical sciences into its studies and actions gains an unprecedented array of action. This will form a highly complex thread of unprecedented applications in biohacking movement. To have a base of all this the pictures culture and others presents us some models, as by the cyberpunk vision of the world, adding hacker culture and classical sciences in a higher dystopia environment futuristic world, involving details from high secret diplomacy to suburban environments. All this generating unexpected results that we could not even dare describe here. From medical applications to complex innovations, chained to high-level logic, but not in the virtual world, but in our concrete world. The biohacking culture will englobe itself with bioscience made before only in high-level labs. Take

note that the term cyberpunk is a term linked to cybernetics linked to the punk movement, something like cyber and anarchism, but with high-level of organizations. Being considered also a subgenre of science fiction, that contemplates the low quality of life next to the high technology. It is a blend of advanced science with high design, a matrix culture of high information with cybernetics. In this scope is inserted high concentration of disruption of common thoughts, disintegration and radical change in some values and social order, according to the (Hassler M.Donald, 2008:14) work.

In cinema, there is a great appreciation of this culture, in which the characters are always futuristic, mostly marginalized, something like the reality presents itself many times, with lonely people, distanced from a full life, and always living on the margins of a society that is judged highly correct. The cinema and various works, from books

to serials, explore this very well. Almost always in a future of dystopia, in which everything changes rapidly due to a ubiquitous high technology. Everything happening in an atmosphere with an excess and absurd amount concentration of information. Many of these works, such as films, are shown in Table 1 below.

This culture of cyberpunk requires a lot of logic and math chain rules in events that occur at the same time. And in the face of all this, there is still the important change in the human body, which often occurs in these settings, including the culture with tattoos, even various bioimplants, changes in the futuristic bodies, from chip implants to the technological device's inclusion, something like transhumanism culture. These invasive and evasive changes are commonly seen in cyberpunk and disrupter culture. Look at the list of cultural works and pictures in table 1:

Table 1. Fiction and Cyberpunk Movies – Attention for subject involving future of dystopia.  
The list of films presented is a reference to the world that is been building.

#### **Fictional Cyberpunk Movies – The Future and the Dystopia Under Construction**

District 9, 2009 - A Scanner Darkly, 2006 - Papurika, 2006 – Ghost in the Shell 2: Innocence, 2004 – Metropolis, 1925,2001 – Kaubôï bibappu: Tengoku no tobira, 2001 – The Matrix, 1999 – Pi, 1998 – Dark City, 1998 - End of Evangelion, 1997 – Twelve Monkeys, 1996 – Kôkaku Kidôtai, 1995 – Strange Days, 1995 – The terminator, 1991 – Tetsuo, 1989 – Akira, 1988 – RoboCop, 1987 – Brazil, 1985 – Videodrome, 1983 – Blade Runner, 1982 – Alien, 1979 – THX 1138, 1971 – La Jetée, 1962

In addition to these cinematographic works, the printed literature contributes immensely. Many of today's technologies were first idealized in works of fiction, e.g. StarTreck. And the traditional post-hacker, the one that only operated digitally, will have a new step in its progress. We can summarize the biohacking movement as the practice of unifying biology with the movement ethical hacker. However, there is much more in this movement, with a strong capacity of cutting-edge technology generations. The dystopia future and cyberpunk are a strong example for biohacking world, where we can remember a sentence by William Gibson: “*Before you diagnose yourself with depression or low self-esteem, first make sure that you are not, in fact, just surrounded by assholes*”.

## **6 The Biosciences Progress Meeting with the Great Technological Matrix**

The curiosity about the functioning of living beings and plants is enormous. An example

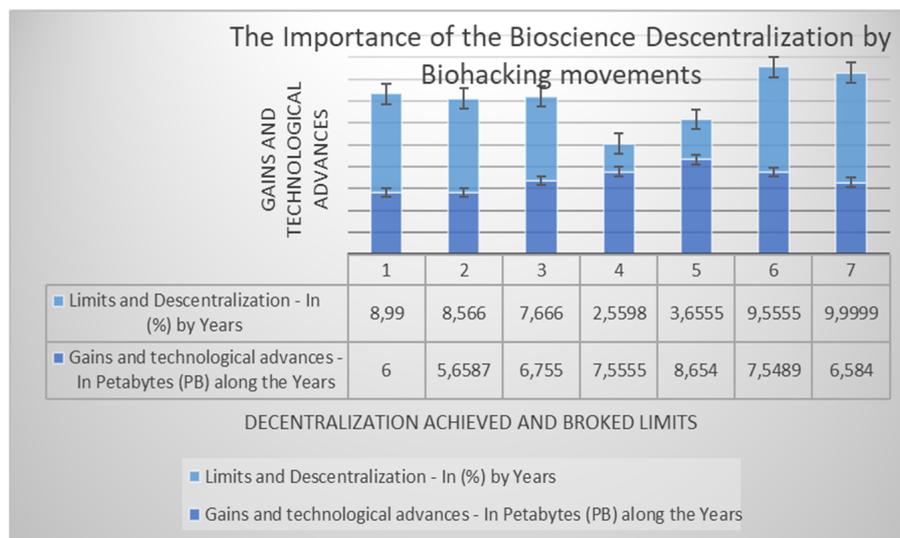
would be William Harvey who conducted research on blood circulation. At present, apparently something obvious, but the reason for blood circulation was not at all clear, around 1530. Thus, although Harvey understood the mechanics of circulation, it was not yet clear why and the reason for that, so then he postulated for the next researchers. "How many things are accepted in physiology, pathology, and therapy from which we do not know the causes, though we have no doubt as to their reason?" William Harvey. In this note, he referred to the understanding of the reason for the circulation of blood, and today we know that it is the form nature use for organisms to carry oxygenation to the tissues, nutrition, to carry out the cleaning of debris, antibodies and other particles using fluids as transport. Since Gregor Mendel with his dealings with plants, making crosses between peas of two colours, inducing the darker colouration, over time the offspring would appear in both colours, something like the dominance of some genes over others. Although this understanding has only become clearer with the discovery of DNA, around 1950's by Maurice Wilkins and Rosalind Franklin. By 1985, plans for complete DNA

sequencing began. But it officially started in 1990 and ended in 2001. Since then, there has been a race to understand the functions of each gene and its interrelationships. During the last decades, these investigations have created various methodologies, techniques and technologies, such as automated sequencers, mass-based comparison and mass-processing software, and biochemical reactions technologies. Techniques such as PCR, sequencing, recombinant DNA technique, antibodies used in therapies, enzymatic fermentation processes, better comprehension on nitrogen fixation in plants, tissue culture, biological extraction, insemination, DNA and other more modern techniques such as the famous CRISPR methodology. At present, all this concentration of knowledge is condensing and passing through filters, for real applications, in which although the CRISPR methodology is promising, it does not rule out the old techniques but used in innovative ways. There are several techniques that are under study, although the focus is on the fight against diseases and cancer, this does not rule out new technologies. As an example, in tissue engineering, organ production and even, in an even bolder attempt in the future a possible artificial life, even if it is a microbe, mounted by the man hands. The question is whether this would be possible if no we even know exactly what life is, for a possible artificial life. In short, we are still in that situation as earlier postulated by William Havey about understanding the reason for blood circulation. Actually, reach some technology for artificial life, manipulating iPSCs or other technology sure will increase the science level. Although we have understood the blood circulation its mechanics clearer in our days, the life sciences, now with this new possibility of decentralization, with biohackers, will have more people thinking about the subject, and this brings more knowledge, including in old know consolidated things. Although there are people against this new world, we cannot deny the contribution of hackers in computing that we have today. And it will not be different with biology, it will only be necessary to popularize the basic tools and allocate all this science in the *laissez-faire* to promoting more freedom.

## 7 Evidences

From the beginning of the creation of works of science, fiction humanity began to disregard their physical limits and to consider the infinite within scientific academic concepts, for a final frontier.

The works of filmmaker Terry Gilliam are a milestone to the hacker progress and innovations. Where we concluded that the movement biohacking and DIY joined the traditional sciences will have a long development path and opportunities. In all fields, but especially in biology and medicine together with nanosciences. The conclusion we reached in this study is that with the knowledge generated by the joint creativity, and with the new tools that we have nowadays. With the high decentralization, complex, expensive procedures, new methods and cheapest tools, in many cases already can be realized outside the academies also in large scientific production centres. Tools such as fast and low cost, including PCR, CRISPR, in addition to the outsourcing texts, characterization, complex and practical methods. Also, some alternatives low-cost bioreactors, gas operation, general low-cost equipment's, biological gases, new innovative methods, and various methods and operations with processes with nanoscience. We still must consider the increasing possibility of complex and high-risk operations that can be outsourced to specialized laboratories. What transforms any company, individual and ideas that can be professionalized and have a great development, decentralized and outside the major research centres. It is a unique revolution that we are witnessing and growing every year, as showed in study 2 as follows.



Study 2. The importance of the decentralization in construction of dystopic world

On the data in Study 2, we can verify that it was based on a study with the high data concentration in the scientific survey, to prove the importance and progress that the increasing decentralization of science and new economics will bring in the coming years. Especially for the progress of the dystopic futuristic world in increasing high developments bringing by biohackers and other decentralized cutting-edge movements. It was demonstrated in the study II using the method used was based on the concentration of pieces of knowledge, estimated in volume new high-level bioinformation's, for that was used the international system of units, in Petabytes, 10-15 bytes volume. Based on growing cross-knowledge with greater freedom, and decentralization for years. This indicates a fertile field to be exploited by the new professions and especially by the biohackers who will be the forerunners in this field.

## Final Concepts

In a world with more and more open information, and with collaborative network systems, crowd-sourcing, new processes, methods and increasing decentralization, new opportunities are open. The culture of biohacking with DIY do it yourself, it is a means of overcoming the difficulties imposed by the centralized means, offering new routes. Dodging high centralization, high costs, expensive and difficult access tools, as well as the possibility of outsourcing risky or complex activities, opens the way for biohackers as historical frontier precursors.

Included in all new compact technologies for easy access to expensive and complex now available. All this opened an innovative route for individuals and scientists not linked to institutions, for act independently and with higher individual freedom. This new action of these enthusiasts such as biohackers may seem somewhat amateur at first as were the hackers. However, there is in this new variable the way for the great ones to advance their projects. In science doing everything within the norms, regulations, committees of ethics are something costly and paralysing. The biohacking is already a major new scenario for the development of science, R & D into the continuous progress of biosciences. The new variables are not popping up just to dodge this costly path. The progress that is underway and is immense, for the unprecedented benefit and progress of science.

“In a dystopian futuristic scenario, a possible patent for a tyrannical state on a very particular mechanism of human DNA will only be fought with a strong barrier against these attacks against humanity by biohackers who as in fiction may be the new heroes”.

## Bibliography

- Charisius, H. (2003). *Biohacking – Gentechnik aus der Garage* (pp. 18-19).
- Christofferson, T. & D'Agostino, D. (2017). *Triping Over the Truth: How the Metabolic The-*

- ory of Cancer Is Overturning One of Medicine's Most Entrenched Paradigms* (pp. 36-37).
- Faguet, J.-P. & Pöschl, C. (2015). Is Decentralization Good for Development?. *Oxford*, 2: 37-47.
- Gibson, W. (1984). *Neuromancer*. cinematographic reference.
- Haley, W. (1628). *On the motion of the heart and blood in animals* (pp. 60-61).
- Hammer, G. D.; McPhee, S. J.; *et.al* (2016). Pathophysiology of Disease: An Introduction to Clinical Medicine. *Lange*, 4: 11-26.
- Hassler, M. D. (2008). New Boundaries in Political Science Fiction. *University of South Carolina Press*, 3: 10-16.
- Lima, E. G. de (2015). Biohacking & Nanohacking (pp. 30-32). Rio de Janeiro: Ed. Ag. Book.
- Luiz, A.; *et. al.* (2002). *Lógica de programação – A construção de algoritmos e estrutura de dados*, 3: 12-36.
- Welsh, J. (2017). Tor – Tor and the Deep Web – A guide to become anonymous online, conceal your I.P. address. *Block NSA spying and jack*, 2: 40-60.
- Wertheim, H. F. L.; Horby, P. & Woodall, J. P. (2012). *Atlas of Human Infectious Diseases*. Wiley: 3-4.