SYNTHETIC BIOLOGY: KNOWLEDGE ACCESSED BY EVERYONE (OPEN SOURCES)

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ABSTRACT

Using the principles of biology, along with engineering and with the help of computer, scientists manage to copy. DNA sequences from nature and use them to create new organisms. DNA is created through engineering and computer science managing to create life inside a laboratory. We cannot dismiss the role that synthetic biology could lead in solving the most pressing problems of humanity. We are using technology to control live organisms and use them as we wish. But how should that knowledge be accessed? And which way is the best way so everyone can benefit from this technology and its developments? Open sources software could be the answer.

KEYWORDS

Synthetic Biology; Intellectual Property; Open Source

1. INTRODUCTION

Now days the human being can travel to the space, read genetic information about DNA and create new live organism inside a laboratory. Yes, the human being is capable of creating life inside a laboratory. Perhaps the times described in the work of Mary Shelley's Frankenstein of 1818 where Victor Frankenstein created life in a laboratory have come true. Synthetic biology is the responsible for this.

Using the principles of biology, along with engineering and with the help of a computer, scientists manage to copy DNA sequences from nature and use them to create new organisms. DNA is created through engineering and computer science managing to create life inside a laboratory. We cannot dismiss the role that synthetic biology could lead in solving the most pressing problems of humanity. We are using technology to control live organisms and use them as we wish. But how should that knowledge be accessed? And which way is the best way to access them so everyone can benefit from this technology and its developments?

2. BODY OF PAPER

Synthetic biology "broadly refers to the use of computer-assisted, biological engineering to design and construct new synthetic biological parts, devices and systems that do not exist in nature and the redesign of existing biological organisms, particularly from modular parts" (Internationl Civil Society Working Group on Synthetic Biology, 2011). In simple terms synthetic biology is an interdisciplinary subject that is used to make DNA from scratch to create live organisms. Synthetic biology promises to "design and build brand-new biological systems to eradicate deadly diseases, manufacture better material and reduce reliance on nonrenewable resources" (Draxler, 2013). Synthetic biology is a very important theme of rapidly growing industrial interest that involves science and technology.

So now we are already creating it. How should it be protected and regulated? Organisms created by synthetic biology are organisms that can probably reproduce naturally without there being human will. The products of synthetic biology are very complex; they should not be treated as a mere and simple invention. It is uncertain on what these organisms can be converted to and whether they represent a contingency for human health or the environment. Despite this, as of today there has not been developed an ad hoc figure that provides the necessary protection and care for a product created by synthetic biology.

Products created by synthetic biology are protected by intellectual property. Two main models of intellectual property are used to protect synthetic biology components, organisms and products: patents and open source software (Calvert, 2012). On the one hand, synthetic biology can be patent just by meeting the simple requirements set by the country-specific legislation. There is a universal agreement among nations that patents should not include abstract ideas, laws of nature, physical phenomena and products of nature. Usually the country-specific also asks for these requirements to be met: novelty, usefulness and non-obviousness. If a product created by synthetic biology fulfills these requirements is patentable. So we can expect that every product created under synthetic biology will be patent just by the mere fact of being created by synthetic biology. A product of synthetic biology is something new that will not be founded in nature, will be something that is not obvious and will have a specific use for which it was created.

The patent "confers on a patentee power to exclude all other from making, using or selling his invention (Baxter, 1966). But this patent can become a monopoly. And if it constitutes a monopoly it will bring "insufficient disclosure of the invention; lack of use or inadequate use of the patented invention; and abusive practices in licensing agreements" (Roffe, 1974). Such a complex and promissory subject as it is synthetic biology cannot afford to have those issues.

On the other hand, open source "describes a set of rules and practices for defining a community of developers through which information is freely disclosed and distributed" (Anderson & Oderkirk, 2005). Open source software are computer software in which the copyright holder provides its rights to everyone and must permit non-exclusive commercial exploitation, must make available the work's source code and, must allowed that its work be developed (St. Laurent, 2004).

As we have explained patents might not been the right mechanism to protect the products of synthetic biology. The patent may be restricting the innovation and knowledge from others. Faced with the challenges we've seen raised by synthetic biology we needed to analyze whether it is necessary to flex the use of patents through the use of open sources (Conde, 2012). These open codes allow you to use a "patent" invention without any obligation to pay for the use of the invention, as long as the outcome of the investigation for which the "patented" invention is used is published in open sources.

Authors like Kumar Rai and Henkel and Maurer have studied this mechanism and believe it would be very useful for synthetic biology as it seeks to exchange different inventions based on the use of synthetic biology with the goal of creating interchangeable and regularized genetic parts (Rai & Boyle, 2006). A model of intellectual property based on open-source software may lead to greater innovation, transparency, and openness (Calvert 2012).

However, implementation of patents and open source software are not an easy task. These intellectual property models for synthetic biology could have a variety of impacts on biodiversity. Convention on Biological Diversity identifies "new and emerging issues relating to the conservation and sustainable use of biodiversity" (CBD Technical Series No. 82, 2015). So under this premise it is that we should analyze the possibility of protecting the products of synthetic biology under open sources.

The Convention on Biological Diversity aims for "fair and equitable sharing of benefits arising out of the utilization of genetic resources" (Lehman, 2008). From here the need to find a mechanism that works like a link between the Convention and intellectual property rights in order to ensure transfer of knowledge. There is a need to research this field in order to achieve and to analyze the access to genetic resources and sharing of benefits of synthetic biology in light of intellectual property.

Following this path is that the first problem arises. The right of access to genetic resources and sharing of benefits often combines with the intellectual property rights to use patents, but these patents can represent a barrier to access new technologies created under synthetic biology. This is where we presented the eternal disagreement between those who argue on one hand, that patents are an obstacle to the right of access to genetic resources and on the other side, those who believe that patents are intended to encourage innovation in the development of new technologies (Andermariam, 2007).

Companies now days rather that contributing to knowledge in synthetic biology are restricting it by patenting their findings. In a subject as complex as synthetic biology and were one DNA-sequence must be needed in order to help other scientists develop their research, knowledge cannot be restricted. Scientists should work together in an open mechanism to share genetic information that can help resolve the most pressing problems of humanity.

Synthetic biology represents a challenge to the intellectual regimes that exist today. They represent a challenge for three things: (1) the organisms in synthetic biology evolve, (2) the traditional relationship between the product and the risk of synthetic biology are not the same as a normal product and (3) the

regulatory approach of conventional existing laws on the final product of chemicals in the case of synthetic biology tends to be very poor to regulate a technology that produces new organisms with its own risks (Mendel & Marchant, 2014).

So you cannot expect the regulatory system that we have today in intellectual property to regulate synthetic biology correctly. In fact, it is believed that in United States the legislation that exists today is not able to fully adapt to what is synthetic biology (Rai & Boyle, 2006). So we can expect the same thing happens in the entire world on matters of intellectual property, since there have not been any world-legislation on intellectual property that regulate synthetic biology.

3. CONCLUSION

So, how should knowledge in synthetic biology be accessed? And which way is the best way to access it so everyone can benefit from that technology and its developments? Open sources are a promising way that can answer our questions in matters of intellectual property.

In a world were everything is changing very quickly and were man wants to control everything including life itself, something as important as what synthetic biology may imply needs to be regulated. Or at least may have a specific way designed to be followed. Open sources should be established as a specific and regulated way to benefit from the knowledge provided by synthetic biology. If doing so, everyone will be able to access knowledge in a transparent way. And everyone will be able to benefit from it and continue developing the discoveries founded under this field.

For some, open sources may be a limitation because they will not be able to profit from it. But something as important as life itself should not be a matter of profit. And that is what synthetic biology is about, creating life and managing the fundamentals of the human being.

Open sources should be applied in all fields of synthetic biology; by doing so it would enable research to develop more rapidly by putting in dispocition of everyone knowledge.

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