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INTELLECTUAL PROPERTY PROTECTION IN 3D COPYING

Summary: *The paper will point out the importance of intellectual property in modern business, as well as the challenges facing 3D printig technology in relation to the protection of intellectual property, which is damaged by this printing or copying. The paper will provide an overview of scientific knowledge of other authors from the aspect of intellectual property protection in 3D copying. The aim of this paper is to point out the need for greater coverage of legislation. The contribution of the work is reflected in the fact that changes in the legislation would reduce the number of criminal acts in this area.*

Key words: *3D printing technology, 3D copying, intellectual property, business, management*

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INTRODUCTION

The problems of intellectual property protection in the use of 3D printing technology for the production of physical objects are becoming more pronounced as this technology comes into use and gains more and more significant foothold and popularity. The application of this technology will have increasingly significant implications for manufacturers and users of 3D printed products in term of the legal issues related to the emerging opportunities that this technology solves is not only solved but almost unknown both in the market and among those who should solve it. It is not necessary to look far into the past and see that similar problems and dilemmas appeared twenty-thirty years ago, when with the advent of information technologies and later the Internet, the possibility of misuse of digital information and files came to the public's attention for the first time. After almost a decade of unregulated and rather unfair relations in the IT industry, it was not until the end of 1998 year that the first significant document regulating intellectual property protection and rights - the DMCA - digital millennium copyright act. This law, which has been amended several times, has been the starting point for many legislations to regulate business and protect intellectual property, as well as trade in copies of digital files, which were the basis of the intangible economy and control, and advances in technology have become the basis of management and control of every form of material production. The apperance of 3D printing technology combined with 3D and 4-D scanning techniques allows today to copy the physical reality and even any protected or unprotected design or finished product, thus posing to legal experts the problems of intellectual property protection.

1. REVOLUTION OF 3D PRINTING TECHNOLOGY

The following can be stated by researching the protection of intellectual property in terms of the scope of 3D printing technology (Bradshawand and Bowyer and Haufe 2010):
The possibilities of design abuse (3D solid, or 3D print file) are great and can be divided into:

- Possibility of abuse - easy copying of 3D solids; This is a digital AutoCad file and is easy to copy and manipulate, and replicate
- Copying an object from an existing one by scanning with one of the 3D /4D scanning technologies and turning it into a solid that can then be printed anywhere and anytime as needed and desired.
- Digital /virtual object (solid) and physical object are almost identical (differ for production imperfection).
- 3D replica is easily accessible (a consequence of the sale of a product that is publicly available after sale and can be scanned and copied by anyone).

The consequences of this revolution could be both numerous and of great significance. The current state of legal regulations comes down to the fact that the legislator relies on fair treatment and fair use of 3D printing files so that the user would not abuse them in any way.
The critical idea of intellectual property protection is that someone found and misused a digital copy of the design and not that they got a similar or even the same product from the finished product by reverse engineering. The problem is that now, thanks to scanning technologies, we can get the same product without paying anyone or breaking the law.
A special problem in the control and application of existing laws is the extraterritoriality that applies either to the author of the design /file, or to the place where the file is hosted, or to the user who illegally copies and uses it. Extraterritoriality in the process of production / use / trade could be reduced by applying the law of trade on the high seas, but most legislators refrain from this solution because it implies a loss of revenue from the tax on the turnover of facilities. If, and all predictions are that this will be the case, the current trend of accepting 3D printing technology continues, it is certain that there will be a certain social reorganization and that smaller communities will seek independence due to their self-sustainability. In such a collapsed social organization, it is very difficult to implement laws that would limit or reduce extraterritoriality and its legal consequences, ie the inapplicability of legal regulations to acts and events that occur outside the legislator and thus his jurisdiction.
One of the proposals of the participants in the debate referred to the granting of some inalienable rights over the file itself, which contains the design, ie the regulation of the right of use similar to photographs on the Internet used under the Creative Commons License.
An important consequence of the lack of legal regulations in this area today is almost equal to production under license and production by printing 3D objects (3D solids) on 3D printers, which in itself, it results in the demotivation of manufacturers who produce according to licensed technology by paying patent rights to the holders of the same.
One of the ways in which patent rights are protected today, especially when it comes to artistic elements, is that a copy must not contain elements that carry and give originality to a product if it is made as a copy of another product. This type of protection of intellectual property over three-dimensional objects requires that their design be divided into two categories of elements, one of which consists of artistic elements and the other utilitarian elements that are not subject to protection and which are not subject to intellectual property rights.
The debate also mentioned the following ways of protecting designs that dominate legislation today:

- Registered design (shorter duration of protection mechanisms, maximum 10 years).
- Author's work (lifelong, transferable to the first generation of descendants for a maximum of 20 years after the death of the author, unless otherwise defined by a special contract).

- Patent law (according to WIPO and WTO patent law refers to intellectual property rights over registered patents and is 40 years with the right to extend for another 40 years after which the patent becomes a public good and publicly available).

2. CHALLENGES IN INTELLECTUAL PROPERTY PROTECTION IN 3D PRINTING

A special challenge today in the field of intellectual property protection over digital information is represented by Internet sites for content sharing, which are often platforms for illegal exchange and trade of content with protected intellectual property. In terms of combating piracy, some general views and methods are presented that could be applied to 3D solids, regards to the files that the 3D printer uses to materialize the object, and which could be articulated as the following recommendations:

- Content sharing sites should have authorization and verification of copyright before copying.
- File sharing sites free of charge must be banned; the same goes for banning torrents, peer-to-peer sites.
- Control of incoming and outgoing traffic.
- Multi-level user authentication.
- Files should already contain the "Anti-Piracy" part of the code (Cronin 2015).

It could be heard at the debate that the Copyright legislation in the USA does not cover the home use of digital files, so a similar model can be applied to 3D print objects, ie what is printed in a home manufactory based on 3D printing technology does not fall under legal regulation, even if used for commercial purposes. A similar model is applied in South Africa. The legislator in the United Kingdom also takes the view that "Private and Domestic Copy is OK". This raises a very serious issue with significant legal consequences. "Is it fair to use files if you don't pay for something and print it in your garage?"

This question actually raises the question of the legality of the obvious infringement of intellectual property rights at the time of the establishment of technology, ie before the legislator recognized something as an undesirable activity and outlawed it. Today, it is a widespread phenomenon that many items that are or should be part of a protected design or trademark appear on the market made on home 3D printers, which brings huge profits to individuals and creates unfair market conditions. One of the interesting details of the debate regarding the previous question was whether the printed product is used indoors or outdoors, as most legislation (Branković 2021) does not consider the use of a product in a protected home environment at all.

That there are wanderings and vague views on design protection is clear from a number of examples where you can easily find small entrepreneurs on the Internet who will offer you mobile phone cases printed on your own home 3D printers. Faced with this behavior in the market, official manufacturers have taken different positions and are implementing different new market strategies. For example, Nokia has opened up the design of its enclosures by allowing all its users to download and customize them and print on their own 3D printers. In this way, users print the enclosures that suit them. Nokia's position is: "Our product gets better thanks to you".

The opening of the design part proved to be a good marketing maneuver designed with the desire to maintain at least part of the customer loyalty to the brand. Matthew Hall stated that it is better for a manufacturer to give a digital solid than to allow someone to make an "analog" copy of it because it can have negative consequences for marketing, especially when it comes to winning a brand. This raises a number of other unresolved issues such as:

- Who is responsible in case the design fails? / is not functional or cannot be printed.
- 3D Solid cannot be printed.
- Customized solid is not coexistent and self-sustaining
- The "product" does not have the appropriate characteristics / the question arises as to what is actually a printed file or design here.

- Who is responsible for performance / in a similar way Is the music industry responsible for digital music downloaded from the internet?
- Who has the right to produce and sell?
- If you print a protective helmet for a cyclist's head and you fall and injure yourself who is responsible for the offense and who bears the consequences?

2.1 Application of reverse engineering methods as the dominant method for copying protected intellectual property (product design and features)

Engineering is a technical process, based on technical disciplines and system theory, which uses the principles of design, production, installation and maintenance of products and systems to design and produce the same. There are two types of engineering, engineering focused on the production or development of new products (or existing ones developed by the company itself) and reverse engineering. Engineering aimed at obtaining one's own product is a traditional industrial process of transition from high-level abstractions and logical design to the physical application of the system. Although it is often not legally regulated in detail, this type of engineering process is precisely the one that creates new intellectual property or creates new value or perception of value (usually for luxury products) that will be offered to customers in the market.

In special situations, in the context of State Bosnia and Herzegovina it is often related to the maintenance of technical systems or products when the physical part / product exists and is in use, but there is no technical documentation for it (no technical details such as drawings, technical items or no engineering data). The process of duplicating an existing part, subassembly, or product without a drawing, documentation, or computer model is known as reverse engineering. Reverse engineering is also defined as the process of obtaining a geometric CAD model from 3D points obtained by scanning /digitizing existing parts / products. There are a number of reasons why reverse engineering occurs, we will list just a few:

1) The original manufacturer no longer exists, but the buyer needs a product, e.g. Spare parts in the process industry that are usually required after the manufacturer has stopped working for several years, so they cannot be purchased on the market.
2) The original manufacturer of the product no longer produces the product, e.g.
3) The original product is obsolete.
4) The original product design documentation is lost or never existed.
5) Generate data for the restoration or production of parts for which CAD data do not exist or for which data are obsolete or lost.
6) Inspection and / or quality control require that documentation exist and that the part can be produced internally (frequent requirement for critical infrastructure)
7) Some bad features of the product should be eliminated, e.g. Excessive wear can indicate where a product needs to be improved.
8) Analysis of good and bad characteristics of competitors' products.
9) Exploring new ways to improve product performance and characteristics.
10) Creating three-dimensional data from models or sculptures for animation in games and movies.

It is obvious that the reasons from 1) to 6) are legitimate business nature, while the reason under ordinal number 8) can be classified as a form of systemic industrial espionage rather than valid and justified business reasons that would be legitimate from the point of view of respect and intellectual property protection.

It is very important to understand that after dismantling the product, research on technical characteristics can be undertaken, as well as further disassembly, shredding to component levels and mapping and analysis of individual product components, but also the product as a whole and individual subassemblies (Depoorter 2014). By referring to the product characteristics, basic

principles and processing steps described in the product manual, operation and maintenance manual or other technical documentation, as well as relevant parameters, design elements such as processing flow, organizational structure, functional performance specifications can be determined and elaborate to the extent that it is possible to describe the existing product in detail by applying these techniques, and to compile a functional technical specification for it and on the basis of it to produce the same or similar (slightly different product) with similar functions or functions. Furthermore, depending on the applied technology and other benefits, the infringer of intellectual property rights now, after the reverse engineering procedure, is often able to produce the same or similar product cheaper than the original manufacturer, and further damage it on the market through price policy. As the application of reverse engineering is becoming more frequent due to the high availability of technical solutions that simplify and bring it closer to small companies, it is necessary to consider how to protect themselves at the company level from such threats.

2.2 The concept of complexity and its impact on security management

The main problem of intellectual property protection, in addition to the availability of copying technologies, are the difficulties related to achieving adequate security in companies engaged in development and production. Today, the security of these companies is endangered in many ways, and the role of complexity in development and security issues is becoming more and more noticeable. For now, there is no adequate single tool or methodology for the application of the necessary security measures, so the existing methods and technical solutions are applied in reality, taking into account that modern companies can be subsumed under complex adaptive systems, related to taking into account the behavior of all free agents inside and outside. business system (and the associated protection system) (Simić and Marković and Mujanović 2020).
The term business system complexity today is not unambiguously and completely defined, so it is often reduced to a group of concepts derived from system theory, including complex system dynamics, chaos theory, the problem of collective action, and the problem of total consequences for action and internal constraints for effective organization management. These theoretical concepts in strategic management try to answer the question of how dynamic systems generate order (order of things and the structure of the world inside and outside the system) and how they generate self-organization. As modern security environments evolve and new methods and techniques of attacking the corporate security system emerge, and thus the protection of intellectual property rights is increasingly focused on systemic solutions that must take into account system theory and complexity as important characteristics of the business environment. How important it is to observe safety by applying the model of complexity is best illustrated by the following data:

- The overall economic impact of Cybercrime is estimated to be greater, on an annual basis, than total world drug trafficking.
- The annual level of economic impact of Cybercrime in the world is estimated to be twice as high as the economic impact of 9/11.
- Global spending on IT security in 2017 was $ 120 billion.

3. LEGAL ISSUES WITHIN THE PROTECTION OF INTELLECTUAL PROPERTY DURING 3D COPYING

Many more questions were opened about unregulated and unclear legal relations between certain market and technological players in this field (Holland and Stjepandić and Nigischer Christopher 2018). The question arises whether it is better to apply “patent” law (a common way of protecting intellectual property in industry, over physical objects) or “copyright” (which is more acceptable as a way of protection for software) to 3D printing files.

What could be learned is that today “copyright” is not applicable to any scanned object because it is essentially a new object and has no direct connection with the original. On the other hand, design patents cover the product, not the way it is obtained, so it is obvious that none of the mentioned models of intellectual property protection can be directly applied to objects created by 3D scanning and 3D printing technologies. This means that the legislation would have to find completely new models that would protect the rights of authors on the basis of intellectual property.

Also, it is impossible to protect a customized design. No end user of a 3D solid who performs any customization and customization of the file to their needs before use can protect such a newly created design. Products in terms of intellectual property protection, from the point of view of copying risk, can be divided into two groups:

1. Products that will never be interesting for 3D copying such as gifts, wedding rings and the like.
2. Products that are very interesting to copy, whether they are not affordable to those who copy them for personal use or in copying I see the possibility of economic or other benefits.

Considering the moral principles of behavior, the seminar participants concluded that 3D printer manufacturers must take care of who their partners are and that they should by no means do business with someone called Pirate Bay.

Some authors (Depoorter 2014) believe that the price of the file sharig site must not be equal to zero (files must not be free and publicly available for download), but that there must always be some price for the file to be downloaded. In the opinion of the seminar participants, this will change the model of behavior as well as the business model of the site owner, content owner and the awareness of the users of the site or file. Changing the way of thinking and the awareness that files are the product of someone's work and that they are not free but that the work must be rewarded is essential in establishing a positive climate when it comes to the products of the intangible economy. Users must become aware that if they abuse the benefits offered to them and illegally copy or otherwise use the file, they will make money on someone's work. If they continue to do so knowingly, the intention to infringe copyright and patent rights is obvious and that conduct must be sanctioned.

Some authors (Cronin 2015) believe that 3D printer manufacturers are looking for a market and in order to find it, they use marketing techniques that are wrong, encouraging people to copy instead of designing what they print. Enabling any person to produce anything without owning or knowing the technology used by the manufacturer is a sensitive issue that is more in the moral-ethical sphere today than in the legal one, because there is no regulation that would regulate this area. Thanks to the prior knowledge gained during the boom in Internet technology and a series of disputes over the rights and ownership of music and video content, it is much easier for legislators today to find models of market regulation than before.

The levels of ability to do something also determine the level of responsibility, and accordingly the levels of responsibility that different participants and /or facilitators of an illegal transaction would have in the mentioned part. So we can distinguish:

- Ability to procure a printer as a basis for post-processing after a work has been done.
- Possibility to purchase filament (printing material).
- Possibility to purchase or otherwise obtain a 3D solid.
- Someone encourages you to print someone else's or their 3D solid.

Owners of content sharing sites that host 3D solids and other CAD files have at least a moral obligation to run their businesses in a manner similar to that of comparative music or video hosting sites.

Faced with possible lawsuits by the owners of the rights to the mentioned music, movies or other author's works, most content sharing hosting sites have introduced a mechanism by which the disputed material will be removed and the user who published it will be prosecuted if the copyright owner files a report for unauthorized possession of the content. Hosting company and proves that

it has adequate rights, ie. that the disputed material is not the subject of a public good. Most legal analysts today agree that a similar system of informal protection could be applied to sites that host and share content such as 3D models (3D solids) or corresponding print files.

Some authors who are an international expert on intellectual property protection, (Hornick 2017) believes that everything will change the moment everyone can make and produce everything. Today, the recognizable trends and influences of 3D printing technology on the change in the importance of intellectual property on the protection of intellectual property are mainly based on:

1. Democratization of production
2. The Open Collaboration Movement such as MIT - economic of open content
3. Some people don't like intellectual property

Explaining these influences, (Hornick 2017) it is states that the attitude towards the protection of intellectual property by legal mechanisms is largely determined by the size and market position of the company (Laband and Tollison 2000). "Companies below the line" (small companies with relatively small development budgets and without their own patents) always want everything to be publicly available and free to use (open source). The moment they develop and grow above the line, it is natural for their attitude to change and they begin to seek protection of their rights (patent, copyright). It is also emphasizes that today's production paradigm of the world as well as the applied production technologies enable (create space) that intellectual property exists in every step of the production, transport or sales process. Classical production technologies are a generator of possibilities, ie, due to their complexity, they enable an individual process to be singled out and protected as a patent, that is, mechanisms such as copyright or trademark are assigned to the product and product protection. If the production process and the post-production processes that accompany it were not so complex and redistributed, there would be no room for the separation of sub-processes, that is, their protection as an intellectual good.

On the other hand, 3D printing technology reduces the number of production steps, so there is less space for intellectual property protection.

Another factor that could significantly diminish the importance of intellectual property as a legal-economic model of protection is the possibility that opens up to each individual. With the increase of participation and technological development of additive technology, it will open the possibility for everyone to make /produce what they could not do before, while maintaining the total operating price of production / products at the level of large industrial producers today. This is because the unit cost of making products with additive technologies is the same for one and thousands of products.

Concludes is that 3D printing technology could bring production home and make the world smaller than it is today. Hornick bases this prediction on the common sense idea that there is no need to produce something where we produce it now if we can produce it in a way that will be used. This very logical idea worries countries such as China and South Korea today, where the production capacities of most multinational corporations are located due to low labor costs, because withdrawing them and returning them to their home countries could have a dramatic impact on their economies.

It can be said that 3D printers will lead to an economic renaissance in terms of return to production in countries with:

- high rate of intellectual capital,
- high production costs,

such as the US, the EU, Canada, Australia, and even Japan. Increased application of 3D printing technologies will bring production back to these countries, as the benefits of cheap production in China will disappear, but all those involved in the supply chain will also lose their jobs.

The market for the application of 3D printing technology today (70% of the market) is concentrated in the following segments, ie the following comparative advantages of this technology:

- Shortening the development cycle, faster market entry.

- Enabling industrial experiments in technology verification - technological demonstrators; here the possibility of easy change / verification of the design comes to the fore.
- Reduction of production and transport costs.
- Increased confidence in finished products (higher reliability of finished products - better mechanical properties of the material or better "organic" design).
- In some sectors, such as the production of spare parts or the production of parts with a complex structure, almost half of the production machines sold today are 3D printers.

If (/ when) technology is mastered in the future so that 3D printers get the ability to change the characteristics of materials during the printing of complex structures, this type of machine could completely displace today's production machines based on substrate technologies. Hornick predicts that if this does not happen in the near future, it is very likely that the technology will move in the direction of hybrid machines, i.e. machines that can do and what a 3d printer is not capable of. The most probable form of such a hybrid machine would be an aggregate consisting of a 3D printer and a trimming / shaping machine, that is, a finishing machine. In this way, one machine would produce a part in two successive steps, combining the advantages of both technologies so as to obtain a final product that is equal to or higher in quality requirements than today's similar / same products with a significant reduction in prices.

3D printing technology has the potential of an industrial revolution, so it, like the one from the beginning of the 18th century, will lead to a change in the way we experience the world / that is, how it functions in the sense of eco-social production. According to Hornick, the paradigm shift will take place in the direction of democratization of production, related in the direction of a world that:

- No entry barriers.
- The boundaries between manufacturer, retailer and user will fade easily.
- Fundamentally different products will be produced.

4. PARADIGM SHIFT IN THE PROCESSES OF PRODUCTION AND PROTECTION OF INTELLECTUAL PROPERTY IN 3D PRINTING

In terms of paradigm shift, it is important to note that traditional production methods were the ones that dictated what a product would look like and what functionalities it would have. This especially refers to the influence of the dominant producer on the formation of standards in a given area. With additive technologies that have a high possibility of customization and customization of products, this direction of inevitable industrial standardization is not expressed, and in some production spheres it does not even exist. As a result, the products may not look the same as they do today, but they will work the same as today. About this Peter Weijmarshausen, CEO of Shapeways, says (Forbes 2012): "Most of the products we see around us today are similar to each other, substrate technologies limit customization and 3D printing technology makes it possible". A number of design host systems such as Shapeways enable design tailored to the needs of users opinions and actions, related to manufacturing philosophy that has long been suppressed by technology shortcomings.

One of the consequences of the increase in the use of 3D printing technologies (Hornick 2017), will probably be the abolition of mass production as such, which will reflect on the elements and ways of protecting their intellectual capital:

- Even companies that do not have any form of intellectual property protection still have some kind of protection derived from economies of scale; that is, the probability of an attack on their market is relatively small because large investments in machine and production capacities are needed in order to be competitive in the market at all, for which most of those who enter the market by copying someone else's technology simply do not have the financial means.

- Reduction of the importance of mass production due to the fact that everyone is able to produce for themselves consumer goods; in this scenario, protection elements such as brand protection will not make much sense because "why would anyone buy a brand product when they can have the same generic one at significantly lower prices (or for free)

The risk to intellectual capital and intellectual property protection systems will depend on market democratization and will be different for different market segments (Hornick 2017):

- The likely impact on the aerospace and healthcare industries will be small, as people will always opt for those highly industrialized manufacturers who instill confidence in them, so in this segment democratization will not significantly jeopardize the business performance of manufacturers even in cases where everyone can print aircraft or an organ that is necessary to him. This is partly due to the fact that in addition to the knowledge necessary for the production of components or products as a whole for businesses in these sectors, it is crucial to know and adhere to industry standards and discipline.
- While the likely impact on the automotive and fashion industry will be significant, related to "shockingly large" and there will probably be a collapse of individual manufacturers or a huge dissipation of production

Is anticipated predicts that as the technology of additive production is accepted, the probability of intellectual property protection will be lower, or at least the visibility of its violation will be lower, which results in two significant market and legal shifts:

- The future of sales does not lie in product sales, but in design sales - design (3D solid) becomes (primary) product
- Production control becomes unclear; and the question may be asked, "What happens when anyone can produce anything with any functionality without control?" This question can be further broken down into the following: What if you can produce something so that no one knows you produced it (there is no knowledge and awareness of it) and nothing can stop you from producing and abusing what you have produced? Printing personal weapons, the Defense Distributed project in which Cody Wilson printed a fully functional pistol raises many ethical and safety issues.

Legally regulating the previous two issues in the future will be the main task of the legislation related to 3D printing technology and its consequences. It is believed governments will always strive to regulate the market and intellectual property but that their regulatory capacity will decline over time in this area. Also, it is belived (Hornick 2017) that the market for finished products will decline and that it will eventually disappear when everyone has a technology whose products are comparable in terms of quality with those created on the basis of the use of industrial technologies. It is very likely that when this point of development is reached, the legal and economic differences in the market regulation models that exist today between 3D printing technology and software will be erased. That is, in the future, models developed for the protection of intellectual property in software (copyright) will be more often applied to 3D printing technologies than those that today protect industrial licenses, patent rights or trademarks. It is belived that until this point of technological saturation is reached, a combined method of protection of intellectual property and other industrial rights in 3D printing technology will most likely be applied in the future, according to which there will be two separate spheres of regulatory policy influence:

- Controlled sphere, in which intellectual capital retains its importance and ways of its adequate protection will have to be found, refers to industrial users of technology:
  - Multifunctional machines (any functionality).
  - Radically new look and shape of the product.
  - Supplementarity; Substrate and additive technologies will coexist; 3D printing technology will not displace existing production technologies.
  - Advanced economies.

- The uncontrolled sphere, for which the importance of intellectual property becomes irrelevant, refers to home users:
  - Any design, anytime.
  - iFactory (concept similar to Direct Digital Manufacture or Desktop Manufacture).
  - Easy as using a toaster.

It is believed that the key role in the development of technology is played by companies for the production of materials for 3D printers and that this is the area that will develop the fastest in the near future and that this area can be regulated and controlled if the number of companies producing materials small, which could be ensured by introducing special permits and licenses that would have to be obtained from the competent authorities by all those operating in this field. But as the whole field of additive technologies is unregulated, it is hard to believe that legislators will succeed in time (before the number of filament producers grows significantly) to legislate regulations and establish organizations that would control their application in this area, so this is an unlikely scenario.

Considering issues related to the possibility of regulating the significance of the 3D printing market, the Stanford Center for Internet & Society held a public hearing / panel discussion with significant legal experts and entrepreneurs in the field of 3D printing technologies who tried to answer the question of readiness of existing political establishments. regulatory bodies are set by 3D printing technology (Li and et al. 2014). Some very interesting views on the possibility and needs of regulation of this technology as well as the possible consequences of its introduction on the legal order and on court and litigation procedures that will surely follow due to the possibility of easy and cheap copying of physical reality or abuses such as design hammers or unauthorized production and sale of products regardless of whether they are protected by some form of intellectual property protection or not.

Some authors (Engstrom Freeman 2011) are compared the current legal solutions, according to which every manufacturer or seller of defective products that leads to injury to the buyer / user is responsible for the injury or damage, which is applicable to all products. technologies and complete unregulation of the market of additive technologies, which excludes any possibility of injury / damage to obtain fair compensation, because the law does not take into account (does not penalize) non-commercial and informal, realted to domestic producers of industrial products. It is also points to the lack of legislation that defines a product as something that is tangible and has personal properties, because in the modern economic world there are products such as 3D models (solids) that are not material in nature (digital files) and which serve to create the ultimate products using 3D printing technology. Since the product appears in digital form, and therefore intangible before fabrication, it is not subject to any restrictions that the final product, ie the product of 3D printing must have as an inherent property, it is unclear how to apply laws that protect consumers from injury or omission in design. From these preconditions, derives is following predictions and observations (Engstrom Freeman 2013):

- More people will be injured in the future by home-made products that come as a possession:
  - Lack of knowledge.
  - Lack of industrial discipline.
  - Uneven machine operating conditions (3D printer).
- Significantly more disputes and litigation concerning the “seller”.
- Significant increase in product-related litigation.
- There will be a number of new challenges for corporate litigation theory in the future - this is because corporations are “suitable” (available) and legally responsible for the damage their products cause.

3D printing technology allows us to separate discoveries from innovation, that is, the contribution of those who invented something from those who devised a way to produce and use it (Lemley and Sampat 2008). Although it is often noted that the protection of intellectual property was introduced

in order to protect the efforts of innovators, ie the process of creating innovations and new products and solutions, which is by nature expensive and uncertain, this is not true. Innovation is most often associated with inspiration and does not require money and time. These resources are actually required from the manufacturer by the product through the preparation and launch of production, and marketing during market entry. Thus, today's form of intellectual property protection actually protects companies and entrepreneurs from unfair competition by protecting the product launch process. Because he is expensive and uncertain. What happens then when the production launch costs are not large or do not exist at all, which is the case in 3D printing technology? Should there then be a mechanism to protect the rights of producers - especially in cases of "semi-finished products" when it is intangible in nature (it is a question of design)?

Another influence that opens this moral-political-legal dilemma is the fact that the distribution of products is free or almost free, so it loses its significance, which in itself means that it is less interesting from the point of view of abuse or protection.

Also, it is emphasizes important the fact that access to information has always been faster than access to products, which changes dramatically with the use of 3D printing technology, because we can print the product first and then find out first hand information about it (Lemley and Sampat 2008).

To is explain the change in the way economic understanding and the legal order a couple of analogies from a time when internet technologies were at an approximate level of development and general public acceptance showing through a series of examples how certain attitudes and ideas over time proved to be nonsense of their own kind (Lemley and Sampat 2008). This refers to ideas launched by lawyers and lawyers for the protection of intellectual property who in the early and mid-1990 years, claimed that the world would collapse and collapse, because even then there were techniques and machines that could easily copy someone's intellectual property (this idea was once launched and supported by the media by members of the music industry for fear that no one would buy their products anymore). The basic premise of this attitude was that no one will want to create a new intellectual value (music) when they will not be able to have any financial benefit from it, because after publishing it, someone will already copy and use it without compensation. It is a well-known prediction from 1995 year, that the Internet will stop the production of new ideas, because it is impossible to apply copyright to them, on the Internet - time has shown that this is nonsense. However, this could be a big mistake, especially if we miss the opportunity to quickly regulate some key areas of both the technology itself and its application.

The attitude that existed at the time of the advent of the photocopier and video recorder is now repeated and relatively easy to hear: "This device is designed for the purpose of circumventing the rights of intellectual property owners who allow anyone who owns it to abuse our property". those who could lose their jobs in a new economy in which everyone has satisfactory and necessary production capacities. Their common position is to put pressure on governments to ban or slow down the technology, or to regulate it in some other way so that they preserve their market positions (a system of licenses that would be granted exclusively to "authorized" manufacturers or similar). This attitude bore fruit in the years of 1980-1990 when Sony decided not to abandon the technology (VCR) but to agree to introduce rules for its use, which to some extent resulted in regulations governing the right to use the technology for commercial purposes.

Furthermore, the owners of intellectual property rights will seek compensation for lost profits from those who distribute the technology, which could lead to the introduction of some kind of special tax on the sale of 3D printers or filaments, or a special fund to be replenished from this type of tax. for compensating producers who have lost part of their profits due to the existence of this technology - a similar mechanism already exists in the banking sector (like in the Republic of Serbia compensates poor business results of commercial banks in years when their profits are below the threshold agreed for their appearance on the market / business) .

It is believed that design host systems such as Shapeways could in the future become the target of lawsuits by manufacturers because they do not take into account, nor do they have the mechanisms and capacities, to check copyright over all content published and shared on them.
If legal protection mechanisms are not able to "reach" home users, intellectual property owners will sue companies with a business model similar to Shapeways because they have industrial 3D printers and can print what they own.
From all the above, it is concluded that two scenarios are possible in the future when it comes to regulating 3D printing technology (Lemley and Sampat 2008):

1. Dystopian scenario, according to which intellectual property owners will try to convince governments that this technology is dangerous; that products cannot be traced back to the place of their origin which causes huge legal and economic problems and that it is best to ban it, slow down its development or control it by banning it in the public domain and prescribing a level of licensing for its application that will guarantee protection rights of current intellectual property owners (large corporations).
2. Utopian Armageddon scenario, according to which all legal and state systems will adapt to the new situation, which is a frightening concept for all those who work in the public sector (military, police, customs, civil servants) as well as all economists and lawyers because it completely changes their position in the legal and economic order, that is, introduces a high degree of uncertainty in all directly unproductive activities and spheres of life.

It is necessary to mention that in addition to the existing ones, there are at least three other scenarios which is present them here:

- Combined scenario, which would be a combination of previous scenarios.
- Scenario of absolute change of social structure - nucleation of legal-economic and state models on the home planet.
- Scenario of extraterritoriality - departure from the home planet and establishment of colonies on the inner planets of the solar system according to the principle of joint nuclization according to which the real social effects of these technologies on the development and existence of structures would be seen only on newly established legal entities - colonies.

Commenting two predicted models of the future, logically and contextually is predictions with the paradigm that: "The whole economy is based on some kind of fear". Deriving from this the question of what happens when fear disappears. What happens when everything is close, accessible and easy to copy, that is, asking yourself: "How does the economy function in a world where each of us can produce our own things (things we need)?"
Brook Drumm, founder of Printrbot, and an innovator who is credited with inventing the simplest 3D printer that anyone can make and assemble at home in a couple of hours, made a few personal observations at the penalty spot regarding the regulation of 3D printing technology (Engstrom Freeman 2013). The advantage to which he paid special attention is the ability to scan and accurately reproduce what has been damaged, which could be decisive in trying to protect and preserve historical monuments and places. Of course, there is the possibility of abuse, which would be reflected in the possibility of printing the "same" place practically anywhere, which would certainly disrupt the visit to the "original" site, and could significantly affect the tourist income of individual countries. He also referred to the complete unpreparedness of most countries, customs officers and security police structures, explaining to those present how he brought a "portable" 3D pirnter into the plane without much trouble and printed products during the flight, which he then presented at the London 3D printing technology fair. This practice has proven to be a very serious potential security breach (it could also print cold steel or firearms) and is expected to be banned in the future.
Erick Wolf, a lawyer specializing in intellectual property protection, asked a couple of questions related to the possible technical protection of intellectual property on printed products (Schneider and Schneider 2011). He wondered:

- Is there a possibility to protect physical objects by inserting a "code" into them during production (similar to RF antennas and barcodes that are now placed on expensive products in stores in terms of their protection); If this is possible, is it possible for the "code" to be printed in the product structure in terms of additional product protection?
- If the previous concept is not possible for technical reasons, can a watermark be imprinted on the physical object (exists in 3D solid before printing) and is it possible to follow the object after it has been printed?
- In terms of environmental protection, today we are working on the development of materials that have degrading properties over time, ie are biodegradable. Thanks to the development of these materials, is it possible to produce a filament with a "limited shelf life" which will allow the mechanical and chemical properties to be monitored and be predictable so that they can be used to find out when and where, and on which printer the product is printed?

Also, predict is that"secondary reliability" - a form of relationship in which the manufacturer commits to the customer to provide spare parts will appear as a standard model of relationship design when buying a design (3D solid) for 3D printing, or that the standard contracts define the level and complexity of the possible replacement of parts by which the product is considered repaired and after which it is considered a completely new product (although it also contains parts of the previous product /used parts).

Part of this issue is covered by the repair and reconstruction doctrine (US law, although the solution is also applicable globally) which sets out the rules for "repair and reconstruction of impaired product functionality" and who provides the repair file and how it is checked / protected from abuse.

So, if the features of the vehicle degrade, the 3D printer will print a replacement part, but it is not entirely clear whether this violates the rights of the "original" manufacturer, and whether and in what form the warranty is valid if it is possible to talk about the concept of warranty. century, because by applying the replacement model, the lifespan can be practically extended indefinitely.

In this case, the question naturally arises that bothers all manufacturers: "What does the user of the file offer me as a guarantee that he will not abuse the file?"

It is interesting to note that if the "manufacturer" decides not to print the parts one by one and assembles them afterwards, he unknowingly approaches the "classic" patent law and the possibility of doing something illegal and being responsible for it. If it is decided to print as part of patent protection mechanisms, they cannot be applied to a newly created product because it is at least in terms of the way it is created, and probably also in terms of parts of internal geometry, a completely new product.

Also they are noticed anomalies in the current system of intellectual property protection (design) that are often misused or used in terms of market defense because most lawsuits related to design misuse today do not arise in cases where someone copied the design but in cases of "similar" design. its creator came completely independently (following the example and often not the mentioned design). This is quite pronounced in the aviation industry and the automotive sector, where the design, in addition to being attractive to the customer, had to meet the requirements of aerodynamics, so it is logical that (since this is a part of nature regulated by physical laws) products will have to look alike. the laws are the same for all producers). In this situation, the question arises whether similarity can be used at all as a parameter to check the infringement of intellectual property rights.

In such an environment, it is unclear what is allowed and what is not. Also, new home manufacturers have a rather vague situation in front of them regarding the perception of the market, because it is usually not clear to anyone what they can do with their 3D printers without getting into trouble. Educating the public and creating awareness of the need to protect intellectual property is something that could pay off at this time for all the big industrial giants facing the tide of products created in small home manufactories or personal 3D printers.

It is believes that it is necessary to regulate both open sorce and credit creativity movements in some way if possible, because despite the fact that these movements are based on the free exchange of information, there are those who could be harmed by this exchange - owners of intellectual property.

CONCLUSION

The authors in this paper want to emphasize that all the majority of authors cited in this paper believe that the law must be stretched / expanded to include intangible products such as computer code. The reason why this has not been done yet lies mainly in the fact that it was passed at a time when no one still believed that it was possible that something so intangible could harm a person (which we are all aware of today).
Changing and adapting legislation and introducing standards in areas that are directly related to or based on 3D /4D scanning and 3D printing technology are imperative for further development both in terms of its direction and in terms of avoiding possible abuses and criminal acts. How quickly this adjustment will occur and whether it will be followed by some and how serious social changes remain remains to be seen.

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