



## DIGI-GRENT Project

# Digital & Responsible Business Model – 3D printing

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# 1 The Problem and the Opportunity

Nowadays 3D printing is an innovation and a very dynamically developing field. The term "3D printing" covers a variety of processes in which material is joined or solidified under computer control to create a three-dimensional object, with material being added together (such as liquid molecules or powder grains being fused together), typically layer by layer.

3D printing allows many useful, complicated and expensive products enter to markets, from medical prostheses to electronic components. One of the key advantages of 3D printing is the ability to produce very complex shapes or geometries, and a prerequisite for producing any 3D printed part is a digital 3D model or a CAD file.

Bioprinting – production of tissues or organs from living cells using a 3D printer. Professor Anthony Atala – one of the world’s pioneers of bioprinting technology, describes it in a more comprehensive way as: “applying layer after a layer of biological, biochemical or filled with living cells material in a threedimensional and controlled way to create functional components that allow the fabrication of 3D structures.”

There are less than 140 companies on the Polish 3D printing market. There are mainly young and small companies (micro entrepreneurs). Only 3 large companies operate on this market.

3D printing is used in many areas:

- machine and automotive industry
- architecture and construction
- arms industry
- aviation industry
- medicine and dentistry
- fashion
- food industry
- advertising industry
- education
- etc.

That’s why we decided to create a start-up called “3Druki Sp. z o.o.”.

## 2 The Context

At the initial stage of development our start-up will offer 2 main 3D printing services – 3D bioprinting and 3D printing for industry.

*Advantages of 3D printing:*

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- The uniqueness of each product (there are no two identical products)
- A wide range of applications
- Revolutionary changes in medicine and dentistry
- Short model making time
- Low cost of printing the object
- High profitability of printing low series or even single copies
- The ability to apply changes quickly and easily
- Personalization option
- The ability to create complex geometries.

The company will be able to print both items for industry (e.g. parts for machines, cars, models, etc.) and for medicine (implants, bone fragments, epidermis, etc.).

**Each service consists of the following stages:**

- preparation of the 3D model,
- 3D printing,
- post-production process.

An on-line platform will be developed to provide services that will be used for communication between the company and the client. The customer logs into his account and has an access to the project, can make some comments, track the status of the order, and approve individual stages. The platform will be properly secured against unauthorized access to information.

The manufactured product will be used as intended. Compared to products manufactured using traditional methods (casting and forging processes, where material is removed from a stock item or poured into a mold and shaped by means of dies, presses and hammers) 3D printing takes less time.

3D bioprinting solves many problems in the field of medicine and dentistry. Patients will have easier access to specialized medical services (e.g. facial reconstruction, skin transplantation, joint implants, etc.).

### 3 The Solution

At the first year of development our start up will offer 2 main 3D printing services. It will be 3D bioprinting and 3D printing for industry.

#### 3.1 Technology and Operational Issues

There are a lot of technologies for 3D printing, such as:



- FDM (Fused Deposition Modeling)
- SLA (stereolithography)
- DLP (Digital Light Processing)
- SLS (Selective Laser Sintering)
- DMLS (Direct Metal Laser Sintering)
- SLM (Selective Laser Melting)

We will use the most-commonly used 3D-printing process (46% as of 2018) – a material extrusion technique called fused deposition modelling (FDM), also called "printing from plastic".

We have established cooperation with the Lodz University of Technology, we have joined the bioprinting cluster in Bionanopark.

The production will be handled by internal staff.

The digital & responsible element of our idea is the on-line platform for communication between the client and the "3Druki Sp. z o.o."

The on-line platform for communication between the company and the client will be created and implemented in the second year. Using this platform the client will be sure that his project will be protected from copying and stealing. The platform will secure the intellectual property rights. The using of paper will be also minimized.

### 3.2 Competitive Advantage

3D printing technology has been known since the 1990s.

The company's employees have high qualifications and experience in using 3D printers and computer programs to create structural models. We will use the latest solutions in this sphere. And we will purchase a license for specialized software.

Competition on the market of 3D printing in Poland is very weak. There are only 3 big 3D printing companies and only one in Lodz region. The main barriers to entry are:

- high costs of technology
- lack of good qualified employees
- high costs related to the safety of products / services
- high costs of R&D.

In the future, the using of 3D printing technology should be regulated, and high standards of service provision should also be implemented.

We cooperate with the Lodz University of Technology and we join the bioprinting cluster in Bionanopark.

Our products are safety and high quality. We have different printers for different needs. Our services and products will be high quality products with acceptable price. Thanks to the on-line platform, the service process will be maximally shortened.



### 3.3 Description of the Target Market

The value of the 3D printing market is currently estimated at 4 billion dollars. According to the forecast, in 2025 the value of the market will double. The fastest increase in market value will apply to the countries of Central and Eastern Europe. 3D printing will be used in the preparation of custom personalized products. The largest use of this technology will be in short-run production and on request.

Our start up is oriented mainly to industrial and medical companies in Poland and abroad. Our first customers will be companies from Lodz region. We offer high quality innovative personalised services and products with acceptable price. We also guarantee a safe flow of information and protection of intellectual property.

### 3.4 Product/service snapshot

The decision to launch the service / product on the market was preceded by a deep market analysis and the possibility of using 3D printing technology. The owners of the company have experience in the industry, gained from working in a company dealing with 3D printing. In the first period of operation, the equipment will be leased to reduce risk. Signed cooperation agreements with the Lodz University of Technology and membership in the bioprinting cluster will provide access to appropriate research infrastructure to develop the product. Before starting production, a customer needs survey was conducted during direct meetings with customers and by participating in industry fairs. The industry is characterized by product customization and requires joint work on the model.

We will fulfill each order in accordance with the expectations of the client, meeting safety standards.

## 4 The Strategy (Scaling Strategy)

The use of 3D printing technology will allow to prepare quickly and print a wide range of items at a relatively attractive price. 3D printing technology offers innovative, unique products that would be unprofitable to produce using traditional methods. Particularly large possibilities of using this technology are in regenerative medicine. Patients will not have to look for a skin transplant donor that meets the criteria. Instead of waiting, the patient will undergo transplant surgery of skin "printed" on a 3D printer.

#### Key metrics & indicators

Revenue increase of 80% per year

Share of exports in total revenues – 80%

Share of 3D bioprinting in total revenues – 70%



## 5 Entry and Growth Strategy

The company is not focused on selected markets but will operate globally. Distances are not a problem, therefore it is possible to carry out orders for clients from all over the world. The company's strategy will be based on: the quality of raw materials used in printing, the quality of products / services, timely delivery, uniqueness of products / services, quick launching new products / services on the market. The company focuses on 3D printing, 3D bioprinting, bioprinting for regenerative medicine and creating software for 3D printers.

In 5 years we want to be a company with an established position and recognition on the global market, offering high quality products and services in the field of regenerative medicine, ready to fulfill even the most sophisticated orders.

In the first period of activity, "3Druki Sp. z o.o." will focus on developing 3D Printing, 3D bioprinting and bioprinting technologies for regenerative medicine. In the next period, we will focus on the technology of using bioprinting in regenerative medicine and work on software for 3D printers.

Creating, in cooperation with stakeholders, high standards for the provision of 3D printing services, in particular in the area of bioprinting for the medical industry.

## 6 The Marketing Plan

Market advantage is determined by several factors, primarily the quality of products and services offered, which is a consequence of using the highest quality materials and the latest generation of devices. Experienced, creative employees who can create with imagination also provide the advantage. Customers attach the greatest importance to durability, innovation, product uniqueness, a wide range of services and products and technical support.

The company operates on a specific market it is necessary to participate in trade fair and exhibition events and to gain customers. Polish enterprises offering products and services with high innovation potential can benefit from European Union funds and government programs for projects increasing the share of exports. The Enterprise Europe Network will also be used to promote the offer.

3D printing is a niche area and price is not a decisive criterion when choosing a product by the customer. Competition on the 3D printing services market is very weak in Poland. At the final product price 70% is the company's margin.

The project development process will take place via a specially created on-line platform through which the client will become familiar with the project, make changes and approve each step and the final version of project. The finished product will be delivered via courier.



## 7 The Economics of the Business

### 7.1 Financial Highlights

The loan from EU funds will be repaid after 3 years of doing business. The profit generated in this period will be allocated to investments related to the company's development (purchase of new printers, new software, hiring new employees). The products have a large sales potential due to the very wide area of 3D printing use, from the plastics processing industry to medicine.

The annual costs are approximately EUR 150,000.00 (equipment maintenance, salary, rent, utilities, accounting, HR and legal services, model design software license, purchase of certain printing materials).

We expect the first profits after 2 years of doing business.

### 7.2 Financial Need

Purchase of three 3D printers - EUR 15,000.00

Purchase of powder (Sinterit) (20 kg) - EUR 7,000.00

Purchase of photopolymer resin (15 kg) - EUR 4500.00

Purchase of a computer program for model processing (Autodesk Inventor) - EUR 2000.00

Graphic salary – EUR 2,300.00 / month

Salary of employees servicing printers – EUR 2,100.00 / month

Rental of premises - EUR 700.00 / month

Municipal fees – EUR 400.00 / month

Legal, accounting, HR services – EUR 300 / month

Promotional activities – 50,000.00 euro / year

Total: EUR 143,300.00 (for the first 12 months)

(Break-even point: after 2 years)

The project can be financed from loans granted by banks or business support institutions in the Lodz region, financed from European Union funds. The loans are intended to finance innovative projects implemented by young entrepreneurs. The advantage of loans is very low interest rate, availability and repayment period of up to 10 years. An alternative source can be venture capital funds established at the Polish Development Fund. The list of funds is available at the following link: <https://pfr.pl/oferta.html#mikroprzedsiębiorstwa-i-msp/1acyjne-firmy/1>

The rate of return and the fund's exit period are negotiated between the business owner and the fund. By investing in a company, the fund becomes the owner of some shares.





## 8 Conclusions

The analysis shows that the market of has great potential and great possibilities of using 3D printing technology. The largest recipients of this technology are the industrial and medicine sectors.

The company "3Druki Sp. z o.o." meets the definition of a digitally responsible enterprise. The implemented technologies ensure the realization of high quality services while maintaining the highest safety standards. The developed business plan assumes stable development of the enterprise.

## 9 References

<http://3dprintingcenter.net/2019/05/12/the-history-of-bioprinting/>

[https://en.wikipedia.org/wiki/3D\\_printing](https://en.wikipedia.org/wiki/3D_printing)

<https://omni3d.pl/drukowanie-3d/>

<https://hitech.studentnews.pl/s/3911/76450-Nowe-technologie/4077064-Druk-3D-staje-sie-zorganizowany.htm>

<https://printelize.com/pl/T/BadanieRynkuDruku3DwPolsce>

[https://ep.com.pl/artykuly/11560-Technologie\\_druku\\_D.html](https://ep.com.pl/artykuly/11560-Technologie_druku_D.html)

<http://przemysl-40.pl/index.php/2018/09/19/rynek-druku-3d-coraz-bardziej-dojrzaly/?fbclid=IwAR25EOilrmwUtvEs9biupE8agMOSSzW16dvLgZdnqWDU63T9nfwptafd4>



## Appendix – Business Canvas

<b>The Digital &amp; Responsible Business Model Canvas</b>		<i>Designed for:</i> FPE TEAM	<i>Designed by:</i> FPE TEAM	<i>Date:</i> 03 October 2019	<i>Version:</i> 1
<p><b>Problem</b></p> <p>3D printing is an innovation and a very dynamically developing field increased demand for 3D printing services</p>	<p><b>Solution (digital &amp; responsible)</b></p> <p>on-line platform to communicate between company and clients reduction a paper documents specialized software security of access to data</p>	<p><b>Unique Value Prop.</b></p> <p>safety  diversification of products high quality of services and products safety standards in healthcare the uniqueness of each product</p>	<p><b>Unfair Advantage</b></p> <p>relationships and knowledge of the industry  cooperation with research and development</p>	<p><b>Customer Segments</b></p> <p>THE MAIN AREAS: medicine  industry 3D printing is used in many areas</p>	
<p><b>Existing Alternatives</b></p> <p>traditional methods</p>	<p><b>Key Metrics</b></p> <p>number of clients sales volume export volume high level of data security high quality products</p>	<p><b>High-Level Concept</b></p> <p>standard of service quality service transfer protocol</p>	<p><b>Channels</b></p> <p>direct selling</p>	<p><b>Early Adopters</b></p>	
<p><b>Cost Structure</b></p> <p>leasing or purchase of three 3D printers, powder, photopolymer resin, computer program for model processing Salary of employees servicing printers, graphic Rental of premises Municipal fees Legal, accounting, HR services Promotional activities</p> <p><b>Total: EUR 143,300.00 (for the first 12 months)</b> Break-even point: after 2 years</p>			<p><b>Revenue Streams</b></p> <p>3D printing - 30% Bioprinting - 20% Bioprinting for medicine - 50%</p>		



Digital and Responsible Entrepreneurship