

# A Business Model for an online 3D printing platform

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Work Project in collaboration with Berenschot

## - Abstract -

This paper presents the main findings and learning experiences from the Business Project conducted in the past 5 months. The project was made in collaboration with Berenschot, a Dutch consulting firm. The final outcome of the project included the presentation of the main critical success factors for online platforms in the 3D printing industry. In addition, as part of this Work Project, a deep analysis was performed to study the main barriers that those platforms face in the market and that ultimately can contribute to their failure.

**Miguel Filipe Pereira de Menezes e Vale**

MSc. in Management, Student No. 1187

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# **1 BUSINESS PROJECT CONTEXT**

## **1.1 Company**

Berenschot is an independent Dutch management-consulting firm founded in 1938. With over 75 years of existence, it is considered to be one of the oldest companies of its kind in the Netherlands. Last year, the company achieved 59 € million in revenues, counting with 350 employees (Berenschot, 2014). The majority of Berenschot' business is made in the Netherlands, in both private and public sectors. Nevertheless, the company has a very international outlook, with projects in South America, Caribbean, Africa and Asia. According to Berenschot' managers they differentiate from the other consulting firms because of the ability to transform complex strategic and managerial issues into practical solutions and implementations for their clients.

In this past decade, one of the activities that Berenschot has specialized was the provision of solutions related with the 3D printing industry.

## **1.2 Market overview**

3D printing or additive manufacturing is the process of creating a three dimensional solid object through a digital file (see appendix 1 for process description).

Although this industry is very young, with its first developments in 1984 (Deloitte, 2013), it is considered as one of the most revolutionary industries nowadays and has a huge potential of developing in the future (see appendix 2 for the history of 3D printing). According to the research company Canalys, the size of the market reached US\$2,5 billion globally in 2013 and it is expected to achieve US\$16,2 billion by 2018, representing an annual growth of 45,7% (see appendix 3 for a summary of global opportunities).

## **1.3 Current client situation**

To seize all the opportunities that the 3D printing industry presents, Berenschot aims to become the leading consulting company in this field. To achieve that goal, the company developed, over the past ten years, several projects to improve their knowledge. Given that, Berenschot is currently working in the development of two different projects.

The first project is the ManSYS project. The main goal is to establish a consortium of international players to set “e-supply chain tools to enable the mass adoption of 3D printing” (ManSYS, 2014). To do that, the project aims to create a platform where different players in the 3D printing industry can interact. As a partner in this consortium, Berenschot has the responsibility of ensuring an early exploitation of the results, as well as, providing a market

analysis for 3D printing online platforms, coming up with a suggestion for the best business model to follow. The second project is the release of a publication on business models for 3D printing platforms to exclusively support Berenschot's external recognition.

In the end, to become the leading consulting company in 3D printing arena, Berenschot needs to: 1) Gather knowledge about 3D printing industry; 2) Establish itself as a recognized player in the industry; 3) Attract clients to build a portfolio of references and cases.

#### **1.4 The Business Project challenge and methodology**

The challenge that Berenschot proposed to the student team was helping in the execution of the two projects that the company was developing (see appendix 4 for a project summary). Firstly, the team developed a market analysis of existing 3D printing online platforms, based on literature reviews, industry expert interviews and in-depth online platform analysis. This analysis revealed the key players in the industry and their business models, crucial to segment the market. As consequence of it, "variables that are vital for a strategy to be successful" (Daniel, 1961), known as critical success factors, were identified in each segment. Secondly, a recommendation for the business model of the ManSYS project was developed. Finally, to attract new clients, an online sales tool in form of survey was created.

#### **1.5 Summary of conclusions**

After an in-depth market analysis it was possible to identify three segmentation dimensions: Customer Scope, distinguishing between platforms that serve businesses (B2B) or individuals (B2C); Market Scope, exploiting the difference between businesses that are Industry Generic in opposition to Industry Specific; and Key Customer Proposition, considering what the company offer from a customer perspective, namely, Information Providing and Knowledge Sharing, Enabling Services & Development or Own or 3<sup>rd</sup> party Production of Tooling and Parts (see appendix 5 and 6 for a better understanding of the segmentation). Furthermore, there were identified three critical success factors per each segment, for a total of 21 factors (see appendix 7 for a full list of critical success factors). In addition, it was recommended that the ManSYS project should be positioned in the provision of information and knowledge to businesses in specific industries (see appendix 8 and 9 for ManSYS project recommended segmentation). Finally, the online tool allowed potential 3D printing investors to answer some key questions, gaining insights about the best segment and consequent business model. The respondent could further contact Berenschot, so that together they develop the best strategy. In other words, it was a sales tool for Berenschot (see appendix 10 and 11 for tool visualization and simulation).

## **2 BARRIERS FOR 3D PRINTING ONLINE PLATFORMS**

As it was previously mentioned, a crucial part of the Business Project was to find critical success factors that could be placed in each one of the identified segments.

Nevertheless, one subject that I found interesting and that I believe it will add value to the previous analysis is the identification of barriers and/or impediments that online platforms in the 3D printing industry can have. In other words, identify the factors that can lead to online 3D printing companies to fail, in opposition to the success ones discussed formerly. By performing this analysis, and putting together both Business Project and Work Project, it will be possible to have the most important list of factors that lead to the success and the failure of the majority of online companies in the 3D printing industry.

### **2.1 Approach**

Similarly to the approach followed in the Business Project, the exploration of barriers and impediments for 3D printing online platforms was performed through an analysis of the available literature and the conduction of interviews.

Since the 3D printing industry is very young and dynamic, there is little information available, especially in terms of literature and articles. As a result, for the sake of understanding the main problems of online platforms, a generic analysis had to be conducted. Nevertheless, since it was also important to have 3D printing related content, to be able to take more valid conclusions, three interviews with industry experts were performed, namely, with professionals from Shapeways, Protocow and Fablab. Crossing the two sources of information (literature and interviews) with a complete analysis of the major platforms in the 3D printing industry that were defined in the Business Project, it was possible to create a list of barriers and impediments. Furthermore, by taking into consideration the segmentation matrix also defined in the Business Project and referred previously, it was possible to position each of the most important barriers identified in the segment where they would have the biggest impact. In that way, three barriers (McKinsey, 2011) were identified for each of the seven segmentation dimensions, leading to a total of 21 barriers/impediments.

### **2.2 Findings**

In order to fully understand the main findings, it is important to differentiate between the ones derived from the literature in opposition to interviews.

### 2.2.1 Literature review

Regardless of the main barriers that the literature revealed and that it will be discussed later on, it is important to state that poor business performance and repeat patterns of existing behavior are signals and symptoms of failure (Thorne, 2000). For instance, important inhibitors for companies with online activities are: low customer use of e-business solution; uncertainty of financial benefits; limited size of target market; lack of time to start new projects; and the high costs of computing technology (Bowde et al., 2000). In addition, Anckar (2003) add to this list of inhibitors the absence of quality evaluation; the lack of trust in virtual sellers; the lack of personalized service; or the delivery times that are greater than offline shopping.

In a study made by Kanter (2001), he found out that companies with more than twenty years face fewer barriers than younger ones. Usually young companies do not possess a well-defined online strategy that completely fits into the business strategy. Since they do not have that much experience, it is hard to forecast which problems can arise and for that reason a lot of companies fail to survive (Bracke and Webb, 2000). Besides company's age and experience, another important issue is the way technology is integrated in the company. Several companies think that going digital is about having the right technology in place (Barua et al., 2001). However, going digital is about serving customers, creating unique value propositions, leveraging talent, achieving order of magnitude improvements in productivity, and increasing and protecting profits (Slywotzky and Morisson, 2001).

According to several authors, a clear distinction should be made between online platforms that serve businesses and individuals. Since the needs of each of the two groups of consumers are different, the issues that one group values' can be different from the other. As a result, the most important barriers will also differ per group.

For B2C businesses, S. Iglesias-Pradas et al. (2012) propose four main reasons for individual consumers not to buy products online: The perception that consumers have about the risk of making online transactions; the fact that they cannot see and touch the product; the lack of resources to engage with online buying, meaning the lack of internet connection or perceptions of the associated costs; and product related barriers such as shipping costs, product delivery and availability. Another important perspective is the one from Dubelaar et al. (2005) where they divide the main barriers and impediments into strategic, structural and management oriented factors (see appendix 12 for Dubelaar et al. list of barriers).

On the other hand it is also important to consider B2B barriers. Usually, B2B companies replicate offline business models into online ones. It is not that common to see a B2B company offering only online products and services to other companies. In that sense, Stockdale and Standing (2004) consider internal and external barriers as the two main sources of failure. In detail, they assumed that internal barriers could involve: the lack of understanding of the nature of Internet as a trading channel and its interactions with the other traditional trading channels; the limited incentive that online businesses give and the absence of culture of being the first mover, choosing a less risky approach; or the lack of some capabilities to trade in the global markets. Concerning external barriers, they believed that the lack of standards in exchanging information; and the lack of understanding and support to small and medium enterprises are impediments to the success of some companies. Another approach is the one made by Loukis et al. (2011), where they added some barriers regarding the difficulties of B2B companies to integrate online solutions with internal information systems; the inconsistency between the online strategy and the processes, rules and regulations; and the fact that results are often provided in an unstructured and difficult to process form.

Finally, it is very interesting to see that differences also arise when comparing developed countries with developing countries, since the technology and the access to it is more limited on the second group. In addition to those limitations Ksheri (2007) identified another barrier for Internet purchases in developing countries: the inadequate legal protection for online buyers.

### **2.2.2 Interviews**

In order to answer the need of collecting information specific to the 3D printing industry, three interviews were conducted.

Firstly, an interview with Peter Weijmarshausen (Shapeways, 2014) revealed the main concerns for one of the biggest players in the industry nowadays. According to him, the biggest barriers are the general lack of resources that each company needs to stay ahead of competition; the difficulty of dealing with big amounts of data; the need to differentiate yourself from the competition, since copying an online business it is very unlike to work; Not being up to date regarding technological possibilities, namely, having the newest materials, printers or techniques; and the lack of experience in dealing and growing an online business. Secondly, Wouter Pijzel (FabLab, 2014) considered that one threat was that consumers do not possess the knowledge to create their own 3D printing products since they do not know

how to deal with complex programs such as AutoCAD, Photoshop or similar. In addition, he referred the challenge to customize products within such wider markets, satisfying every consumer needs. Finally, Harold van der Hoeven (Protcow, 2014) highlighted the difference between owners of 3D printing platforms and users. For the first ones, is typical to use outdated processes and information, especially from traditional parties that worked for several years in the fabricating industry and adopt 3D printing a few years ago. There are also problems associated with company dependency, especially from companies that print the products. For the users, there is often some disappointment and consequent lose of interest, because 3D printing technic is advertise by media as being able to do everything and expectations are high. Additionally, users do not have the necessary support to solve their problems in using complicated software or in printing objects.

### 2.3 Results/recommendations

Taking into consideration the two main sources of information, it was possible to extrapolate some recommendations concerning barriers for 3D printing online platforms. Figure 1, shows the most important barriers per segment identified in this essay.

**Figure 1.** Final barriers for 3D printing online platforms per segment (Work Project, 2014)

B2B	B2C	Industry Generic	Industry Specific	Information providing & knowledge sharing	Enabling services & development	Own/third party production of tooling and parts
Duplication of offline assumptions	Risk perceptions	Unable to handle big data	Unready business partners	Slow response to market changes	Lack of specific knowledge	Technologically outdated
Internet as one way of interaction	Absence of a fully integrated experience	Lack of capabilities in global markets	Regulation flaws	Non-credible sources of information	Lack of common technological standards	Deficiencies in quality evaluation
Lack of personal service	Limited customer knowledge	Absence of customized offers	Lack of experience in the industry	Few revenue sources	Dependency from other players	Delivery times and availability

In order to clearly understand each of these barriers, it is important to explain the meaning and the way it is influenced by the 3D printing industry. In addition, a specific academic paper justifies the importance of the barriers chosen.

As it was already mentioned, not many companies were created with the original goal of taking advantage of the possibilities that the 3D printing industry creates. They usually limited their actions by incorporating this new technology into the processes and technics



they already possess (Dubelaar et al., 2005). Following the same reasoning, these types of companies tend to think in using a 3D printing online platform to communicate with customers and not for customers to communicate with them (Dubelaar et al., 2005). As a result, it is more difficult to understand customer needs. Finally, the lack of personal service in online B2B relations when compared to offline, will potentially damage the relation between the parties, since customer needs are not fully satisfied (Kangis & Rankin, 1996).

On the opposite side, B2C companies need to play with the different risk perceptions from individual consumers (S. Iglesias-Pradas et al., 2012). The lack of trust in the security of personal information and online payment methods, the fear of fraud and the fact that the 3D printing industry is so young and full of recent developments will restrict online transactions. In addition, for a 3D printing business to stay competitive it needs to deliver a good experience to the customer (Dubelaar et al., 2005). However, there are many companies in this field that, for example, fail to integrate attractive websites with important functionalities, customized products, trustful payment methods and a good range of products. In addition, since there is no face-to-face interaction between the company and the client, it is harder to know the customer and their beliefs. Also individuals do not purchase as often as companies. As a result, it is harder to know their purchasing patterns (Dubelaar et al., 2005).

Concerning Industry Generic, the fact that a company cannot efficiently take care of all the different data that such broad business generates can severely harm the business (Shapeways, 2014). Furthermore, for a business that serves several industries (generic) across the world (online), not being able to take care of import/export procedures, different currencies or shipping services is a death sentence in those markets (Stockdale and Standing, 2004). In the end, when having a generic business that does not focus in providing specialized solutions it is very difficult to customize the offer to every client, which is precisely one of the main flagships of the 3D printing technology (FabLab, 2014).

In opposition to generic platforms that do not distinguish between industries, Industry Specific involves serving at most three different industries (Business Project, 2014). As a result, business partners are key to be able to offer the necessary expertise, such as the one needed in the medical industry (Dubelaar et al., 2005). The fact that those partners are not ready for the challenge of 3D printing online business, it will result in the loss of competitive edge. In addition, since the 3D printing industry deals with sensitive and highly regulated areas such as the medical, automotive or aerospace, means there is no margin for error and both internal regulations as well as legal frameworks need to be clear and respected (Loukis

et al. (2011). Furthermore, to gather the necessary knowledge to serve such specific areas, time is the most effective way of acquiring experience (Shapeways, 2014).

For platforms with the goal of providing information, it is possible to assume that their response needs to be immediate so that they can provide the most reliable and credible information (Protocow, 2014). For that, their sources will play an important role too since no consumer wants to read something that is outdated or that is not entirely true (Sterntal et al., 1977). In addition, those 3D printing platforms will also face issues to become sustainable in the long term since their revenue stream is based in advertising (Laudon & Traver, 2009).

Regarding 3D printing services, such as the provision of 3D designs or software, the lack of knowledge in how to make or use this tools, respectively, will be a strong impediment to the success of any online business (FabLab, 2014). Additionally, these platforms often allow users to share, for instance, designs. Not having common technological standards among platforms, is going to interfere with the website usability and consequent experience (Loukis et al., 2011). Finally, companies that operate in this segment are often dependent of other players, since they are only intermediates and need, for instance, printer companies to sell printers so that they can sell their designs (Protocow, 2014).

Still considering the same dimension in the segmentation matrix but a different segment, the production of tooling and parts need to use the latest possible materials and printing techniques or the customer will turn to a competitor. In other words, there is no room to be technologically outdated (Shapeways, 2014). In addition, by not being able to touch and feel the product, so that the customer can evaluate its quality, is one of the main barriers that companies that sell products online have (Anckar, 2003). Finally, comparing offline and online businesses, the fact that the product is not immediately available and deliver to the client in store will not meet customer's need for instant gratification (Vassos, 1996).

## **2.4 Main limitations and risks**

It is important to refer that even if a company has some of the barriers mentioned, that does not mean automatic failure in the industry, but rather a lower probability to succeed. As a result, those barriers are not the opposite of the critical success factors from the Business Project. In addition, due to the lack of available information about 3D printing industry, some conclusions are based on generic information about online platforms. Finally, some of the research is based in articles with more then 10 years and since it is a very dynamic and fast moving industry, some of the findings can be outdated.

### **3 LEARNING REFLECTION**

After four months of intense effort, working as an external consultant for a consulting company (Berenschot), I can say the project was a success. The client was very happy with the recommendations and the team was able to successfully surpass some difficult setbacks.

The need to constantly report and ask for approval to Berenschot, the fact that the 3D printing industry was completely unknown for me, and some language constraints transform this project in a unique one during my master program.

#### **3.1 Previous knowledge from the master**

I would say that a key learning that I took from Nova's master to this project was how to manage teamwork. Due to the high number of group works performed at Nova SBE, it was clearly to me how to approach the challenge and to deal with team members and potential disagreements. In addition, by having courses like Marketing in a Dynamic World and Strategy where segmentation was approached and exercised several times, made the thinking process and the conclusions easier to reach. Moreover, Strategy in Global Markets and Brand Management way of performing environmental scanning was extremely important to know how to perform a complete and deep market research analysis.

#### **3.2 New Knowledge**

The learning experience on this project was extremely valuable. However, in the beginning of the project it was difficult to understand how could the team reach the desired outcome. In other words, it was difficult to see the big picture. Being obliged to deliver a project proposal with a carefully and methodical planning with concrete deadlines was one of the best practices that I took from this project and that I will apply for sure in the future.

In addition, I became very knowledgeable regarding the 3D printing industry, namely about the main players, processes, activities and drivers, and about digital markets and online platforms. This knowledge can be fundamental, as the world is turning more and more global.

Lastly, a fundamental framework used in this project to validate findings and recommendations was the MECE framework (Mutually Exclusive and Collectively Exhaustive). This tool was completely unknown for me, but a fundamental one for consultants to provide the best solutions to their clients.

### **3.3 Personal experience**

From what I have experienced so far, the best of my abilities will be better employed in a team. In this project, I believe my strengths were the availability to work in every topic, at any time, as long as needed; the critical outlook, asking questions and trying to come with different perspectives and ideas; making sure that every step was the right one to take in that moment; and finally, my leading capabilities, checking if everything was understood by everyone, at the same time as trying to have the big picture of the project in our heads. On the opposite side, as weaknesses, I believe I need to give space for others to talk and listen more carefully their positions. In addition, I need to be able to overcome uncomfortable situations with other team members, without resent from it. Finally, I believe I should try to be as honest as possible and tell what I truly think about my colleagues' work.

In order to solve all the issues mentioned previously I believe honesty will be the key. I need to be honest with myself, identifying and accepting situations where I overlap someone. On those situations I need to let my pride aside and be able to apologize and remain quite. In addition, I need to be honest with others by telling when things are not as they should and letting them assume responsibility for their mistakes. As a result, I will stop putting all the workload left from someone else's errors on my shoulders.

### **3.4 Benefit of hindsight**

Having the Business Project in retrospective I believe that the set of practices that contributed for the success of the project entail the good working environment among team members and Berenschot team, the allowance of ideas to flow and settle by giving time to discussed every issue in detail and the careful and rigorous planning of the project guaranteeing that the group knew always what issues to tackle next.

On the opposite side there were also some ineffective practices or setbacks that I would have managed differently. The lack of internal feedback was indeed one of the major issues with the group. Some team members were clearly underperforming and the issue was not addressed and solved when it should. Moreover, the team chose not to assign any specific roles. If on one hand it was good because allowed the team to be more flexible, on the other hand resulted in some overlapping of work and time wasting. Finally, it was extremely difficult to conciliate both university and company perspective regarding the project. Erasmus University demanded a more academic work, based on available literature, while Berenschot wanted some practical insights about the opportunity that the 3D printing market presented to them. In the end, a better management of both parties' expectations was needed.

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- ManSYS project. Retrieved from <http://www.mansys.info/>

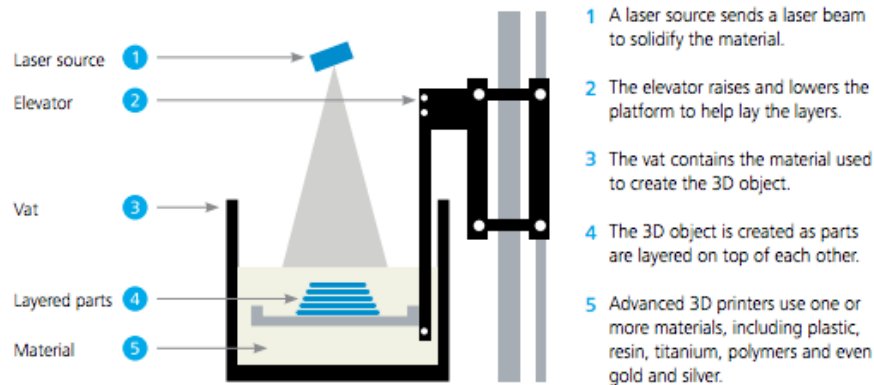
#### **4.3 Interviews** (Performed between June 9<sup>th</sup> 2014 and June 20<sup>th</sup> 2014)

- Peter Weijmarshausen (CEO - Shapeways, 2014)
- Wouter Pijzel (Managing Director – FabLab, 2014)
- Harold van der Hoeven (Marketing – Protocow, 2014)

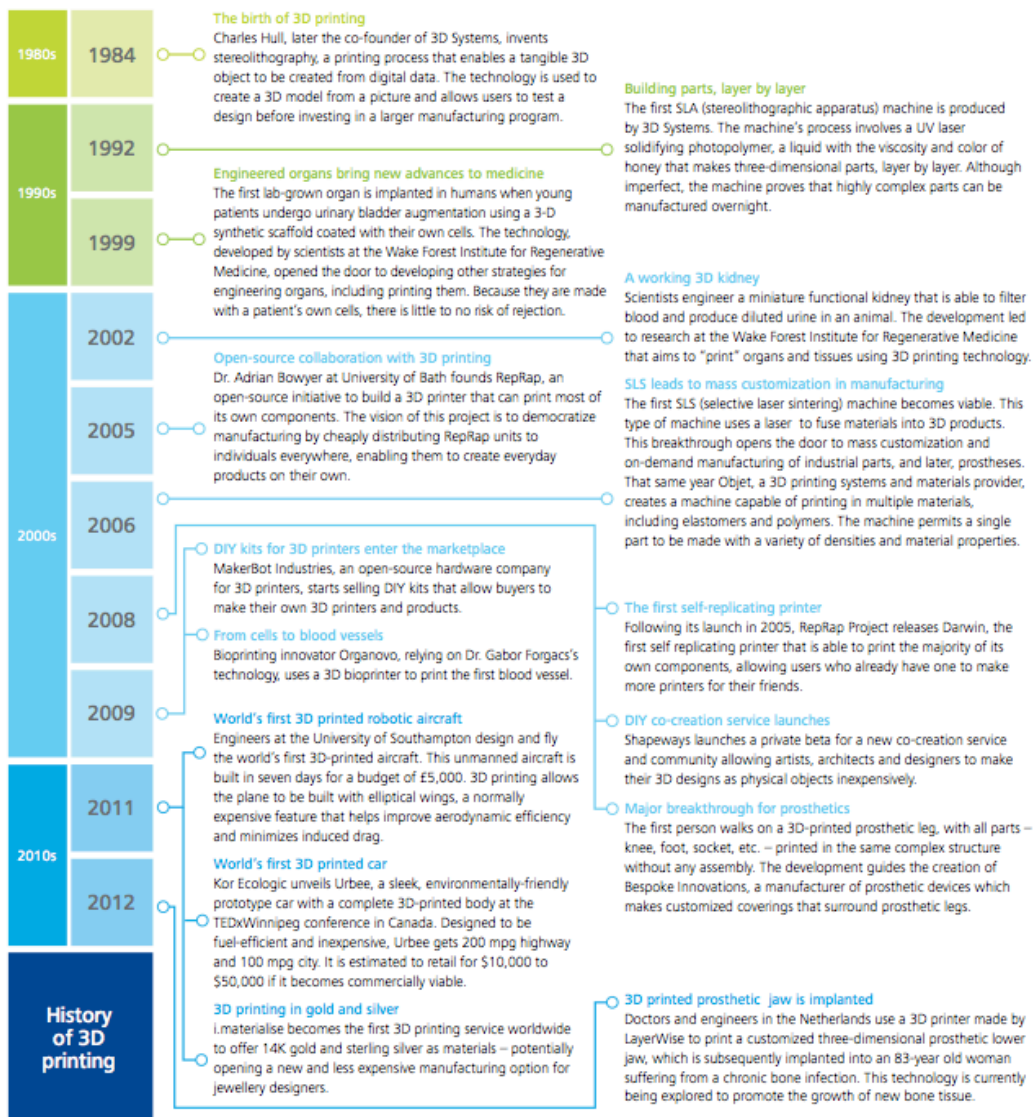
## 5 APPENDICES

### Appendix 1 – 3D printing process (Deloitte, 2013)

3D printers work like inkjet printers. Instead of ink, 3D printers deposit the desired material in successive layers to create a physical object from a digital file.



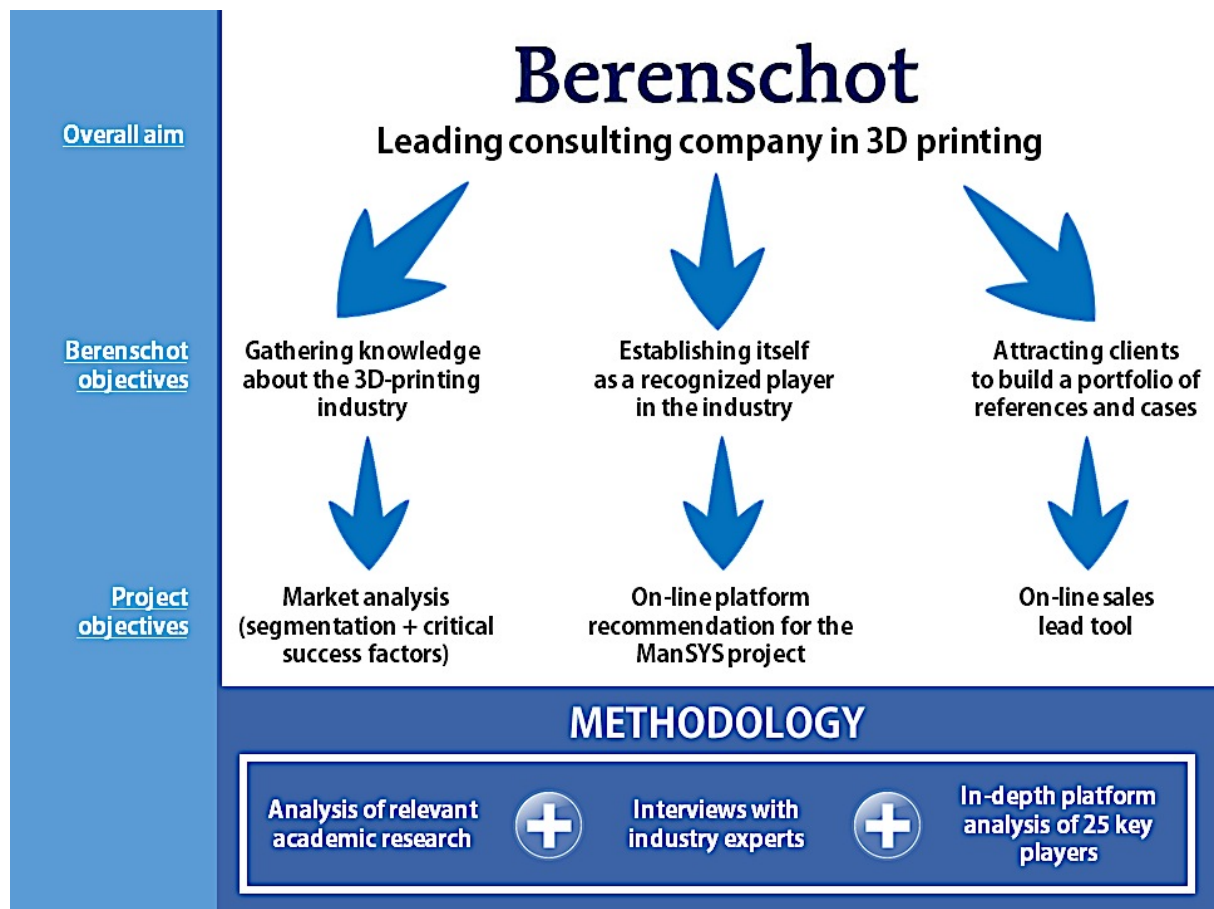
### Appendix 2 – History of 3D printing (Deloitte, 2013)



**Appendix 3** – Global opportunities for 3D printing (Forbes, 2012)

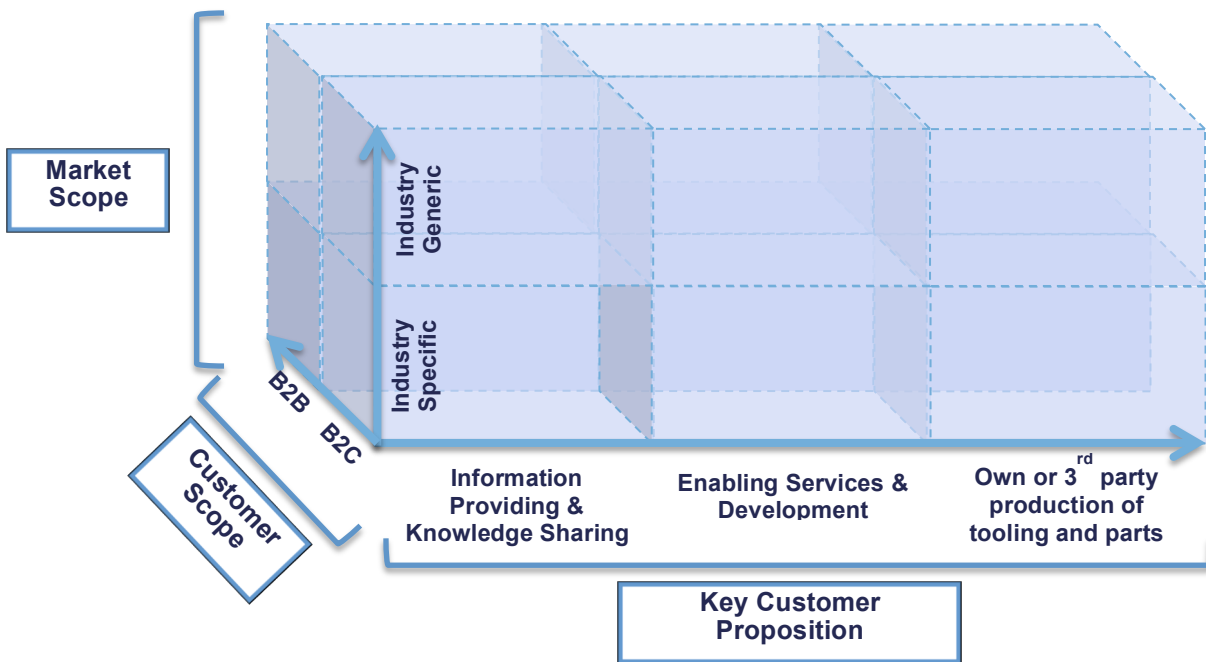
		Target user		
		Consumer	Small to mid-sized business	Corporations
Printer readiness	In need of further R&D		<ul style="list-style-type: none"> <li>• Organ Replacement, \$30B</li> </ul>	<ul style="list-style-type: none"> <li>• Furniture, \$20B</li> <li>• Consumer electronics, \$289B</li> </ul>
	Nearing commercial use	<ul style="list-style-type: none"> <li>• US Prepared food, \$23B</li> </ul>	<ul style="list-style-type: none"> <li>• Bicycles, \$6B</li> <li>• Guns and ammo, \$11B</li> <li>• Global apparel, \$1T</li> </ul>	<ul style="list-style-type: none"> <li>• Life sciences R&amp;D, \$148B</li> <li>• Home building and improvement, \$678B</li> <li>• Power tools, \$22B</li> </ul>
	In use	<ul style="list-style-type: none"> <li>• Craft and hobby, \$30B</li> <li>• Animation and gaming, \$122B</li> </ul>	<ul style="list-style-type: none"> <li>• Medical prosthetics, \$17.5B</li> <li>• Retail hardware, \$22B</li> <li>• US Auto parts stores, \$40B</li> <li>• Toys, \$80B</li> </ul>	<ul style="list-style-type: none"> <li>• Industrial R&amp;D (for Prototyping), \$23B</li> <li>• Aircraft and defense R&amp;D, \$9B</li> </ul>

**Appendix 4** – Infographic summarizing the project (Business Project, 2014)





**Appendix 5 – Final segmentation matrix (Business Project, 2014)**



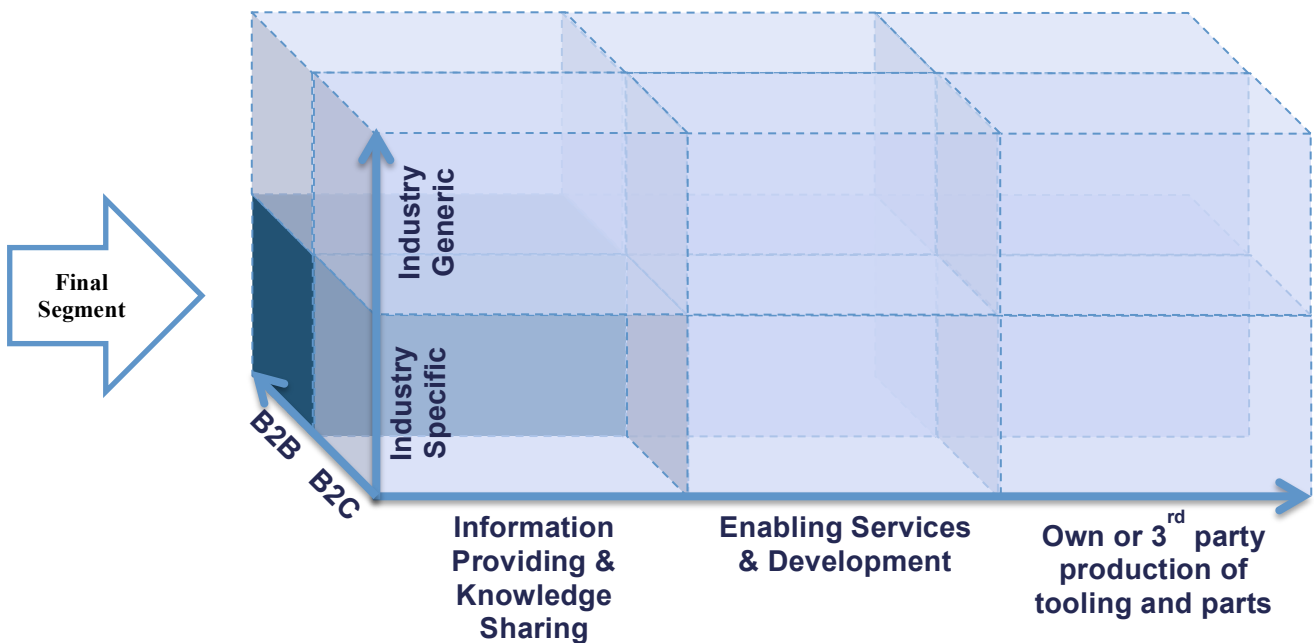
**Appendix 6 – Axes description of the final segmentation (Business Project, 2014)**

<b>Customer Scope</b>	<b>B2C</b>	<b>B2B</b>	
	<ul style="list-style-type: none"> <li>A company mainly serves <b>consumers</b></li> </ul>	<ul style="list-style-type: none"> <li>A company mainly serves <b>businesses</b></li> </ul>	
<b>Market Scope</b>	<b>Industry Specific</b>	<b>Industry generic</b>	
	<ul style="list-style-type: none"> <li>A company serves clients from <b>three or less different industries</b></li> </ul>	<ul style="list-style-type: none"> <li>A company serves clients from <b>more than three different industries</b></li> </ul>	
<b>Key Customer Proposition</b>	<b>Information Providing &amp; Knowledge Sharing</b>	<b>Enabling Services &amp; Development</b>	<b>Own or 3<sup>rd</sup> party production of tooling and parts</b>
	<ul style="list-style-type: none"> <li>End customers are mostly concerned with <b>information and knowledge</b> provided through the company</li> </ul>	<ul style="list-style-type: none"> <li>End customers are mostly concerned with <b>enabling services and development</b> provided through the company</li> </ul>	<ul style="list-style-type: none"> <li>End customers are mostly concerned with <b>production of physical products</b> provided through the company</li> </ul>
	<ul style="list-style-type: none"> <li>- News</li> <li>- Knowledge center</li> </ul>	<ul style="list-style-type: none"> <li>- Design</li> <li>- Quotation</li> <li>- Software</li> <li>- Prototyping</li> </ul>	<ul style="list-style-type: none"> <li>- Printers</li> <li>- Materials</li> </ul>

**Appendix 7** – Total list of critical success factors per segment (Business Project, 2014)

B2B	B2C	Industry generic	Industry specific	Information providing & knowledge sharing	Enabling services & development	Own/third party production of tooling and parts
Customer relationships	User friendliness	Big user base and/or community building	Deep understanding of industry	Value added & user-generated content	Customization & creativity	Strong Partnerships
Quality assurance & process control	Security & privacy	Scalability of business model	Trust & credibility	Agility & flexibility	Standardization of data formats and processes	Flexibility & speed of quotations
Focus on product features	Focus on experience/emotion/engagement	Branding & positioning	Customer satisfaction	Knowledge & expertise	Unique value proposition	Reliability & quality

**Appendix 8** - Final recommended segment for the ManSYS project (Business Project, 2014)

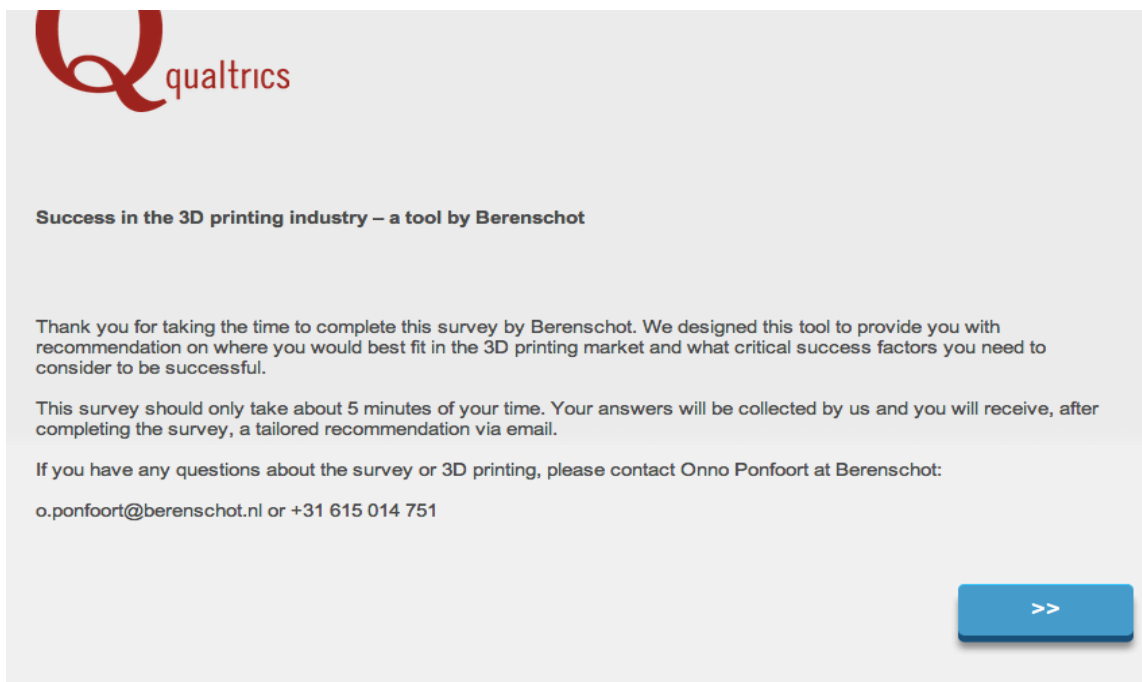


**Appendix 9** – Critical success factors for the ManSYS project (Business Project, 2014)

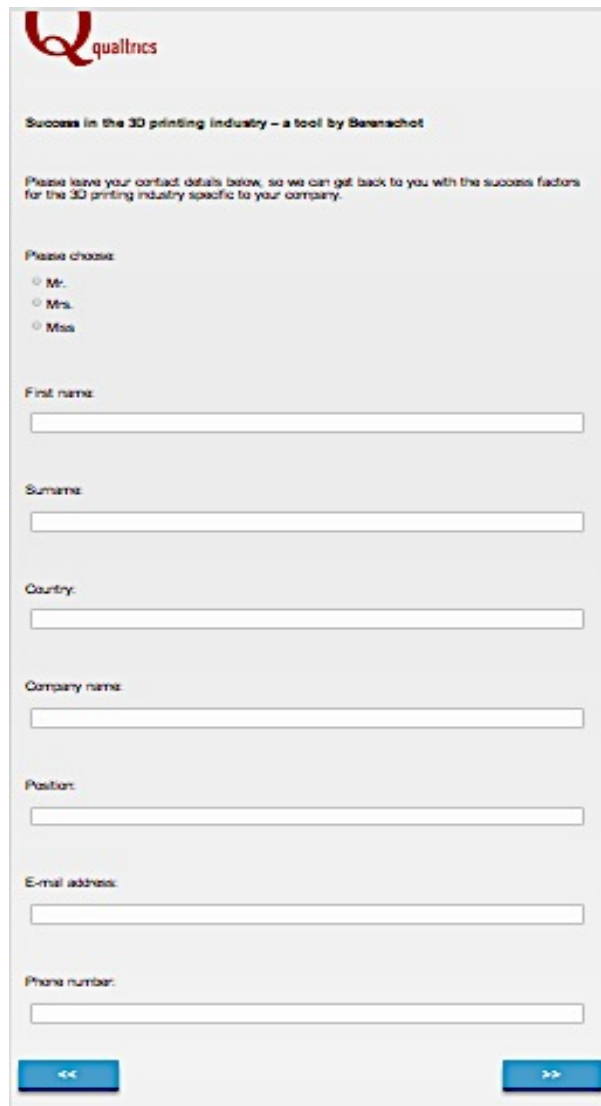
B2B	Industry specific	Information providing & knowledge sharing
Customer relationships	Deep understanding of industry	Value added & user-generated content
Quality assurance & process control	Trust & credibility	Agility & flexibility
Focus on product features	Customer satisfaction	Knowledge & expertise

**Appendix 10** – Online tool screenshots, step by step (Business Project, 2014)

Step 1:



Step 2:



The image shows a contact form for 'Qualtrics'. At the top left is the Qualtrics logo. Below it is the title 'Success in the 3D printing industry - a tool by Baranachot'. A paragraph of text asks the user to leave contact details for success factors. The form includes a gender selection (Mr., Mrs., Ms.), and input fields for First name, Surname, Country, Company name, Position, E-mail address, and Phone number. Navigation buttons '<<' and '>>' are at the bottom.

**Qualtrics**

Success in the 3D printing industry - a tool by Baranachot

Please leave your contact details below, so we can get back to you with the success factors for the 3D printing industry specific to your company.

Please choose:

- Mr.
- Mrs.
- Ms.

First name:

Surname:

Country:

Company name:

Position:

E-mail address:

Phone number:

<< >>

Step 3:

Success in the 3D printing industry – a tool by Berenschot

**1.1. Who are your main customers?**

- My current customers are primarily active in businesses or industrial markets (>66% B2B)
- My current customers are primarily end consumers or active in consumer markets (>66% B2C)
- My current customers are catering to both business and end-consumer markets (B2B & B2C)

**1.2. What is your main purpose for investing in 3D printing?**

- I plan to invest in 3D printing in order to attract new or keep current customers in the B2B arena
- I plan to invest in 3D printing in order to attract new or keep current customers in the B2C arena
- I plan to invest in 3D printing in order to attract new or keep current customers in both the B2B and B2C arenas

**2.1. What is the focus of your activities at this point in time?**

- My current products/services are generic and not tailored to a specific industry
- My current products/services are industry specific; I focus on 1 to 3 specific industries
- My current products/services are industry specific; I focus on 4 or more different industries

**2.2. What will be the focus for your investments in 3D printing?**

- My main focus will be on generic applications or services
- My main focus will be on applications or services for specific industries
- I do not have a specific focus for my investments yet

<< >>

Step 4:

3. What do your business activities mainly entail (more answers possible)?

- My main business activities entail providing information, creating a community, and/or sharing knowledge
- My main business activities entail providing intangibles like research and development, services, consultancy, software
- My main business activities entail the production and sales of tangible physical products (parts, components, prototypes)

4. Are your business activities currently on-line or off-line?

- My business activities are currently primarily offline
- My business activities are a combination of online and offline
- My business activities are currently primarily online

5. How important do you think 3D printing (additive manufacturing) will be for your company?

- 3D printing will be an addition to existing business activities
- 3D printing will be replacing existing business activities
- 3D printing will be the primary business activity
- 3D printing will have a limited effect on our business activities

6. Is 3D printing (additive manufacturing) currently part of your business activities?

- I am currently active in the field of 3D printing (additive manufacturing)
- I am currently not active in the field of 3D printing (additive manufacturing)

<< >>

Step 5:

Success in the 3D printing industry – a tool by Berenschot

Thank you for taking the time to participate in this survey. We will contact you in the near future with your results and point out critical success factors you should follow to prove successful in your recommended segment.

Please click the double arrow button below (on the right) to end the survey and share the results with us.

If you have any questions about the survey or 3D printing, please contact Onno Ponfoort at Berenschot:  
o.ponfoort@berenschot.nl or +31 615 014 751

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## Appendix 11 – Simulation of an email sent to survey respondent (Business Project, 2014)

### Developing your business with 3D printing

Dear Mr Tillema,

Thank you for taking some time and using our high level checklist on 'Business Models for 3D Printing'.

#### Your Results:

My current customers are catering to both business and end-consumer markets (B2B & B2C). I plan to invest in 3D printing in order to attract new or keep current customers in both the B2B and B2C arenas. My current products/services are generic and not tailored to a specific industry. My main focus will be on generic applications or services. My main business activities entail providing intangibles like research and development, services, consultancy, software. My business activities are currently primarily offline. 3D printing will be the primary business activity. I am currently active in the field of 3D printing (additive manufacturing).

Based on your answers we can give you some first indications on the key competencies you need to possess for successfully entering the 3D printing arena.

#### Regarding the main market segment you focus on:

- **Customer relationships** - Long term customer relations are essential. Thorough understanding of your customer's strategic goals and demands, and the benefits of 3D printing to achieve them, is crucial.
- **Quality assurance and process control** - In order to successfully serve businesses, you need to ensure consistent product quality. 3D printing process monitoring, with track and trace functionality is a key requirement.
- **Focus on experience and engagement** - Customer motives to purchase products are often not rational. Interactive elements like polls, games or 3D printing simulations on your website increase the engagement.

#### Regarding your industry specific choices:

- **Large user base and community building** - A well-populated community of users and 3D printing experts, with diverse backgrounds from many different industry sectors, is required to make your website an informative resource.
- **Scalability of the business model** - To establish a large user base, your business model architecture should allow for incorporating 3D designs and ideas, fast growth and easy connectivity with other networks and services.
- **Thorough understanding of the industry** - In-depth knowledge of the industry you focus on, needs to be apparent. Your choice of adaptations and additional features, and your explanation of the benefits of 3D printing need to relate to industry specific situations and demands.

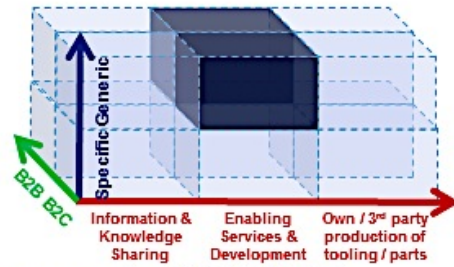
#### Regarding your main proposition:

- **Customization and creativity** - The possibility to customize or profit from creative insights from others is important to fulfill specific customer needs. A position in 3D printing technology or material development is beneficial.
- **Standardization of data formats and business processes** - Specific 3D printing standards are not yet available. Your own protocols and processes need to be well defined, clear and undisputed to be used as the basis for interaction and contracts.
- **Unique value proposition** - 3D printing offers unlimited possibilities to develop a unique value proposition. Especially when offering services or software, integrating 3D printing in your activities gives a competitive advantage.

Although these tips are somewhat generic, they do indicate the areas where you need to outperform competitors to be successful. Please feel free to give us a call to further discuss your 3D printing plans.

**We are looking forward to hearing from you.**

The Berenschot 3D printing team



**Berenschot**

Please contact **Onno Ponfoort** at Berenschot  
[o.ponfoort@berenschot.nl](mailto:o.ponfoort@berenschot.nl) or +31-6-15014751  
or visit [www.berenschot.nl/thema/3d-printing](http://www.berenschot.nl/thema/3d-printing)



## **Appendix 12 – Common e-business impediments (Dubelaar, Sohal and Savic, 2005)**

### Generic factors

- Internal resistance including employee and management resistance to change.
- Unready customers.
- Lack of top management support.
- Technology deployment including issues related to selection of appropriate technology or budgetary constraints.
- Internal constraints including unsuitability of existing business processes for e-business cannibalization of sales by Internet based channels.
- IT infrastructure including issues related to integration of legacy systems with new technologies.
- Unready business partners.
- Generic e-business issues including security and privacy.
- Limited knowledge about customer trading patterns, very few performance measures in place, little in-house technical expertise, and limited trading options.
- Online and tendency to respond slowly to market changes.
- Absence of fully integrated online experience.
- Inadequate response to market changes.
- Problems with site speed, systems capacity, integration with backend systems.

### Strategic factors

- Creation of web activities without major interruptions to the core business.
- Duplication of traditional business assumptions online.
- Comparison of performance with traditional industry competitors in the physical world and dismissal of online competitors.
- Perception that Internet is an opportunity for company to communicate with customers, not for customers to communicate with them.

### Structural factors

- Internet is adopted and related activities are sprinkled throughout the company with no direct connection to the core business.
- E-business division is kept separate and disconnected from the core business.

### Management-oriented Factors

- Under-commitment of resources and assignment of e-business responsibility to executives with no subject expertise.
- Lack of in-house technical and web skills results in choosing inappropriate vendors for development of e-business solutions.
- Insist that an Internet venture meet every corporate standard, without committing sufficient resources, both staff and economic.
- Celebrate conversion to e-business by requiring changes from people they are confused about making.