MINDSETTR

Denmark, www.thingiverse.com/Mindsettr

A science-based start-up implements a crowdsourcing approach to stimulate user awareness of the new solution and mobilize external experts for refining the concept

Executive Summary

A start-up company, which was formally founded in August 2015, has introduced a totally new concept for a plug'n'play headset device that lowers the entry barriers for neurostimulation. The key value proposition is in making the user a better problem solver and creative thinker via neurostimulation, which is safe and easy to apply. From the concept development stage the company has been actively utilizing external sources of knowledge and expertise (building and maintaining relationships with individual experts, research teams, lead users and other companies), while also sharing in-house expertise and knowledge externally. After growing the staff to seven employees, the company downsized on purpose to 2 key staff while building a stronger external team (individuals hired on a project basis). The SME is not just a company but a crowdscience project, which runs a community of neuroscientists, engineers, developers and creative contributors. The company finalized its first patent application in December 2016.

CASE N°: SC96

SECTOR: CONSUMER ELECTRONICS

TECH INTENSITY: HIGH-TECH

LIFE CYCLE STAGE: START-UP

INNOVATION VECTORS: PRODUCT, PROCESS, ORGANISATIONAL

OI PARTNERS: PSR, OTHER SME, MUNICIPALITY, INDIVIDUAL EXPERTS, LEAD USERS/CUSTOMERS, CROWDSOURCING, OPEN SOURCE PLATFORM

KEYWORDS: Neurostimulation, headset, neuroscientific development, new medical technology, boosting creativity, crowdscience project, community

BACKGROUND

Mindsettr offers a headset which enhances creativity through neurostimulation. The company was founded in August 2015 by two people. One of the co-founders has a strong scientific background in neurostimulation, creativity development, design thinking and innovation management and works in the university and research institution which supports the company as a crowd-science project. Another co-founder is specialized in hardware and software development.

The origins of neurostimulation technology are to be found in medical research where it was initially used for such purposes as memory training and the rehabilitation of stroke patients. More recently, the technology has been used for training pilots, military training and for professional athletes. Our brain is basically an electrical grid. Neurostimulators like the one developed by Mindsettr work by adding a micro-dose of electricity similar to that of the brain's natural processes. This temporarily changes the type and location of the natural brain activity. The modulation only influences the already on-going processes.

One of the key issues for developing the business was, and still is, a lack of understanding of neurostimulation processes among the general public. As all of us are taught from childhood to stay away from everything that is electric, people have a built-in fear of electricity. Moreover, most people do not understand well how the brain works. At the same time people still tend to search for ways to boost their brain activity, often by taking chemical substances (painkillers, caffeine, nicotine, all types of drugs, including illegal ones). Those chemicals actually interfere with the brain, and most people take them without actually realizing that they are manipulating their brain. On the other hand, when they are offered to use a headset and apply electro-shocks directly to their head (which is actually a side effect-free treatment), people have apprehensions.

This case relates how Mindsettr used a variety of external sources of knowledge to overcome the business challenges, while also fighting the general public's apprehension of neurostimulation and educating potential users.

INNOVATION CHALLENGE & MARKET OPPORTUNITIES

The idea behind the product (a headset enhancing creativity through neurostimulation) came to the co-founders back in 2011. The innovative idea was entirely their own (internally developed) concept which was supported both by the co-founders' background and experts in the field with whom they had links. However, the market was not ready for their product in 2011 as there was a distinct lack of knowledge and information about neuro-stimulation, both in the scientific and user communities. Back in 2011 the concept was so new that the co-founders never thought any consumer would ever understand what it was.

Around 2014-2015, some intensive activities in the neurostimulation domain started to occur around the world, e.g. the US company Thync (https://www.thync.com/) launched a similar (but not a directly competing) product for which it received a lot of funding and attention. Thync spent all their marketing budget on the new product. At the same time, the movement, which slowly started around 2005, began to intensify. Public awareness of neurostimulation and the spread of devices which measure it on the skull had started to increase. This was a very positive development for Mindsettr as more people got a more rational idea about how the brain actually runs on electricity and even experienced wearing a device on the head to measure the brain's signals. These all constituted signs for the company's co-founders that the time was now ripe to launch their business.

The market opportunity for the product was difficult to capture back in 2011 due to two key reasons. First, there were no identical type of product on the market yet and even though the technology itself was well developed, the company still had to make the actual product to a large extent from scratch. The second reason was a lack of awareness of the technology among end-users. At the moment of the interview in 2016, the market had still not revealed its full potential. According to the company's co-founder there are currently two companies using similar technology in their products, but their offering is still different to that of Mindsettr.

The ultimate long-term goal of the company is to offer a product for medical use. For that reason they plan first to launch a consumer product which is medical grade, but not necessarily medically approved. Then, based on the feedback from the

first users and test observations of the product, they will start the process of documenting and applying for medical purposes. In this way, the consumer market is supposed to become a kind of gate to the medical market.

OPEN INNOVATION TRAJECTORY

Concept development

Already at the concept development stage, a number of external sources of knowledge were used by the company. The four key types of external knowledge sources were:

1. **Open source project and expert online communities** – 'the best sources of basic knowledge': The company's co-founder notes that input from these communities, which is entirely voluntary ('give and take' principle), was not only helpful, but necessary for the quick development of the concept. Among those communities, Mindsettr highlighted three:

- The open source project called OpenBCI (https://openbci.com/), which developed a 3D printed EEG headset. It was used a lot by the company, particularly at the proof of concept and prototyping stage. The OpenBCI made a product using technology which is the opposite to that used by Mindsettr. In Mindsettr's product electricity is being sent into the brain, while the OpenBCI product is reading the electricity coming out. Nevertheless, a lot of the design challenges are the same for the two products. Mindsettr used OpenBCI open source parts and components and added their own. In return, Mindsettr then published their 3D printing files and specs in the OpenBCI community, in case other developers were interested in using their framework for stimulation instead of reading. In this way, they actually contributed to the other project as well. Mindsettr's first prototype was therefore based on the OpenBCI framework. From then on the company underwent a closed, internal concept development phase, where the lead designer basically did the work all by himself.
- Information was shared on Reddit (https://www.reddit.com/), the technology interest group / Internet forum, where more than 8 000 people are asking questions, sharing information and links to articles and discussing, amongst other things, topics regarding the type of technology that Mindsettr was using. Even though Reddit is 'sort of the most anarchistic place in the Internet', where many users are 'just hanging out to troll others' questions' (which makes Reddit not a very user-friendly source), and 90% of the comments are generic, the other 10% were highly valuable to the company.
- A couple of open-source biohacking groups, like NeuroTechX, that are self-publishing about the work they do.

2. **Potential users**: The company had close collaboration with potential future users throughout the whole project. The team was very active in user involvement also at the early stage, at the the very front-end of the innovation – at the proof of concept and prototype stage. Mindsettr created a programme called the Pioneer Programme, which is a programme consisting of 25 users who have paid to be part of the development programme. They supported product development, tested the prototypes and gave feedback to the development team. It was a mixture of the co-founders' friends, family and network, but also outsiders interested in the product development. It was critical to try the product on as many heads as possible to make sure that the headset was comfortable and fitted all kinds of head, given that people have extremely different shaped heads.

3. **The company advisory board**: At the moment of the interview it was a team of 26 people - experts from very specific domains with experience from marketing to mechanics and production to FDA (Food and Drug Administration) regulations, etc. The co-founder named this knowledge source as the most important one for fast concept and product development, as they were able to get an answer to any question in a couple of minutes from the advisory board experts.

4. **Business incubators**: The company had experience of two different incubators. The team spent the first year in a small, user-centred/ interaction design-type of incubator, which was a very useful experience for the early stages. At the beginning of September 2016 the team moved into a high-tech physical product incubator. This incubator currently has on board more than 20 companies, all of which working in hardware, which, according to the company co-founder, is quite hard to find in Copenhagen. That has been a 'very nice place to be', also from the point of view of being able to talk to the right people and finding

the right resources.

The development process, IPR and competition strategy

After a series of development rounds, which were carried out mainly internally – apart from a series of product tests with potential users, the product concept was locked. According to the co-founder, locking the concept too quickly was the biggest mistake the team has ever made, because they did not explore multiple concepts: 'We just went in one direction and then we kept developing in that direction and we never really challenged the direction. Whenever we had feedback from all the users (we've had hundreds of users testing in various stages of development), we never used that feedback to change the actual concept. ...One of the most classical mistakes you do in product design is involving the users in verifying what you already designed instead of using them in the process of figuring out what to design.'

In the end, the team had to re-evaluate the concept, go back to concept design and make a completely new concept - which is performing much better than the one they started out with. However, this cost time, which would have been saved if the concept had not been locked too early.

In terms of IPR, Mindsettr used the framework of the OpenBCI open source, parts and components, as a basis for developing their product (headset) and in return published in the OpenBCI community their 3D printing files and the specs. The company filed for a patent application for specific novel aspects of their own technology in December 2016.

The USP of the company is: 'You can choose which type of mindset you will be in, while you work... using a plug and play, side effect free neurostimulation headset' – and such a product is not yet provided by any existing solution. Mindsettr has had quite fruitful communication with the three companies which offer the most similar products. They have not directly discussed any partnerships but the team was planning to have a workshop with one of them in order to share their learnings and challenges. Since their products 'will never be direct competitors', it is a win-win initiative for both sides.

One of the other two companies was very interested in learning from Mindsettr, but not willing to share anything in return. The third company was very interested in learning and sharing but not in doing any joint work. They were very curious to hear what Mindsettr was doing and were quite open and shared at least more information than could be found online. They have also been contacted by a Pakistani start-up that is doing something similar. Even though this start-up is the closest to a direct competitor, Mindsettr shared some information with them (information which was not public at that moment, but which would become public anyway), since the start-up is still years from the market (they have the idea and a prototype).

Mindsettr named the **delays that they experienced as being the key business development challenge** and explained that all the processes (product designs, software, electronics – everything, except the patent application process) were delayed, citing the team's over-optimism about timescales.

In terms of fundamental competitive strategies, for the moment and for at least a few years ahead, the company plans to follow a combination of a niche market strategy (as their product offering is unique and the market is still developing) and a cost reduction strategy (i.e. the product saves users time in getting into the right working mode). However, in the long run and provided that the company grows, the team aims to pursue a mass market strategy by maintaining its pioneer position and targeting the medical device market.

Commercialization and follow-up

Mindsettr has been selling prototypes, but this is not really scalable. The team is currently building the scalable product which will be ready for mass production. The huge problem with the whole product category is communicating about the product and educating users. The company has to educate users about what the product is, how to use it, convince them that it is safe, what are the (expected) negative consequences, in short everything you can expect to get out the product. The other similar products on the market or similar innovations struggle a lot with the same challenge.

One patent application is pending; there are no plans for licensing so far (too early).

During its first year, which was a time of intensive concept and product development, the company went through a series of organizational restructuring. After the company started as a team of 5 people they added 2 people within the first couple of months, so, by Christmas 2015 there were 7 people in the team. It was a fully self-funded company running with no salaries and saving money. Then in January-February 2016 they re-arranged the team and went back to 5 people. Since then the company has received more money

making it possible to employ staff full-time on the project with a salary. On 1 December 2016 the company re-arranged the team again. It went down to 4 people and in January 2017 it was supposed to be a 3-person team.

The company is currently building up a stronger external team so that there will be a core team of 3 people with a handful of externals who are hired on the project but with no ownership. The company management assumes that the smaller their organization is the more they will rely on externals, who in the long run might become part of the core team. At the beginning it is more about trying to find the knowledge they need outside the company because the core team members 'know, what they don't know'.

According to the co-founder **the biggest mistake the team has made in terms of internal collaboration has been that they might have been too silo-based** even in the small team. The people in the team had very clear distinct areas for which they were responsible. The person in charge of the product development did not include other people as that was 'his area'. Everyone was working on certain things individually, and the team didn't integrate the knowledge enough and therefore a more holistic picture of the product and the business was missing.

The company has had some good media coverage in Scandinavia, in the UK and for one activity in the USA. A couple of those have been a collaboration with newspapers on how to educate people and what the product is really about. Mindsettr has also started the process of hiring multiple marketing experts to get help in planning the education of users, but so far the media coverage, in combination with small-scale marketing consulting received from the outside, has been enough.

Mindsettr brought on board all the best designers they know. They run short, compact workshops with external designers, which have very concrete expertise within the design domain, and the core team makes iterations with user involvement in between the workshops. In this way, they take one step in design and then one step with users and one step with design. Everything is done in a workshop format where they include people they can get in contact with (the outermost experts). The team has used the same model with electronics. They have been meeting with a handful of external design agencies as well as with external product development departments. Instead of setting up an entire department inside the company, they are considering to hire one externally.

BUSINESS IMPACT

Mindsettr's headset is a very complex product for which a number of very narrow fields of expertise are required, ranging from electronics to software and product design to user experience. If taken together, the company would need a team of 50-60 such experts from various fields. At the same time many tasks are only one-off tasks, so there is a need for the right person to help out only once. The list of the domains and expert contributions required was endless for the product development, and Mindsettr could not physically hire everyone who was necessary. It was one of the company's key skills from the very beginning to be able to understand the value of contributions by external experts and the leverage which the company's network could have on product and business needs.

The company realized early on that it takes less time to track down the person who knows most about a certain subject and involve that person instead of trying to become an expert yourself.

The bottom line impact for Mindsettr was created by the advisory board. In the first two months the team signed up about 20 advisors and then added or subtracted people depending on the challenges they faced. If they had not chosen that route from the very beginning they would still have been at the prototyping stage. Speed of action has surely been the biggest benefit that the team gained thanks to their efforts in building and leveraging their advisory board. The key challenge was bringing together the varied disciplines and tasks required - electronics, medical aspects, production, 3D printing and prototyping – and it was in those areas that Mindsettr received the most support from outside.

LESSONS LEARNED

This case shows how a high-tech solution can be extracted from the totally new medical sector of neurostimulation in the form of a complex physical device like a headset. The team had the courage to introduce a totally new and sensitive concept to the market where there is no one to show the path to take for this particular product. The case illustrates well the crucial need for both the contribution of external experts and the involvement of users when developing complex high-tech products.

This case also demonstrates that sometimes a smaller size company can be more efficient in leveraging sources of external knowledge as there

is no need and actually no resources and no reason to hire experts for every required domain.

Main lessons learned:

1. ‘Know what you don’t know, and as a team always try to have an updated list of what we know and what we know that we don’t know, and then find the right people quickly and get them to help you to sort out those things’.
2. ‘Don’t be afraid to ask, because if you address the experts in the right way, they love to contribute. If you acknowledge their expertise and the fact that they know more than you do, then people are extremely helpful when it comes to sharing’.
3. ‘Make sure that you actually use the right people externally; often the people who come to you are not the people you would like to use. In other words, make sure that you actually investigate the people you are going to work with in depth before involving them, because if you involve the wrong people you may waste a lot of time before you figure it out’.

According to the co-founder, 90% of the external advisors were identified through networking and the other 10% through research by Googling the people who are the best in a specific domain. In terms of maintaining these relationships, the key advice is in respecting the different needs external people have. Some people need to be ‘kept warm’ – so, keep getting back to them, keep sending them updates, keep inviting them, because they want to be in the loop even though you do not necessarily need their feedback at that point. Others prefer not to be contacted unless it is specifically important for them.