TUM School of Management Case Center
Technische Universität München

HIGGS (A) - Multi-perspective Live Streaming

Nicole Beaven

TUM School of Management Case Series

Case: #TUM-2019-013

First published on: 01.11.2019; last revised on: 04.04.2022

This case was developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

HIGGS

A Wake-up Call

"I've finally got it! I know precisely what we should do!" came out of the phone's speaker very loudly, considering it was not yet seven o'clock. It was a rainy March morning in 2017 and a rudely-awakened Glenn Glashagen was on the phone to his co-founder Jakob Bodenmüller who, having spent much of the night brooding over how exactly to create a scalable business model for their company HIGGS, had finally had what he considered to be a ground-breaking brainwave. Jakob seemed beside himself with excitement, and rang up the founding team one-by-one: they all *had* to meet immediately in their office!

Going through his morning routine, Glenn reflected on the past year, which had seen the HIGGS team try to deploy their Fraunhofer-licensed live video streaming technology in a series of markets. While they had not been short of positive feedback, the team had struggled to identify *the* opportunity: a large enough market niche in which they could scale up their venture. As he felt his morning coffee finally kicking in, Glenn had to admit he had become genuinely excited to hear that Jakob thought he had come up with a possible solution to their struggle. Arriving at the office and seeing the look on the faces of his other two co-founders, Lucas Jacobson and Leon Szeli, he could see that as tired as they were, they were hoping just as much that Jakob had finally cracked the puzzle they had been trying to put together for months. Excitedly, the three awaited Jakob's arrival.

Standing on the Shoulders of Giants

HIGGS originated at the "FDays" event in Munich. FDays was a twelve-week incubation program co-organized by Germany's famed Fraunhofer society[1] and the UnternehmerTUM GmbH, the center for innovation and business creation at the Technical University of Munich (TUM). As part of this program, Fraunhofer scientists would present some of the technologies from the many different Fraunhofer laboratories, which Fraunhofer could imagine had commercial potential, but which Fraunhofer did not want, or had not been able, to bring to market themselves. In such cases, the goal of the FDays would be to have participants, often students from TUM, but also members of Fraunhofer and other organizations, join together in entrepreneurial teams aimed at developing

[1] The Fraunhofer Society for the Advancement of Applied research consists of over 70 largely independent institutes, each of which engages in a different area of work. Funded largely through contracts with industry over government, Fraunhofer actively tries to bring science into practice. With over 25,000 employees, it is the largest organization of its kind in Europe. Among its most famous outputs was the development of MP3 audio compression technology.

these technologies in a strategic manner, and develop a pitch as to how this technology could be further developed and implemented in a certain market.

While Lucas Jacobson soon hoped to able to get his hands on the HIGGS technology, the three other founders Leon Szeli, Glenn Glashagen and Cornelius Filbry, joined the FDays event on the second day due to study obligations. This meant that that many of the more flashy technologies had been snapped up by other teams. The three were left with what appeared to be the leftovers of the technological all-you-can-eat buffet.

One of the things that caught their attention was a technology described as a mobile production studio. When Fraunhofer scientists pitched the technology “HIGGS”, a moniker the Fraunhofer had given the technology, they spent many minutes detailing the video editing potential and recording studio side of it. As an aside at the very end, they mentioned that live streaming of numerous feeds was possible at once as well. And it was the mention of the word “live” at the very end that piqued Lucas’s interest, “*the idea of being able to communicate in real time, live as it were, is something that is currently an enormous trend and already was at that time as well.*”

The original technology encompassed two Android apps: the HIGGS Cam and the HIGGS director app. If devices that had the HIGGS-Cam app were using the same Wi-Fi as a device with the HIGGS-Director app, then it was possible to stream and combine up to five different perspectives in the HIGGS-Director app. These various perspectives could then be changed merely by clicking on them, recorded and sent to an rtmp address, a TCP protocol that allows a persistent connection to be maintained, breaking streams up into fragments, enabling streams to be delivered smoothly and as much information as possible to be delivered. The most frequent rtmp addresses would be those of big social media platforms such as YouTube or Facebook. The content could then be streamed live on the chosen platform. The Fraunhofer team was clearly able to show that the technology worked. However, it was a very different matter using it in practice. The technology was very sensitive to any disruptions in Wi-Fi signals, which often resulted in it crashing.

None of the original HIGGS student team members was really sure just how to use the technology at first, not coming from an academic technical background. However, after two hours of playing about with it, the excitement had begun to build. At the end of the day, they presented several possible means of employing the technology using GIFs to highlight various possible areas in which it could be implemented. Fraunhofer liked their pitch and the team received a preliminary app from the Fraunhofer institute about eight weeks later.

Trying to Find the Needle in the Haystack

After developing the technology further, they once again pitched to the Fraunhofer institute and, in the middle of June 2016, they were granted an exclusive license to use the technology and the patents behind it. Yet, right about the same time, Cornelius Filbry left the team to pursue other projects.

To test their first prototype, the team created a page on Facebook in July 2016. Their aim was merely to see whether a switch from one perspective to another in their live stream would also work on Facebook. Their first test for the page took place in the kitchen of Lukas's flat share and basically consisted of one camera filming the fridge door and the other some toast and marmalade. After of few seconds of filming those not particularly breathtaking items, Lukas's flatmate burst into the kitchen asking what they were filming because he'd just seen it on his Facebook feed. They were dumbfounded at first, as, while the algorithms behind Facebook's feed are oblique to say the least, a freshly created page with zero likes was surely not one that would have any kind of reach. Excitedly, they checked Facebook, only to realize that, amazingly, their stream had reached three hundred people in just two minutes. This was all the confirmation they needed. If a live video with such bland content could reach so many people in so little time, they thought, imagine how many people truly interesting content could reach.

In August 2016, the HIGGS teams were joined by new member Jakob Bodenmüller, who had a degree in business administration and who was in his second year of an IT Bachelor degree at the TU Munich. Once the new team received the HIGGS source code in November 2016, they immediately got to work developing their own version of the app, creating a version that they could use for presentations by December 2016 (see exhibits 1-3).

Finding a Place Away from the Competition

While advancing their software development, the team had started to scout the market for potential competitors and divided them into three categories. The first was professional live-streaming teams, the second big platforms that also offered live streaming services from one fixed perspective, and the third apps offering similar services (such as several camera perspectives). The team created a graph with two axes, one detailing the number of perspectives on offer and one showing maximum reach, so as to get a better overview (see exhibits 4-5).

The first group of competitors, professional film teams, offered the highest degree of customization, but, with an average accompanying price tag of €10,000 per day they were by far the most

expensive option. However, for that price, customers could ask for numerous simultaneous camera perspectives, and the content produced could be streamed live to any desired platform. Often, footage would only be produced for the company's own stream or website though and the filming crews would charge extra to upload onto platforms such as Facebook. The quality of the footage was, of course, much better.

Second were the social media platforms. Both YouTube and Facebook and – at that time – a fledgling Instagram offered features with which live content could be shared. Beyond their potentially near-unlimited reach, the big social media platforms all had one thing in common, they were free, which was a great advantage for users, but their disadvantage was that they only offered one-perspective-streaming.

A third group of competitors were quite similar to HIGGS: apps that could offer customers great reach by connecting multiple platforms on which content could be distributed, and also the ability to combine multiple camera perspectives in real time. For example, Tickaroo enabled fans to keep track of scores in real time and also allowed different content such as text, photos and videos to be integrated, as well as the use of several social media platforms. While video streaming was usually something that was not broadcast live, Tickaroo had been able to find strong partners to collaborate with, such as leading German football magazine *Kicker*, and had, since it started operations in about 2011, gained some foothold with volunteers who willingly covered a diverse range of sports, providing viewers with short reports.

Even closer to what HIGGS were doing, the team had identified iTunes app Musicnow from Russian start-up mobile up. A free app targeted specifically at musicians, Musicnow offered multi-perspective live-streaming, in which users would then be able to pick a perspective. Given the fact that Musicnow was targeting spectators only, their app was completely free, however user donations were gratefully received. Yet, Musicnow was limited in the amount of platforms to which it could stream its content. What made the HIGGS app special was that all the different perspectives being filmed by participants could all be bundled together in one virtual place, the director app. This allowed any participant taking part to become a cameraman at an event, enabling a director to choose one of numerous multiple perspectives at any given time. The director's chosen perspective was then streamed live via whichever digital platform they selected from YouTube, Facebook or the customer's own website. However, the technology only worked well on Android phones and then only if all external factors were optimal. The team then added additional effects later, such as the overlaying of company logos, enabling for both personification and ownership of content, as well as providing marketing possibilities at the same time.

A Technology in Desperate Need of a Market

Realizing the potential of the technology, the team was now facing an entirely different challenge. Out of the many potential settings in which their technology could be used, which one should they focus on? The team believed that the app might enable companies to interact with their customers more closely, creating content that had been developed through direct interaction with them, capturing a customer's attention by allowing the customer to directly be part of the content and so securing an emotional relationship with them. Big media and phone companies, such as Sky or Vodafone expressed great interest, and the team had even been invited to join the Sky incubator. Sky seemed particularly interested in the bond that could be created if viewers created their own program and viewing experience. The HIGGS team dreamed of having their technology used during Champions League games, but in reality this proved to be something that was not viable, as even simply filming fans at these games was not possible due to legal regulations; UEFA and FIFA owned all video and film rights.

While large partner firms could act as powerful brokers, it was clear to the HIGGS team that they would not be committed to using the HIGGS technology if HIGGS could not prove that it worked and that a market existed for its application. The team quickly saw how they lacked the time and resources to explore multiple opportunities in parallel, meaning they would need to find a way in which they could explore markets sequentially—and, ideally, find an opportunity they could tackle profitably and sustainably, fast.

One of their first opportunities fell into their laps almost accidentally. They were at a location at which the World Food Program was holding a conference and were asked to cover the conference when the organizers found out about their technology. Shortly afterward, the team were able to secure a gig to join the presentation of the new Mini Cooper, with the BMW marketing team hiring them hoping that multi-perspective streaming could help them better reach a younger audience. And as Bill Gates, the founder of Microsoft, was invited to give a talk at TUM to discuss globalization and foreign aid with then-Secretary of Economic Cooperation and Development Gerhard Müller, the team was quick to secure the opportunity to stream this event live, too.

While the team had enjoyed these first successes, they thought that their app would be more suited to markets that boasted some form of recurring event, rather than the one-off project engagement that conferences or marketing-focused events such as product launches provided. After all, their product was mainly digital, and the team was hopeful they could identify a market and a business idea they could scale up quickly.

As is the case for many entrepreneurial teams, the first of markets that HIGGS identified were those to which they had some sort of existing connection. Jakob used to play handball on a regular basis and was a member of a handball club. As there are many handball clubs in Germany, but the filming rights were free up to the second league division, the team thought that the sport would provide a good testing ground for possible uses for the app. Handball was also an advantageous choice as the typical playing field was much smaller than an average football field and so ideal if one was filming using a smartphone.

After some initial research, the team believed that, beyond handball, the sport event market more generally presented huge untapped potential. At the beginning of 2017, there were roughly 90,000 sports clubs in Germany. The team calculated that if each of these clubs' teams played thirty games a season, there were about 2.7 million sports events taking place every year. While a large number of these clubs had already got professional teams to shoot footage of their events, such as all premier league football clubs, many sports, such as handball, were not fully covered, however, many clubs were too small to be able to afford to pay anyone money to shoot footage. This meant that sports clubs between these two extremes were those that were of interest. These were teams that did not have the budget to pay for professional coverage, but did have enough fans to warrant a live stream. The HIGGS team analyzed which sports were of most interest to the German public by looking at fan base numbers on Facebook. They drew the conclusion that clubs that had fan bases ranging between 2,000 and 50,000 followers on Facebook were most likely to be their target market (see exhibit 6).

Having developed another prototype of the app by January 2017, they began ringing up all official handball sports clubs in Germany, offering them use of the app and its live stream services. They obtained lots of positive feedback. "*We had a list and we just rang up one club after another, it was insane, like being a telemarketer*" recalled Glenn. The team also tested the app at various volleyball matches throughout Germany, as they were similar to handball tournaments in that the playing field was quite small and the filming rights for lower league divisions free. As was the case for the handball clubs, volleyball clubs also expressed a high level of interest in the product. These small clubs were more than happy to have their matches filmed and uploaded onto social media, and club members and players enjoyed watching them at the team get-togethers after the matches.

When testing their app at handball and volleyball events, things did not always run smoothly though, as the technology was only compatible with Android phones at that point. Once, the HIGGS team turned up at a match, only to discover that the entire team all had iPhones and there was not one single Android phone to be found, not even in the crowd. Another problem the team

quickly learned about was that high-speed Internet access was not something that could always be taken for granted. While high-speed mobile coverage was notoriously poor all over Germany, the team also had to learn that many locations had no or very poor Wi-Fi, and the HIGGS team would need to set up routers and – provided that their routers and Wi-Fi actually worked – cables would need to be plugged in dozens of meters away from where the action was taking place. While the team members used these types of occasions as ways of ironing out existing glitches with the technology, they also became increasingly frustrated.

Beyond technical issues, another major drawback was that the various sports clubs were scattered all over Germany, but the original Fraunhofer director app could only be used by the HIGGS team. This meant that the team always had to be present whenever a club was interested, something that was neither profitable, nor practical. The team also learned that most sports clubs they approached only had a marketing budget of around fifty euros per year. And finally, they found that most of the time, they were not only the ones working the director app, but also the only ones producing video streams: many of the people at the events were not particularly interested in filming it, as they wanted to watch the match itself and not spend time trying to find a good angle from which to film it.

As a potential alternative, in March 2017 the team began to test their app at music events and live DJ sets at local clubs. While these clubs expressed strong interest and had much higher marketing budgets, the events themselves turned out to be as wrought with problems as the sports club events. For example, a lot of the clubs were underground, causing even graver Wi-Fi and routing problems than those present at sport club events. The HIGGS team also learned that while DJs and club owners seemed very open to their product before events, once an event had started, things changed quickly. As Glenn recalled, "*The club promoters were always very open to the idea of us being there, but then once we were actually at the event, they were too busy, the DJ was surrounded by his friends and various drinks and there simply wasn't room for us as well.*" DJs and event organizers also had no desire or time to actually film the event on the night itself and although the club promoters often liked the idea of having a live stream, the amount they were willing to pay seemed pitiful.

Take-off or Just Another Take?

With sports events increasingly looking to be problematic, and the last unsatisfying club event only one week ago, the team members were particularly excited to learn more about Jakob's "Aha!" moment, and, when he walked into the room, calls of *"what have you come up with?"*, *"what's your idea?"* and *"tell us!"* quickly echoed around their office meeting room.

Jakob explained that while he had been pondering the team's big vision late last night, he had kept coming back to the various tests they had carried out over the last months.

"As you know the app is not quite ready for complete user-produced film domination" he started.

"That's true", Glenn cut in, *"most of the test-situations we have encountered have not really been financially viable as at least one of us always has to be physically present to oversee the actual filming."*

"And our own filming really isn't up to scratch!" Leon said shaking his head. The videos that the team had produced so far had been somewhat lacking aesthetically.

Lukas leaned forward, *"really we should be following the big money. It would be great if we could come up with some system that allows us to sell the app to big TV brands such as Sky"*. He went on somewhat dreamily, *"imagine if one of the top TV channels used our technology during a Championship game…or even the World Cup!"*

"Exactly!" Jakob agreed. *"I think I've come up with a great way of improving the app and building a user base that actually produces film material that is not only usable, but great."* He continued, *"what if we offer an extra incentive, by say, paying users twenty-five euros if the livestream they manage to film is a good one, shot from a good angle."*

"OK…" Glenn started to think aloud, *"but how do you think that would work exactly?"*

"Various users of the app could create live film feeds and we could then select those we like best to be uploaded onto social media," Jakob explained. *"I think a reward system is just what is needed."*

"But wouldn't that cost us a lot?" cut in Lukas worriedly. *"And, really, just how many of our "normal" users are capable of shooting truly good film?"*

"Well…" Jakob began, *"I had one other idea that could work. What if we set up a network of freelance cameramen, willing to work for a daily wage when they were not busy with other products?"*

"Yeah…that sounds good. But, just how many out-of-work cameramen are there at the moment?" Glenn asked the table. *"We'd have to check and see."*

"I prefer the user idea" Leon stated. *"The whole app is based on people not just watching what we have on offer, but also being able to engage, and be contributors themselves."*

"No, I don't agree" Lukas said, *"if we want the app to be successful, we need to produce material that will guarantee that big corporations are going to be interested in using it and I don't think that user-shot footage is going to cut it, well, at least not by itself."*

"That's true", Jakob said, picking up on Glenn's last point, *"It makes perfect sense. All aesthetic limitations will be more or less abolished as it is in a cameraman's very nature to shoot film that is pleasing to the eye, and that can convey whichever mood is of the essence. They're also not shy about getting as close as necessary to their subject."*

"Hmm, it could work", Glenn said, frantically googling "freelance cameraman Munich". *"But, as Leon said, I'm really not sure if we wouldn't be losing some of the app's authenticity, unless we used cameramen who were actually at a given event by their own free will and we had not sent them there especially. Whatever we choose to do, we do need to make some changes as we simply can't be everywhere at once."*

Glenn looked around at the others. Just as the first rays of weak spring sunlight attempted to fight their way through the thick layer of grey clouds shrouding the city, so, too, did the team feel that there might be light at the end of the tunnel and that a solution might just be on the horizon. Now, like so many times before, it was "just" a matter of fine-tuning he thought.

Exhibits

Exhibit 1: Screenshots of the app in director mode in December 2016

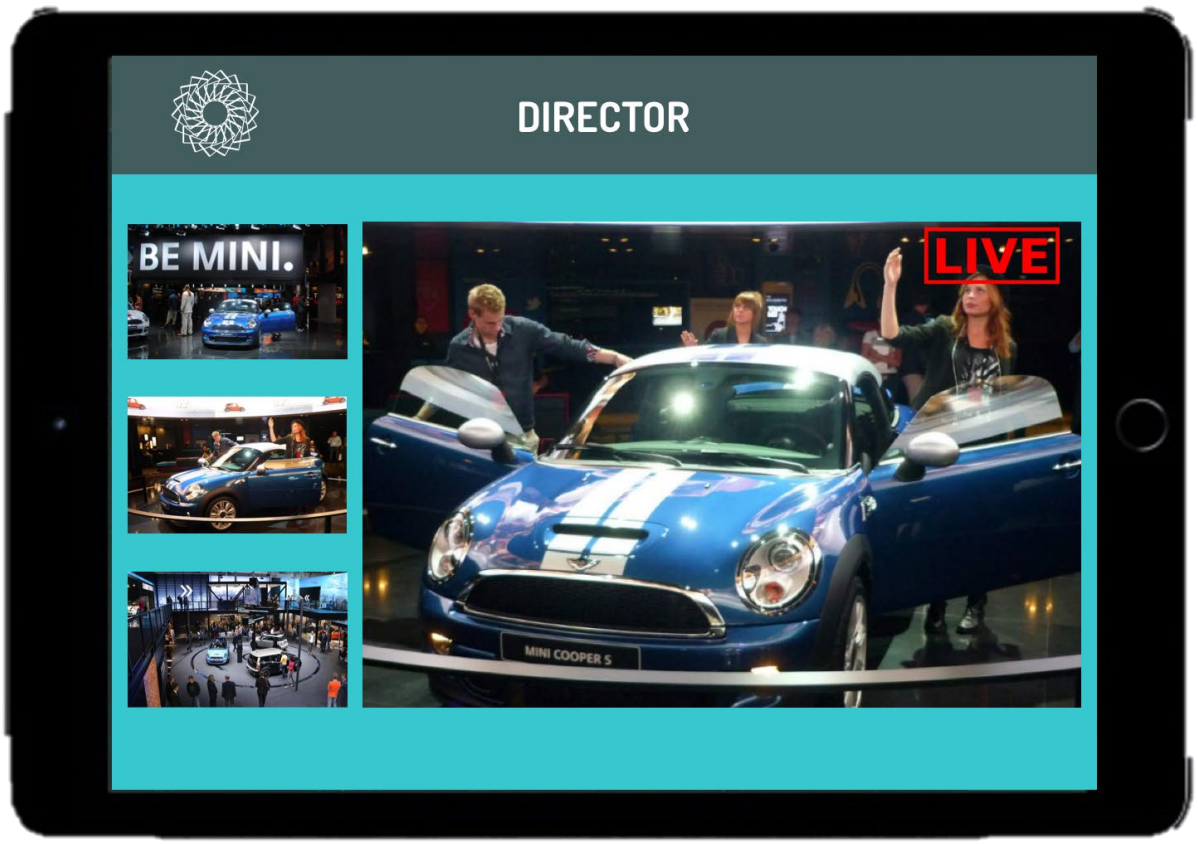


Exhibit 2 Screenshot of the app in camera mode in December 2016

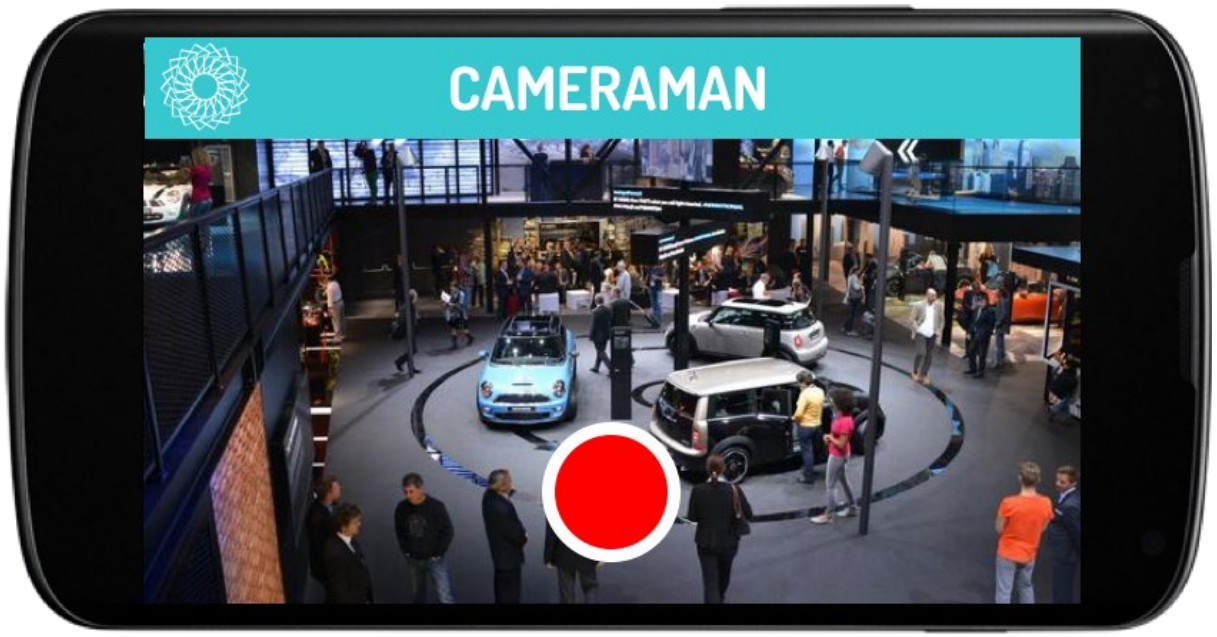


Exhibit 3: How the app works

FILMING	CHOICE OF PERSPECTIVE	LIVESTREAM
Visitors to an event or staff can film the event using their smartphones	All perspectives are bundled on one tablet. The best perspective is then chosen and published.	The video is then streamed live on Facebook, YouTube or a given company's website. It is also possible to save the video locally.

Exhibit 4: List of competitors

	HIGGS Jan. 2017	HIGGS Jan. 2018	Professional Film Team	Instagram/ Twitter/ YouTube/ Facebook	MUSICNOW	Switcher	livestream
Number of perspectives	5	10	99+	1	5	5	99+
Number of compatible platforms	3	99+	99+	1	3	6	3
Able to stream on multiple platforms at once	✗	✓	✓	✗	✗	✗	✗
Target groups	Music/ sport	Big events & brands	Events that have big budgets	Platform users	Musicians	Profe-ssional production teams	Events
Overlays/ watermarks	✓	✓	✓	✗	✗	✗	✓
External audio signal	✓	✓	✓	✗	✓	✓	✓
Back-up video	✗	✓	✓	✗	✗	✓	✓
Price	€0 or €100 (premium version)	€0 or €100 (premium version)	€10 000 per day	€0	€0	$25 per month	$2399 per month
Operating system	Android	Android and IOS	✗	Android and IOS	IOS	IOS	✗

Exhibit 5: No. of perspectives offered by competitors

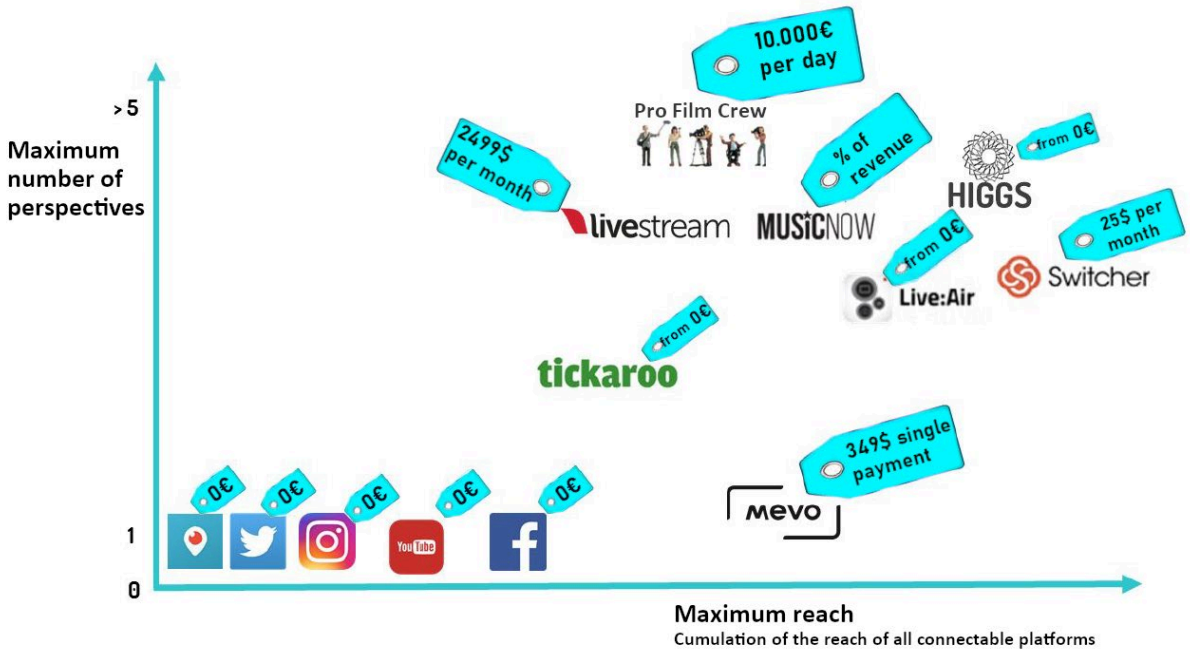
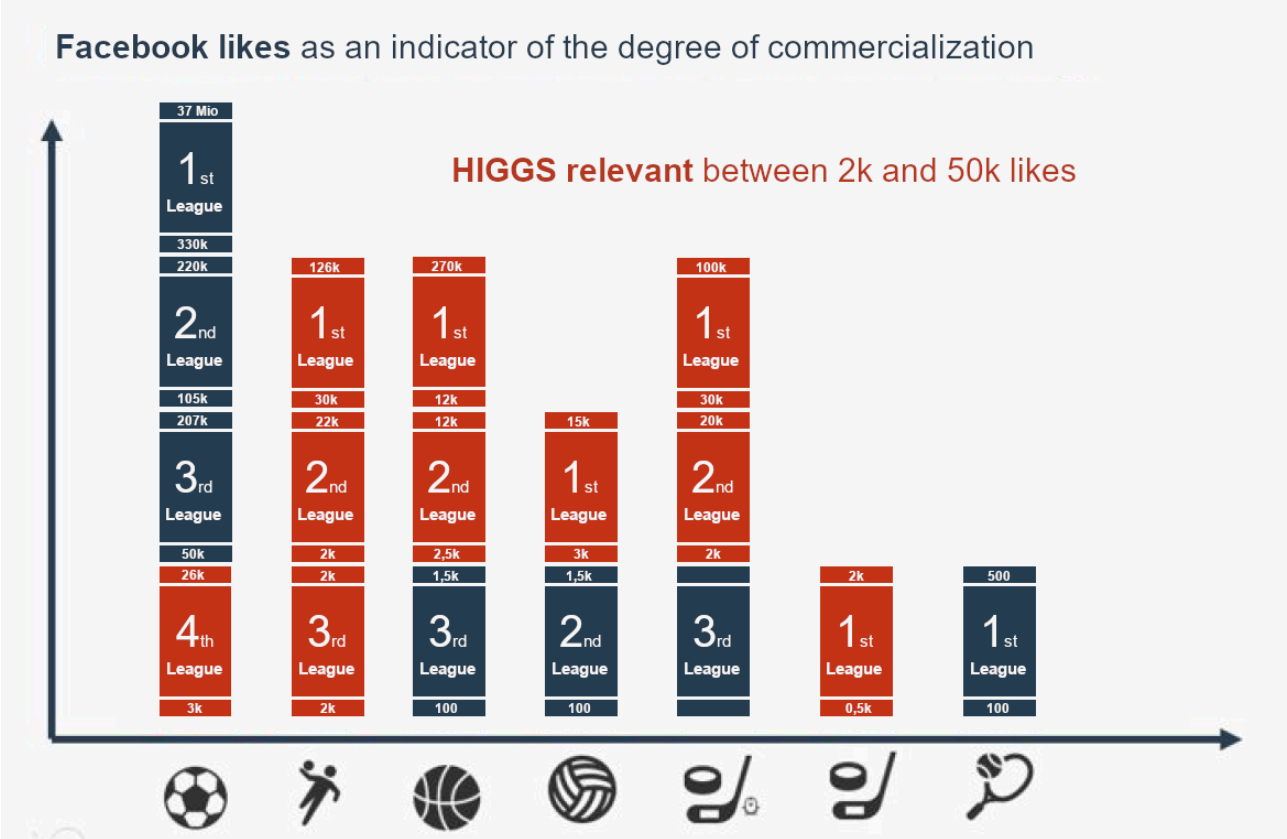


Exhibit 6: Analysis of fan bases of various sports clubs.



Technische Universität München
TUM School of Management

Arcisstraße 21
80333 München

www.tum.de