Formula E: Next Generation Motorsport with Next Generation Fans[1][2][3]

Teaching Case

Willem Standaert
Vlerick Business School &
Ghent University, Belgium
willem.standaert@vlerick.com

Sirkka L. Jarvenpaa
McCombs School of Business,
University of Texas at Austin, USA
sirkka.jarvenpaa@mccombs.utexas.edu

Abstract

This case examines Formula E (FE), the first all-electric racing series. To appeal to the millennial generation, FE had made big efforts to alleviate pollution, elitism and sexism perceptions from motorsport, yet it was not sure how to effectively reach and engage their target audience. The case is situated in between the second and third year of race operations, and describes a variety of digital innovations at FE, leveraging social, mobile, virtual reality, gaming, and artificial intelligence technologies. In the case, two key executives – the CEO and the Head of Digital at FE – appraise the initiatives and raise challenges ahead. The learning objectives include understanding: how to build a passionate and committed fan base locally and globally, not only during race days, but also in-between, under high uncertainty; the characteristics of (disruptive/digital) service innovation; and the varied possibilities and value of intertwining the physical and virtual world.

Keywords: Fan engagement, digital innovation, millennials, eSports, social media, mixed reality, entertainment industry

Introduction

In early July 2016, just days after the final race of the second Formula E (FE) season, Alejandro Agag, CEO of FE, and Tom Halls, Head of Digital at FE, met at the London Headquarters to discuss how to continue to build and engage the audience for the fledgling startup. FE was the first fully-electric racing series and had its inaugural season in 2014–2015. Agag highlighted the key objective of the new championship: "We need to catch the new generation, which so far has shown little interest in motorsports. Formula E is aimed at a new, younger motorsport fan –the smartphone millennial generation." Halls, himself a millennial, stressed the challenge of targeting his generation: "Digital natives are time-poor, cash-rich, and tech savvy. If you don't offer them what they want, when, and how they want it, they just won't be there."

Motorsport was a tough sell to millennials, as this generation showed less interest in driving a car, giving preference to living in cities with short daily commutes. Also, car ownership was becoming less and less relevant in the sharing economy, with companies such as ZipCar and Uber leading the way. The key challenge for FE was to overcome these tremendous hurdles and appeal to the next generation of motorsport fans. How could both global and local communities of fans be engaged, emotionally and long-

[1] Please contact Willem Standaert (willem.standaert@vlerick.com) or Sirkka L. Jarvenpaa (sirkka.jarvenpaa@mccombs.utexas.edu) for the teaching note.
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term? What technologies should be used, on- and off-track, to engage the younger generation? At what pace should innovations be launched and with what partners?

The Start of Formula E

The Fédération Internationale de I'Automobile (FIA) was founded in 1904 to safeguard the rights and promote the interests of drivers and motorsports. The FIA governed racing events of more than 30 motor racing series all over the world, including categories such as Circuit, Rallies, Off-Road, Hill Climb, and Historic, with the focus on driver safety and fair competition. The FIA launched its flagship championship series, Formula 1, in 1950.

The FIA initiated the concept of an electric car series in 2011, in order to help develop electric vehicle technology, accelerate interest, and promote sustainability. The President of the FIA, Jean Todt, became one of its strong supporters: "This spectacular series will offer both entertainment and a new opportunity to share the FIA values and objectives of clean energy, mobility, and sustainability with a wider and younger audience as well."

In Summer 2012, following a tender, the FIA gave FE the green light to exclusively license the commercial rights of an all-electric racing championship, for at least 25 years. Agag, a 45-year-old business man, a former politician, and an insider in the world of motorsports, became FE's first CEO. He explained the goal for the new championship: "This is a real competition between cars and drivers, where the best technology and the best pilot win. Looking back at the past two seasons, we have definitely succeeded in creating exciting and competitive racing; there's not much to improve there.... Yet we want to further revolutionize the fan experience, catered to the millennial generation."

Racing for the Millennial Generation

Motorsport struggled to attract the millennial generation, both on and off the track, for a variety of reasons. To begin with, this generation was not wealthy, with many still in college loan debt, yet motorsport events were priced excessively, with race day tickets of 300 USD not an exception. In addition, motorsport was regarded as a boys' club, with most of the drivers, pit crew, and fans being male, whereas millennials increasingly voiced strongly about diversity and gender-equality. Also, motorsport was primarily broadcasted over television, free-to-air or via a subscription service, yet millennials were known as "cord cutting," meaning they had no traditional television cable subscription. Moreover, the millennial generation was believed to be more environmentally conscious, which was at odds with the carbon dioxide emissions inherent to gas guzzling motorsports.

Another factor that was considered to play a major role in the declining interest for motorsport, was the fact that the millennial generation showed less interest in driving vehicles, not to mention buying them. In particular, in the US, 24% of 16-year-olds obtained their driving license in 2014, compared to 46% in 1984, and the percentage of 18-year-old driving license holders likewise dropped from 80% to 60%[i]. In addition, less than half of millennials found it important to own a car and they had repeatedly been reported to value mobile devices more than cars.[ii] There were several potential explanations for this declining interest in cars: millennials preferred living in cities, where they could use public transport; technology, and social media in particular, substituted for driving a car around to connect with friends; and ride-sharing services such as Uber and Lyft, and car-sharing companies such as ZipCar, made it convenient to get around, at a low cost, without the need to own a car. Then again, millennials were excited about the development of self-driving vehicles, in which companies such as Apple and Google, which digital natives showed strong affinity with, were involved.

Some race series were knowingly neglecting this generation. For instance, Formula 1, the pinnacle of motorsports with 400 million television viewers globally in 2015, saw little value in attracting a younger fan base. In particular, Bernie Ecclestone, the chief executive of Formula One Group, which owned the commercial rights to Formula 1, told a reporter[iii]: "I don't know why people want to get to the so-called 'young generation.' Why do they want to do that? Is it to sell them something? Most of these kids haven't got any money. So, there's no point trying to reach these kids because they won't buy any of the products here. And if marketers are aiming at this audience, then maybe they should advertise with Disney."

In stark contrast, FE wanted to create a motorsport series tailored to this generation. Halls, who was appointed Head of Digital at FE ahead of Season 2, and who had experience in a similar role at the British

Tennis Association as well as in the video gaming industry, commented: "Fundamentally, the concept of racing and the engagement with fans has not changed in 30 years. We want to go against the established wisdom by being the most forward-thinking innovators in every aspect of motorsports."

The Millennial Formula

FE was profoundly different from other motorsports in various ways. For starters, in FE, track practice, race qualifying, and the race itself were all held on a single day, with the final race lasting about 45 minutes. This is unlike for instance Formula 1, where the action was spread throughout three days, culminating in a final race on Sunday afternoon, lasting just under two hours. Halls commented: "To be honest, I have never sat through an entire Formula 1 race; I don't have the time. Digital natives have a short attention span. So I think packing everything into one day, and the relatively short races, are spot on."

Also, at traditional, non-electric races, a large part of the track-side experience involved the noise from the cars. For instance, Formula 1 fans, which were over 100,000 in attendance on race day at several circuits, loved the ear-splitting roar the petrol-driven cars delivered (about 140dB). However, the electric racing cars of FE produced much lower noise levels (80dB). Agag commented: "At first sight, you'd think the Formula E competition is a very tough sell: cars that don't make as much noise and go slower than other racing cars. So why would people watch it? They come to see the races because it's the future, it's new technology, it's exciting, and so on."

The low noise levels along with the lack of air pollution, allowed races to be held on purpose-built street circuits in city centers, requiring the temporary cut off of roads for traffic. The races, referred to as "ePrixs", had spread across three continents in major cosmopolitan towns during Seasons 1 and 2 (see Appendix 1), close to world-renowned landmarks which offered compelling images for remote viewing audiences. For instance, the Moscow ePrix circuit ran alongside the Red Square and Kremlin (see Figure 1.), and the Eiffel Tower hovered over the fans in the Paris ePrix. In other words, FE brought the action to city centers, where the millennial fans were, allowing them to come by public transport. Moreover, the ePrixs were priced relatively low, at the equivalent of about 20 to 30 USD. In total, close to 400,000 spectators attended the FE races track-side across the 11 ePrixs of Season 1.

Figure 1. ePrix in Moscow

All sorts of activities were planned to get the fans to the track early and engage them throughout the day. At the "eVillage," electric concept cars were exhibited and fans could compete in an electric kart race. Moreover, music played a major role, embodied by FE's resident deejay ("EJ"). Agag commented: "While traditional fans attend races purely for the on-track action, millennials expect a broader experience. With our focus on music entertainment, we tap into a key aspect of their lives." In particular, electronic dance music was played track-side, not only ahead of the race but also during the action, to add excitement and

compensate for the low noise levels of the cars. In addition, the music was featured as a soundtrack for the live broadcast of the race. Halls commented: "We wanted to simulate the atmosphere of watching an exciting car race in the movies, kind of like 'The Fast and Furious,' but in real life." At the Season 2 finale in London, there was a live music stage, featuring six local upcoming talents in different music genres, a concept FE was planning to continue in Season 3. In addition, FE was looking into hosting after-race club shows at the host cities, featuring EJ among other performers.

Ten teams competed in the FE championship, each providing 2 drivers (see Appendix 2). The set of drivers included former Formula 1 drivers and relatives of some of the most iconic drivers ever (i.e., Ayrton Senna's nephew and Alain Prost's son). Moreover, FE was gender-neutral, allowing men and women to compete alongside each other, with two female drivers at the outset of Season 2. The drivers were very accessible at the race venues, where autograph and selfie session were organized. A fan commented: "I love Formula E because it is so fan-friendly. I hope it doesn't get like Formula 1 with all politics, secrecy, and drivers who are quickly ushered past waiting fans. To me Formula E is what Formula 1 was 20 or 30 years ago." Another fan testified, "I am here because this is the future."

Face of the Greener World

Sustainability was at the heart of the FE championship, Agag commented: "We offer a story about using technology to make the world better, to try to make cities less polluted. Our millennial fans and our sponsors relate to our core sustainability values." Among the major sponsors of FE were Julius Bär, a Swiss Private Bank, TAGHeuer, a luxury watch maker, and G.H.MUMM, a champagne producer.

FE aimed to become the first carbon-neutral motorsports championship. Illustrations of its efforts included charging cars with glycerine-power generators (which obtain energy from sea algae) and using electric trucks for logistics at the tracks. In addition, DHL, as a logistics partner, committed to cutting carbon in its operations by optimizing the schedule of the race calendar, and by using ships and trains instead of road and air transport whenever possible. Likewise, Enel, as a power partner, committed to optimizing clean energy generation, distribution, and management, through an advanced mini-grid solution including smart meters, which gave racing teams and fans the opportunity to monitor power usage in real-time. For these sustainability efforts, FE was recognized by its peers in the form of accreditations and awards[iv]. Also, FE established a Sustainability Committee, chaired by Oscar-winning actor Leonardo DiCaprio, who had become an environmental leader and was spreading the message of sustainability around the world. He commented: "Climate change is both a moral and business imperative. This Committee sends a clear sign that we are on the front lines of helping to solve the climate crisis. Formula E provides the top global mobility and innovation players with a strong collective global voice on the subject of sustainability."[v]

Yet, FE had not been without controversy of the environmental impact around its city races. Particularly, the London finale races of Season 1 and Season 2 at Battersea Park had local protesting because of the temporary loss of public space caused by the races. The action group of about 3,000 people voiced complaints that included the loss of public space for 3.5 weeks, 800 truckloads of concrete to pave the park roads and some grass areas, and the move of the zoo animals. Agag commented: "If you want to make an omelet, you need to break some eggs. There is some disruption when we go somewhere, but there is also gain. We do take into account very carefully what people say. What has been called 'the noisy minority' – and I think that is what it is, a very noisy minority – has to be taken into account. We have to listen to them and try to address some of the problems that they have, even if we don't agree. We have to keep in mind that democracy is the rule of the majority. Also, the result of a championship like Formula E is so much bigger than the carbon footprint that we may have, and that makes the whole project consistent from a sustainability point of view. If we achieve having one or two hundred thousand – or millions – of electric cars on the road, it will offset the footprint of the championship." However, Agag and Halls agreed that Formula E needed to do a much better job of communicating its sustainability message, so that it would resonate with the audience at large.

At the same time, Formula E offered a platform for researching and showcasing cutting-edge vehicle technology, Agag commented: "The car industry is going in three directions: electric, connected, and driverless. We are spearheading each of these areas, yet our main focus is to make electric cars sexy among the younger generations. One of the biggest problems electric vehicles faces is image: many think that electric vehicles won't work for them or will be too slow. We show what electric cars can do in extreme conditions." Some industry experts saw FE as a turning point in customer awareness of electric cars, and

their performance in particular. Yet, there were still big barriers to overcome before electric cars could become mainstream: Battery technology had not improved as quickly as hoped; charging took time; and other issues, such as cars' resale value, were to become more pressing if their popularity increased.

Yet Agag envisioned innovation at FE far beyond the electric vehicle: "We offer a platform for innovation and validation of all technologies relating to racing and fan engagement. We are at the hub of a whole ecosystem of technological innovators that are interested in this millennial generation." In particular, FE had partnered not only with car and battery manufacturers, but also with established companies in high-tech, finance, marketing, video gaming, logistics, and lifestyle. Indeed, as FE saw itself as a next-generation entertainment property, it strived to be in pole position in terms of delivering emotionally connecting experiences for digital natives, on and off the track, by leveraging cutting-edge technology.

On-Track Digital Fan Experience

FE's digital initiatives to augment the on-track experience included fans virtually competing in races with the FE drivers ("eRace"), fans watching instant replays on demand, and a driverless car competition (details of each initiative are presented in Appendix 3).

eRace

At the Mexico City race, round 5 of Season 2, an eRace was held for the first time at the eVillage (See Figure 2.). Halls explained: "On race day, qualifying finishes at 2pm, and the race starts at 4pm. So that's a two-hour slot that you have to fill with a very easily bored audience. So how do you do that? Besides music, we think gaming could be the solution in that space."

Figure 2. eRace

In the eRace, the fan who set the fastest time on the simulators during the day had a chance to compete with nine of the professional FE drivers. The eRace involved lots of crashing, corner-cutting, and blatant taking out of rivals. Nonetheless, big crowds came to see this event, which was also live-streamed on YouTube, and the fans certainly enjoyed it. According to one spectator: "You get to see the drivers really up close. When they are racing on track wearing helmets, it is very hard to sense their emotions. Yet during the eRace, you see their facial expressions and gestures, and you can hear them shouting at each other. Although it is not the main event, the drivers are clearly very competitive." After the eRace, the drivers commented about it as if it were a real race. Because it was so well received, eRaces were held during the remaining rounds of Season 2.

In addition, FE announced it would hold a completely virtual race in Las Vegas in January 2017, as part of the yearly Consumer Electronics Show, amongst its regular race drivers and five gamers that win the online 'Race to Vegas' competition in the three months prior to the event. Agag commented: "The fun thing would

be for a gamer to win it against the professional drivers. I think it's going to be very tough. Depending on how it goes, I could envisage that virtual races give points for the championship in the future, but not now."

Instant Replay

At the Paris ePrix, round 7 of Season 2, a new mobile application was piloted with 350 spectators at the track. This app allowed fans to instantly replay on their mobile what had just happened on the track. The app also provided the race program, as well as updates on general progress and key moments of the race. Halls commented: "When you are attending the race, you can easily miss out on some pivotal action. With this app, fans can repeatedly replay exciting and controversial moments. Moreover, it allows us to better understand fans' track-side behavior by tracing their locations."

Roborace

In Season 3, kicking off in fall 2016, a driverless car championship would be launched – as a support series for FE – using the same city tracks. Agag commented: "Others could have announced a driverless car championship, but they probably didn't dare to. For FE, this kind of bold initiative makes sure we go in the right direction for the future." Similar to the FE championship, the purpose of this series was twofold: to raise awareness and interest of the millennial generation for driverless car technology by proving it works in extreme conditions, and to provide a test-bed for artificial intelligence and technologies embedded in self-driving cars, such as sensors, radars, and cameras.

Ten teams would compete, each using the same car (see Figure 3.). Denis Sverdlov, CEO of Roborace, explained: "We didn't want this to be a hardware competition; this is all about software engineers creating and testing algorithms in a competitive environment. It's not about the fastest car, but the smartest people. We nicknamed the competition the 'global championship of intelligence.'" The teams would include major car manufacturers, as well as technology behemoths, such as Google and Apple. Halls added: "At each race, there will be a fan crowd-sourced team. The public will be able to submit algorithms, which will then race virtually. The winners can compete in the actual race with the nine other teams. We expect teams of coders from technology startups and universities to be interested." Agag added: "Roborace provides tremendous opportunity for excitement. Taking the barrier of driver safety away, there is virtually no speed limitation other than the laws of physics. Another direction this could go is to have a man-vs.-machine race, similar to IBM with Deep Blue in chess or with Watson in Jeopardy."

Figure 3. Robocar Designed by Legendary Daniel Simon

Off-Track Digital Fan Experience

While digital technology was heavily used to augment the fan experience on-track, FE also leveraged several technologies to engage fans off-track. To enable fans to follow the races live, online streaming services were used, including 360° video. In addition, technology was used to engage fans between race days, as Halls commented: "The new generation of fans is very fickle, not always as loyal to sports, teams, and drivers. We need to involve them not only during the race, but also between race days. So we look for ways to provide instant value that keeps them engaged on a daily basis." In particular, FE built a presence on all the major social media platforms (of the Western world) and launched initiatives involving gaming and virtual reality. These fan engagement initiatives were launched at a fast pace (see Appendix 3), and fan reactions, on online fora and social media, were mixed (see Appendix 4).

Online and Mobile Coverage

While FE provided live television coverage in more than 100 countries, with an average audience of about 6 million viewers during Season 1, it also retained the rights to live-stream through its website and mobile application. The FE website was relaunched in early 2016, Halls commented: "Everything we do has to work on a mobile first; our core demographic demands that access, and we constantly look for ways to enrich that experience." During the race, FE website visitors could choose among multiple camera standpoints, follow the current position of each driver, and access a huge amount of telemetric data, including the drivers' heart rate. Agag commented: "We pride ourselves on how transparent we are. As a matter of fact, the fans have the same access to data that the teams have. We turn this data into interactive graphics, making it easy for fans to consume." Similarly, through the mobile application all of the track action was live-streamed, with live timing, commenting, and driver tracking. Moreover, the website and mobile app allowed fans to access race recaps, the latest news, and social media updates from teams and drivers.

Another technology FE was pioneering in the motorsport world was 360° videos. Halls commented: "Formula E is the first to enable fans to virtually sit in the driver's seat. Indeed, capturing and transmitting 360° images from a fixed point in the stands has been done before – for example, in basketball arenas. But doing this from a car that moves at 150 mph is a different ball game." At each race, 360° video camera systems were positioned onboard four cars, as well as at fixed positions. In Season 1 this footage was included only in race recap videos, but in Season 2 fans could choose to watch these streams live during the race, via the mobile app. Other 360° videos, available on YouTube and Facebook, included a Pit Stop clip, as well as other behind-the-scenes footage.

Halls looked into the future: "A next step is certainly equipping all cars with the 360° cameras. Also, it would be nice if fans could watch instant replays in 360 degrees. For example, if you see a driver going off a corner, you can check if another driver nudged him. Another piece of augmenting the experience could be audio: Can we give fans access to the drivers' audio streams? Obviously, this move would be quite bold, with audio interaction often including team strategy, but it's the drivers who are pushing us to facilitate this."

Social Media

Social media platforms, such as Facebook, Twitter, Google+, YouTube, and Instagram, have attracted a considerable amount of interest in recent years, particularly among millennials. Agag commented: "Born in the digital era, it goes without saying that FE wants to outreach any other motorsport series, or even sports league in general, on social media." FE had established a page and a fan base on each of the major social media platforms, as had other motorsports championships (see Table 1). On its social media pages, FE posted about the races, what was happening behind the scenes, the sponsors, the teams and drivers, and the fan initiatives. Nicki Shields, a female presenter and pit lane reporter, was referred to as the "face of the championship," as she was pictured in the majority of YouTube clips. ePrixs were live-streamed on Facebook and YouTube, and in-race highlights were featured within seconds on social media. FE also incentivized fans to submit track-side pictures by awarding prizes and featured this fan-generated content on its pages. At the final round of Season 2 in London, Formula E debuted coverage of the race as a Live Story via Snapchat, featuring a mix of inside-access and fan-submitted Snaps.

Table 1. Number of Fans on Social Media Pages for Different Motorsports (numbers retrieved on August 3, 2016)				
	Formula E	*Formula 1*	*IndyCar*	*NASCAR*
Facebook	225,582	2,618,106	387,221	4,627,247
Twitter	92,963	2,224,220	214,184	2,912,983
Google+	1,880	23,209	2,352	2,609,051
YouTube	70,176	213,743	133,938	169,186
Instagram	64,000	1.5 million	76,600	592,000

Table 1. Comparison of Formula E's Social Media Pages with other Motorsports

FE also leveraged social media to sustain fan engagement beyond the race events. For instance, FE featured series of videos on social media, such as "My First Time!," in which drivers provided insight into their background and racing history, and "Knowing me, Knowing you," which were comical Q&As with both drivers of a team. Moreover, FE aimed to reach a broader audience, by developing viral social media content. For example, a video in which a stuntman, facing away from a Formula E car that approached him at 100 km an hour, performed a blind backflip over the car ("Leap Of Faith"), reached close to 5 million views on YouTube in one week's time.

In addition to its main global pages, Formula E recruited voluntary Facebook and Twitter fan site operators across 46 countries to translate posts from the official accounts into their native languages, and to stimulate interaction among local fans.[vi] Halls was contemplating how the community of fans could be involved more actively: "We are already giving the teams and our partners plenty of opportunity to develop content around FE – more than other sports leagues do. Yet we can also hand our content to our digital-savvy fans and allow them to go and create mashups, using their own soundtrack, and then feature that fan content in our television broadcast. Imagine an end of season highlights real composed and produced entirely by our fans!"

FanBoost

The apex of FE's social media activities was a crowdsourcing capability called FanBoost (see Appendix 5), Agag commented: "With FanBoost, we are merging social media and motorsport in unprecedented ways – making Formula E a fusion between a real race and a video game. Fans can directly influence the outcome of the race by [crowd] voting for their favorite driver through social media, who can get extra power during the race as a result." In particular, the three drivers that received the highest number of crowd votes (see Appendix 5), each received a "boost" of 100 kJ of energy that they could use during the race. An overview of each driver's crowd-based FanBoost nominations during Season 2 is provided in Appendix 2.

Halls commented: "In addition to the cars being all-electric, FanBoost is our unique selling proposition. It's like the speed boost in the Mario Kart video game; it really 'gamifies' the sport! Fans either love it or hate it; traditional motorsports fans do sometimes have a challenge with it. But the brilliance of FanBoost is that drivers and teams are reaching out to fans on social media so they can win the extra power. As it turns out, we see a high correlation between the FanBoost nominations and the championship results.[vii] So our drivers are becoming the most engaged athletes on social media!" A fan's reaction illustrated the impact of FanBoost: "I FanBoosted Bruno Senna on Instagram, and he said thank you for voting. I felt great because he used it to pass Prost in the race!" However, FanBoost was not without controversy among fans and drivers alike, as concerns about its legitimacy had been raised. In particular, it was claimed the system could be flawed and the outcome manipulated by the crowd's use of automated bots and fake email addresses that artificially increased votes.

In addition, Halls was contemplating what fans could get in return for casting their vote: "At the moment, fans don't really get a lot of value.... Drivers could reward them with a personalized video message, an autographed photo, that kind of thing. Going beyond that, we could identify who cast the decisive vote for a driver, and, for instance, get that fan to talk to the driver during the race!"

eSports

A key strategy for FE in appealing to digital natives was to link with eSports. eSports was a competitive form of video gaming. Real-time, global gaming competitions were facilitated by network-connected personal computers and game consoles (e.g., Sony PlayStation, Microsoft Xbox, Nintendo Wii). Younger generations increasingly engaged with sports through a video game first, before becoming fans of professional sports

leagues. Also, there was close affinity between motor racing and eSports. Gaming had been a route to professional motorsports for several drivers. Key competences, such as fast reaction, could be harnessed on game consoles, particularly in early ages when such skills had to be developed. Gaming was seen to democratize the motorsport industry because it enabled more people to become drivers without years of huge financial investments in on-track training in carting or other competitions[viii].

Agag stressed the strategic importance of eSports for FE: "There is huge potential! This is a way to capture the attention of new, young fans. Particularly the kids are not so much into motorsport, but more into video games. Hence gaming is a way to access a public that is otherwise very difficult to reach." Halls agreed and was eager to experiment in the gaming space: "If you look at our fan-base, they like motorsport, technology, and gaming. As a technology-driven motorsport series, we are hitting two of those areas, so why not go for the third?" FE partnered with leading companies in the gaming world, including Electronic Sports League (ESL), the world's biggest eSports event organizer[ix], and Microsoft, which developed the racing game Forza Motorsport featuring FE cars and tracks[x].

FE also organized separate eRace exhibition events, apart from physical races, in order to bring greater awareness to its eSports activities. At these events, fans could qualify for a race with two professional FE drivers, such as Bruno Senna and Nico Prost. Senna commented prior to one of these events: "I'm looking forward to the challenge of driving the FE car in a game rather than on a track. Video games and computers are getting closer and closer to reality and there's a proven record of drivers learning real-world racing skills in the virtual world before they ever take to the track. I hope it also works in reverse so that Nico and I can have a proper battle!" In the first two events, a fan had won. One of the winners commented: "It's great that I can go from racing in my bedroom to racing against a Formula E driver who won last week."

FE still needed to get to the mindspace of the large, global eSports community. In March 2016, FE announced the creation of an eSports championship, allowing the best video gamers around the world to race on the same stage as FE's world-class drivers, taking their eSports involvement to the next level. Looking into the future, Halls said: "It's nice that our cars are featured in Forza, yet we need to think further than that: Is our brand strong enough to develop our own licensed title? What can we do in the mobile gaming space? What opportunities does gaming provide for our partners and sponsors." Agag agreed, yet envisioned an even more challenging future: "I want Formula E to be a hybrid between the real and virtual world. What if we can use technology to add virtual drivers, who see the real cars in real-time through computer-generated image, yet only compete against them virtually? This may sound like a far stretch, but the technology to make this happen is probably not far away."

Virtual Reality

FE announced a virtual reality recreation of the races, the end-goal of which was to allow fans to experience the race in real time from any of the drivers' eye-line perspectives (see Figure, 4 on the left) as well as any point along the track, including adjusted audio. Moreover, the idea was to create a social experience, to enable fans around the world to watch the race together in a virtual environment (see Figure 4, on the right). Also, behind-the-scenes imagery was created that allowed fans to virtually walk around in the garages and paddocks.

Figure 4. Virtual Reality Experience of the Race

Agag commented: "Putting fans in the driver's seat of the championship is part of our DNA. Hence, this technology is a perfect fit with our mission." Halls added: "99% of our fans are not able to make it to the race, so Virtual Reality might be the technology that takes fans to the best race day experience, or even beyond. A lot of people mix up virtual reality and 360° videos, but to me there is a clear difference. Virtual reality is taking you to a virtual, computer-generated space. Hence, new digital collateral is created, offering new ways to engage with the sport, as well as with brands and sponsors."

Virtual Reality also was being implemented as a new technology in gaming, offering major opportunities for racing simulators. In particular, it enabled an immersive, close to real-life virtual environment, although technological advancements did not yet fully allow for interactions between the physical and the virtual world (also referred to as mixed or augmented reality), such as seeing hand movements in virtual reality.

Conclusion

FE had succeeded to not only alleviate pollution, but also elitism and sexism perceptions from motorsport. FE had successfully negotiated races in global cities such as London, Miami, Los Angeles, Buenos Aires, Mexico City, Berlin, Beijing, and so on. Season 3 would feature many new cities including Hong Kong, Marrakech, Brussels, and New York City (see Appendix 1). New audiences could be tapped, but there was concern of the lack of continuity and predictability in the race calendar. For example, in Season 3, FE would not return to the UK that had been the site of the final two races in Season 1 and 2. For many fans, this was a significant loss, as the UK was the mecca of the world's Formula racing. Repeated races in the same locale built strong local communities. Would the local UK community wither or would the technology initiatives sustain the fan base? Could a global millennial community be built without continuity in local races?

Agag set the overall ambition: "Having the exclusivity for an all-electric championship for 25 years gives us some room for error, yet it's also a big responsibility. It's been full of bigger challenges than we thought, but I didn't expect that so many people would want to join this adventure. I think we have created something that is fantastic, but there are still a lot of things to perfect. To become the pinnacle of motorsports and achieve something good for people, we need to continue breaking new ground in terms of fan engagement, sustainability initiatives, and strategic partnerships."

Halls was eagerly searching for the winning formula of engaging millennials, by launching digital innovations: "At the moment, we are more akin to a technology startup than any other sports series. If we try something and it catches on, that's great, we're first to market. If it fails fast and we learn from it, then that's not the end of the world either. We are two seasons in, which means we don't have too much legacy that can be harmed."

To grow further and really break through, Agag and Halls agreed that several questions needed to be addressed. Was FE effectively identifying, segmenting, and targeting the fan base? What would it take to get the core fans to connect emotionally and to build a long-term relationship with them? How could both global and local communities of fans be engaged? What technologies should be used, on- and off-track, to engage the younger generation? What car, technology, and other companies should FE partner with? How could FE organize races and fan engagement in an even more sustainable way?

Appendices

Appendix 1. Race Venues in Season 1, 2, and 3

Season 1	**Season 2**	**Season 3**
Beijing, China	Beijing, China	Hong Kong
Putrajaya, Malaysia	Putrajaya, Malaysia	Marrakech, Morocco
Punta del Este, Uruguay	Punta del Este, Uruguay	Buenos Aires, Argentina
Buenos Aires, Argentina	Buenos Aires, Argentina	Mexico City, Mexico
Miami, USA	Mexico City, Mexico	Monaco
Long Beach, USA	Long Beach, USA	Paris, France
Monaco	Paris, France	Berlin, Germany
Berlin, Germany	Berlin, Germany	Brussels, Belgium
Moscow, Russia	Moscow, Russia*	Montréal, Canada
London, United Kingdom	London, United Kingdom	New York, USA

*The race in Moscow was cancelled

Appendix 2. Season 2 Teams, Drivers, and Number of FanBoost nominations

Team	Host Country	Drivers	Home Country	Rounds (10)	# FanBoost
DS Virgin Racing Formula E Team	United Kingdom	Sam Bird	United Kingdom	All	3
		Jean-Éric Vergne	Spain	All	4
Mahindra Racing Formula E Team	India	Bruno Senna	Brazil	All	
		Nick Heidfield	Germany	1-2; 4-10	4
		Oliver Rowland	United Kingdom	3	
Dragon Racing	United States	Loïc Duval	France	All	1
		Jérôme d'Ambrosio	Belgium	All	1
Renault e.Dams	France	Nicolas Prost	France	All	
		Sébastien Buemi	Switzerland	All	4
Trulli Formula E Team*	Italy	Salvador Durán	Mexico	1	
		Jarno Trulli	Italy	2	
		Vitantonio Liuzzi	Italy	1-2	
ABT Schaeffler Audi Sport	Germany	Lucas di Grassi	Brazil	All	5
		Daniel Abt	Germany	All	
Venturi Formula E Team	Monaco	Stéphane Sarrazin	France	All	3
		Jacques Villeneuve	Canada	1-3	
		Mike Conway	United Kingdom	4-10	
Amlin Andretti Formula	United States	Robin Frijns	The Netherlands	All	
		Simona de Silvestro**	Switzerland	All	
Team Aguri	Japan	António Félix da Costa	Portugal	1-7	
		Nathanaël Berthon	France	1-3	
		Salvador Durán	Mexico	4-6	1
		Ma Qing Hua	China	7	
NEXTEV TCR Formula E Team	China	Nelson Piquet Jr.	Brazil	All	2
		Oliver Turvey	United Kingdom	All	2

* Withdrew after the first two rounds
** Female driver

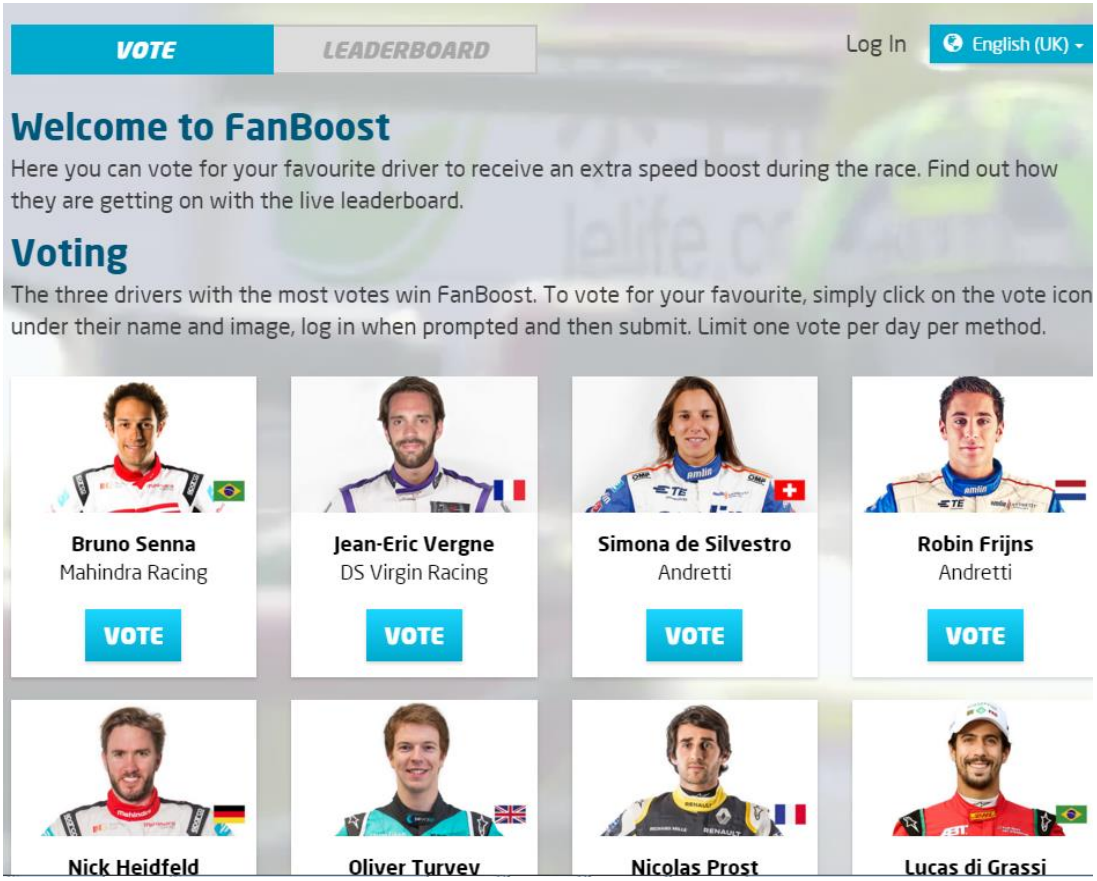
Appendix 3: Digital Initiatives: Timeline and Detailed Description

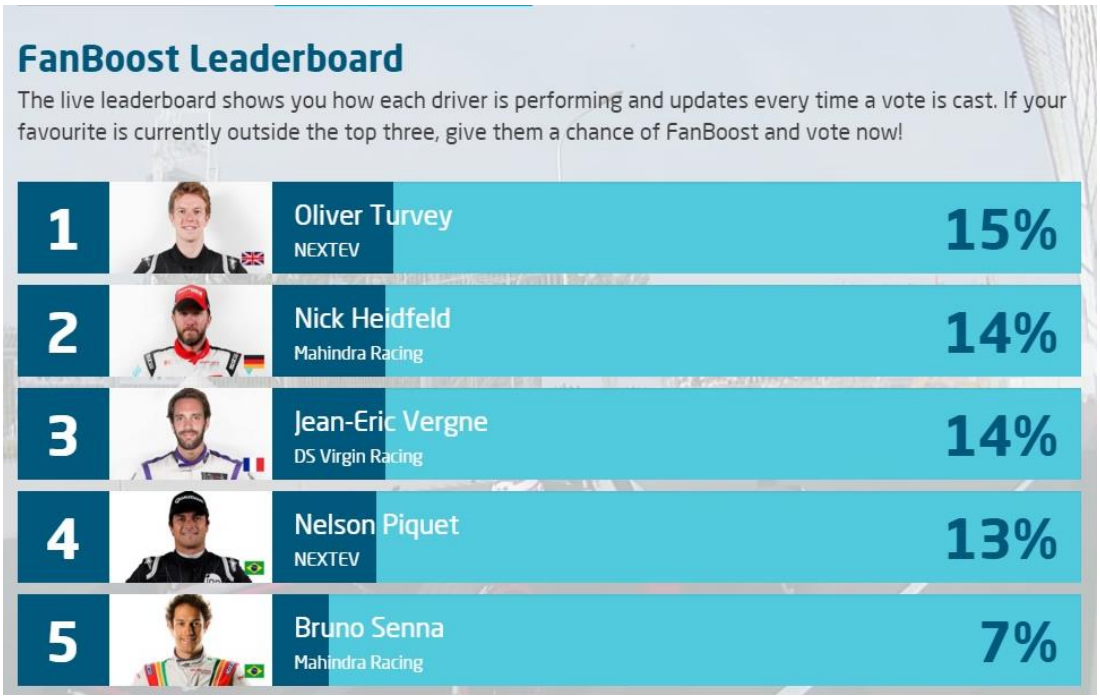
On-Track Digital Fan Experience	**Time**	**Detailed Description**
eRace	Season 2, Round 5	The eRaces were set up in rFactor 2, which is a computer racing simulator for Windows PCs, developed by Image Space Incorporated. This simulator was used by real professional racing teams, including the FE teams, for driver training and track familiarization. Indeed, the simulator included all the tracks and cars of FE, custom-made by MAK-Corp. While 1 year online access to rFactor 2 could be purchased for 44 USD, it required a PC with high-performance central and graphics processing units that came at a high price. In addition, the simulator set-up included a Playseat® F1 chair and a ClubSport Steering Wheel.
Instant Replay	Season 2, Round 7	Fans watching instant replays on demand on their mobile phone. The app was called Rewind and was developed by CURB in partnership with ICON, part of CSM Sport & Entertainment. See also: http://www.csm.com/rewind-instant-replay-technology-launches-at-formula-e-paris-eprix/.
Roborace	Season 3	The car was designed by automotive futurist Daniel Simon, who was known for his vehicle designs in blockbuster movies, such as Tron: Legacy, Captain America, Prometheus, and Oblivion. The car would be powered by Nvidia's Drive PX 2 supercomputer.
Off-Track Digital Fan Experience		
Mobile app	Season 1, Round 1	The FE mobile app won an award for Best Mobile Video Experience in 2016, issued by "TV Connect Industry." See also: http://fiaformulae.com/en/news/2016/april/formula-e-pick-up-award-for-best-mobile-video-experience/. In partnership with 360 Racing, FE enabled 360° video through the mobile app.
FanBoost	Season 1, Round 1	Voting opened 12 days before each race and closed 6 minutes into the race. Fans could vote online using a Facebook login, using the hashtag #FanBoost in addition to tagging the drivers' handle on Twitter or Instagram, or via FE's mobile application. Each fan could vote once per day per vote mechanism, which was monitored by Telescope, a company specialized in audience participation initiatives. Online, a real-time leaderboard was available, showing the ranking of drivers along with their share of votes. The extra 100 kJ that the most popular drivers received, could be used once during the race, for a maximum of five seconds. The driver can increase the car's power from the standard 170 kw to 180–200 kw. The higher the value, the shorter the duration of the boost.
eSports: Race Off Exhibition Events	Season 2, Round 3-5	These events involved racing in Forza Motorsport 6 on Xbox One consoles, using a gamepad, in the Season 1 FE car. The events began with open time trials, giving fans a chance to qualify for the semi-finals by setting the fastest lap time. The 16 fastest drivers advanced to the semi-finals, which consisted of two races with 8 drivers each. Subsequently, the top 3 of each semi-final progressed to the grand finale, in which the fans competed against two professional FE drivers.
eSports: Race Off Pro Series	Season 2, Round 6-10	To compete in the Race Off Pro Series, gamers had to enter a "Rivals" event in Forza Motorsport 6 through the Xbox Live lobby. They subsequently had the chance to set their fastest lap time, participating as much as they wanted. Ahead of each of the five final ePrixs of Season 2, this type of qualifying competition was organized. More than 10,000 gamers participated in each qualifying Rivals event. The gamers finishing in the top 10 when the time trial closed, on Thursday before the ePrix, were invited to the finals, held on Friday and live-streamed by ESL.
Virtual Reality	Season 2, Round 6	In partnership with Virtually Live, FE created computer-generated images of the tracks, based on a combination of physical trackers and image recognition software. Before the live-streams were available, the races were offered for download after the race was held, on the Oculus, HTC Vive, and PlayStation Virtual Reality platforms.

Appendix 4: Selection of Fan Reactions to Digital Initiatives

Technology	Fan reactions (from online discussions)			
Roborace	"I think it will just be a different kind of competition among enthusiastic people, like robot fights, not necessarily a "motorsport". I think that the cars performance will be crucial for having a nice show, especially when they will go beyond the limits of human pilots. Although autonomous cars will be the future of transportation, car racing with drivers won't lose its charm in favor of the autonomous, like running competitions weren't replaced by bicycle races because of the invention of the bicycle."	"I simply don't know if Roborace's A.I. dogbone cars will produce interesting racing on their own. After all, it's the unpredictable nature of human drivers, not the perfect-to-the-letter bots, that Google's autonomous cars have been struggling the most to handle. If every car is plugging away lap after neatly programmed lap, where will the action be? The fastest programmed cars will get out in front, and be able to move around the predictable slower traffic without incident. You can't intimidate machinery. You can't get up in the mirrors of a robot and make them sweat by hanging right off their bumper until they either move over or screw up. Our new robot overlords don't care that you're a tough guy. The basic mental games racers play with each other will have no role in this series."		
Formula E Website	"I like the driver tracker they put on with the circuit map for live sessions on the front page."	"They need to get rid of the 100 tweets they have on the home page as well. Quite often they're nothing relevant to FE"	"I think the official website is totally user UNfriendly. It lacks basic information that I need especially for a race day & some of the features they had previously have disappeared altogether. I'm not a fan of their website."	
Formula E Mobile App	"Crashes often, live coverage does not work except audio which is 20-30 secs delayed."		"The app helped me be more involved, I'm really excited to see it evolve."	
360° Video	"I think it's fairly boring frankly. Just my opinion."	"It would be awesome if you could watch the race live in 360 from any driver's car of your liking."		
FanBoost	"I don't know what to make of it to be honest. It's a bit gimmicky. But it might appeal to some new viewers, which is important for a start-up racing series – especially one that is unconventional like this one."	"It's nothing to do with sport, racing or driving. It is a pathetic attempt to make motor racing more like a video game to draw in the moronic PS3 generation, a sad and miserable way to connect sport with the mind numbing banality of the brainless shameful tsunami of diarrhoea that is reality TV and lastly a shameless way of making revenue from the morons idiotic enough to pick up the phone and dial a premium rate number to vote. Have I expressed my distaste sufficiently?"		
Race Off	"Still not a fan of it really, especially given that Forza 6 apparently favors those who use aids and a controller. I understand that it's just a bit of fun, but there is so much more potential when it comes to online racing than that."	"Competing online also means people from outside the UK can take part. Only thing is with the ordinary competitors not actually present you don't get to see their faces so I think it loses something from that."	"If they want to keep on doing this and maybe start an official series from it, then a simulator would be a greater decision for the future. - I mean, simulators already have championships with over 200 drivers in it. And that is without the famous name of an FIA behind it."	"I think the problem with Race/off was that there's only a week between the announcement and the actual event; that's barely any time to train really."
Virtual Reality	"Having a CGI version of the race seems utterly redundant, especially when you can just watch the real thing in 360 degree video."	"No matter how good those computer-generated recreations are I probably still would think I was watching a cartoon. I prefer camerawork of the real stuff."	"I thought it was interesting that they're offering to roam around the virtual paddock; it would be cool (if it was detailed enough) to wander into garages and areas that would usually be cordoned off to fans."	

Appendix 5: FanBoost





Video Links:

These videos, accessible via the YouTube links below, illustrate several of the initiatives highlighted in the case:

- What is Formula E: https://www.youtube.com/watch?v=mPzShxKzFeU
- On-track experience at Paris ePrix: https://www.youtube.com/watch?v=XB5zO8NnMyQ
- eRace: https://www.youtube.com/watch?v=9T9ypKt5Ac8
- Formula E simulator: https://www.youtube.com/watch?v=72pBcoIuAvo
- Roborace: https://www.youtube.com/watch?v=20BnWsVhJms
- 360° videos: https://www.youtube.com/playlist?list=PLiSlrzIEN5WIOUCJFdhLpTwlUfoMGz-ib
- Overview of YouTube videos: https://www.youtube.com/watch?v=g-klLASe1Bo
- Snapchat Live Story: https://www.youtube.com/watch?v=_UAm0EOvd-c
- Viral video: "Leap Of Faith" https://www.youtube.com/watch?v=EF9bbY3-lQU
- Race Off Exhibition Events: https://www.youtube.com/watch?v=PJrwULR7TR4
- Race Off Pro Series Grand Final (London): https://www.youtube.com/watch?v=O1KgQUSGNv4
- Virtual Reality: https://www.youtube.com/watch?v=3aWy-K14F6Q

End Notes:

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[i] http://www.umtri.umich.edu/what-were-doing/news/more-americans-all-ages-spurning-drivers-licenses

[ii] http://www.goldmansachs.com/our-thinking/pages/millennials/

[iii] Interview Campaign magazine, November 14th 2014: http://www.campaignasia.com/article/exclusive-f1-boss-bernie-ecclestone-on-his-billion-dollar-brand/392088

[iv] FE received the highest level of accreditation in the FIA Institute's Sustainability program, it was awarded the Low Carbon Transport award, issued by the British Renewable Energy Association, and both the Sustainability Team of the Year and Company of the Year Awards by businessGreen.

[v] http://fiaformulae.com/en/news/2015/october/leonardo-dicaprio-to-chair-formula-e-sustainability-committee.aspx.

[vi] An overview of local fan sites can be found here: http://fiaformulae.com/en/news/2016/june/fan-sites-20-000-strong-and-growing/

[vii] Nelson Piquet, Jr., won the inaugural championship and had received the most FanBoost nominations. Likewise, the champion and runner-up of Season 2, were the two drivers with the most FanBoost nominations.

[viii] For example, the GT Academy, financed by Nissan Motor Co., provided a pathway from amateur gaming to professional racing. In 2015, through a series of time trials and elimination rounds among 700,000 gamers on a Sony PlayStation console, the top performers were identified and invited to drive a real Nissan racecar. The grand prize was a spot on the Nissan racing team. Similarly, in 2016, the FIA had announced a partnership with Sony that would enable players of Gran Turismo Sport on PlayStation 4 to obtain an FIA Digital License by completing online racing etiquette lessons and showcasing virtual on-track sportsmanship. The license would allow racing in the real world, provided the local motorsport body participated in the program.

[ix] ESL had more than 6 million registered gamers worldwide. It set up both national and international competitions for more than 50 video games in different genres. ESL broadcasted tournaments via Twitch, a subsidiary of Amazon that served as an online video streaming platform, and it provided real-time commentary. Moreover, FE had partnered with GINX eSports TV, an international, multi-language TV channel dedicated to eSports.

[x] Microsoft Studios established Turn 10 Studios in 2001 to develop a racing video game series, Forza Motorsport, for the Xbox gaming system. Xbox is a home video game console developed by Microsoft; its latest version, Xbox One, was released in 2013 and had sold more than 19 million consoles by January 2016, at a price of at least 250 USD. In 2015, Turn 10 Studios released Forza Motorsport 6, which featured more than 450 cars, including the Season 1 FE car, and 27 tracks, including the Long Beach street circuit that is one of the FE races. By early 2016, more than 1 million units of Forza 6 had been sold, at a price of about 40 USD.