

# Time2Play - Multi-sided Platform for Sports Facilities: A Disruptive Digital Platform

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**Abstract:** Digital platforms drive disrupting businesses, supported by emerging technological improvements. These platforms enable new business models that use technology to connect people, organizations and resources in an interactive ecosystem where all the affiliates to the platform can create, add and capture value. This drives us to an innovative technology-driven business model called multi-sided platforms that is transforming our lives in ways that would be impossible to think a few decades ago. This new business model, platform-based and value-driven, enables direct interactions and/or transactions between two or more affiliates, enabling network effects, and consequently increasing the value of the network where affiliates belong to. Creating value through business model innovation is the engine of the success behind this kind of platforms. The main goal of this project is to build an innovative multi-sided platform to become a reference on the booking of sports facilities sector bringing together sports facilities' owners and players. The proposed platform is modeled and presented, after being characterized through analysing the most similar tools in the market, and comparing them with a Blue Ocean Strategy tool, namely [yellow tail] value curve.

## 1 INTRODUCTION

Creating value through business model innovation is recognized as the main driver of the success of well-known companies on the global landscape (Amit and Zott, 2015).

Over the last decades, the success of web-based platforms prompted the interest of several companies around the globe. Parker *et al.* share their vision about this phenomenon, reflecting the major importance of digital platforms and the way that they radically changed business. "Platforms are eating the world. The disruption they are driving is reaching businesses one industry at a time and is likely to hit practically all information-intensive industries at some point" (Parker et al., 2017). This new digital platform approach is characterized as a disruptive force, but it can also provide important lessons on how any business can operate in a more efficient way. The same authors defines a digital platform as a business model that uses technology to connect people, organizations, and resources in an interactive ecosys-

tem in which remarkable amounts of value can be created and exchanged (Parker et al., 2017).

There are several online booking platforms right now available on the market that are references on their respective sectors, such as Airbnb, Uber, Booking, Cabify, Lyft, among several other well worldwide known examples. To the best of our knowledge, there's not, right now available on the market, any worldwide known and referenced platform on the sports facilities booking sector, hindering a prompt and easy answer to any of the following questions, "what if I do want to book a sport's facility, on a given location, date and time?", or "what if I do need to invite more people, to reach a minimum number of players, and know their availability, to practice a certain group sport's modality, on a given location, date and time?", or "what if I do own one or more sports facilities and I want to register and list online any of my spaces, with all the details about them, including their availability and price per hour to be booked?". And, this is despite the large number of private and public sports facilities all over the world. To enable an answer to these questions, we present in this paper the conceptualization and development of *Time2Play*,

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an online platform that will allow any user to find the availability of sports facilities, to practice a sport's modality on a given location, date and time. In addition, any registered user should be able to invite other users, either registered or not, in order to reach the minimum players required to practice a certain sport's modality, on a given location, date and time. This should be possible after organizing an event such as a football game, for example, where the organizer or anyone already enrolled in the event should be able to invite additional users. Moreover, the owner of each sport's facility registered on *Time2Play* will be able to describe the sport's facility, providing as much information as possible to allow the user to decide which alternatives are the best for their goals. Each user should have available all the relevant information that they might need to book the sport's facility, such as the price per hour, accepted payment modalities, images, if it's an indoor or outdoor facility, what equipment is available for the practice of the sport's modality, and if it's included on the booking price or if it's an additional cost, among other relevant information. *Time2Play* also will provide information on the weather forecast for a given location and time, to provide as much information as possible to the user, to ease their decision process.

This paper is structured as follows. Section 2 describes the methodological approach used in this research project. In section 3, some major concepts related with multi-sided platforms, network value and structure are presented, mentioning the supporting major studies. Section 4, describes some related platforms, and analyzes and compares them in detail, between each other and to the proposed platform. Section 5 presents the platform conceptualization. Section 6 presents some details on how the models have been addressed in the implementation, and finally, section 7 presents some ideas for future work, together with the main conclusions.

## 2 METHODOLOGICAL APPROACH

This project is structured according Design Science Research (DSR) methodology that requires the creation of innovative artifacts in order to solve a specific problem on a specific domain. This methodology is based on iterative and sequential approach through six main activities: problem identification and motivation, objectives definition, design and development, demonstration, evaluation and communication (Hevner et al., 2004; Cruz et al., 2014). This iterative process should respect the sequence and or-

der of activities, however, some phases (steps) can be repeated as many times as required in order to achieve the best and accurate result possible. So even being on the iteration evaluation or, even, communication, near the end of the iterative process, it can go back a few iterations, to objectives definition or to design and development, if required. But then, going forward, all the phases will have to be repeated sequentially.

## 3 INNOVATIVE BUSINESS MODELS BASED ON MULTI-SIDED PLATFORMS

The innovation theory is the edge where technological improvements meet newer and innovative business models. In the early of 1942, the economist Joseph A. Schumpeter described the process of innovation as "the process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one" (Schumpeter, 1942). Schumpeter's work on innovation theory supports that innovation is the engine of economic growth. However, there may be cost associated with it, that is the dynamic process of innovation that he called as creative destruction, where successive waves of technological innovations, or, more precisely, disruptive technological changes, can transform existing industries and create value by destroying previous economic structures. Even though, not all innovations result on this creative destruction process. There are two major types of innovation: radical (disruptive) and incremental innovations. Disruptive innovations are the result of the creative destruction process described above. Incremental innovations are defined as improvements and enhancements to a product, process or service without changing them radically (Trott, 2017; Evans and Schmalensee, 2016). Kaplan's (Kaplan, 2015) complementary vision of the innovation process supports the idea that an innovation can simply derive from the careful analysis of the market. Therefore, on his assessment, "Innovation is not always about coming up with the next big idea. It might be about combining existing ideas and parts in a new way".

Mauborgne and Kim developed a framework focused on key competitive factors of the, direct or indirect, competitors of a company in order to analyze them very carefully and build an innovative business model (Mauborgne and Kim, 2005). These authors agree that the innovative process should be value-driven, and to achieve this goal one has to understand what the market is already offering. Thus, this in-

novative framework, known as Blue Ocean Strategy, supported for some tools, such as canvas strategy, analyzes what should be created/added, removed, raised and reduced in order to create a different and valuable offer to the market. In a world where business models are evolving rapidly, and new competitors can emerge overnight, it is mandatory, for any company, to innovate in order to stay relevant on the market. It's important to understand that an innovative business model can either create a new market or allow a company to create and exploit new opportunities on existing markets (Still et al., 2017; Evans et al., 2006).

### 3.1 Multi-sided Platforms

In 2003, Jean-Charles Rochet and Jean Tirole studied an innovative technology-driven business model based on direct interactions between two or more affiliates (Rochet and Tirole, 2003). The disruptive power of web-based platforms is transforming our lives in ways that would have been impossible a few decades ago. In 2014, Jean Tirole received the Nobel Memorial Prize in Economic Sciences for a number of important accomplishments, but mostly due to his pioneering contributions to the new economics of multi-sided markets. Multi-sided platforms are defined as technologies, applications or services that create value by enabling and facilitating direct interactions and/or transactions between two or more affiliates (multiple sides) (Rochet and Tirole, 2003; Armstrong, 2006), (Hagiu and Wright, 2015). On multi-sided platforms, users and groups can be thought of as nodes and the major role of the platform is to enable direct and valuable interactions between them.

The main questions on this innovative business model are how many sides to bring on board and what kind of ties to establish between affiliates. So, looking to the current market offer it's important to understand what the market is already providing, on which terms, and define the new business model, either creating a new market, or just competing on existing ones, creating and exploiting new opportunities. Among the best-known examples of multi-sided platforms, we can mention Airbnb, bringing together residence owners and renters; Uber, enabling direct interactions between professional drivers and passengers; Facebook, brings on board users, advertisers and affiliated third-party sites; and, Amazon, eBay and Alibaba, enabling direct interactions between buyers and sellers (Parker et al., 2017; Evans and Schmalensee, 2016). Moreover, Airbnb, Amazon and Uber are examples of successful multi-sided platforms that are worldwide recognized, not only by their customers, but as well by Boston Consulting Group (BCG), on their annual

report as most innovative companies.

Key features characterizing a multi-sided platform are the capacity to enable direct interactions between two or more sides that are affiliated with the platform, there is value (co)creation for the intervenient, is a value-based platform and enable network effects (Parker et al., 2017; Evans and Schmalensee, 2016; Rochet and Tirole, 2003; Hagiu and Wright, 2015).

Enabling interactivity, connectivity and the creation of ties helps users to derive value from the network, turning the network more attractive to potential new subscribers. This phenomenon is called network effect and represents a new economic achievement, driven by technological innovation. Network effects, sometimes referred as Metcalfe's Law, are also known as network externalities or, as demand-side economies of scale. They occur on situations where a product or service becomes more valuable to the user as the density or the number of users increases (Bellaflame and Peitz, 2016) (Veljanovski, 2007). Value co-creation is a very important concept related with network effects, since users or groups can be considered a valuable part of the value chain (creation, addition and exchange) to the network that they belong to (de Oliveira and Cortimiglia, 2017). Based on the basic key features described above, it's easy to understand that a single affiliation is not sufficient to define a multi-sided platform. Amazon adopted, for several years, a business model of pure retailer but decided to move over a multi-sided platform business model as growth strategy, by enabling and facilitating direct interactions by third-party sellers with buyers using exclusively their own platform (Gawer and Cusumano, 2015).

### 3.2 Understanding the Network Value and Structure

When network effects are present, understanding the key sources of the network's value, is important to understand the structure of the network itself. The value of a product or service increases as the number of users grow. Thus, network effects are among the most powerful strategic and key resources that can be delivered by technology-based innovation (Adner and Kapoor, 2009). In (Hariharan, 2016), different theories and approaches are presented and compared, related to network-effects-value, in order to measure the effective value of a network. Even being totally different theoretical approaches, and based on a distinct value definition premises, they converge and agree on an extremely significant conclusion, for network effect theory: that the network value is directly related with the network size. The first network value ap-

proach mentioned on their study is known in the literature as Sarnoff's law, and it defends that, in broadcast networks, the value of the network is linearly proportional to the number of viewers. The network value is represented by,

$$\text{NetworkValue} = N \quad (1)$$

(where N is the number of network nodes or users).

The second approach is known as Metcalfe's law (Li, 2008), perhaps one of the most worldwide recognized network value theories. Metcalfe's law, de-

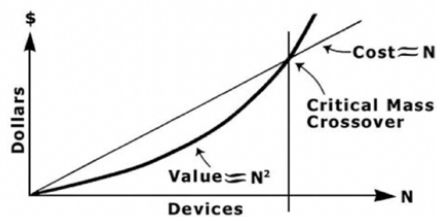


Figure 1: Metcalfe's Law (Extracted from (Li, 2008)).

picted in Figure 1, is the most widely accepted model, to explain the "web-effect". This theory, named after Robert Metcalfe, co-inventor of the Ethernet and co-founder of 3Com, pointed out that the value of a telephone network grows nonlinearly as the number of subscribers of the network increases, making more connections among subscribers possible. The original theory was trying to explain the logic behind the sale of networking cards, that the cost of the cards was proportional to the number of devices installed and the value of the network was proportional to the square of compatibility of communicating devices. Thus, this theory defends that the value of the network is proportional to the square of the number of connected users. This may be expressed algebraically as having a cost of  $N$  and a value of  $N^2$ ,

$$\text{NetworkValue} = N^2 \quad (2)$$

Metcalfe's Law is a useful way of encapsulating how network effects create value for those who participate in a network, as well as for those who own or manage the network. Based on this approach, the steady state, or breakeven-point, is defined as critical mass, after which the network will become self-sustainable and produce further growth by itself.

The third, and last, theory presented on their study was the Reed's law, which defends that the network value can increase exponentially with the size of the network. Algebraically, this is represented by,

$$\text{NetworkValue} = 2^N \quad (3)$$

For all above expressions, just note that N needs to be greater than one, since when there's only one node

in a network no connections are possible. This study concludes that the more people are connected to a network, the more valuable the network is to each person that is part of it, regardless of the typology of the network. This principle is a phenomenon called direct network effect, also referred as a positive direct network externality, since the value achieved by the increasing number of the network members results on a positive effect to the entire network.

Establishing a valuable ecosystem around the network can help to sustain and stay relevant to their members in the long term. The network structure affects the network value in multiple ways. First, when designing a network, the priority should be on creating a structure that provides every user the ability to interact with each other, in order to maximize the connections within the network, increasing value to the user. There are some exceptions, such as when on a network it is allowed to restrict user interactions by creating restrictive groups. Even though, while being part of these restricted groups, the users can still continue adding and capturing value to their restricted group members, thus benefitting by being part of that sub-network. The only difference would be that they're not sharing this value with the entire network. Thus, the network structure affects how members can position themselves inside the network and how they can capture or add value. Therefore, on a closed network, the network effects are more limited than on an open network, where the network effects grow exponentially (Evans and Schmalensee, 2016; Bellaflame and Peitz, 2016; Veljanovski, 2007). The way ties are built between users and groups inside the network impacts on how much they can derive value from the network (Bellaflame and Peitz, 2016; Veljanovski, 2007).

## 4 RELATED WORK

Even if not considered a reference on this sector, there are a few platforms that enable booking a sports facility. Of these, we have selected three that we considered to have the most disrupting features.

The first platform is AirCourts ([www.aircourts.com](http://www.aircourts.com)), a Portuguese company that has as core business the development of an Enterprise Resource Planning (ERP) system designed specifically for the management of sports facilities and, additionally, they provide the possibility of registering, listing and booking a sport's facility on-line. This is the only sports facilities related booking platform in Portugal that we were able to find. According to the information available on their

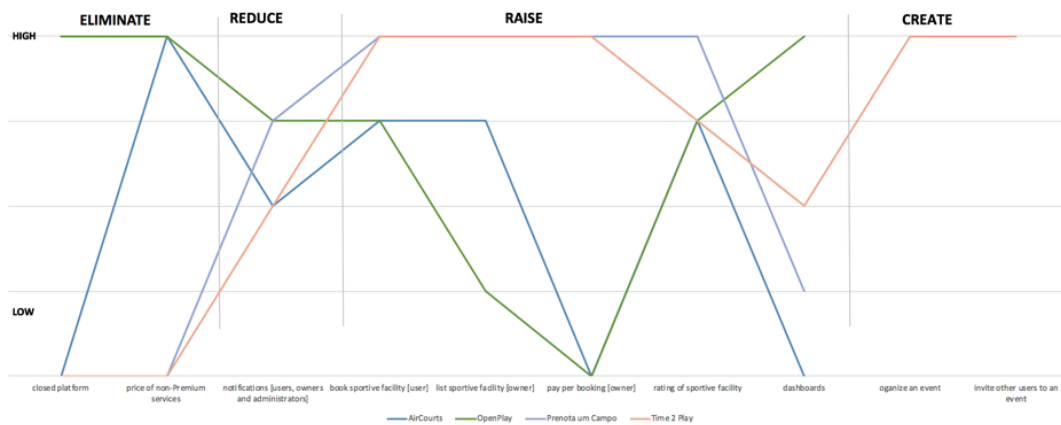


Figure 2: [yellow Tail] Value Curve for Analyzing the “competition” in Booking Platforms for Sport Facilities.

own website they have registered near six hundred sports facilities, all located in Portugal. This is an extremely low number considering the amount of sports facilities, private and public, that are currently available. This might be due to the fee that is charged to have access to the software, which might be a barrier to increase the number of sports facilities registered and to potential new clients.

The second platform is Prenota un Campo ([www.prenotauncampo.it](http://www.prenotauncampo.it)), a web-based platform that allows to register, list and book sports facilities. This is a free Italian platform, with only Italian clients, and the core business is the booking of sports facilities.

The third platform is OpenPlay ([openplay.net](http://openplay.net)). This is not a free platform and the registration is mandatory to have access to the functionality. It is based in the United Kingdom and the core business is a management platform for sports facilities and bookings. However, they don't have a single list where to consult any sport's facility registered on the platform. We have considered this platform as relevant for this comparative analysis since, from the management perspective, it is very complete, intuitive and useful, since it has several dashboards that can give fast and easy access to relevant data.

The state of the art is analyzed through the use of a tool available in the Blue Ocean Strategy approach (Mauborgne and Kim, 2005). We will use the canvas strategy, which is a diagnostic and action framework, that identifies positive and negative key factors and features, and we'll represent the output graphically. This graphic is known as [yellow tail] value curve and provides a representation of a company relatively to their direct or indirect competitors, or even, to a representative market segment and the strategic direction that we want to define to our company (Mauborgne and Kim, 2005). In this analysis, the competitors are the three above identified platforms in the sports fa-

cilities booking sector (see Figure 2).

While selecting the above platforms, we have defined a set of key factors and features that we considered the most relevant in order to build a successful booking platform for sports facilities. For that, an extensive research has been made on what similar platforms, even belonging to different sectors, are offering to their users. We tried to understand the way each platform is creating and capturing value for/from each user. Then we decided which key features the new Time2Play platform should have. Additionally, and respecting the premises of this framework we have decided, as well, what features to create as innovative elements. Those key factors and features are the following:

- Closed platform;
- Price of non-Premium services;
- Notifications;
- Book a sport facility [end user];
- List a sport facility [owner];
- Pay per booking [owner];
- Rating of sport facilities;
- Dashboards [users, owners and administrators];
- Organize an event;
- Invite registered/non-registered users to an event;

Each key factor and feature described previously is evaluated in a range from low to high, comparing the three platforms mentioned above. Additionally, we have evaluated on the same scale, the same factors and features for our new platform Time2Play, as well, and defined the strategy. Figure 2 represents the [yellow tail] value curve for the three above mentioned platforms together with Time2Play. The factors presented above are being compared, for each platform, and are presented in the horizontal axis. An important

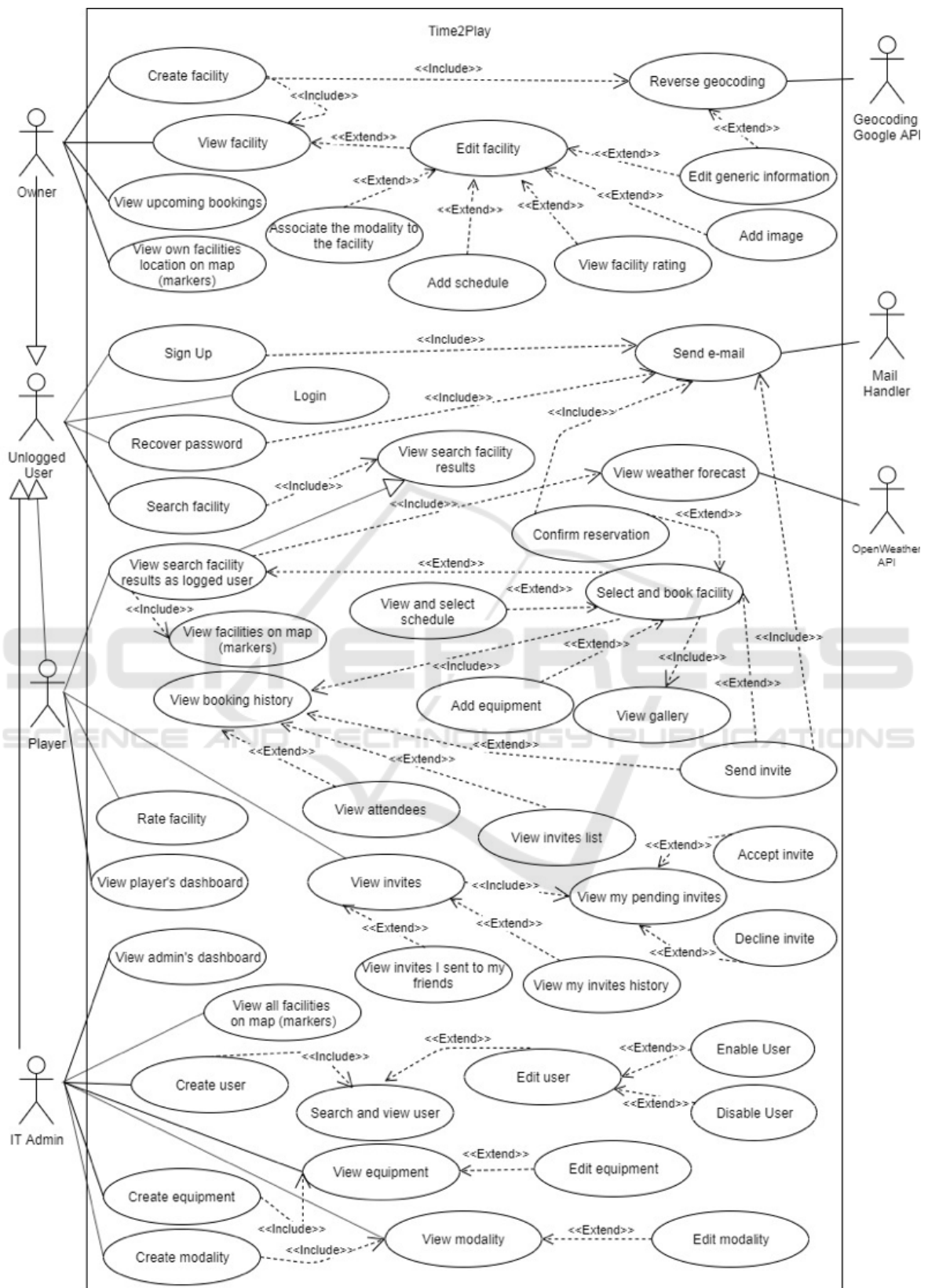


Figure 3: Use Cases Diagram for the Time2Play Platform.

and valuable part of this representation is that, based on the evaluation for each company, it should be decided what to eliminate, reduce, raise and create/add in order to achieve what we think is the optimum for the Time2Play platform.

From this analysis, reading the [yellow tail] value curve presented in Figure 2, the platform being proposed should provide the new differentiating features of organizing a sport's event and inviting players for that event, while raising functionalities for booking and rating a sports' facility or listing facilities and bookings, reducing notifications for any type of user, and eliminating features such as being a closed platform, where users must pay for accessing the platform, or paying for non-premium services.

## 5 PLATFORM CONCEPTUALIZATION

In this section we model the Time2Play platform using UML. Figure 3 presents the Use Cases diagram for Time2Play. There, four user profiles are modeled as actors, namely Owner (owner of sports facilities), Player (user that looks for facilities to book), IT Admin (platform administrator), and Unlogged User (anonymous user that did not log into the system). Besides these, three external APIs or servers are also modeled as actors, as prescribed by UML, namely a geocoding API, a weather API and a mail server. The use cases modeled in the diagram represent the pieces of functionality that the Time2Play application provides to each user profile. Each use case is further specified in (Caldas, 2019), identifying its involved actors, actors' goals, use case pre- and post-conditions, the normal course of events during the interaction between actor and system, etc..

Domain entity models are central artifacts on the domain analysis and design of any software solution. This model presents a graphical representation that characterizes each entity class and the way they're related to each another, in order to meet the defined requirements (see Figure 4).

In this model we can devise three distinct user types: administrators, players and the space owners. The space owner owns a sports facility. The player searches for and books a sports facility, and may invite other players, registered or not in the platform. A sports facility has some equipment to lend. An equipment can be used on several bookings and a booking can use several equipment. An invitation respects to a booking. Also, a user will belong to a given location (Location table) and country (Country table).

Each booking will be related to a given sport facil-

ity and a given sport modality, on a given location and country. The availability of a sport facility will be defined based on an associated schedule. Each booking can contain some equipment, associated to a sports facility, which may be booked together with it.

Related with each sports facility, there's also the payment types accepted and an image gallery.

The host of a given booking (player that created the booking) will be able to invite other users to attend to the event created. There are three distinct statuses available for the invite process that are 'No answer', 'Accepted' and 'Declined'. All accepted invitations are considered Registered for the event.

Every registered user will be able to rate a sports facility where they already attended to a given sport event. Every time a sports facility is rated, an arithmetic average is calculated, and the result is rendered every time that the sports facility is returned on a search. If the sports facility hasn't been rated yet, a message will be displayed to the user informing that "No evaluation is available" (see (Caldas, 2019)).

## 6 PLATFORM VALIDATION

In this subsection we explore and demonstrate two of the most representative UCs scenarios, and how these are accomplished in the developed application.

When accessing the Time2Play application, a user sees a first page (landing page), which is not authentication protected. This means that any unlogged or unregistered user has access to this page and is able to search for all the available sports facilities for a given sport modality, location and date. Figure 5 shows the landing page, which also corresponds to UC.04 (*Search facility*), where a sport's facility may be searched. Any unlogged user will be able to search for a sport facility to practice a sport modality on a given location and date (UC.04: *Search facility*). However, the booking and invite functionalities will be only available after successfully logged as a Player.

The "New Booking" page displays all the results retrieved by the query along with the information related to each sport facility that matches the search criteria, and renders some data related with the weather forecasts matching the location and date selected. The "Book now" button, on each result, will redirect the user to the New Booking: Confirmation web page, where some details can be added.

Here, we have showed how two UCs scenarios are accomplished in the developed application. For a complete set of scenarios, please see (Caldas, 2019).

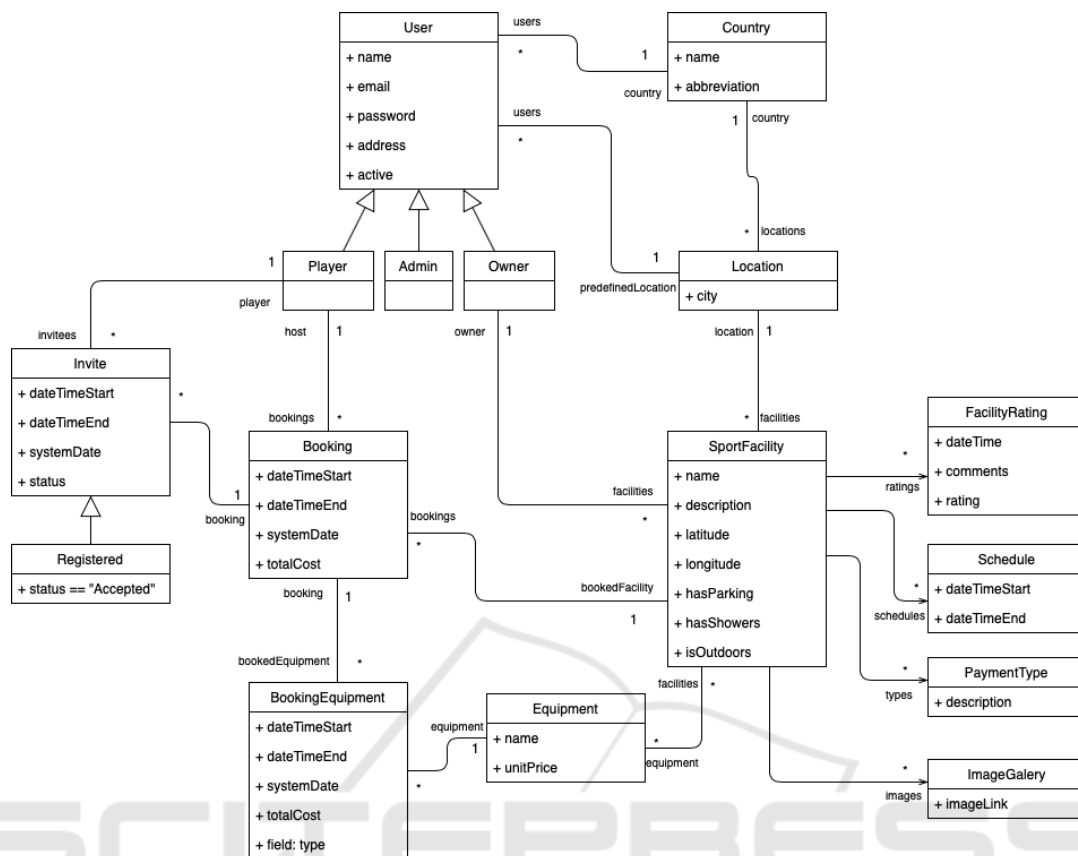


Figure 4: Conceptual Domain Model for Time2Play Platform.

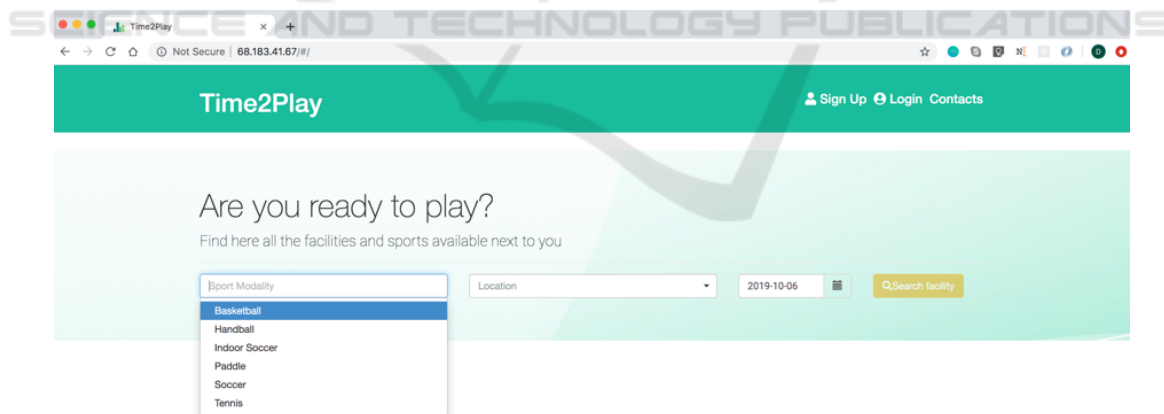


Figure 5: Search Facility Page (Landing Page).

## 7 CONCLUSIONS AND FUTURE WORK

Businesses are changing fast on the global landscape, and innovative business models are transforming the economy. Multi-sided networked markets are a result of these innovative processes. Interactive ecosystems

are being created enabling direct interactions between two or more affiliates, empowering network effects where value co-creation and exchange is a key source to the network where they belong to. Establishing a valuable ecosystem around the network can help to sustain and stay relevant on the long term. Network effects are one of the most powerful key strategic as-



sets that can be created by technology innovation.

This paper reports the conceptualization of a multi-sided platform for sports' facilities. It started by contextualizing multi-sided platforms as disrupting businesses, enabled by digital technologies, and by identifying the sports' facilities booking market segment as an opportunity to be developed and investigated through a multi-sided platform, since there's no worldwide known and referenced web-based platform on the sports facilities booking sector. The main goal of the reported project was the conceptualization and building of an innovative multi-sided platform that, we hope, will become a reference on the booking of the sports facilities sector, bringing together sports facilities' owners and players.

The exponential growth of mobile devices will drive us to consider, on a further stage, the development of a mobile application.

We consider as well, as further development, the creation of a tournament management system within the Time2Play platform, covering several sports modalities. This point will be a valuable asset to our core platform, as a Premium service, for providing, on a single platform, as much relevant services as possible, related with the practice of sports.

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