UNIVERSITY OF
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Human Computer Interaction

—

Unified Sports Booking System

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Abstract

If you currently want to book sports facilities, the only way to search is directly through the individual sports center's websites, or through direct communication. If someone is flexible in the location or choice of sport, they are required to search multiple locations to find the best compromise.

In addition to the difficulties of checking multiple websites, often each of these websites are unintuitive and difficult to use, requiring the user to know exactly when and where they want to use the facilities and often not giving clear information about other possible factors such as cost.

Here, we propose a new, unified interface for finding a time, location and the cost for playing any of a number of sports, at any of the available locations within a given distance or relative to a different location.

Contents

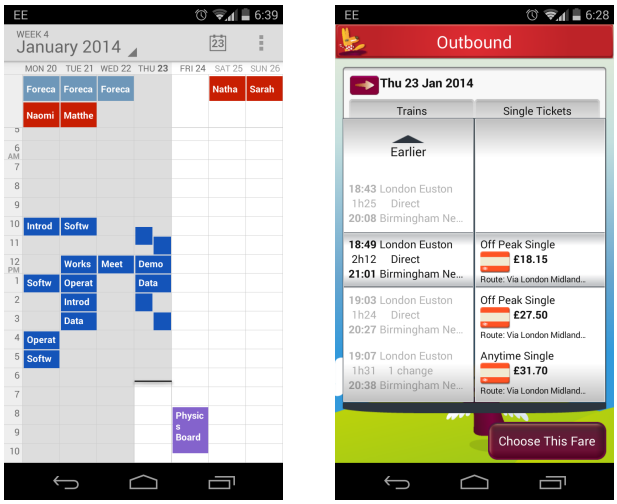
1 Review of Related Work

1.1 User Input

In order to present a user with useful information, our application will have to accept data from them. This is done by means of forms, text input and buttons. To maintain a clean, intuitive user interface, a simplistic approach is often taken to reduce the thinking time required to process information on a single screen. If more information is required, multiple screens are often used.

1.1.1 Timetables

A common set of information presented to a user which represents a considerable challenge, particularly on small screens, is a timetable of available or appropriate times. From this, the user can then select which is most suitable for them. When too much information is displayed on a single screen, this can become confusing or impossible to read. For example, in figure 1a [5], despite a single hour being a common appointment length, the text for these slots is hidden entirely.



(a) *Google Calendar* **(b)** *RedSpottedHanky*

Figure 1: *When too much information is displayed on a screen, it can be hard to read and interpret, whereas condensing the information and splitting it so that only currently appropriate information is shown makes it much easier to understand.*

A common way to improve the readability of theses complex structures, which often contain a large quantity of data, is to have graded selection of that data. In other words, where there is an option to refine a search to reduce the data needed to be displayed, only the immediately relevant information is displayed, with simple navigation to other relevant data.

This method can be seen clearly in the RedSpottedHanky.com application, figure 1b when a user is searching for tickets for a specific date and time. Although there may be many trains within a

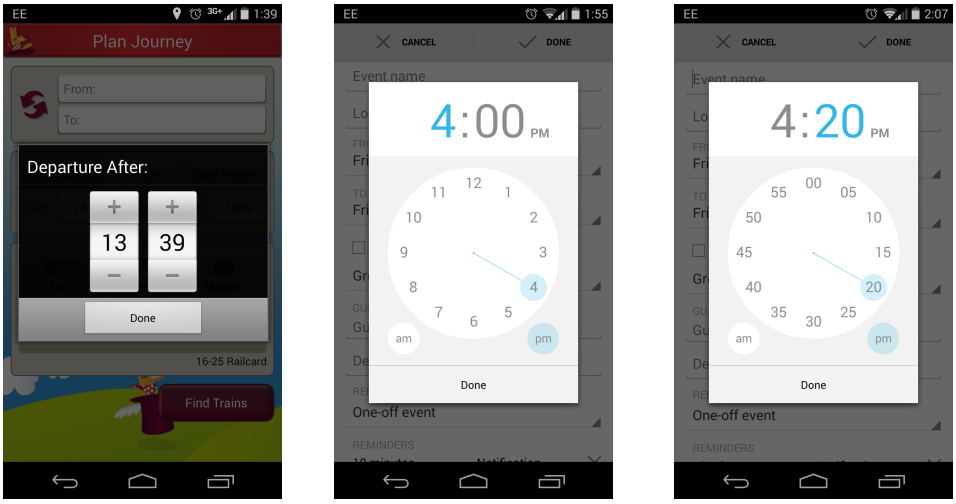
narrow time gap, the application shows a small number of tickets with the option to move either earlier or later. Each ticket time is also associated with a number of options relating to ticket price. These are shown only for the currently selected ticket time.

1.1.2 Date/Time Selection

In order to reduce the search range, often a date and/or time selection dialogue is used. Figure 2 shows two different implementations.

Figure 2a, on the right is an example, again, from RedSpottedHanky [6], which shows the time selection associated with booking a train ticket. This design fails since the method of changing time requires very close control when accuracy is required, and is time consuming when the desired time is far from the currently selected time. The movement is performed in single increments or decrements of the hours and minutes. This is despite the functionality described above which lets the user view and switch to other trains at nearby times.

Figures 2b, in the middle and 2c on the left are examples from Google Calendar which shows how the process can be made much more intuitive, simple and fast. Through the use of separate screens with large and clear selection, this selection is much easier to navigate than the scrolling method used above.



(a) *RedSpottedHanky* **(b)** *Google Calendar* **(c)** *Google Calendar*

Figure 2: *The time selection for RedSpottedHanky requires the user to spend to much time selecting the time when larger increments could be used to smoothen the process. Google Calendar, on the other hand, allows simple and fast selection of the hours and minutes through separate screens.*

A combination of both of these is used in the stock iOS, shown in figure 3 [3] where a much easier to navigate scrolling mechanism is used. Though this can still cause the user to spend more time selecting the correct number, the fact that the used can "flick scroll" though the numbers means reaching a value that is far from the currently selected one is much quicker than the RedSpottedHanky.com application.

(a) *RedSpottedHanky* **(b)** *Google Calendar*

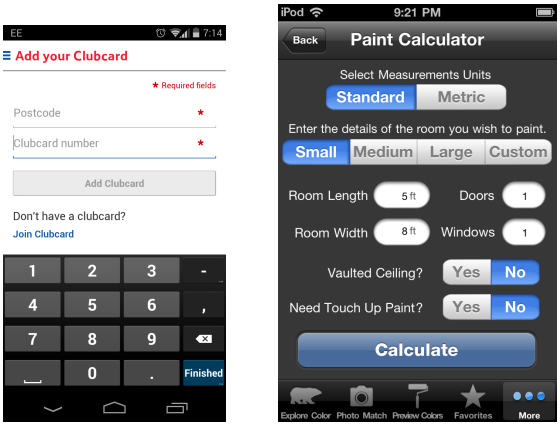
Figure 3: *Stock iOS date and time picker is easier to scroll through, but still requires more time than selecting the appropriate number.*

1.1.3 Forms

When entering information that is not limited to a small set of possible values, such as a name, location or arbitrary number, a form must be used to accept the user input. Since touch screens rely of the user being able to navigate to to correct form section, the input must be of sufficient size to allow this movement easily.

Figure 4a show a simple form with two input boxes. Each has a clear border around it so the target for interaction is easier to select.

An important consideration that has been made here is to specify that, for the second set of text input, the data is strictly limited to digits. For this reason, the keyboard switches from a general purpose "qwerty" keyboard to a purely numerical version. Again, this assists the user, both by indicating that only the provided digits are acceptable, and making the input of those digits easier (often the numbers on a touch screen keyboard are only accessible by switching modes).



(a) *Large, easy to access text entry* **(b)** *Crowded interfaces make entry more difficult.*

Figure 4

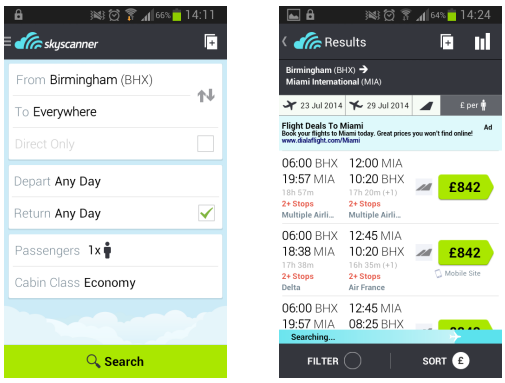
By contrast, the interface in figure 4 is overly crowded with too many small buttons squashed together. This could cause the user to select the wrong input area, or not be able to navigate the application properly.

1.2 Current Comparison/Booking Applications

The idea of comparing various services to match your requirements at the best price is widely spread over the web, especially when it comes to booking flights, hotels, transport etc. We want to take this idea and apply it specifically to booking sports facilities across the county. Some applications compare results from different websites; others show available options from different companies on their own website.

1.2.1 Skyscanner

Skyscanner is a flight search app which compares flights and airlines. The app allows the user to search by airport, departure/return date, number of passengers and cabin class. They are then directed to search results matching their criteria. Once the user has chosen their desired flight, they are linked to the airline or travel agent to buy directly.



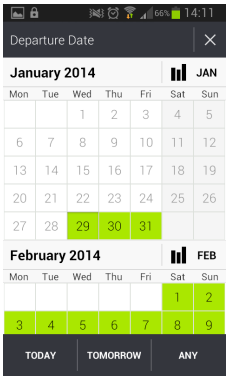
(a) *Skyscanner's home screen*

(b) *Skyscanner's search results.*

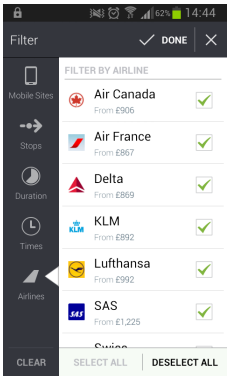
Figure 5

Strengths

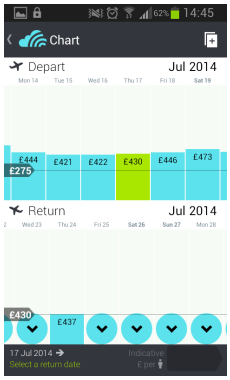
- The date selection page is simplistic and easy to use. The user is provided with a calendar where they can simply touch the date they would like to fly (figure 6a)
- Clear, concise information is shown on the results page. This allows the user to quickly scan the flights available and doesn't clutter the page with information which would not affect most customers' decisions (figure 5). Further details (destinations and times of any stops) can be viewed by clicking on the flight.
- If a return date is not specified, an extra screen is displayed which allows the user to see the prices of different departure dates and the return dates available. This gives the customer an opportunity to change their departure date based on the prices shown. (figure 6c)
- There is a filter option on the results page permitting users to be more specific. For example, particular airlines, direct flights only, flights times etc. (figure 6b)



(a) *Skyscanner's easy to use calendar for date selection.*



(b) *Options available to further filter results.*



(c) *Screen shows prices of alternative dates.*

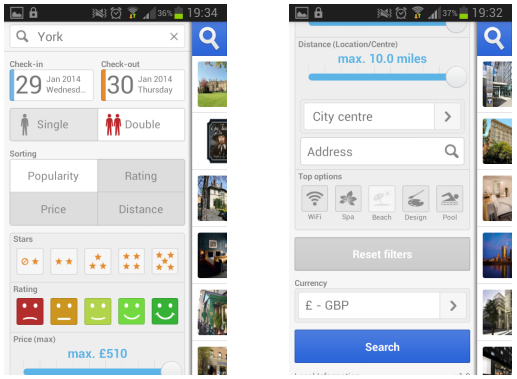
Figure 6

Weaknesses

- There is no flexibility in departure date (except for the option of "any" date). However the return date option allows flexibility of one day.
- The "Everywhere" option (figure 5a) seems slightly pointless as it is unlikely someone would have no preference as to where they wish to go but have a particular date in mind. It is more likely they have a general idea of where they want to go, for example the country, but there is no option for this.
- When choosing a destination, the user is required to select a specific airport. This restricts the user to where they can fly. For example, they may wish to check prices to a variety of destinations within a particular area or group of Islands with various airports.

1.2.2 Trivago

Trivago is a hotel comparison website comparing hotels from booking sites such as booking.com and Lastminute.com. The initial search screen boasts many options and filters. As well as the expected search criteria such as location and check in/out date, the user can also filter by rating, popularity, distance, price and whether the hotel has certain features such as WiFi and a pool etc. A maximum price and distance can also be set within a certain range using the sliding bars (figure 7). The results show the cheapest price for each hotel available and what booking website the customer can get this price. Once the customer has chosen their hotel, they will be directed to the booking website where they will make the payment.



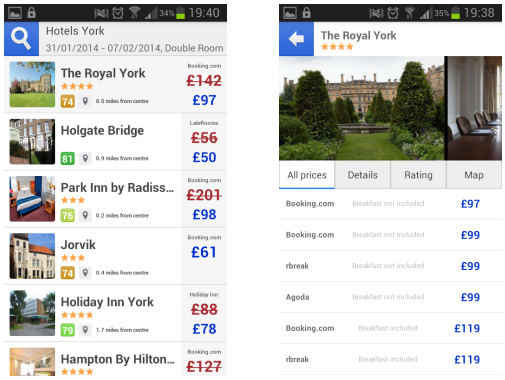
(a) *Top half* **(b)** *Bottom half*

Figure 7: *Trivago's home screen*

Strengths

- As a location is typed, the number of available hotels is displayed in brackets next to suggested locations.
- Searching is very flexible, for example you can search by hotel name, region, points of interest and city.
- It is possible to search for hotels in the vicinity of a specific address, very useful if you want to find the nearest hotel to a specific location.
- Search results automatically load up at the side of the screen as search criteria is filled out. The user can swipe across to see them, for example once a location had been entered, it will load up available hotels whilst still maintaining the search screen.
- The search results are very clear and simple in that they show enough information without clogging up the screen. The hotel name, rating, stars, distance from the centre, price and a photo are all displayed in a concise manner (figure 8a). The user can then look into more detail by clicking on the hotel (figure 8b).

Weaknesses



(a) *Trivago's earch results screen*

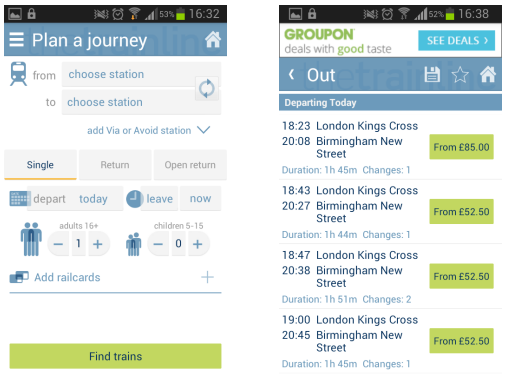
(b) *The hotel in more detail*

Figure 8

- The 'current location' feature in the search box is useful if you need a hotel there and then, but in reality this is rarely the case. Customers would usually book a hotel at least a day in advance at which point there current location is unlikely to be near an area they would need a hotel.
- There is no option to select how many people and therefore no option for multiple rooms. The user may require multiple rooms if there is more than two of them. Therefore this app is useless for families and people travelling in large groups.
- There are no additional filters past the home screen. Customers may require extra filters such as free parking.

1.2.3 thetrainline.com

thetrainline.com is a train ticket retailer app designed to let customers buy train tickets without the need to have a paper ticket. This app differs slightly in that it independently searches individual trains without searching external websites. Train journeys can be searched by location of departure and destination, departure/arrival time and number of passengers, as shown in figure 9a. All available train journeys are then displayed with the cheapest price for each journey. Once the customer has confirmed their chosen journey they can pay for their ticket on thetrainline.com. The customer will be sent a barcode ticket to their mobile phone.



(a) *Search criteria screen*

(b) *Results from the search*

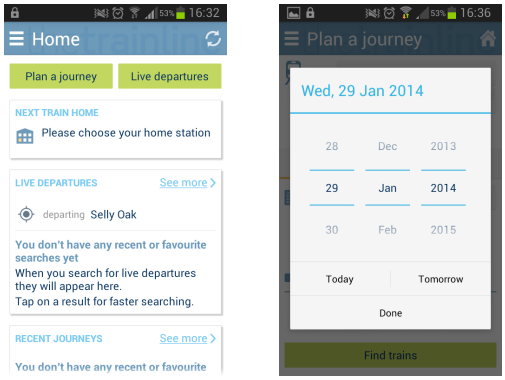
Figure 9: *Search using thetrainline.com application.*

Strengths

- When typing the name of the station it suggests possible stations based on the first few letters. Useful if you're unsure of the name of the station. For example, typing 'Birmingham' shows a list of all stations in Birmingham. In addition to this all recent searches are also displayed, so it is not necessary to type the name of the station each time.
- The app uses GPS to find the customers nearest station and it is also possible to set a home station to make it quicker and easier to plan a journey home every day. (figure 10)
- There is no redirection to another website, the customer can pay directly on thetrainline.com which provides a quicker and smoother payment process.
- The results shown are not limited to the specific time chosen, figure 9b. This gives the customer an opportunity to choose an earlier or later train if it happens to be a lot cheaper.

Weaknesses

- The time and date selection feature is very sensitive and therefore requires a steady hand when scrolling up and down. The time can also be selected to the nearest minute, which when it comes to planning a journey, isn't particularly necessary considering multiple journeys are shown on the results page. Both these flaws contribute to time taken to find the desired journey.



(a) *Home screen showing GPS feature*

(b) *Sensitive time selection feature*

Figure 10

1.2.4 What we can learn

- Our sports booking app would benefit from having a GPS feature as those looking to play a particular sport would usually prefer to play near their current location. For the same reason, when the results are displayed, a filter for distance to the sport venue could be beneficial to the user.
- It would be useful if a message was sent to the users phone to confirm the booking. This will allow the user to check the booking details they are likely to forget such as court number or price. If the user booked the court well in advance, there could also be an option for the user to request a reminder, say a day before they are due to play.
- When searching for a particular location, the user should have the option to search by either postcode, address, town or city. By entering the city, this gives the user flexibility on location. However if the user does not wish to travel far, the other options would be more constructive. Either way, there is no restriction on how to search for a venue.

1.3 Current Sports Booking Applications

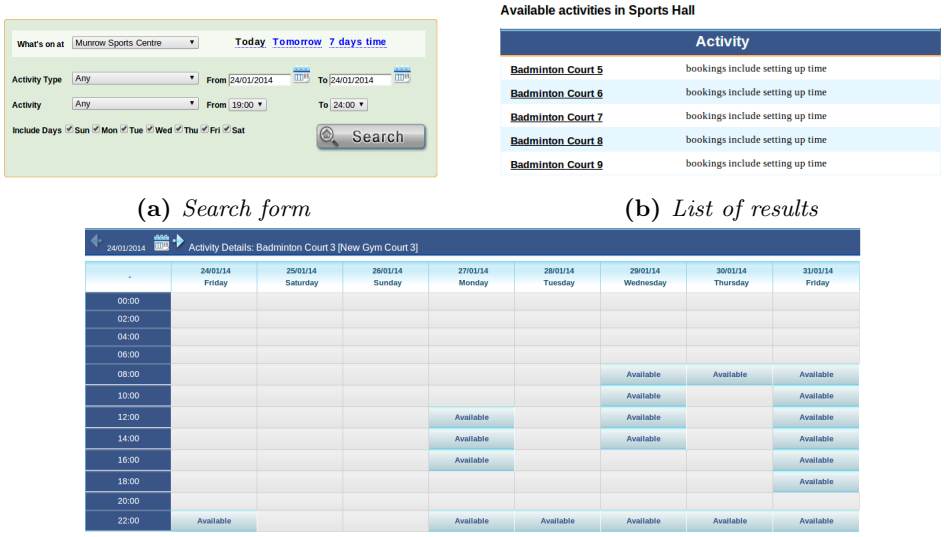
Our application will allow searching across multiple organisations, locations, times and sports to provide available bookings. There are currently no applications that allow searching across multiple organisations' facilities for available sports bookings. There are, however, web applications for specific organisations which:

- have multiple locations, each with many available sports to play,
- have a single location with many sports to play,
- have multiple locations with a single sport to play.

There are also web applications which allow for searching of different facilities but offer no information on available bookings beyond providing contact information for each facility.

1.3.1 University Of Birmingham Sport

The University Of Birmingham has an online booking system for numerous sports available to play at facilities at its campus in Edgbaston [9]. This site allows search by location, type of activity and time. Once the user has entered their search criteria, a list of "activities" are returned. The user then selects an activity and is shown a timetable indicating at what time this activity is available. The activity can then be booked directly on the website.



(a) *Search form* **(b)** *List of results*

(c) *Timetable of available bookings*

Figure 11: *The booking interface for University of Birminghan Sport.*

Strengths

- The search form has tick boxes to filter out particular days of the week. A user may only know which days of the week they want to play a sport rather than exact dates. This feature gives the user a quick way to search for this.
- There are quick links on the form to change the date ranges to either today, tomorrow or 7 days time. When a group finishes playing a particular sport one week, they may want to quickly see what is available at the same time the following week; these quick links speed up the process of finding these available bookings.
- It is possible to search solely by time, leaving all sport and location fields blank. If the user knows they want to play a sport at a particular time, but would like to have options on sport and location, the search form in figure 11a allows them to search this way.

Weaknesses

- The option to filter by "activity type" in the search form is actually a filter for location and many of the locations host a variety of different sports. Furthermore, the names of these locations, such as "Sports Hall", often offer no clear indication of which sports are

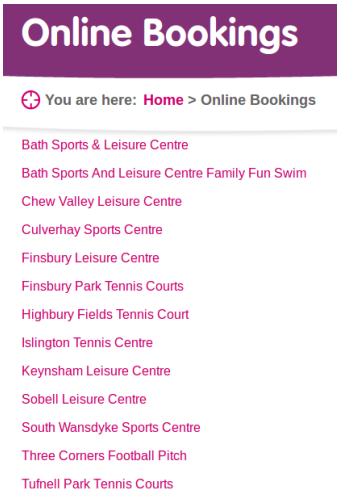
Figure 12: *Display when the 18:00 two hour slot is chosen. However, only one of two hours following 18:00 is available.*

available at a particular location. If the user wants to know what sports are played at a particular venue, they have select that venue and then see which options then appear under the "Activity" drop down box of the search form. This is confusing and unintuitive for the user.

- For many sports, such as badminton where there are multiple courts available for badminton across several locations, there is no way to simply search by that sport. The user is required to go to each court individually to see what times are available for that court. The user is unlikely to have a court preference and most likely just wants to know at what times they can play badminton; this system offers no quick and easy way to do this.
- The timetable results groups times into two hour slots but often each booking slot is one hour long. It will show 'available' for a two hour slot when at least one of those two hours is available. Therefore it is impossible to know if the exact hour a user wants to play is available without selecting the containing two hour slot as shown in figure 12.
- There is no indication of price until you select a booking slot for a particular sport at a particular time.

1.3.2 Aquaterra Leisure Centres

Aquaterra is a charity funded by Islington Council who manage several leisure centres and other sports facilities in Islington, London. They maintain a website [4] where users are able to book at each of these facilities. The booking home page shown in figure 13a prompts a user to select which of the locations they would like to make a booking at.

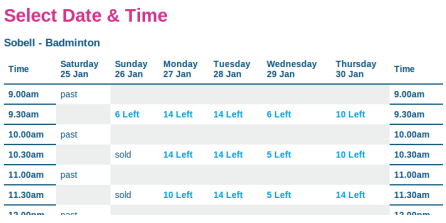


(a) *Aquaterra booking homepage*

(b) *Facilities available at Sobell Leisure Centre.*

Figure 13: *The booking interface for Aquaterra Leisure Centres.*

The interface for each of the locations varies slightly, but each will generally show a list of available activities at that location that can be selected to display a timetable of available booking slots within the following week for that particular activity. The price is displayed at this point and the booking can then be made directly on the website after choosing a preferred court.



(a) *Beginning of timetable showing available badminton slots*

(b) *Confirmation page for a booking slot showing price and choice of courts available*

Figure 14: *The booking interface for badminton at Sobell Leisure Centre*

Strengths

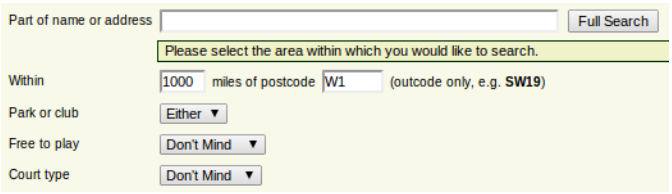
- If a user knows the location they wish to play at and the sport they wish to play, then they can see on one page everything that is available to them in the next week. Rows being coloured alternately and having the time displayed at both sides of the timetable makes it easy for the user to navigate to a particular time slot at a glance.
- The timetable for badminton in figure 14a indicates how many courts are available within each slot. If very few courts are available in a preferred time slot, it could indicate to the user that they need to make a quick decision as those courts may soon be booked by someone else. Conversely, if there are many courts available it could indicate to the user that they could delay making a decision on which time to book a court. Providing the user with this information early in the search process could be very helpful.

Weaknesses

- When selecting a location from the page in figure 13a, there is very little indication to the user what sports are available at which location. Therefore if they want to play a particular sport but have no location preference, they are required to go through each option on the homepage to compare what facilities are available for that sport at each location. Furthermore, as each location's page has a slightly different interface, the user has to make sense of each page separately, slowing down their ability to compare information provided for each location.
- There is no indication of price until you select a particular sport at a particular time.

1.3.3 London Tennis

London Tennis is a website designed to help tennis players in London find partners to play with, as well as tournaments to play in and courts to play at. The court search feature in figure 15a allows a user to search for a court anywhere in London including options to search by cost of playing, location and type of court.



(a) *The search form for looking for a tennis court.*

(b) *Drop down to predict input when typing a name of a court.*

Figure 15: *The search form for London Tennis.*

There is also the option to select courts from a map, as shown in figure 16. Users can filter out courts which are free or not free. However, there are no other interactive features on this map. Once a search is performed, the user is shown a list of courts matching their chosen criteria as seen in figure 17a. Once a court is chosen, the user is shown details about the court including exact location, type of court, price and weather predictions for the local area.

Strengths

- The user is able to show only free courts straight away without having to complete any other aspects of the search. This is in contrast to other sites we have seen so far and allows the user to immediately filter by something that is potentially a deciding factor in choosing a court.
- The weather predictions are a useful addition given tennis is very much dependent on good weather.

Weaknesses

- The size of the map for searching in figure 16 is too small for the number of courts shown on the map, particularly given there is no option to zoom in to more detail on the map. Though the map does give, at a glance, an idea of where courts are concentrated in London, it is difficult to actually select a court due to how close the buttons to select each court are to each other.
- There is no information about opening times for any of the courts. Although London Tennis is primarily a service to find court locations rather than provide details about available bookings it would be useful to inform the user of when the courts are even open.

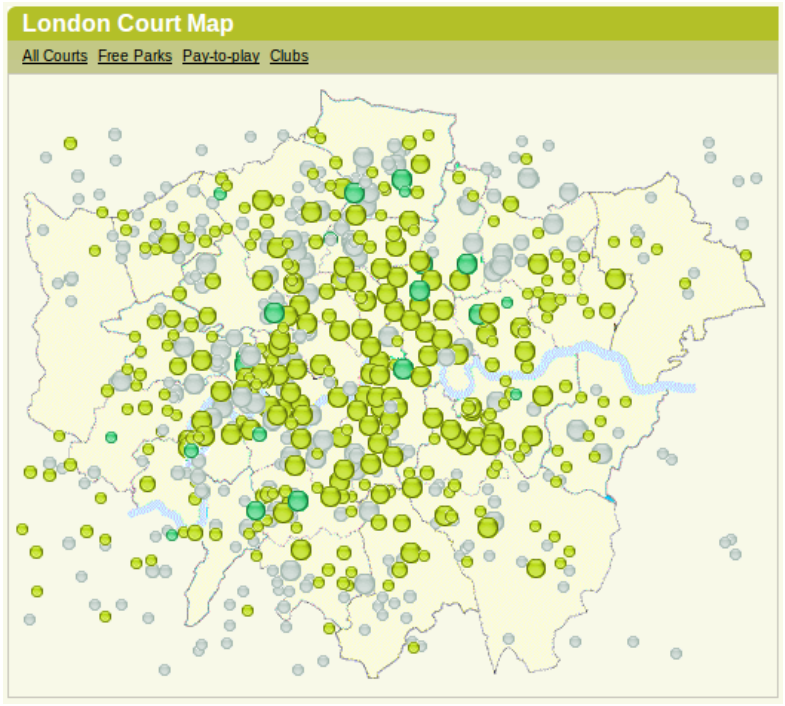


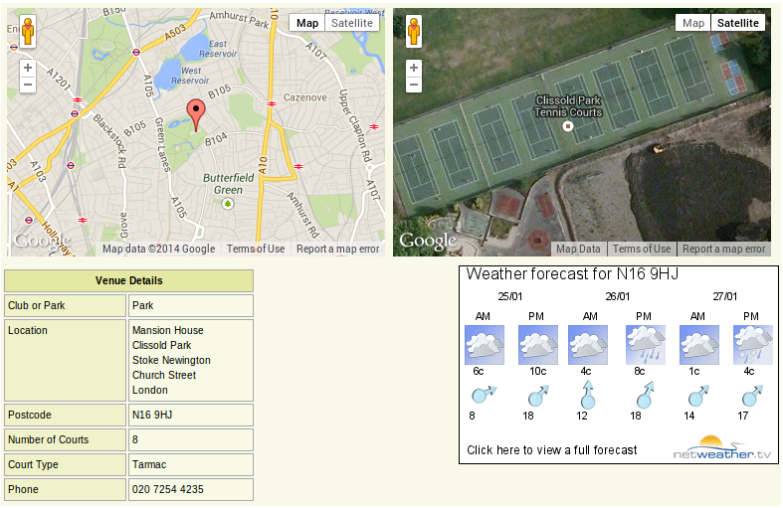
Figure 16: *All courts by location on a map with the ability to filter between free and pay-to-play courts*

1.3.4 What we can learn

- It could be useful to add options to filter by day of the week in addition to buttons that quickly allow searching by times relative to today such as tomorrow or one week from now as this is possibly be one of the main criterias of the users search.
- The naming of options to filter by when searching need to be intuitive and unambiguous otherwise it is difficult for the user to know how to actually search for what they want.
- Using a timetable layout similar to figure 11c could create difficulties in clearly displaying all available options after a search is done. There may be far more booking slots to display in our app given that our search will be conducted over a greater number of facilities. The screen space available will also be smaller than University of Birmingham has on their website. Therefore we need to think of a clearer way of showing the user the results of a search.
- Price is likely to be a factor in a user's decision of what sport to play and where, therefore our application needs to either provide a filter to search by price or clearly indicate the price of a booking option as early as possible when displaying results to a user.
- If we are to use a map to display results of a search, it will be difficult given the potentially large number of results to display every option individually on the map, particularly if the map covers a large area. Therefore it may be better to group options together, possibly by colour or different shapes or picture icons, in order to make it possible to read and navigate through the results.

Club	Address	Postcode	Club or Park	Courts
Clissold Park	Mansion House, Clissold Park, Stoke Newington, Church Street, London	N16 9HJ	Park	8
Hackney Downs Park	Downs Park Road, London	E5 8NP	Park	3
Millfields Park	Millfields Road, Hackney	E5 0AR	Park	4
Spring Hill Park	Spring Hill, London	E5 9BL	Park	3
Springfield Park	Spring Hill	E5 9EF	Park	5

(a) *List of courts matching a search.*



Venue Details	
Club or Park	Park
Location	Mansion House Clissold Park Stoke Newington Church Street London
Postcode	N16 9HJ
Number of Courts	8
Court Type	Tarmac
Phone	020 7254 4235

(b) *Details about a chosen court.*

Figure 17: *The displays for results of a search.*

- Weather could be an important factor when a user knows when they would like to play a sport but want to compare what sports are available at that time. When a user is looking at search results for outdoor bookings, it could be useful to display weather predictions for that time, particularly if the search is in the near future as predictions are likely to more accurate for the near future.

1.4 Application Considerations

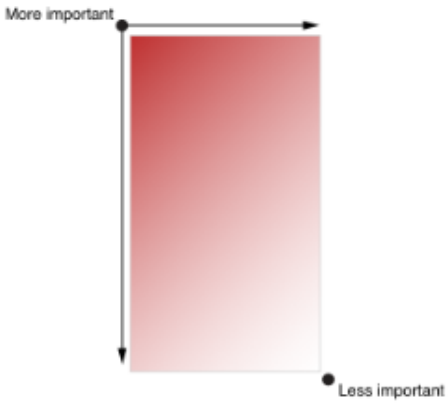
Depending on the operating system, each platform has it's own specific guidelines on how to provide users with a good experience. Key issues include; page layout, navigation and interaction.

Apple recommends that the most important feature of an app should be displayed at the top-left of the page so that it will be the first thing a user sees [1]. Booking.com and the trainline.com both implement this well [2].

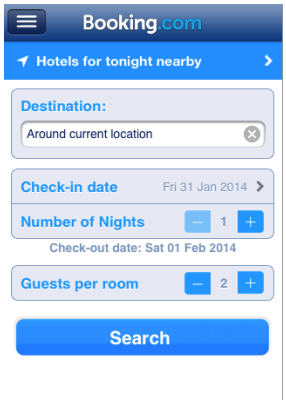
Users should be able to navigate their way through the app to achieve their goal of booking sports facilities.

There are 3 main styles of navigation;

Hierarchical navigation is where users make one choice on the first screen, another on the second screen and so on until they reach their final destination. To navigate to another destination, the user may have to retrace some steps or start over from the beginning. This



(a) *iOS page layout recommendation*



(b) *Booking page for thetrainline.com [7].*

Figure 18

could be very inconvenient for the user as they may have to go back several steps or start over.

Content or Experience-driven navigation depends on the content of the application. The navigation also plays an important part of the app experience. The Skyscanner app includes a globe, which allows the user to explore the cost of travelling to particular locations. This is a feature provides a unique experience for the user.

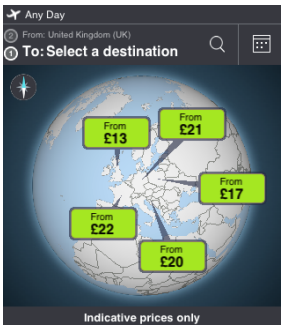


Figure 19: *Skyscanner apps globe feature*

Flat navigation allows users are move from one category to another, as all categories are available from the main screen. This style has been used by many of the apps studied including redspottedhanky.com, booking.com and thetrainline.com

In some cases, it may be better to combine more than one navigation style, but it could also run the risk of overcomplicating the design of the app and the user's experience.

Some apps like Trivago have a navigation bar, which manages the screen's contents. The user can select to change the search criteria or pinpoint hotels on a map. In the Zipcar app, the options in the navigation bar allow the user to perform actions. E.g. 'Reserve' or 'Log in'. These

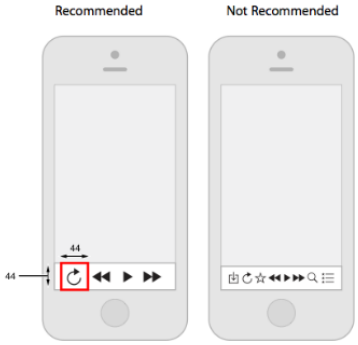
options change depending on where the user is in terms of navigation

Figure 20: *Zipcar navigation [10].*

Some navigation styles have tab bars placed at the bottom of the screen; this allows the user to switch between different subtasks, views or modes. For example, redspottedhanky.com's app includes the options of switching between finding trains, viewing tickets or account details or finding other information. This is a useful feature that helps a user navigate their way through an app, which thetrainline.com has chosen not to use in their design.

Apple and Microsoft both recommend 44×44 points and a maximum of 5 icons to avoid tab bars being over cluttered.

(a) *RedspottedHanky tab bar.*



(b) *iOS tab bar.*

Figure 21: *Tab bar icon sizes.*

None of the apps studied take into account the orientation of the screen. Users have no option but to use the apps when the phone is in portrait. It would be best to provide users with the choice of holding their device in landscape too. Trivago, in particular, contains a lot of details within its side menu; some users may prefer to see slightly bigger, which could be possible when the screen is tilted horizontally.

The way all of the apps function is through a touchscreen interface. Users may be used to certain functions such as 'pinch to zoom' and other interactions defined below for iOS. It will be important to consider these interactions to make the app easy to use

Other ways the user could provide input include using speech recognition. For example, the user could say the sport, date, time and location instead of having to input text or select options.

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[1] Apple Inc. (2013). Apple Inc. Retrieved from `https://developer.apple.com/library/ios/documentation/`. Last Accessed 01/02/2014.

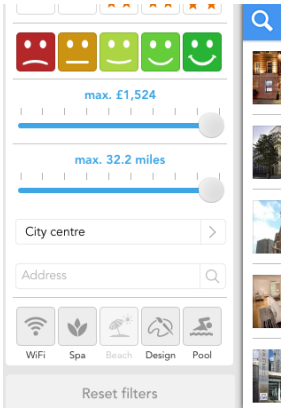
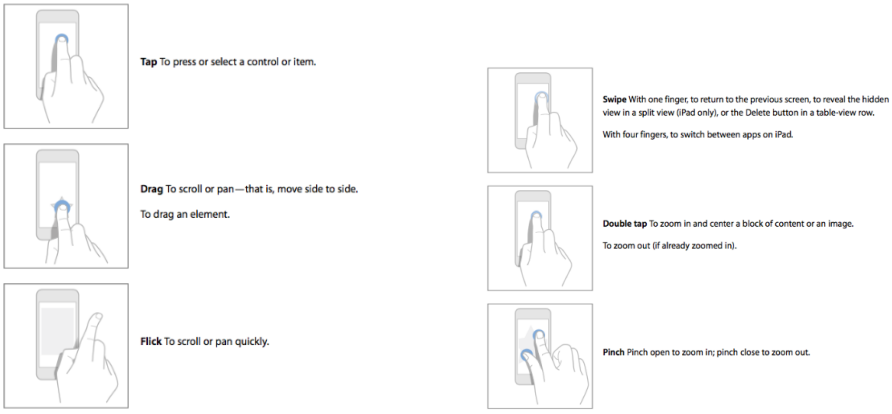


Figure 22: *Trivago input [8].*



(a) *iOS touchscreen interactions* **(b)** *iOS touchscreen interactions*

Figure 23

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