

Heuristic Review for “MBTA Bus” Mobile App

using Usability Heuristics and Severity Scale

Full App Name: Where’s My MBTA Bus?

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App Version: 2.3

Evaluated in iPhone5

Current Academic Literature of Mobile Heuristics:

Mobile devices are evolving and adopting rapidly. Since the screen sizes are smaller, battery lives are shorter, context of use is different and the need to receive response is quicker, many new challenges arise. The heuristic evaluation methods have been developed to work for desktop websites, therefore they do not fully address the needs of this new medium. Therefore, traditional evaluation techniques need to be readapted to be used for mobile devices and readjusted for their specifications.

Since the mobile technology is relatively very new, most of the literature revolving around mobile heuristics is less than 10 years old. Yáñez et al. (2014) propose a heuristic guideline based on previous literature. According to their approach to literature, the main constraints when designing mobile consist of limited input/output facilities, mobility and varying context, task types, multi-device access, limited processing power and adoption. Po et. Al (2004) suggests adding scenarios to heuristic evaluations, stating that scenarios “not only helped evaluators discover more critical usability problems, but the focus on these problems also shifted from being product-oriented to use-oriented.”

Meanwhile, Bertini, Gabrielli and Kimani, researchers from the University of Rome were researching on a set of heuristics that enabled a user-friendly navigation of relevant information or features in mobile conditions of use. Their findings (2006) indicated that mobile heuristics “detect less cosmetic problems and that, in any case, they should not be considered as alternative to user studies but synergic”.

Ni Mi et al. (2014) reorganized 44 statements out of an initial set of 59 user requirements for their heuristic checklist, Yáñez et al. gave a total of 13 heuristics out of 230 sub-heuristics. Many heuristic checklists have been made and will continue to be formed. However, the change in mobile heuristic checklists may not deviate from the traditional heuristic checklists as quickly as expected, and the reason may be rooted in our behavioral patterns, rather than the rapidly evolving smartphone interfaces: “Heuristic checklists change very slowly because they derive from human behavior, not the technology.” (Budi & Nielsen, 2011).

Heuristic Method:

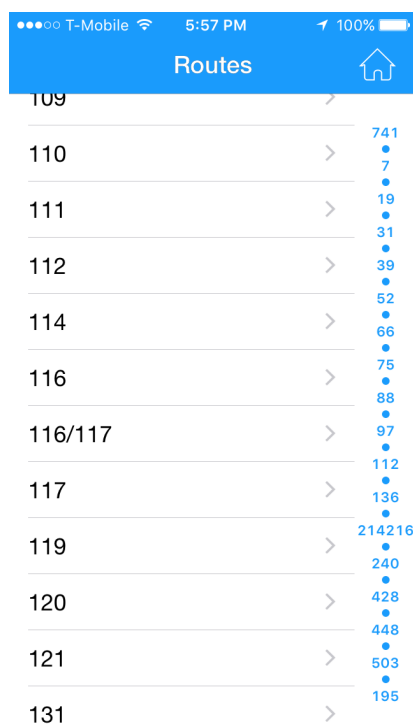
I decided to investigate the heuristic issues of the database, using Inostroza et al.’s (2012) heuristic evaluation method. The reason I chose this method is because of its familiarity with Nielsen’s heuristics. The main problem with heuristics for mobile is that the heuristics evaluation methods used today are not configured for mobile but mostly to desktop websites. The strength of Nielsen’s heuristics lies in its meaningful categorization of website problems in ten items. I used Nielsen’s heuristics before and I found it to be extremely helpful in covering all bases while conducting an expert review. When I found out that Inostroza et al. used Nielsen’s ten heuristics as a baseline however improved its content for mobile and changed it successfully to fit into their 12-item heuristic evaluation method, I found it meaningful and accepted it to be a bridge from desktop to mobile, a smooth transition between heuristic evaluations.

Severity Ratings:

I used Jeff Sauro’s severity scale (Sauro, 2014): Minor, Moderate, Critical. In this scale, Minor refers to “some hesitation and/or slight irritation”, Moderate refers to “occasional task failure for some users; Having used Rubin’s 4 step and Nielsen’s 5 step severity scales in the past, I find it easier to explain the severity level of an application by explaining it in as little steps as possible. Since mobile is about simplicity, it might be beneficial to adopt the approach while criticizing it as well. I personally think that three steps are sufficient to make a point.

Heuristic Analysis with Severity Ratings:

Visibility of system status: The app is easy to use. The design is simple and it's clear that a thoughtful reduction was made during the design process. Yet, for users who do not know which buses operate to which areas, it is quite difficult for the user to find that out easily.



Because, the system does not have a search bar for the user to search for the areas the buses run to, but only the labeled numbers (Fig. 1) of the buses in a numerical order. Therefore, unless the user knows which bus number runs in between which route, they will have to look for their specified route one by one, which is a lengthy process.

Severity Level: Moderate

Fig. 1

Another problem where the system fails to give feedback in a reasonable time is when no bus is available in a given timeframe. Instead of informing the user when the next available bus will be, the system states: "No predictions are available at this time" (Fig. 2). It confuses the user for two reasons; first of all, the user can not comprehend why the system states so. It is unclear if a) there are no buses throughout the day b) there are buses available but the system is unable to detect them c) there will be buses soon but not in the next n hours. The system does not easily reveal what the problem with searched route is.

Severity Level: Critical

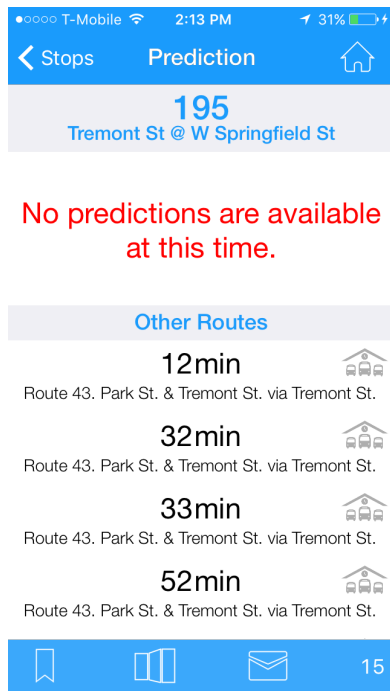


Fig. 2

The search results display under the “other routes” (Fig. 2) are a good feature however the results may be totally irrelevant with what is expected, as it is unclear how the default settings in the “other routes” results are adjusted (On a note from a personal experience: The system recommended 71-Watertown when I was expecting to see the timetable for 73-Belmont, since I assume the system recommends because both buses share the same route halfway. Still, I am sure many novice users will be confused until they find their way out in the app).

Severity Level: Minor

Match between the system and the real world: Although the system generally displays the information in a logical and natural order, there are exceptions. For example, Bus Route 195 should be displayed in the beginning section according to number order, however is placed last (Fig. 3). When one realizes that numbers are not in numerical order all the time, it gets confusing to fully comprehend the logic behind how the information is prioritized. Another side note is that, although all buses are labeled in numbers, Silver Line buses, Ct line buses are exceptions, besides, they are displayed first in the list (Fig. 4). It doesn't make sense.

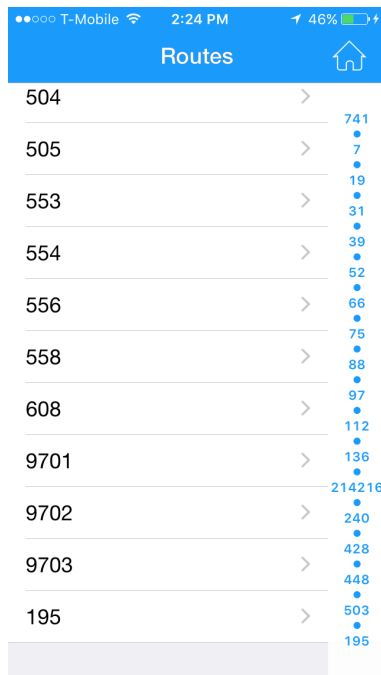


Fig. 3

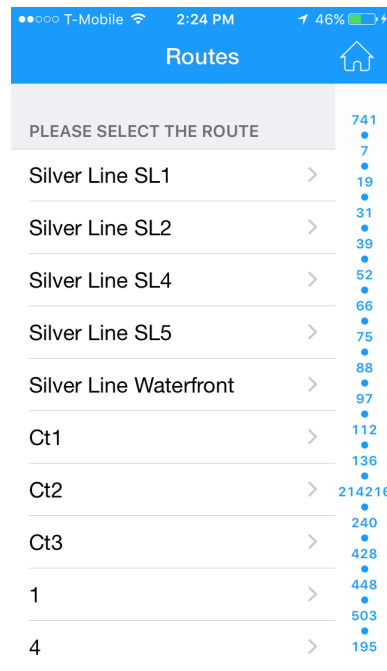


Fig. 4

Severity Level: Moderate

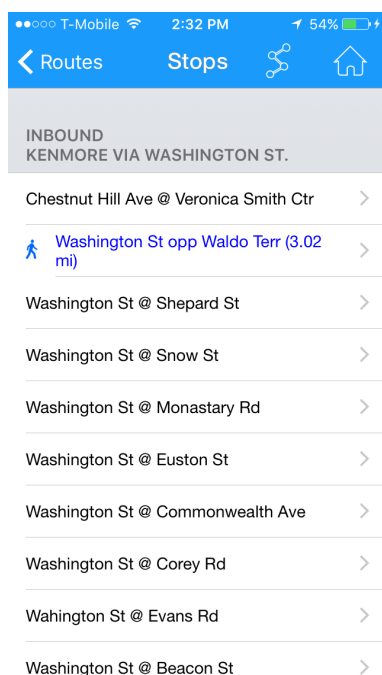


Fig. 5

Another problem that is related to this heuristic is that the metaphors used are very unlikely to match with the mental model of the user. For example, when a bus number is chosen, the walking man icon is displayed in one of the bus stations on the schedule with a distance information right near the icon (Fig. 5). There's no indication to why a bus station within that route is selected for placing the walking man icon. It is confusing.

Severity Level: Minor

When the route icon on the top is clicked on, the system displays a map. On the map, buses with different numbers are displayed on the map. These numbers display another numerical labeling system

that is not directly related to what the user is looking for. For example, Bus 0462 may be scheduled to be used for 65, meaning that a bus with number 0462 is scheduled to be on route between Kenmore and Brighton. The user knows or may know that 65 operates on that schedule. However, knowing 0462 (or 0485 or 0576) as the number of the bus offers not only offers no incentives to the user, but also adds to the cognitive overload. Since these bus numbers have no connection with what the user knows about the searched bus and its route, it confuses the user even more (Fig. 6, 7, 8 and 9).

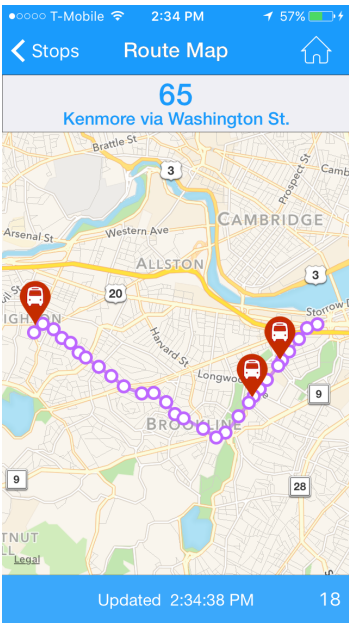


Fig. 6

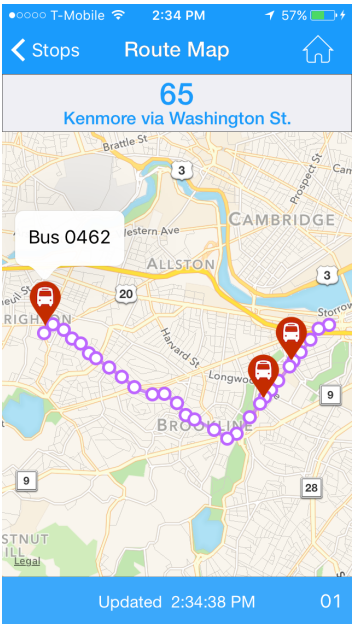


Fig. 7

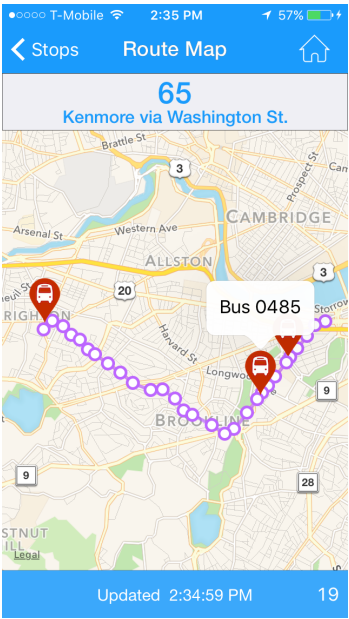


Fig. 8

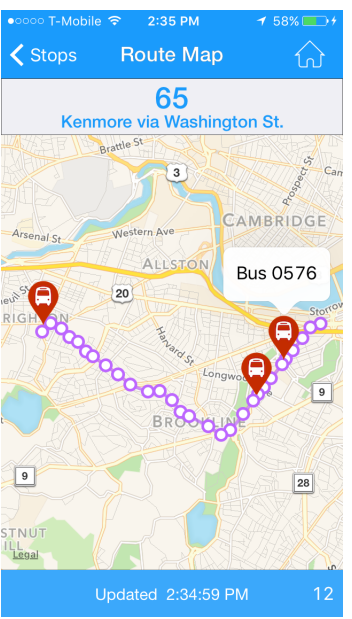


Fig. 9

Severity Level: Moderate

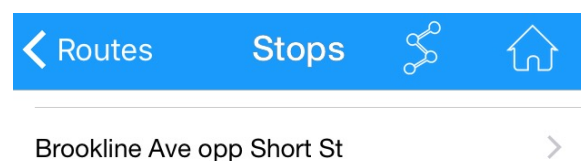
User control and freedom: Back and home tabs work flawlessly no matter where the user is. The only problem is that these buttons serve the similar purpose of going back. Placing Home button to the upper right is confusing as it contradicts with the user's prior knowledge. There are times back button is available, there are times home button appears, and there are times both are displayed at the same time. This definitely cause confusion as the user will have to remember how to control the content, which is also related to another heuristic as well, "minimizing the user's memory load".

Note: This heuristic issue is described in more detail in the next heuristic: Consistency and Standards.

Severity Level: Moderate

Consistency and standards: Generally, the words used is consistent throughout the database, such as Inbound, Outbound and Last Stop.

On the other hand, one of the problems that causes inconsistency throughout the app is the confusing placement of the icons for getting back to a previous menu or the homepage: When the user clicks to a tab in the homepage, a back arrow icon appears on the upper left side of the screen in all the landing pages. The problem with the back button is that, it takes the user back to every single previous page except the home page. To reach the homepage, the user has to use the homepage button, an icon that is always visible on the upper right menu.



Back arrow on the upper left
and home icon on the upper right (Fig. 10)

Fig. 10

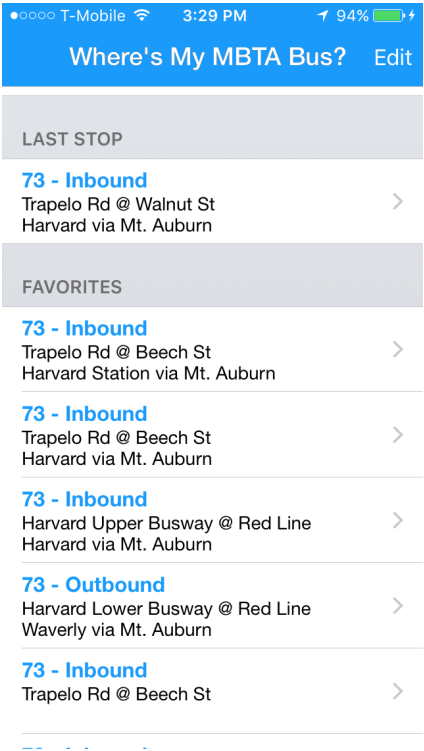
Although it offers practicality to offer a previous page back button on the upper left and a homepage button on the upper right, it overcrowds the upper tab, disrupts the flow and serve little purpose This is a clear example of inconsistency in terms of usability.

Severity Level: Moderate

Error prevention: The app does not provide access to additional information. When the user asks for a specified route, the system may state that no predictions are available at the time, however, this information is not always accurate. This has also been discussed as a part of visibility of system status and displayed in Fig. 2 (I came across this message a couple of times when the bus that appeared unavailable in the system actually arrived at the station. Likewise, there were times when no bus arrived at the designated schedule so I ended up waiting for a long time until the next one comes up, or fails to do so). The system is unable to give 100% accurate information to the user regarding the schedule changes in real-time.

Severity Level: Critical

Minimize the user’s memory load: Once the user becomes more experienced within the system, it’ll be easier to use. It is difficult to recognize the numbers of the buses of a specified location. Also, the content of Favorites section on the main search page is frustrating and should be simplified to assist in easy retrieval while using the system.



In the screen on the left (Fig. 11), you may see 6 different items in the Favorites section. They all mean the same destination: Bus 73 from Waverley to Harvard Sq, or the opposite.

Severity Level: Minor

Fig. 11

The same problem persists in the map that informs the user about the buses that operate in a specific line, however the system does not share the bus line numbers but the bus numbers instead (Bus Number 0468 instead of Bus Route 65 as explained before).

Severity Level: Minor

Customization and Shortcuts: The app assists the user in customizing the Favorites section in the homepage. There's an edit button on the upper right side that enables the user to remove any routes from the section. However, there is too much content and the system is unable to detect the content that repeats itself. Same route is displayed 5 out of 6 times in a row (Waverley-Harvard Inbound in the example displayed in Fig. 11).

Severity Level: Minor

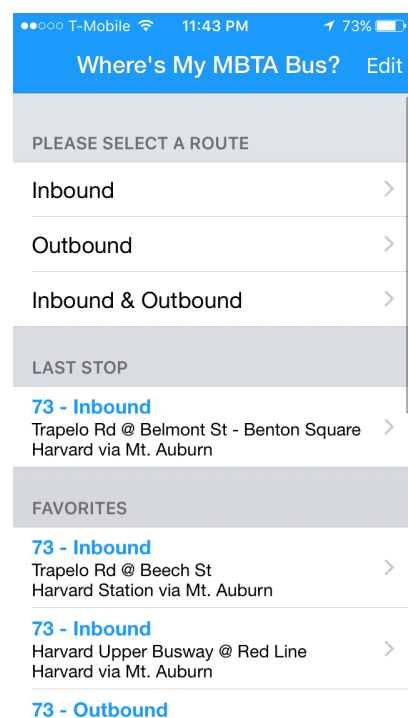


Fig. 12

Aside from that, no opportunity is given to customize the content (Fig. 12). Inbound/Outbound separation is not easy to distinguish. The app displays all three options: Inbound, Outbound and Inbound & Outbound in the homepage. It may be considered as a shortcut for a user looking to find any option suited to their needs, however, it causes redundancy.

Severity Level: Moderate

Efficiency of Use and Performance:

One of the good things about the app is that it displays the required information in a reasonable time. For a user who knows their bus number, the required steps are minimal. Since acting quick is one of the crucial features for users looking to find the next bus as soon as possible, this real-time app is working efficiently.

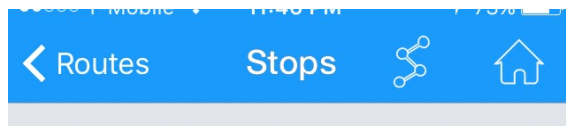
Aesthetic and minimalist design: The app has a minimalist design and it helps the user in finding things easier. On the other hand, lack of a search filter makes things more difficult.

Favorites section may be useful, but the system has to filter the overwhelming Favorites list that repeats itself. Irrelevant content such as “Bus numbers vs bus route numbers”, “Route Maps vs. Prediction Maps” confuse the user and ruins the experience in terms of aesthetics.



“Prediction” map is placed on the bottom tab and its icon looks like a folded map (Fig. 13).

Fig. 13



“Route” map is placed on the upper tab and its icon looks like a curved route line (Fig. 14).

Fig. 14

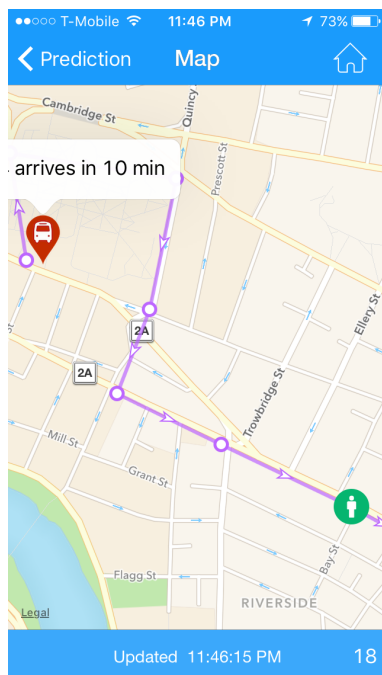


Fig. 15

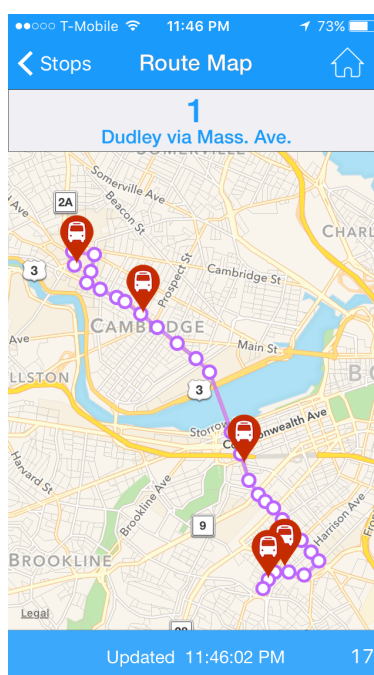


Fig. 16

Fig. 15 and Fig. 16 displays what the user comes across when they click on the Prediction and Route icons. The content does not engage with the user since the context is not addressed properly.

In terms of minimized content, the mail symbol at the upper tab is meaningless. It only asks the user to mail when there's a problem with the app that they want to report. This is a that totally ignores the user's mental model when it comes to prioritizing information.

Two more tabs are redundant in the homepage. First: “MBTA Alerts”. No user would click that link, go to its calendar, select the date and look for alerts. A user would only look for alerts when there’s a delay, and they would not scroll down in the homepage to see where the alerts are. Another redundant tab that should not be a part of this design is “Rate Us in the App Store” tab. In a context where simplicity is key, any content that would overwhelm the user while looking for their bus schedule should be removed.

Severity Level: Moderate

Help users recognize, diagnose, and recover from errors: When a warning such as “No predictions available” is displayed, it actually confuses the user more, because the accuracy of that information is questionable when the bus that is displayed as “unavailable” arrives in the real world. The system is unable to recover from this error, or warn the user that its information may not be accurate. It is fair to say that the system is unable to suggest a constructive solution.

Severity Level: Moderate

Help and documentation: A user generally only asks for help when desperate to sort out an issue with the schedule or the routes, however the help section of the database does not exist. The app, although rich in content and filled with numbers and maps, is poorly designed in terms of assisting help when necessary. In short, the app needs a helps section.

Severity Level: Critical

Physical interaction and ergonomics: The app is easy to use in terms of ergonomics. It can easily be used with one hand. It enables the user to interact with one thumb. The content is located in recognizable positions so the user may intuitively interact physically with the system.

Key findings and recommendations:

- The app is simple and efficient to use.
- The app is easy to use with one hand, even one thumb.
- The buttons and the layout is consistent throughout the app with a few exceptions such as back button and home button functions and placement.
- The heuristic review indicates 5 minor, 8 moderate and 3 critical problems within the app.
- The most critical finding is that, the app tends to show false negatives in its most important task: bus arrivals. There are cases when the app indicates that there are no bus predictions, however a bus arrives concurrently.
- Another critical finding is that, there's no way to ask for help. It is important to be able to ask for help, especially for an app that serves data to its users in real time.
- The application also has a number of problems in terms of usability. From a basic search button for a novice user to an intermediate user trying to find the next bus available, the site is unable to customize itself according to the user's expertise level.
- The app uses two different live maps (Prediction Map and Route Map) with two different icons placed in two different tabs and there is no indication of how they assist the user in their search for their bus.

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