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CS-C3120

**Human-Computer Interaction**

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## **10 Usability Heuristics**

*Assignment #3*

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## Acronyms

**FGC** Ferrocarrils de la Generalitat de Catalunya - Railways of the Catalan Government. 1–4, 6–11

**TMB** Transports Metropolitans de Barcelona - Metropolitan Transports of Barcelona. 2, 4

**UI** User Interface. 3

## 1 Website: FGC

Ferrocarrils de la Generalitat de Catalunya - Railways of the Catalan Government (FGC) is one of three main public transport operators in Catalonia. It operates some of the suburban lines and services in the Barcelona Metropolitan Area, four metro lines in Barcelona, one regional rail line in Lleida; as well as a series of rack railways, funiculars, and gondolas. Unlike the other two, FGC is not a shared entity between different local and regional administrations like Transports Metropolitans de Barcelona - Metropolitan Transports of Barcelona (TMB); nor is it subject to complex political debates between Catalan and Spanish governments for their titular and shared responsibilities like Rodalies (regional rail). Due to it being of full titular of the Catalan government, it is allowed more flexibility in both operations and design choices; and is generally viewed more positively by public transport users due to their punctuality, cleanliness, and fast and clear communications [1].

The goal of this assignment is to apply the 10 Usability Heuristics for User Interface Design [2] to the companies' website (Figure 1) [3], and analyse how it fares when trying to provide for useful information, ticket acquisition, etc. It is important to note that, when visiting this website one should expect to be able to find relevant service information, way-finding and timetables; and, importantly, have easy access to ticket buying mechanisms, no matter if the ticket is one comprised within the new integrated mobility smart card (T-Mobilitat), without it, or for services outside the metropolitan area of Barcelona that are not included within the integrated fare system but are nonetheless operated by FGC.

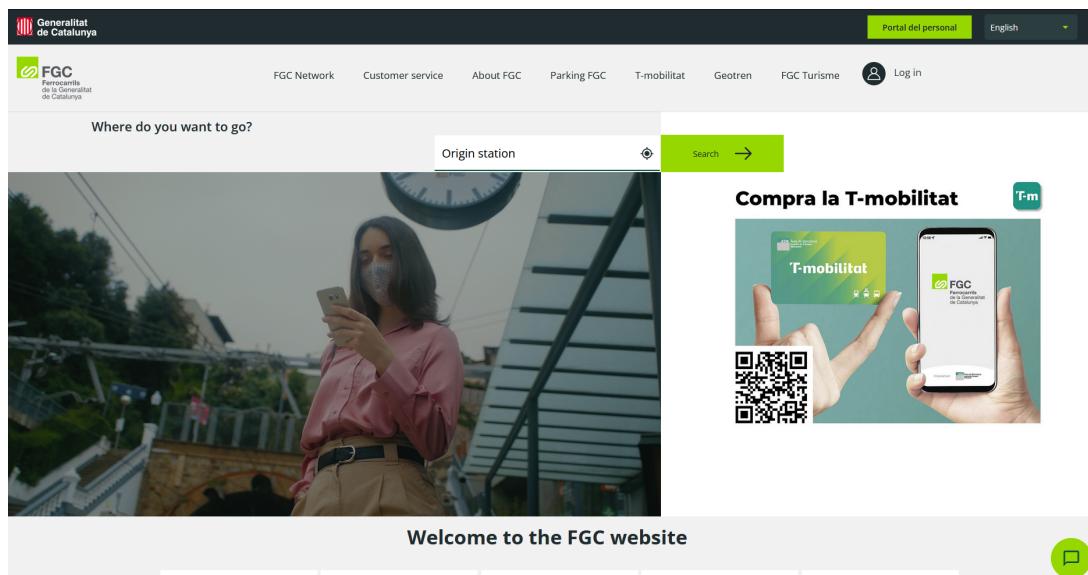


Figure 1: Landing page on FGC website [3].

## 2 Review and Analysis

For an in-depth analysis of the website, Nielsen's 10 Usability Heuristics for User Interface Design [2] have been followed, in combination with Nielsen's Usability Engineering handbook [4].

### 2.1 Visibility of system status

This rule is about keeping the user informed at all times of the process he is going through; and showing as clearly and accurately as possible what is going on in the system. Since this is a website; loading pages depends on the user's internet speed; yet the lack of custom loading animations and pages makes it hard sometimes to know if the system is responding as expected or not. In general, response times are good enough to justify not including that; but, for instance, if one is to try to search for schedules without specifying the station of origin, the system has a delay of a few seconds before redirecting to an empty schedule searcher (Figure 2). A timespan in which the user surely wonders what is wrong; when the page is just trying to process an empty search parameter. Users with lower internet speeds will experience similar phenomena when accessing different parts of the web; and it that sense, including some sort of loading information would be a nice addition.

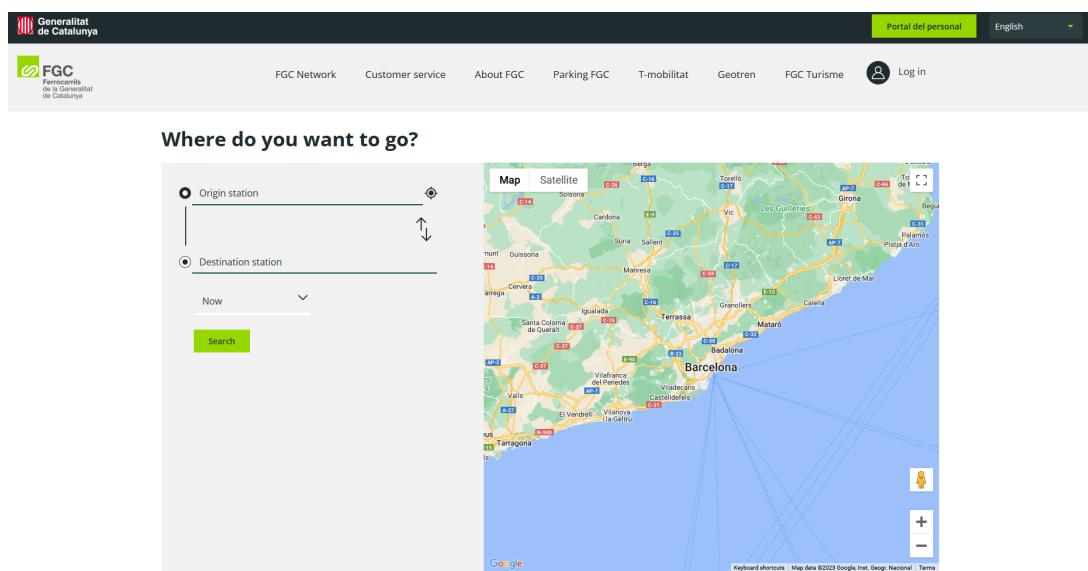


Figure 2: General schedule searcher sage.

### 2.2 Match between system and the real world

This heuristic refers to how the User Interface (UI) shall use understandable language for the average user to understand; and provide for interaction systems that are intuitive and match the real-world counterparts. Internal jargon should be avoided, and natural mapping should be the baseline when designing interaction systems. The principal pitfall FGC's website has in that regard is the continuous use of rail terminology when referring to the services it operates. It is much more common to say the name of the service one takes than the formal name of the line. For instance, one is much more likely to say "*I have to take the S1 train*" than it is to say "*I have to take the Barcelona-Vallès line*". The latter is the correct one in railway terms; yet it does not provide for helpful information to the traveller, for that line includes three metro services (L6, L7, and L12) and two suburban railway services (S1 and S2), all with different ending points (Figure 3). Despite this, the main choice presented to the user when consulting timetables is precisely which line one is to consult (Figure 4). Weirdly, a much more general schedule searcher for all lines and services does exist and can be accessed once the origin

station is introduced, as seen in Figure 2, so one has to wonder why that is not the one and only schedule searcher offered.



Figure 3: Infographic map of the Barcelona-Vallès line, operated by FGC, as of 2023 [3].

The figure shows the main schedule searcher page of the FGC website. At the top, there is a navigation bar with links for 'Generalitat de Catalunya', 'FGC Network' (highlighted in green), 'Customer service', 'About FGC', 'Parking FGC', 'T-mobilitat', 'Geotren', 'FGC Turisme', 'Log in', and language options ('Portal del personal', 'English'). Below the navigation bar, there are three search boxes showing sample routes: 'Barcelona Vallès' to 'Llobregat Anoia', 'Lleida' to 'La Pobla de Segur', and 'Barcelona' to 'Vallès'. A large search input field labeled 'Where do you want to go?' with a placeholder 'Origin station' and a 'Search' button is centered. Below the search field, there are links to download maps ('Download the map' and 'Download PDF') and a link to 'Consult the new plan for the 2022 integrated rail network'.

Figure 4: Main schedule searcher page.

Other than that, the webpage does provide with helpful visuals and interactions that match the exact way-finding the user will see in the stations. The services are indicated as exact parallels of the real world, and the information is the same as shown in the information screens on the stations, down to the same colour coding. If it is a service included in the integrated fares around Barcelona, the number of zones the ticket must have (Figure 5).

Alternatively, the user can go to the ticket recommender, which will display the possible tickets one can buy to do a certain route; and what buying options exist (Figure 6). This is an intuitive process; yet the complexity of the integrated fare system (which is the fruit of an agreement between operators, FGC, TMB, and Rodalies) leaves little room for optimization in making the message clearer and intuitive (Figure 7). The fact that tickets can only be bought online using the T-Mobilitat smart card system is also omitted until the search is done can be frustrating and make the uninitiated user waste time.

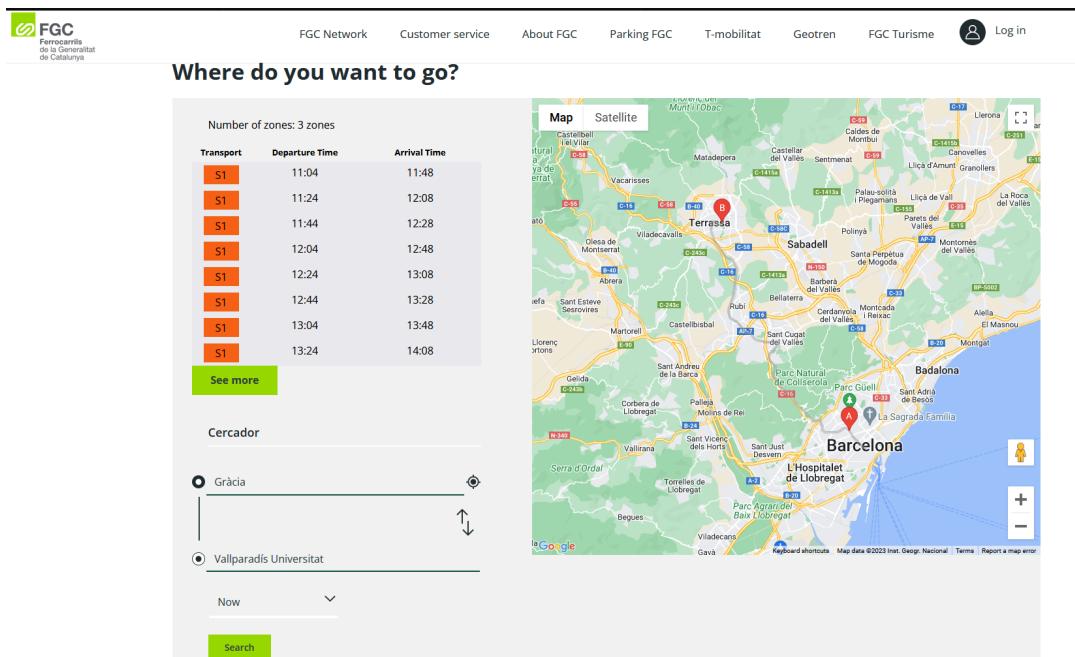


Figure 5: Results of doing a schedule search.

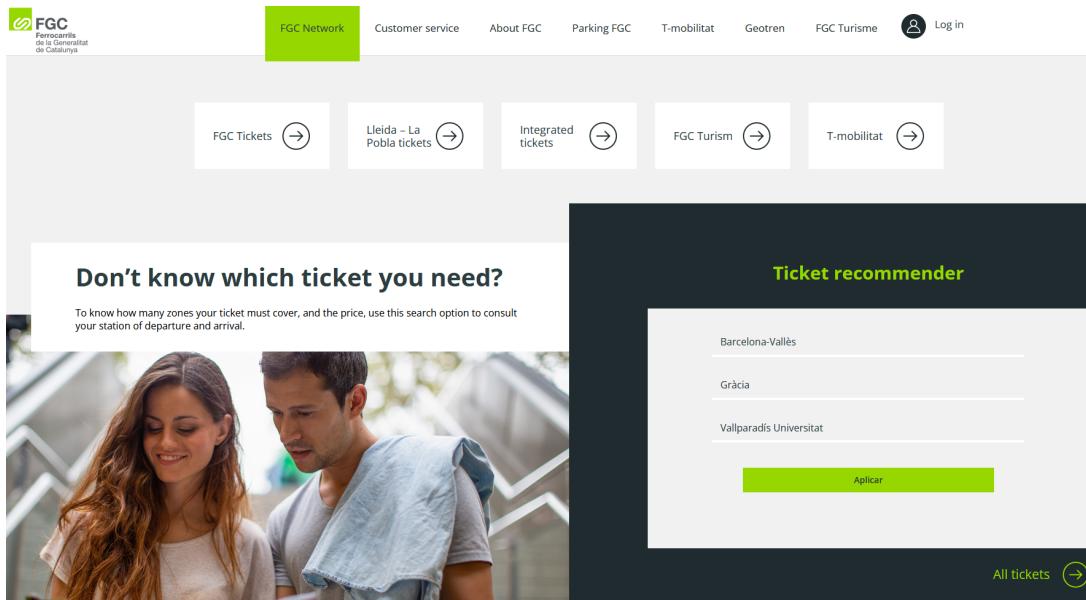


Figure 6: Ticket recommender.

ZONA 3	Bitllets integrats: T-usual	27,00 €
ZONA 3	Bitllets integrats: T-familia	27,00 €
ZONA 3	Bitllets integrats: T-usual FM/FN Cat. General	60,45 €
ZONA 3	Bitllets integrats: T-usual FM/FN Cat. Especial	37,80 €
ZONA 3	Bitllets integrats: T-jove	40,00 €
ZONA 3	Bitllets integrats: T-jove FM/FN Cat. General	118,05 €
ZONA 3	Bitllets integrats: T-jove FM/FN Cat. Especial	73,80 €
ZONA 3	Bitllets integrats: T-70/30	213,50 €
ZONA 3	Bitllets integrats: T-70/90 (FM/FN) Cat. General	170,80 €
ZONA 3	Bitllets integrats: T-70/90 (FM/FN) Cat. Especial	106,75 €

Figure 7: Example of the results given by the ticket recommender.

## 2.3 User control and freedom

User control and freedom refers to the good practices of letting users move freely through the website, and supporting their mistakes, allowing them to go back to previous stages of the different processes without having to go any long way around. The only truly lengthy process in FGC's website that requires for this type of tools to be available is the process to register and acquire a smart card ticket. In this process, the user has at their disposition support for undo and redo, previous and next steps buttons, as well as direct information and links to pages from before the process is started (Figure 8); which clearly follows good design practices. The links offered in the top left work both as an indication of where one is in the process, as well as an emergency exit.

Figure 8: Smart card (T-Mobilitat) registration process.

Nevertheless, this emergency exit seems to fail in some occasions, redirecting the user to, for instance, a home page different from the main one shown when entering [fgc.cat](http://fgc.cat) (Figure 9). This

different homepage has a lot less functionalities, and fewer ways to access other relevant pages than the main home page, which ultimately probably forces many users to manually go back to the real home page.



Figure 9: A home page different from the main one.

## 2.4 Consistency and standards

This heuristic refers to the fact that the same systems and concepts should be referred always in the same ways. Families of products should also be consistent internally, and overall this should help minimize the amount of information the user needs to learn; as well as making the interaction overall more intuitive. This has been partially addressed in some heuristics before, but overall FGC makes a good use of consistent naming (lines and services aside), and the systems of interaction and overall aesthetic design of the page is consistent; using always similar patterns of interaction. This is, however, broken, when the user enters the part of the website regarding the smart card (Figure 8), where despite the clear intentions to keep some design choices, forms are formatted slightly different, and the overall process feels quite different to the others. This is probably because this need to be coordinated with the other operators, yet the break in consistency should be circumvented.

## 2.5 Error prevention

Error prevention seeks to go beyond providing error messages. Rather, the design should serve as a guideline that avoids at least most errors the user might commit, and show helpful warnings and instructions as to how to proceed to avoid errors. FGC's website does perform quite well in this regard, for the website is overall very permissive, and errors have been difficult to find. As it has been seen before, things like trying to search for schedules without specifying station or service does not result in a problem, and one is simply redirected to a general schedule searcher (Figure 2). When registering for the T-Mobilitat smart card, since the process is more lengthy and complex, more warnings are provided (Figure 10). Nevertheless, many of those could be avoided if the spaces in the forms were, for instance, pre-filled with example information so that the user knows what to expect from each field.

The screenshot shows a user registration form on the FGC website. At the top, there are links for Home, Members Area, and Sign up. The 'Sign up' button is highlighted in green. The main title is 'User registration application'. A red callout box contains a warning message: 'To complete your application you must review and complete in the following fields: 'Document number' is required. 'Birthdate' is required.' Below this, the form is titled 'Basic user data' and includes fields for 'Document type \*' (with 'DNI' selected), 'Document number \*', and 'Birthdate \*'. The 'Birthdate' field has a placeholder 'Month/Day/Year'. Navigation buttons 'Previous' and 'Next' are at the bottom.

Figure 10: Warnings displayed when failing to fill forms.

## 2.6 Recognition rather than recall

The heuristic of recognition focuses on trying to require the user to remember as little as possible when navigating the website. The user should not have to remember things when switching interfaces, for all required information in every step should be available in the same place. Overall, FGC does a good job with this, searching for schedules is easy and requires little-to-no knowledge of the system, though a clickable map may help the users that have photographic memory. Having said that, and as seen before in Figure 7, the integrated fare system could be presented in a more easy way despite its complexity. If a better selector of the discounts one is entitled to for the tickets; as well as other filters, were included in the ticket recommender, the user would not need to be concerned about the multitude of different names for very similar tickets.

## 2.7 Flexibility and efficiency of use

The main point of this heuristic is that shortcuts are to be provided to spare knowledgeable users from having to follow lengthier processes meant for novices. This heuristic is utterly failed by FGC's website. Despite providing for helpful guidance to those new to the system; personalization options are lacking, and no shortcuts to reach either schedules or ticketing have been found. It is, nevertheless, nothing FGC has not done before. It is a fact that they do have the know-how, for the FGC app does provide for customization option where registered users can save their recurrent trips, set up alarms so that they are reminded when to get off the train, and even get information on the distribution of passengers amongst cars, so they can get in the less crowded one (Figure 11). Not unifying these two systems and thus not offering this functionality when only consulting the webpage is clearly a failure that should be addressed; for recurrent users should be also able to just get to their typical services and get the info they need quickly like they do in the app.

## 2.8 Aesthetic and minimalist design

This second-to-last heuristic is about ease of navigation, intuitiveness, and aesthetics. The webpage should avoid providing unnecessary information, specially when it is not related to the process a certain interface is about. Visibility of key information should be paramount. In that sense, FGC's website has a tall order, for the diversity of the services they offer (from suburban rail to touristic excursions with rack railways all over Catalonia) means paths to every option need to be included without breaking the minimalist green-white-grey aesthetic, and without leaving the potential user saturated from the diversity of options. Nevertheless, the website does end up doing a remarkable job at that. As seen in Figure 6, one can get to specialized tickets for niche services from the very

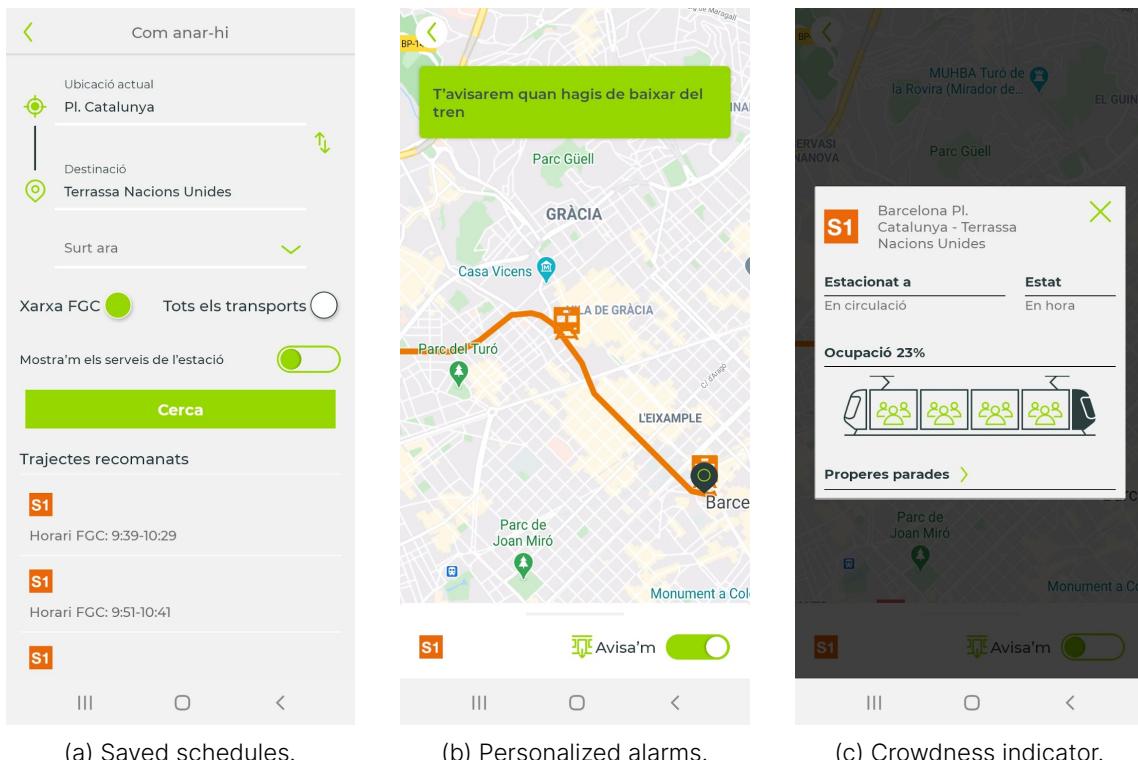


Figure 11: Screenshots of some functionalities FGC's app offers not available in the webpage.

same ticket interface that includes the ticket recommender, without those options overcrowding the interface. Around the website, little unnecessary information is found; with the usual exception of the smart card registration system. There, the user needs to navigate the publicity of the very same service they are trying to register for, which is clearly a bad practice (Figure 12). Having the register and log in buttons for the T-Mobilitat service be more easily reachable (or, even better, be the same as the log in system for the user's FGC account) should be of paramount importance when so much effort is clearly being put towards expanding the user base of this service.

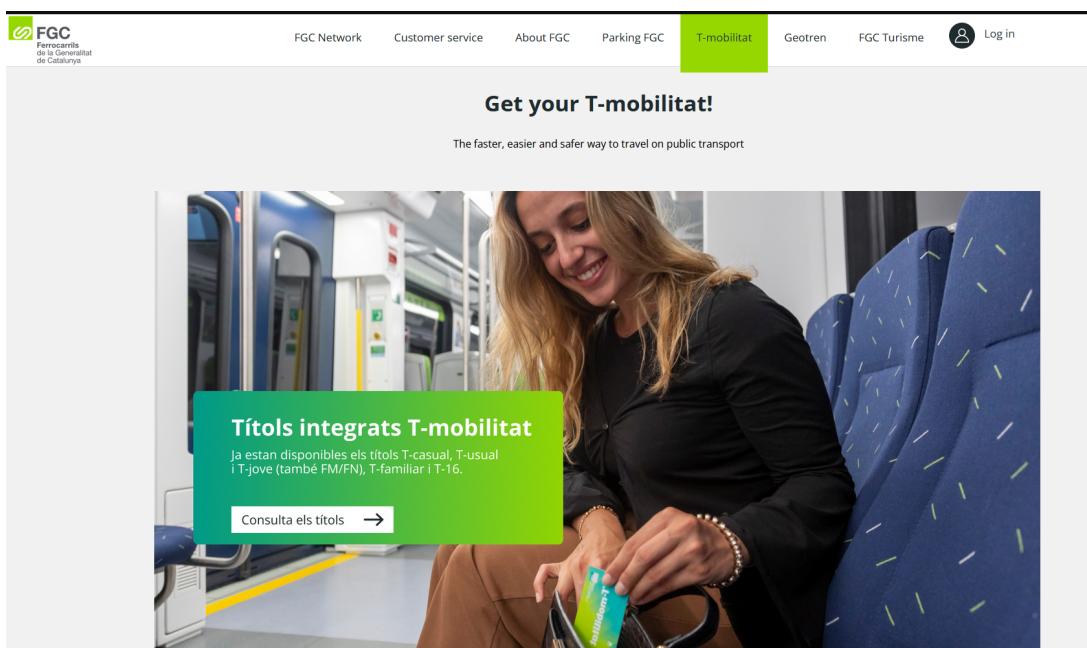


Figure 12: T-Mobilitat smart card homepage in FGC's website.

## 2.9 Help users recognize, diagnose, and recover from errors

The goal behind this heuristic is to provide users with routes and instructions even when the system is down; making them feel guided and give them tools to recover from them and avoid repetition of the same error. In that sense, only one error was found during testing. In that case, the log-in system was undergoing maintenance (Figure 13). That was communicated in the three supported languages (Catalan, Spanish, and English); no error code was given, which is positive, and the overall language used is plain and direct, which leaves little room for doubt or misinterpretation. Nonetheless, no information about when the system would be accessible again was given. Since the maintenance works blocks any possibility of accessing that system, no alternatives really exist, yet this information is not conveyed either. An easy solution would be to inform of this fact and provide for an exact time of the day the system will be accessible again.

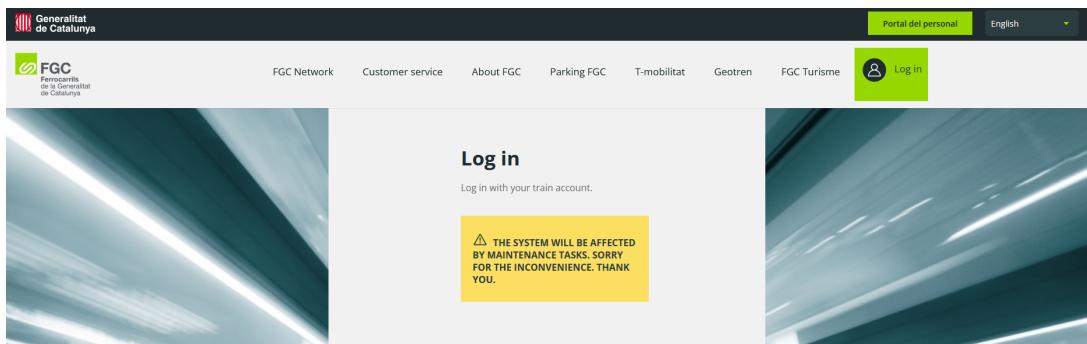


Figure 13: Error page when trying to log in.

## 2.10 Help and documentation

While the best help is the one a user does not need; in case it is needed, this heuristic is about having it accessible at all times, recognizable, and easy to follow and understand. In that sense, FGC's website's contact and documentation is, as it is usual in many pages nowadays, at the bottom of every page (Figure 14). This is accompanied by a now trendy application: a chatbot. This helping hand is also available everywhere on the website, with the notable exception of the interfaces related to the smart card functions. This is in general, terms and without getting into the actual usability of the chatbot, a good following of design principles and of this heuristic. Again, though, the pitfalls start to show up on the T-Mobilitat interfaces. The location of the help is swapped, and is now located at the very top of the page (as seen in Figure 8). There, no documentation is available, no chatbot is present, and only an e-mail and a phone number are presented at the very centre of the attention of the user (in a way admitting that the process of getting people to use this service has resulted in many not finding it intuitive enough, and seeking help). Again, a more thorough standardization of help and documentation processes and locations should be carried out throughout both pages.

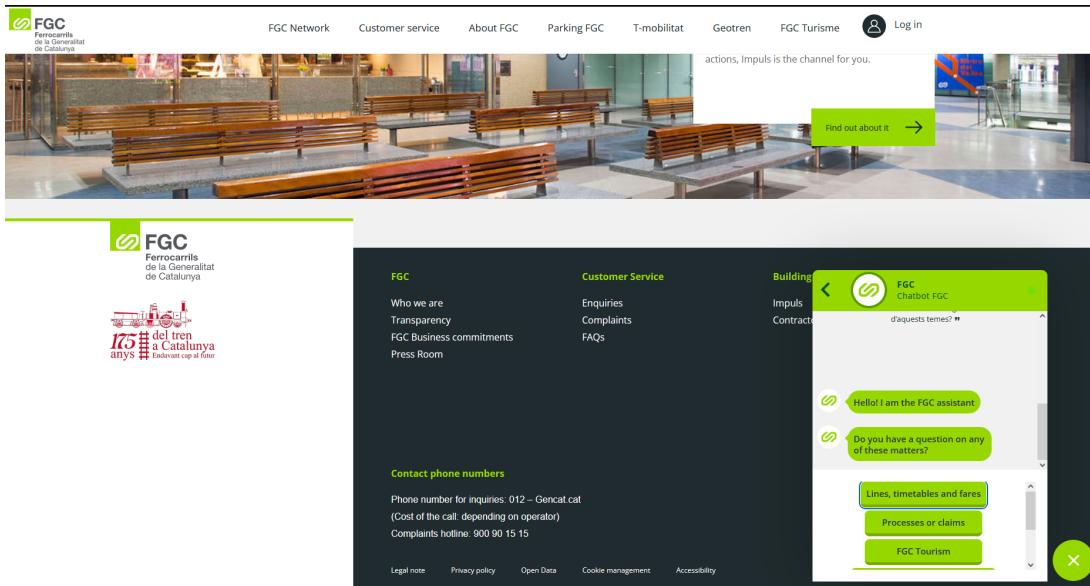


Figure 14: Chatbot, contact information, and documentation.

### 3 Reflections

After analysing such a complete website and reading the recommended website and book [2, 4], I think that the one with most difficult applicability and understanding is “Recognition rather than recall”. Many times, the user base is so large that it is hard to tell what they will actually be able to recognize. Yet, at the same time, if too much focus is put into giving all the necessary information to the user, one can come into contradiction with other heuristics regarding minimalism and intuitiveness. In that sense, it is also one of the most difficult to come up with examples for, for the very definition of what the user already knows is dependent on the assumed user base; which may not be the same considered by the original designers of the webpage.

Overall, though, the most clear example of a design solution that violates several heuristic rules seems to be the interfaces related to the T-Mobilitat smart card. In a way, this reflects the political complexity of getting one system for so many different public transport operators to work. Yet, the fact that it is not an external webpage but a subdomain within FGC’s website should allow them for more seamless integration within the rest of the interface and ensure the heuristics that are otherwise followed quite thoroughly when looking at the rest of the website. The found usability problems are not of high severity; but it is true that many that require an inexperienced user to spend quite some time in navigating the page, getting to know the systems, to finally find out the most optimal solution for their particular case. It is precisely because of this diversity in previous experiences and goals that it is of utmost importance to have an evaluation conducted individually by each evaluator before aggregating all the findings. Otherwise, assumptions are easy to make and unknowingly, the evaluators my get to know the system before even testing it, just from the findings of others.

All in all, the 10 usability heuristics are, despite their age, of almost perfect usability nowadays. Their enduring relevance highlights their timeless principles in guiding the design and evaluation of user interfaces, proving invaluable in ensuring user-friendly, efficient, and enjoyable digital experiences. This is clearly seen in the example analysed, where many of them were followed consistently, thus overall resulting in a website that is intuitive, easy to navigate, and useful.

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