



UIL Tool – The UIL Methodology

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The UIL Methodology

This document describes the process followed to evaluate the accessibility of icons and inclusiveness in relation to services and applications' interfaces. The objective is to propose a methodological path that can provide developers and service providers with useful insights to plan, build and perform quick and intuitive exercises with users. This can be done already in the prototype phase of the service/application development and replicated several times, according to the user-centred design principle "test early and often".

To identify a proper set of accessible and inclusive icons, we suggest following three main steps, i.e.:

1. Carry out a preliminary review of similar services to explore icons use and the accessibility of interfaces;
2. Build a user-centered exercise as described in this UIL to involve users in the evaluation of icons;
3. Consolidate the review and the results of exercises that have been carried out with a more systematic survey, using the UIL survey as an example.

Review of services and applications

In the first step, we identified a preliminary set of icons to be evaluated in steps 2 and 3, through the analysis of digital mobility and delivery service applications. The analysis included relevant screenshots of applications' interfaces where both general icons and specific mobility icons were clearly identifiable. In addition, we explored 20 applications¹ commonly used in Europe offering both transit (DMS) and food delivery services (DDS), plus few applications dedicated to people with visual impairments. On this quite extensive list of digital applications, we built a catalogue of 27 recurring icons and classified them following Norman Nielsen's heuristics^{2,3,4} and Universal Design principles (see UIL Toolkit - **Errore. L'origine riferimento non è stata trovata.**). The evaluation focused on the use of visual icons in mobile applications (Figure 1), leaving out the in-depth analysis of mobile operating systems.

¹ The 20 common applications explored are: DTS | blablacar, Cabify, Citymapper, Flixbus, FreeNow, Lyft, Moovit, Omio, Safr, Transit, Uber, Waze DDS | Deliveroo, JustEat, Glovo, UberEats. Apps for the visually impaired | BeMyEyes, Emit, Kimap, Wheelmate

² <https://www.usertesting.com/blog/user-friendly-ui-icons> - last access on 29th of June 2021

³ <https://www.nngroup.com/articles/icon-usability/> - last access on 29th of June 2021

⁴ <https://www.nngroup.com/articles/icon-testing/> - last access on 29th of June 2021



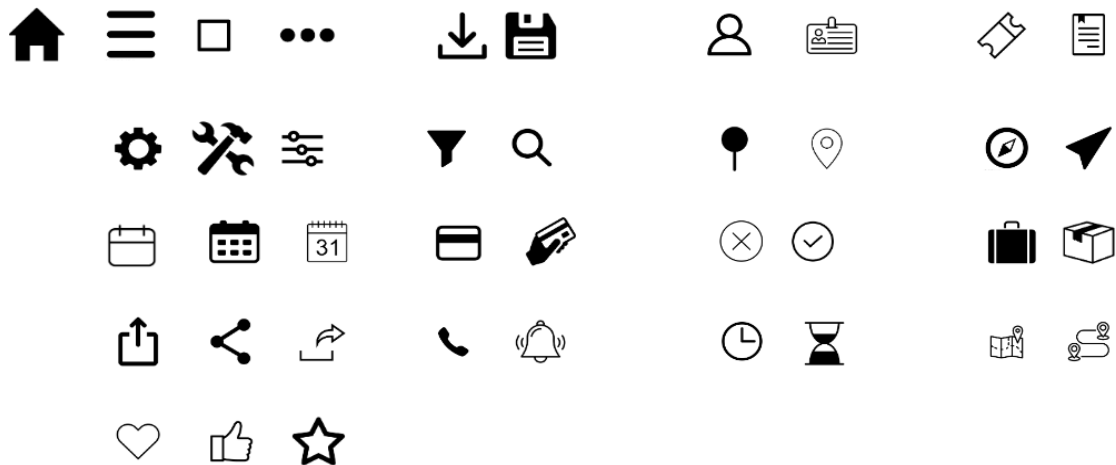


Figure 1 – Recurring icons in digital mobility and delivery applications

UIL exercises

The selection of icons collected in the preliminary phase was compared with those used in the pilot sites’ applications. Thereafter, five similar interactive UIL exercises were built (one for each pilot site) starting from existing Human Factors design and UX testing examples (ETSI - Technical Committee on Human Factors (HF), 1993) (Bagagiolo, Vigoroso, & Caffaro, 2019), and questionnaires (Blees & Mak, 2012) (Zender & Cassedy, 2014). The UIL exercises took place during pilot sites’ COPs between March and April 2021 and in total 46 participants attended as described in the following Table 1. The full debriefing templates about UIL exercises are available for download from the UIL Tool of the INDIMO Toolkit.

#	Pilot Site	Date	N. of participants	Targer groups involved
P1	Emilia - Romagna	29/04/2021	14	Town major; Citizens; Researchers;
P2	Antwerp	30/04/2021	10	Users’ representatives; Local Public Transport Accessibility Council Antwerp; Agency of Accessibility Flanders; Blind persons organization representatives; Developers; Designers; Researchers;
P3	Galilee	05/04/2021	7	Users’ representatives; Developers; Researchers;
P4	Madrid	13/04/2021	10	Riders representative; Users’ representatives; Public officer; Developers; WEB designers; Food store owner; Researchers;
P5	Berlin	26/03/2021	5	Users’ representatives; Developers; Researchers;

Table 1 - UIL exercise information

The exercises focused on gathering qualitative feedback about the User Experience from a vulnerable-to-exclusion person’s point of view. The term User Experience refers to how a person interacts and experiences a product, a system or a service. It includes all perceptions and responses that results from the use of such product, system or service (emotions, beliefs, preferences, perceptions, behaviours and accomplishments that occur before, during or after



use) (Law, Roto, Hassenzahl, Vermeeren, & Kort, 2009). Despite the hype around the term User Experience, its role is often misinterpreted by non-experts as a way to make applications look nicer and increase customers and revenues. The truth is, as users we only realise what is UX design when something doesn't work as we expect it to. Our assumption is that digital mobility and goods delivery services shall be considered as public services, since they support and facilitate autonomy through access to public and private transport services and the purchase of essential goods. Thus, we believe user-testing should not only explore the expectations and needs of the main group of target users, but involve vulnerable-to-exclusion users since early phases.

We decided to test up to 6 icons in use by the pilot' applications and discuss with participants during COPs online meetings how they were used in the application user interface. The exercises sessions were attended by users and non-users, civil society organizations representing vulnerable-to-exclusion groups, operators, policymakers, researchers, and other relevant stakeholders. The level of ambiguity of icons was qualitatively evaluated both as stand-alone elements and as parts of the related interface context.

The main objectives of the UIL exercises were:

1. Raising participants' awareness (both users and developers) of the ambiguity of icons';
2. Identifying the most common issues in the usability of icons;
3. Identifying how the application interface and internal structure influences the comprehension of icons;
4. Finding potential solutions or mitigations to accessibility barriers of digital applications.

We tried to ensure the highest degree of inclusivity during 1-hour online meetings, taking into consideration the fact that the INDIMO CoPs (Communities of Practice) were composed of people who could present one or more characteristics of vulnerability, or by vulnerable users' representatives (NGOs, associations). To this aim, interactive exercises were led by a guiding moderator who presented the slides on screen and facilitated an open discussion verbally. Moderators were invited to leave the questions as open as possible and to give the minimum input to participants, in order to avoid biased answers.

The moderator received specific instructions in advance to collect participants' feedback without influencing their answers with broad explanations. An open and non-judgmental setting was an important feature of UIL exercises..

The exercise consisted in two parts: one introducing the theme of the ambiguity of icons and the other exploring their use in the digital context of the application itself.

The first part consisted of the "icons' pitch". All the participants were shown a first set of icons that are typically part of the graphic language of most of the mobile apps and a second set of matching icons with similar meanings (Figure 2).

In the second part, participants were invited to observe the same icons as they appeared in the different "application screens". For this purpose, they were invited to comment on screenshots taken from the actual interface of the pilots' applications (Figure 3).

To summarize, during the UIL exercises participants were asked feedback about: i) the meaning of the icons; ii) the potential matching with other icons that could be used to convey the same meaning; iii) elements that were unclear or produced confusion in the visual outlook; iv) elements that could be added for clarification or a more accurate communication; v) other elements that should be kept in consideration when designing a graphic interface.



The exercises provided a clear understanding of the common interpretations that people give to visual icons, the variety of meanings attached to them, the interaction between their intrinsic characteristics and the relationship with the other user interface components.

Finally, each pilot was asked to fill in a debriefing template to collect participants' comments and feedback during the UIL exercises. A synthesis of the most relevant results is reported in sections **Errore. L'origine riferimento non è stata trovata.** and **Errore. L'origine riferimento non è stata trovata.** of the full project deliverable D2.3 Universal Interface Language.

The UIL tool includes the UIL exercise template used to perform the icons' analysis in the five pilot sites and the instruction for moderators. Annex 3 of D2.3 Universal Interface Language reports the full transcription of UIL debriefings for each pilot.

1) Icons pitch



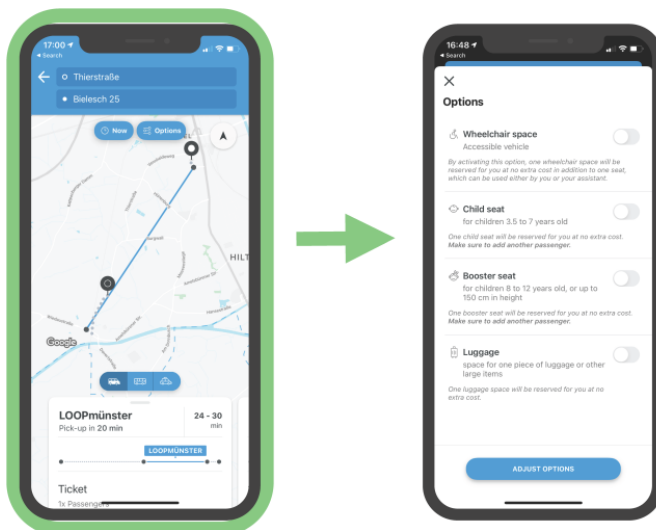
10 MINUTES - Please, name and describe the meaning of each presented pictogram in your words. According to your experience, what does this symbol/icon mean or what actions does it trigger in a digital application?

5 MINUTES - Your meanings have been added to the most used ones. Are there other pictograms you've seen used to issue the same message?

5 MINUTES - Here some examples, who would like to comment? Do you think they are equivalent?

Figure 2 - an example of UIL exercise - icons' pitch

5) Options



INDIMO WP2 - UIL exercise for P5 | Berlin

This is the related screenshot.

- 5 MINUTES: What other information would you like to be included here?

Figure 3 - An example of the UIL exercise - Berlin app screens



The UIL online survey

To complement results about icon's evaluation collected through the review of DMS and DDS applications, and the UIL exercises performed in the local COPs, an online UIL survey was distributed to all project partners and stakeholders, social media followers and to the members of the INDIMO Co-Creation Community. The full text of the online survey can be downloaded from the UIL Tool or found in the **Errore. L'origine riferimento non è stata trovata.**

The survey included five sections as follows:

1. Survey introduction;
2. Consent form;
3. The use of pictograms in the digital mobility and good delivery services;
4. General questions on accessibility of digital services;
5. Background information.

The main section 3 of the survey explored icons' ambiguity. First questions (Q1-Q2) were about common general icons, supposedly the least ambiguous among the non-mobility specific ones. Q1 asked respondents how certain they felt about the outcome when clicking on some icons (i.e. Home, Phone handset/Contacts, Lens, Info circle, User profile, Funnel/ Filter). Q2 included open fields to shortly describe the meaning of such icons according to the respondents' experience, to let discrepancies emerge.

Core questions (Q3-Q13) focused on the level of comprehension of recurring icons on DMS and DDS applications. Participants were asked to rank on a four-steps Likert scale all proposed icons, from the one most related with a specific function to the least (i.e. open menu; go to settings; rate a content/app; share content; save or download; visualize travel documents/tickets; locate point of interest on a map; contact support; go to payment; visualize map; plan trip). The aim was to identify which icon best represented the function with the lowest rate of ambiguity. Question Q14 asked participants to match a set of pictograms (i.e. clock, alarm clock, hourglass, calendar, timetable) with the functions they better represented, based on their personal experience.

Results concerning *Section 3* of the UIL survey are included in the icons catalogue in section **Errore. L'origine riferimento non è stata trovata.** of D2.3 Universal Interface Language.

Section 4 – General questions on accessibility of digital services focused on the respondents' perspectives and experience with digital mobility applications. The set of questions Q15-Q21 collected responses about common barriers experienced by respondents due to the poor accessibility of the digital mobility or delivery services, or specific situations concerning the use of digital application at general level (e.g. contacting the support center, error occurrence, ...). Four-steps Likert scales were used.

The last set of questions (Q22-Q28) included in *Section 5 - Background information.* focused on respondents' socio-economical background information such as age, gender, education, state of employment, caregiving activities, income.

The online survey collection of responses lasted for three weeks in the month of May 2021 and it was promoted on all social media accounts and website of the project and through a dedicated newsletter item circulated internally and through co-creation community members. In total, 89 responses were collected. A frequency analysis was performed.

