





Universal interface language for digital transport services



UIL



INDIMO

INCLUSIVE DIGITAL MOBILITY SOLUTIONS

de·sign

/də'zīn/

noun

1. a plan or drawing produced
and function or working
object before i
veiled



Universal interface language (UIL)

The UIL tool **summarises in a nutshell the co-creation process related with the accessibility and inclusivity of visual icons and user interfaces** used by digital mobility and delivery services.

The INDIMO Toolbox is intended for a practical use, providing **direct access to interactive self-assessment tools, templates and documentation.**





Universal interface language (UIL) - INDEX

- [How to navigate the tool?](#)
- 1. [What is the **UIL**?](#)
- 2. [Why do I need the **UIL**?](#)
- 3. [How can I use the **UIL**?](#)
- 4. [What is the science behind the **UIL**?](#)
- 5. [Examples of UIL Recommendations](#)
- 6. [Useful links](#)
- 7. [References](#)
- 8. [Project information](#)





How to navigate the tool?

Tips and tricks

Dynamic
navigation
index



Full
screen
mode

Move back
and forth



Slides
index



Toolbox
webpage



INDEX PAGE



How to navigate the tool?

Navigation style



DEEP-DIVE

- click on the links provided in each slide to open contents contextually



READ-ON

- read thoroughly the slides and download all templates in a compressed file at the end



SPEED-UP

- fast-read and skip slides or jump to the final slide whenever you want

1. What is the UIL?

The UIL ambition and challenge

The **Universal Interface Language** aims at **improving the non-textual communication** of digital applications to ensure that everyone may intuitively access contents overcoming the language, cultural, physical and cognitive barriers.

The UIL derives from the need to answer the following **key questions**:

- Are people aware of the **emerging role of icons** in digital mobility applications?
- How **can icons help all people navigating smoothly** the contents and features of digital applications?
- Are the **meanings of icons clear enough** to all users?
- When interacting with icons, **are users sure about the expected outcomes**?



1. What is the UIL?

Key features of the UIL

1. It establishes a **clear conceptual approach, to promote awareness** about digital mobility and delivery service accessibility.
2. It supports the **analysis of visual icons** and the related user-interfaces in a Universal Design (UD) perspective.
3. It provides a **set of guidelines for the user-centred design or selection** of visual icons as part of more complex user interfaces.
4. It offers **quick and easy exercises to assess users' comprehension of icons** in relation to the user interface, starting from the prototyping phase until the finalisation of the development process.

Click to download the
extended document



Download the full
UIL pdf file



INDIMO Inclusive Digital Mobility Solutions project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 875533.



1. What is the UIL?

From co-creation to recommendations

The INDIMO Toolbox provides a **user-centric design approach** and a set of **recommendations** based on the empirical research carried out in the Communities of Practice (CoPs) and the Co-creation community (CCC), also drawing from literature review and desk research.

In the following sections you can read more about the UIL methodological process, the results and find the other downloadable templates and documents.

Click on one of the links to visit the online interactive recommendations repository



UIL recommendations



All recommendations



2. Why do I need the UIL?

Find yourself!



NGO or association representing people with special needs and/or impairments

You know the needs of the people you represent, but you face difficulties in expressing this expectation to other professionals.

The UIL will help you **substantiate your ideas and provide recommendations** to increase service inclusivity.



Developers, UX/UI and graphic designers

While developing a digital mobility or digital delivery system (DMS/DDs) you try to do it for the widest audience as possible and be able to adapt it to emerging needs.

The UIL will help you **identify users' needs and suggest you practical tips** on how to tackle them.



Mobility/delivery service providers

You want to be sure your service can be used by everyone and be as inclusive as possible to increase your customer base.

The UIL will contribute **generating awareness in your team and guide the decision-making process** through inclusive principles and approaches.



Policymakers

As you are in charge of promoting accessibility, you either elaborate, deploy or execute policies, or you shape laws and regulation that directly affect mobility and delivery services.

The UIL allows you **including essential requirements to bring more inclusive services on the market.**

3. How can I use the UIL?

The UIL objectives

You can use the UIL to achieve one of the following objectives:

- To **assess accessibility** and inclusiveness of icons as part of the interface of **existing digital mobility and delivery services**.
- To **design accessible** and inclusive icons and user interfaces of **new digital mobility and delivery services**.

You can use the UIL to analyse, develop or redesign a service in two ways:



DEEP-DIVE | Discover and **apply the 4-step UIL methodology** to evaluate the accessibility and inclusiveness of new or existing visual icons and user interface.

Continue navigation
to DEEP-DIVE



SPEED-UP | Identify and **apply the appropriate UIL recommendations** for the inclusive design of visual icons and user interface of a new or existing service.

Click here
to skip slides



UIL recommendations



3. How can I use the UIL?

A four steps methodology

STEP 1

Run a **preliminary review of similar services** to explore icons use and the accessibility of interfaces;

STEP 2

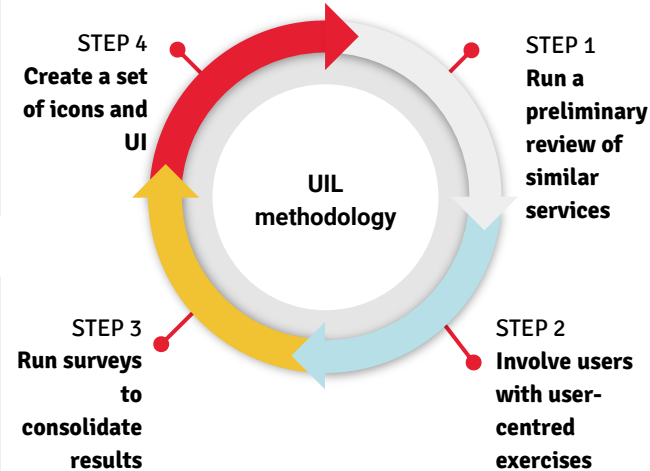
Build a **user-centered exercise** as described in the UIL to **involve users** in the evaluation of icons;

STEP 3

Consolidate the review and the results of exercises with a **systematic survey**, using the **UIL survey as an example**;

STEP 4

Organise the results into an icons catalogue to identify of a proper set of icons and the related user interface.



Continue navigation
to read each step



3. How can I use the UIL?

The UIL Methodology | STEP 1 - preliminary review

The preliminary review aims at involving users in the evaluation of an initial set of visual icons that are commonly used in similar services. The analysis will highlight potential ambiguity issues of icons and/or suggest best practices to consider when designing your application/service.

The icons can be classified using to the usability heuristics and Universal Design principles included in the questions template.

Click here to
download



Usability questions
template



Usability best practices



UIL methodology



3. How can I use the UIL?

The UIL Methodology | STEP 2 - user-centred exercise

The **UIL user-centred exercise** is a quick and replicable exercise to assess the comprehensibility of icons in relation to the user interface. It will help you collect feedback from the most diverse group of users. The qualitative results will include:

1. The users' interpretation of the **meaning of icons**.
2. The potential **matching with other icons** that could be used to convey the same meaning.
3. **Elements that are unclear** or created confusion in the application interface.
4. **Elements that could be added** for clarification or a more accurate communication.
5. Other elements that should be kept in consideration when designing the **user interface**.



3. How can I use the UIL?

The UIL Methodology | STEP 2 - exercise structure

The UIL exercise consists of two sessions:

- A. *“Icons pitch”*: a series of icons is shown to participants together with a second set of matching icons with similar meanings. This part introduces the theme of icons’ ambiguity.
- B. *“Icons in context”*: the same icons are now displayed and discussed as they appear in different application screens. Participants are invited to comment on screenshots and prototypes of the current application interface.

Online interactive
board template



UIL exercise guide and
debriefing template



1) Icons pitch

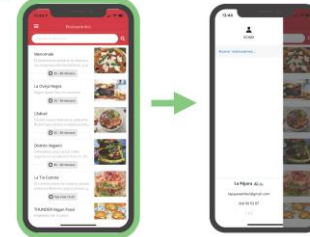


10 MINUTES - Please, name and describe the meaning of each presented program in your words. According to your experience, what does this symbolization mean or what actions does it trigger in a digital application?

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?

3) Main menu



3. How can I use the UIL?

The UIL Methodology | STEP 3 - icons survey

The **UIL icons survey** for end users complements the results from STEP 2 collecting quantitative feedback about the use of pictograms through 4-step Likert scales, to **identify which icons best represents the function with the lowest rate of ambiguity.**

Ideally, the survey should be answered by different kinds of end users, especially involving those categories who experience some kind of barrier in using mobility services (i.e. people with different kinds and degrees of impairments).

Click here to
download



UIL icons survey template



Section 3 - Icons survey

In this section we explore the use of pictograms in the digital mobility and goods delivery services. A pictogram is a picture, symbol or icon that represents a word or a phrase. In a digital context, you can point, press or click on pictograms to give instructions and/or access specific functions. Other times pictograms are only used to provide useful information.

Please leave on your answer focusing on your personal experience with mobility, transport and/or goods delivery applications for smartphones and mobile devices. Personal data if your experience is very limited, your answers are very important for the European research!

Icon	Very certain	Certain	Slightly uncertain	Extremely uncertain
Home				
Calendar				
Alarm clock				
Hourglass				
Checkmark				
Payment card				

1. Imagine you are using a mobile app and there are several pictograms you can interact with. For each proposed pictogram, how certain do you feel about the outcome when clicking on it?

Icon	Very certain	Certain	Slightly uncertain	Extremely uncertain
Home				
Calendar				
Alarm clock				
Hourglass				
Checkmark				
Payment card				



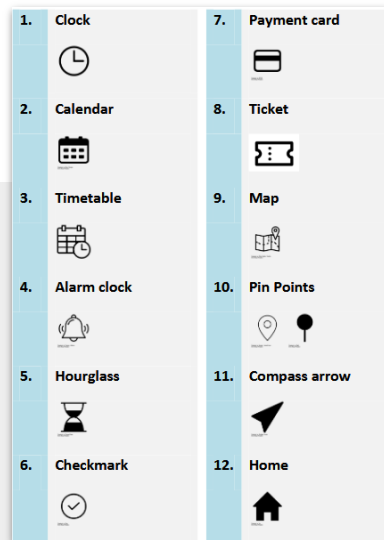
3. How can I use the UIL?

The UIL Methodology | STEP 4 - icons catalogue

The **icons catalogue** includes results from INDIMO, insights about recurring icons in digital mobility and delivery applications and an **empty template to collect your in-depth icons' analysis** results gathered in STEP 2 and STEP 3.

Use the catalogue to inform the design team about the reasoning behind your choices.

TIP: You can further improve it and update it with time and use it as internal reference for all further services you want to analyse or enhance.



Click here to
download



Icons
catalogue



Icons' card analysis
template and example



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INDEX PAGE



4. What is the science behind the UIL?

Challenging universal icons

Visual icons are fundamental to transfer meanings in the fastest and more intuitive way. There are pictograms considered “universal icons”, because they are pretty much intuitive for most people globally, or because they are included in international standards and used worldwide.

However the **comprehension of signs and symbols challenges most users**, be it in the real world and in the digital world.

Why? Because the **comprehension of icons and user interfaces are influenced by external factors** such as the context-of-use, socioeconomic and cultural background of users and their different levels of perception (i.e., kind/s and degree/s of impairment).

Therefore high degrees of comprehensibility and acceptance by themselves are not sufficient to declare icons universal!



4. What is the science behind the UIL?

Communication and signage comprehension in crowded and multicultural environments

Signs and symbols in the physical environment are often misinterpreted, especially in hectic contexts such as transport hubs. We can draw important lessons concerning icons' design that can be applied also to the digital world from European studies exploring **signage comprehension in crowded environments such as transport hubs**, where people from all countries travel and seek for visual cues:



Multi-cultural communication guidelines:

How to represent objects and actions in such a way that they are highly comprehensible to most users worldwide.



Communication during emergencies:

How to increase icon's immediate comprehensibility, reinforcing signage with multi-sensorial cues.



Communication and signage comprehension in crowded and multi-cultural environments

4. What is the science behind the UIL?

Examples of signs' comprehension studies

Here two examples of results from healthcare symbols and digital icons comprehension studies:

- 1) **Comprehension of standard healthcare symbols** by a sample of 100 participants from different cultures, age, groups and literacy levels:
 - Symbols referring to **abstract concepts are the most misinterpreted**.
 - Human figures and **description of actions are better understood** than abstract concepts.
 - **Interpretation varies across cultural backgrounds** and increases with education and younger age.
- 2) **User-testing of 190 icons in Android apps** run by Human Factors and usability specialists:
 - Only **few icons are universally recognized** by users (i.e., home, print and shopping cart).
 - Some icons are confusing and frequently misunderstood by users. (e.g., heart and star).
 - The **use of labels increases the usability** of icons and clarifies what is the action outcome.
 - **Testing** icons for recognisability and memorability **avoids miscomprehension**.

Note: references are available in Section 7 (slide 26)

4. Conclusions

Test, test, test!

Main UIL question: How can icons representing objects or actions related with time and movement be designed in such a way that they are clear enough and unambiguous for all people over time and across countries?

Key recommendation: icon's usability can be increased by properly applying Universal Design principles and the Universal Interface Language approach proposed by INDIMO when developing user interfaces and...

Test, test, test with all kinds of end users!

See some UIL
recommendations examples



5. UIL Recommendations

Three examples

Source
UIL

Offer options to rate and review accessibility

Theme/Aspect: **Service features** / Organisational measures

[Read all](#)



Source
UIL

Assess diverse contexts of use

Theme/Aspect: **Assistance offered** / Organisational measures

[Read all](#)



Source
UIL

Provide additional fields for special needs

Theme/Aspect: **UD principles** / Digital user interface

[Read all](#)



Go to online list



[UIL recommendations](#)



[All recommendations](#)



Continue navigation



5. UIL Files and templates

All in one click

Congratulations!

You've come to the final part of the UIL. Continue navigation to find useful links, references and project info. Alternatively you can:

1. **Download in one click** all the documents and templates provided in this UIL tool
2. **Use the Service Evaluation Tool (SET)** to evaluate your service accessibility performance and get a specific selection of recommendations
3. **Explore all other tools** from the main INDIMO Toolbox page



Download all UIL files
as a compressed folder



SET tool



INDIMO Toolbox



Continue navigation



6. Useful links

- Skeuomorphic icons: <https://www.interaction-design.org/literature/article/flat-design-an-introduction>
- Biohazard symbol: <https://99percentinvisible.org/article/biohazard-symbol-designed-to-be-memorable-but-meaningless>
- Iso standard symbols revisited: <http://isotyperevisited.org>
- Aichler's pictograms in Europe: <https://www.piktogramm.de/en>
- AIGA's 50 signs for the U.S. Dep. of transportation: <https://www.aiga.org/resources/symbol-signs>
- Challenging icon accessibility: <https://accessibleicon.org>
- Icon usability: <https://www.nngroup.com/articles/icon-usability>
- User testing of icons: <https://www.usertesting.com/blog/user-friendly-ui-icons>
- W3C initiative for mobile content accessibility: <https://www.w3.org/WAI/standards-guidelines/wcag-mobile-overlap>
- ETSI guidelines:
https://www.etsi.org/deliver/etsi_EN/301500_301599/301549/02.01.02_60/en_301549v020102p.pdf



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INDIMO

INCLUSIVE DIGITAL MOBILITY SOLUTIONS



Project Information

End users categories

End users targeted in the research



Lower-income citizens



People living in peri-urban or rural areas



Ethnic minorities



Foreigners



Lower-educated citizens



Caregivers



Women



People lacking digital skills



Non-connected people



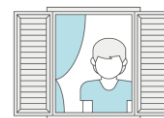
Older people



People with mental health impairments



People with reduced vision or mobility



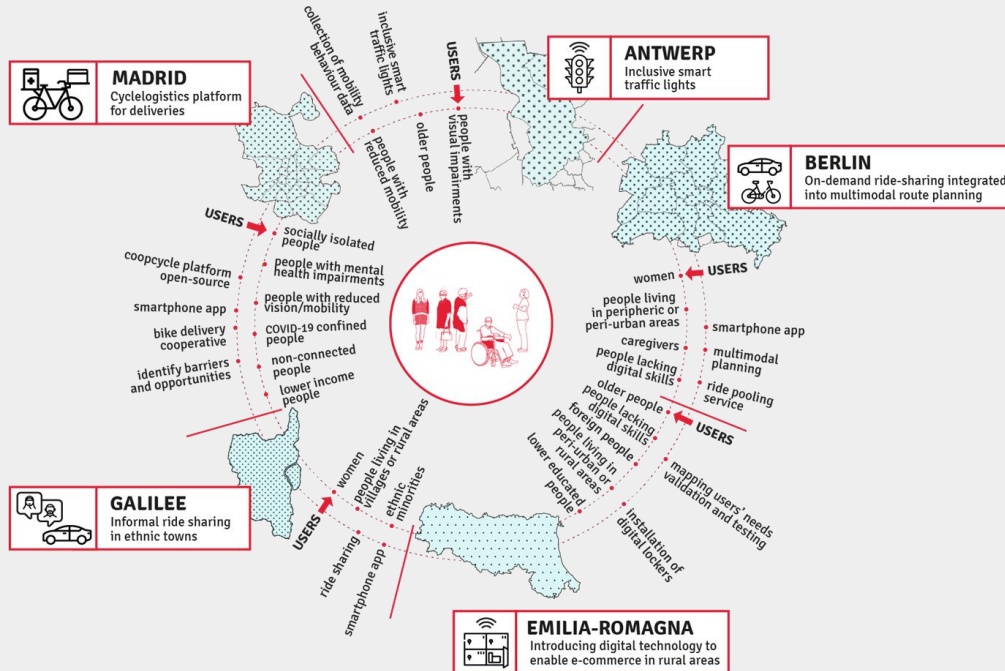
Socially isolated people



Covid-19 confined people

Pilot projects

The five European pilot sites, their goals and target groups



[Open pilot projects webpage](#)

Pilot implementation

Strategic phases



Assess the state of the art and define high level guidelines to design, prepare and implement pilots' activities.

Assess users' needs and requirements towards digital mobility solution, by investigating general population as well as specific groups living some kind of barriers to access services.

Redesign of existing services or set up of new services based on the assessment and use of the first version of the **INDIMO Digital Mobility Toolbox** in co-creation workshop.

Implement (re)designed services, based on final testing and transferability assessment.



Disseminate and exploit the Toolbox across all potentially interested actors in the digital mobility services domain

Co-creation Community

Involving stakeholders in the redesign of services

The **co-creation community** has been **strongly involved** in the development of the **INDIMO Toolbox** through **workshops, consultations** and **interviews**. The co-creation process was based on the establishment of a Co-creation Community in each pilot, composed of **transport user representatives, policymakers, operators, and developers**.

Several meetings took place both in the individual pilot site cities and in online plenary sessions, supported by the European Transport and Mobility Forum discussion platform.



Visit the INDIMO Co-creation community webpage

Take-up pilot cities



Online ETM forum community



Co-creation workshops



Communities of practice

Involving end users to create common knowledge

The INDIMO **Communities of practice** established in each pilot included **end users**, mobility service providers and developers, in order to **create common knowledge on travel behaviour and barriers** in the use of digital mobility services.

They built on the knowledge and experience of their members to propose solutions adapted to local users' needs and interest, in a peer-to-peer learning context.



Visit the INDIMO
Communities of practice webpage



Develop productive
services



Empower end users
depending on their skills



Create common
knowledge





INDIMO

INCLUSIVE DIGITAL MOBILITY SOLUTIONS



THANK YOU FOR YOUR ATTENTION!

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@INDIMO-H2020



@indimo-h2020

Credits:

Icons from thenounproject.com (rainbow designs, monkik, adrien coquet). Icons from own design INDIMO copyright (Deep Blue: chiara mucitelli, daria verna ceccherini, elsa costamante). Pictures from Unsplash.com



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