

Democratizing User Interfaces

Sérgio Alves

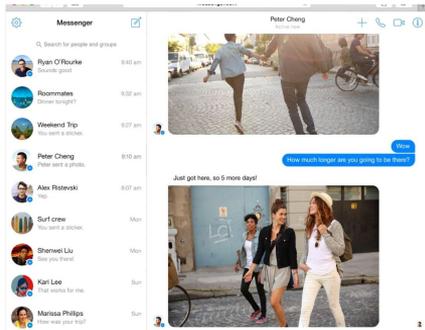
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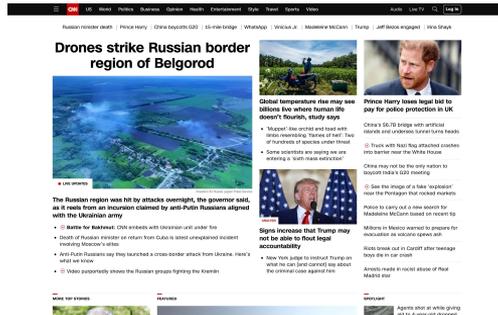
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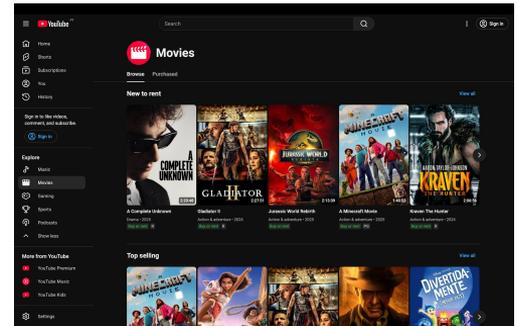
User Interfaces



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User Interface Design



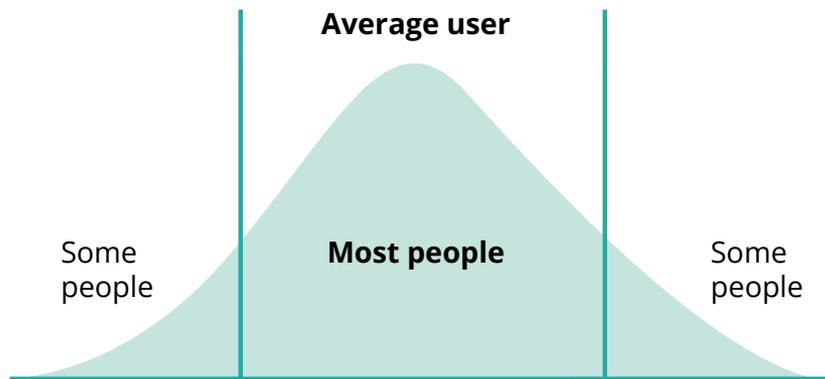
Traditionally, designers and developers control the UI design process.

User Interface Design



People lack control over UI design: their feedback informs the design, but experts retain the final decision.

User Interface Design



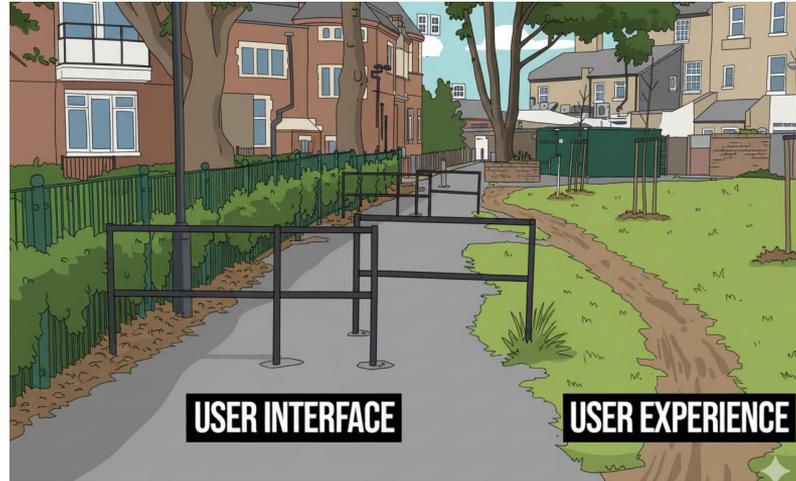
Most UIs are either “one-size-fits-all” or limited to superficial personalization.

User Heterogeneity



Individual characteristics and contexts influence how UIs are used and experienced.

Design vs. Reality



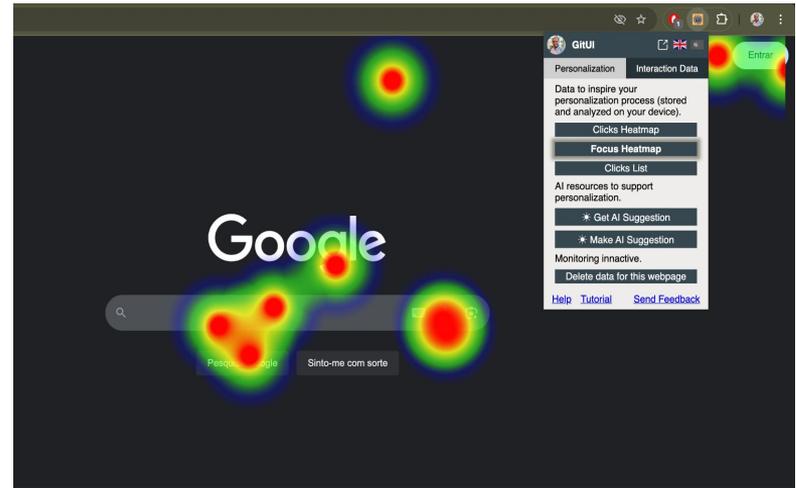
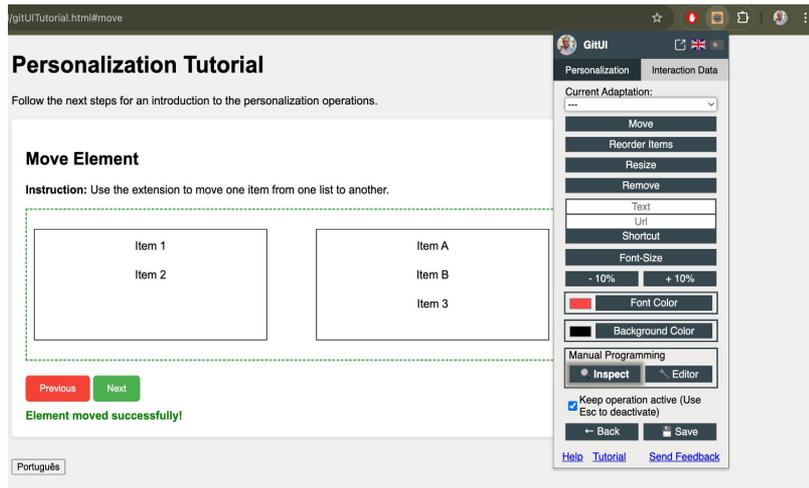
Designers cannot ensure that the UIs they create will meet every user's needs.

Adaptation to Personal Needs



Tailoring UIs to personal needs is necessary.

User Interface Personalization



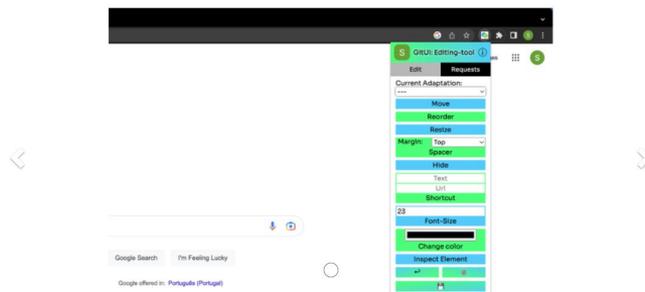
The GitUI extension allows users to personalize with nine operations (left), and analyse their interaction data (right).

User Interface Personalization

Personalization of User Interfaces



We explore solutions to increase the agency of individual users over the interfaces they use.



We envision a digital world where people have the power to adjust user interfaces (UI) to their personal interests and needs. In recent history, we have witnessed the democratization of other technologies and services. The Internet democratized access to information. Social media democratized access to audiences and communities of interest. Smartphones democratized access to computing and communication resources. Conversely, one crucial aspect remains out of bounds to individual agency: the UI. Our research draws attention to the importance of increasing the agency of individual users over the interfaces they use.

Personalization by Default

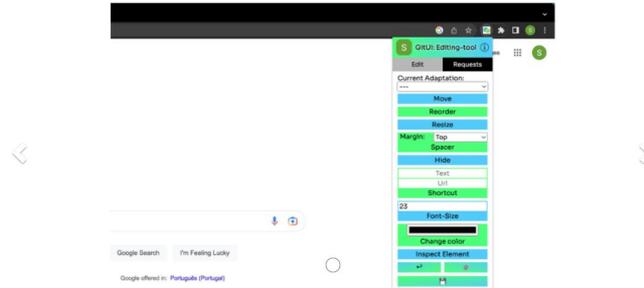
When users open a web page or application, the way in which the UI can be adjusted to their abilities and likings

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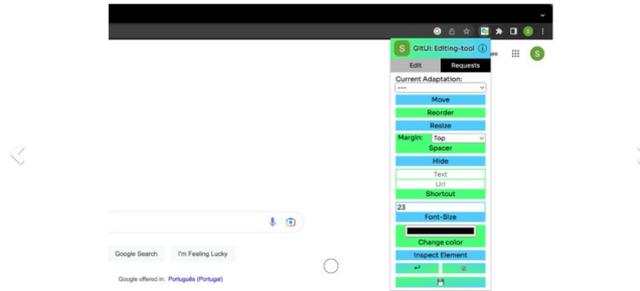
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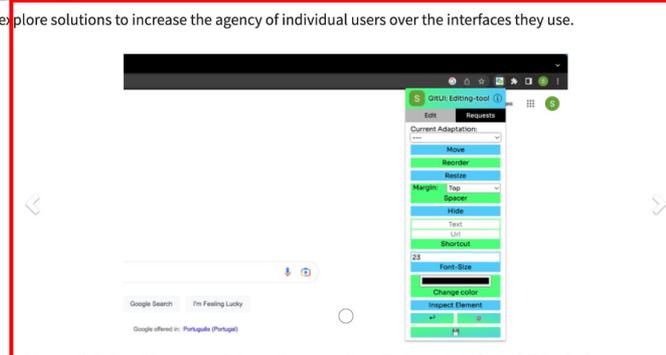
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Democratize Access to Personalization

While third-party personalization solutions were found to be beneficial, they often require significant effort and technical skills, beyond the reach of most users, impeding the future adoption of interface personalization. In our research we explore opportunities to provide equal access to personalization solutions. We also study the role that human factors play in people's adoption intentions.

Publications

- [GitUI: A Community-Based Platform to Democratize User Interfaces](#)

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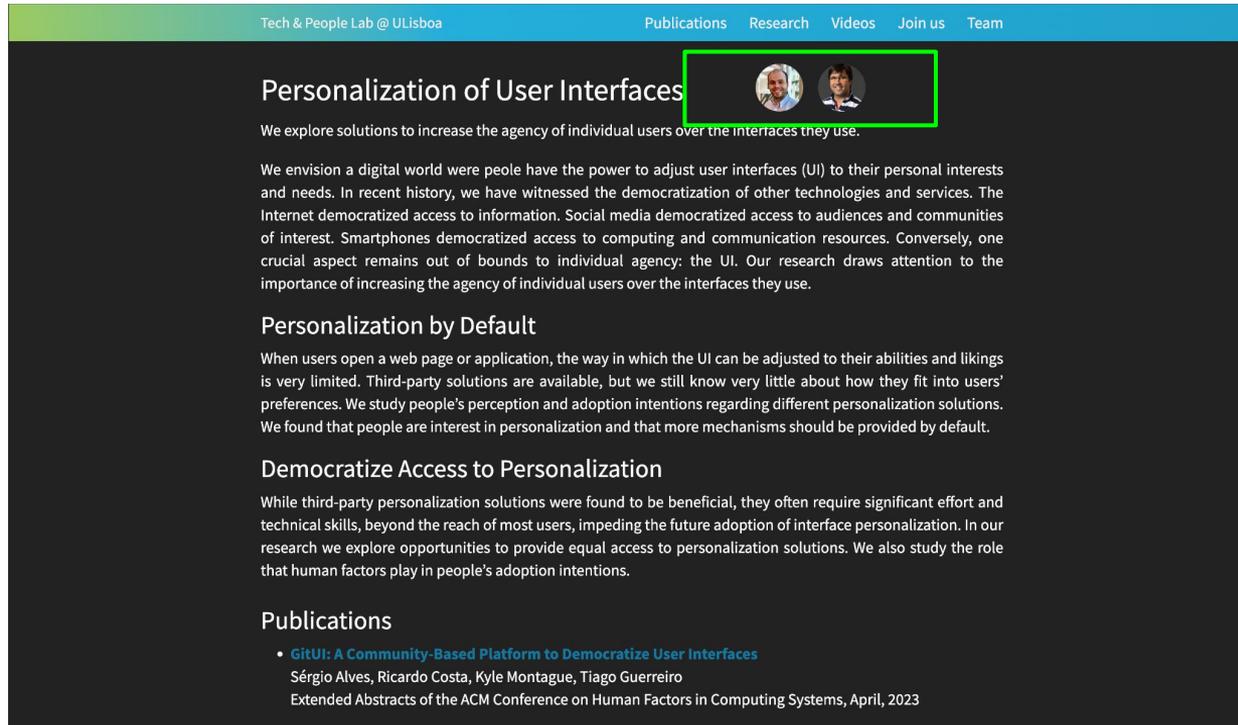
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Sérgio Alves, Ricardo Costa, Kyle Montague, Tiago Guerreiro
Extended Abstracts of the ACM Conference on Human Factors in Computing Systems, April, 2023

Democratizing User Interfaces

Transferring control to users to allow them to decide how their UIs should be.

Background

User Interface Personalization Approaches

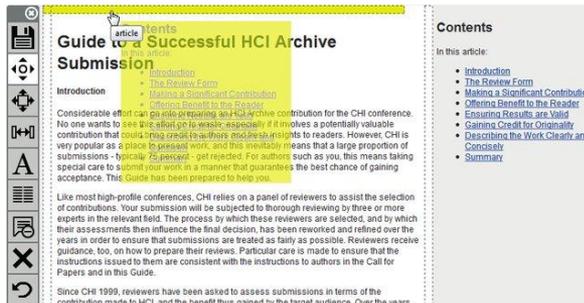


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User Interface Personalization Approaches



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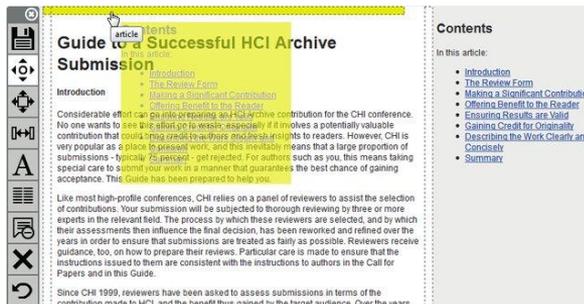


User-driven (e.g., CrowdAdapt (Nebeling et al., 2013))

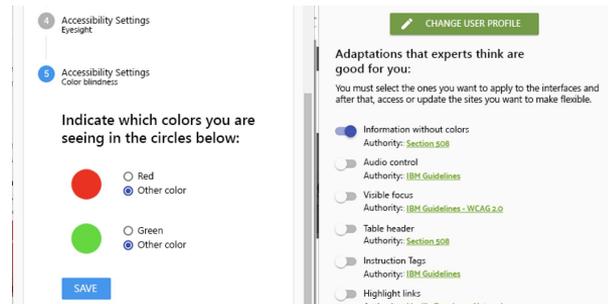
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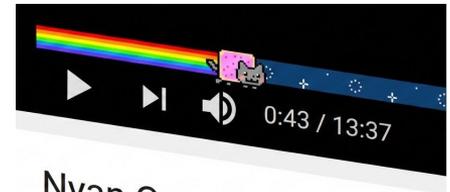
User-driven (e.g., CrowdAdapt (Nebeling et al., 2013))



Hybrid (e.g., UIFlex (Proença et al., 2021))

Personalization Benefits

- Accessibility
- Visual comfort
- Efficiency
- Express personal identity
- Control and Personal Agency



Nyan Cat

Visor and Nyan Cat

Problem

- Unanticipated or transformative changes are inaccessible to most.
- Personalization decisions are typically driven by assumptions.
- Limited information about how users can personalize beyond the predefined options.

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Problem

Opportunity to **reimagine personalization** to **shift control** to users, regardless of their technical proficiency.

Research

Research Questions

- RQ1. How do people envision exercising democratic control over the interfaces they interact with, and how do they see personalization mechanisms supporting this process?
- RQ2. What use do people make of existing personalization features, and what are their personalization needs and preferences?
- RQ3. How can we support users in taking greater control over the personalization process, in accessible ways that advance UI democratization by promoting personalization freedom, human independence, and informed decision-making?

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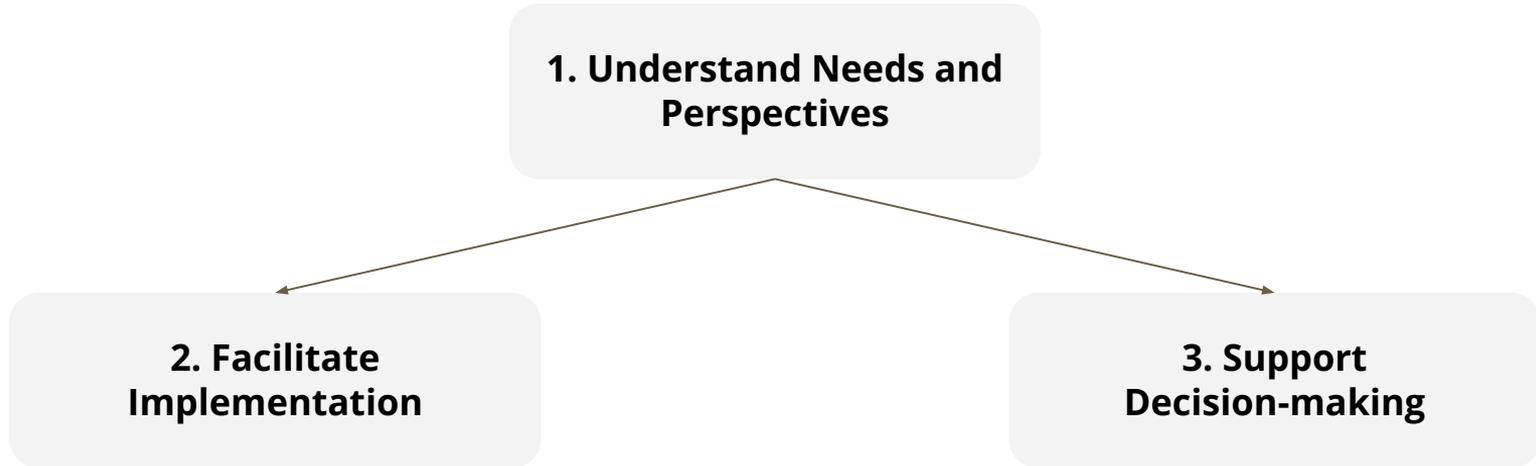
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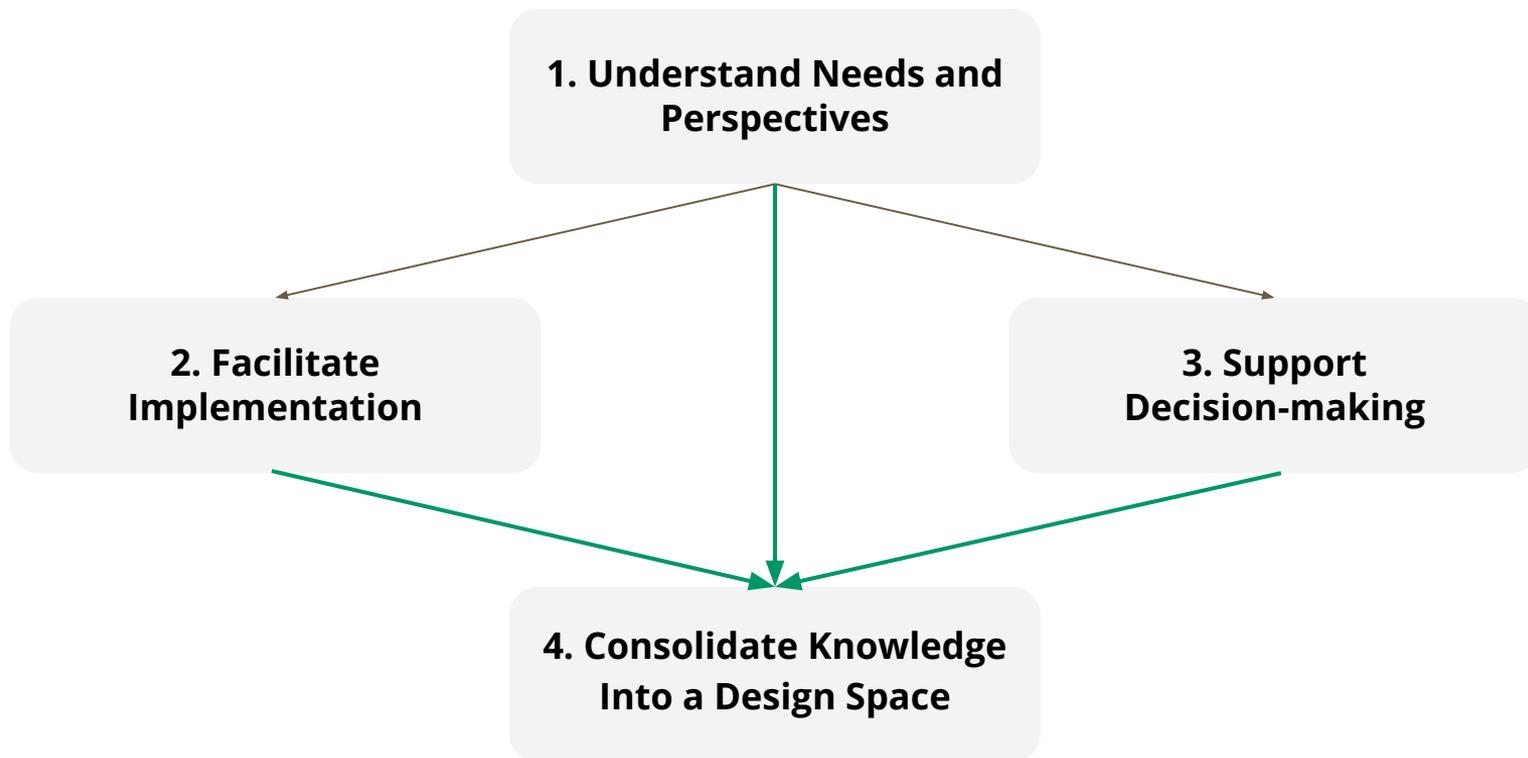
Research Approach

1. A User-Centric Exploration of User Interface Personalization Needs, Practices, and Aspirations (Studies 1 and 2).
2. A Community-Driven Approach Aimed at Democratizing Personalization (Study 3).
3. Reflections on the Role of Interaction Data in Empowering User Decision-Making for UI Personalization (Study 4).

Research Approach



Research Approach



**Stage 1: A User-Centric Exploration of User
Interface Personalization Needs, Practices, and
Aspirations (Studies 1 and 2)**

Stage 1: Goal

Listen to users about their everyday interactions with UIs and the role that UI personalization was playing and could play in enhancing their digital experience.

Stage 1: Methods



Co-customization of web user interfaces with end-users (Study 1)

Understand experience with UIs, needs, and preferences.

n = 7 



Online survey about current and potential personalization practices (Study 2)

Understand personalization practices and aspirations.

n = 145 

Stage 1: Methods



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Stage 1: Findings

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- Personalization needs are diverse and complex.

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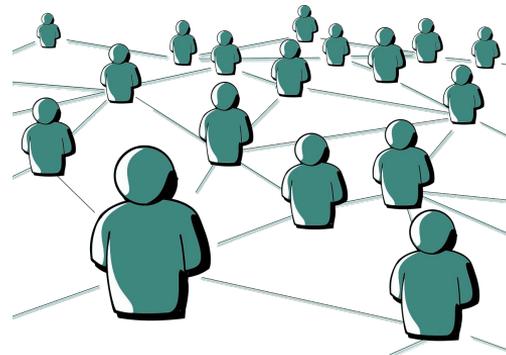
- People struggle to identify opportunities for improving their UIs.
- Personalization needs are diverse and complex.

How can we make it easy for everyone to ideate and implement their needs?

Stage 2: A Community-Based Approach Aimed at Democratizing Personalization (Study 3)

Community-Based Personalization

- The **community collaborates** to create personalized UIs.
- People can **personalize themselves**, ask for **assistance**, or search for publicly available **personalization templates**.



Stage 2: Goal

Study the dynamics of community-based UI personalization.

Stage 2: Methods



Two-week exploratory study

- Think-aloud training session
- Customization at home
- Interview

n = 9



Stage 2: Findings

- People enjoy customizing for others.

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- To customize for themselves, people need help with the creative process.

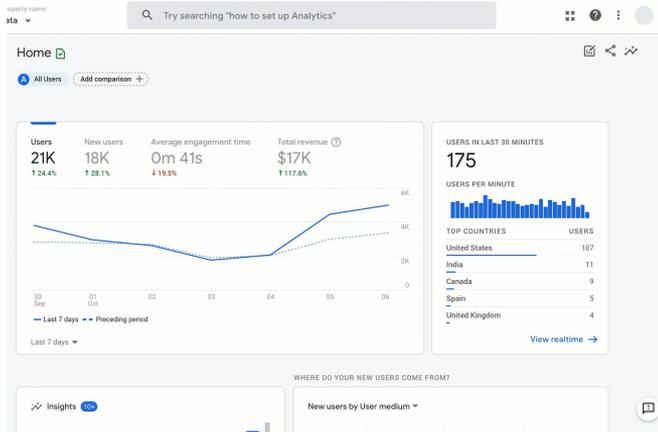
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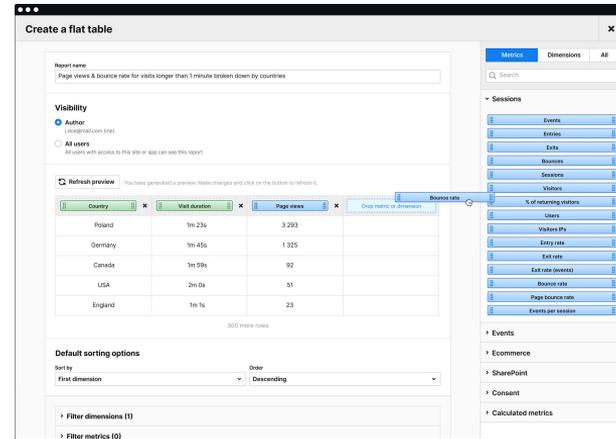
How to support the identification of personalization opportunities and the creative process?

**Stage 3: Reflections on the Role of Interaction Data
in Empowering User Decision-Making for UI
Personalization (Study 4)**

Using Interaction Data to Support UI Personalization



Google Analytics



Piwik

Stage 3: Goal

*Study how people **engage** with interaction data to **identify** and **reflect** on meaningful UI personalization opportunities, and the necessary support for transitioning **from data visualization to personalization**.*

Stage 3: Methods



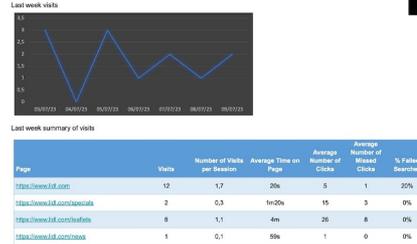
Interview study supported by vignettes

Reflect on four different forms of using interaction data for supporting UI personalization

n = 12 

Stage 3: Methods

Lidl – Global Data (Week of 3 July)



A

Lidl – Textual Suggestions

Based on your usage, we identified the following improvements. We estimate that this personalization would require approximately four minutes, yielding a benefit of three seconds per visit.



B

A5

B24

Lidl – Visual Suggestions

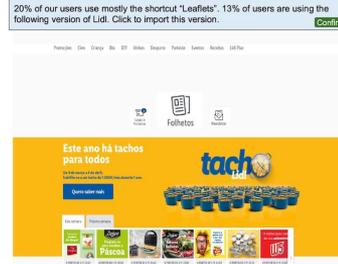
Based on your usage, we propose the following changes.



C

Lidl – Social Suggestions

Based on what other people like, 20% of our users use mostly the shortcut "Leaflets". 13% of users are using the following version of Lidl. Click to import this version.



D

C31

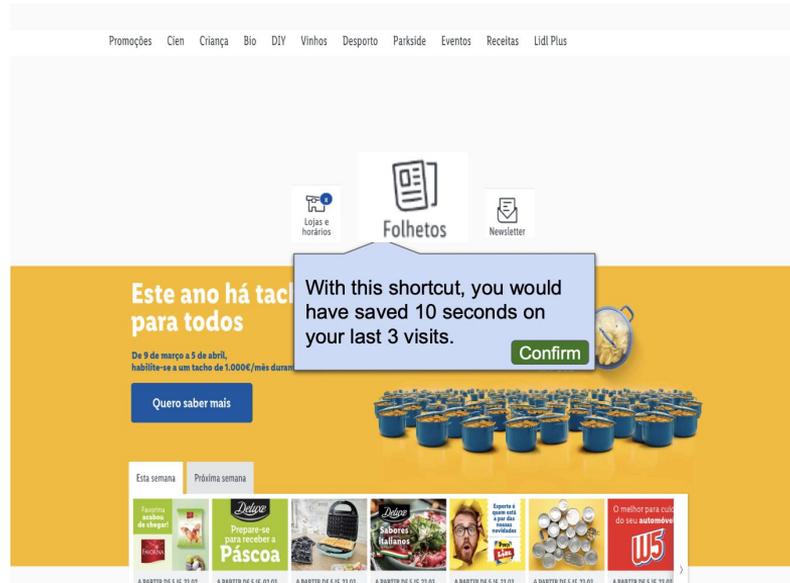
D36

Example vignettes from each of the four sets.

Stage 3: Methods

Lidl – Visual Suggestions

Based on your usage, we propose the following changes.



Visual Suggestions.

C31

Stage 3: Findings

- People can independently identify personalization opportunities but prefer visual personalization suggestions.
- Interaction data and time-savings estimates highlight the value of personalizing.
- Personalization suggestions can be trigger for other changes and play an educational role.

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Answering Our Research Questions

Exercising Democratic Control Over User Interfaces and the Role of Personalization (RQ1)

- Most people view UIs as rigid entities.
- They either adapt themselves to UIs, avoid them, or develop workarounds.
- This mental model shifts while discussing others' needs or analysing visual suggestions.
- Interest in personalization is high, but people need time to adapt to having those options.
- Personalizing is not something people expect to do frequently, but when they do, they want control over every possible detail.

Use of Existing Personalization Features and Users' Needs and Preferences (RQ2)

- High use of built-in features.
- Most people are either unaware of third-party options or avoid them due to uncertainty and privacy concerns.
- Personalization is not always about radical redesign.

Supporting Users in Taking Greater Control Over the Personalization Process (RQ3)

- UI democratization extends beyond unrestricted personalization.
- Empowerment arises when users can make informed, independent, and meaningful decisions about themselves and UIs.
- Key directions: allow for the unexpected; facilitate reflection, ideation, and execution.

The Design Space of End-user UI Personalization

The Design Space of End-user UI Personalization: Goal

Support the development of personalization mechanisms more aligned with people's needs and expectations.

The Design Space

Extent of Personalization	Magnitude of Change	Legibility of Changes	Data Agency	Malleability	Execution Assistance	Decision Support
Pre-defined	Subtle	Opaque	Data-Free	Rigid	Manual	Unsupported
Parameterized	Moderate	Noticeable	Closed	Reversible	Requested	Exploratory
Unrestricted	Transformative	Descriptive	Transparent	Malleable	Offered	Informative
		Rationalized	Negotiable	Transferable	Automatic	Recommendative
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The Design Space - GitUI

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Illustration of GitUI's personalization features.

The Design Space - User Preferences

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 User Preferences (based on the findings from our studies)

The Design Space - GitUI and User Preferences

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GitUI

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GitUI

User Preferences

Dialogue-Driven Personalization

Using conversational agents to reflect on data, and create and continuously refine personalization templates.

Conclusion

Contributions

- An in-depth study of personalization needs and preferences
- The concept of community-based personalization
- Design considerations for integrating interaction data with UI personalization
- A design space of end-user user interface personalization

Future Work

- From personalization to interface creation: AI-mediated interfaces
- UI recommender systems: pacing, language, and magnitude of change

Publications

Sérgio Alves, Carlos Duarte, Kyle Montague, Tiago Guerreiro. "Exploring the Role of Interaction Data to Empower End-User Decision-Making In UI Personalization" (CHI 26).

Sérgio Alves, Ricardo Costa, Kyle Montague, Tiago Guerreiro. "Citizen-Led Personalization of User Interfaces: Investigating How People Customize Interfaces for Themselves and Others" (CSCW 24).

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Democratizing User Interfaces

Sérgio Alves

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