Loki
technology & knowledge for interaction

Software Appropriation: Characterizing Tailoring Tasks and their Workflow(s)

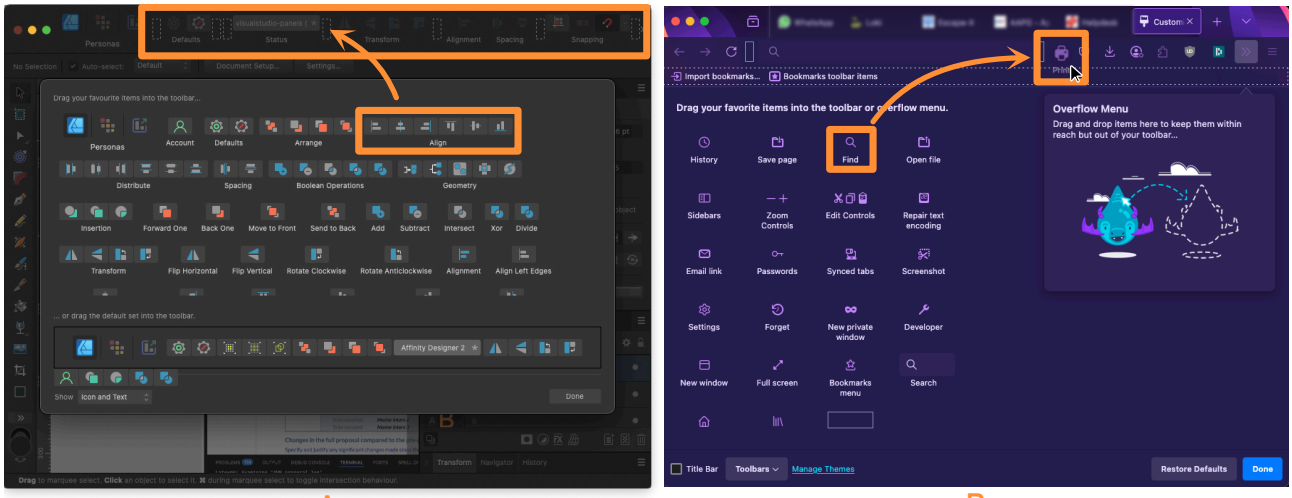
Team(s) Loki (Inria Centre of the University of Lille – CRIStAL laboratory)
Level Masters
Duration 15 months
Advisor(s) Bruno Fruchard, Mathieu Nancel **[Contact advisor(s)]**

This postdoc is in the context of the APPROPRIATE project funded by the ANR (ANR-25-CE33-5375).

Abstract

Interactive systems aim to support large audiences of end users to achieve stereotypical tasks. This approach limits their support for personal needs and preferences and forces end users to make significant efforts to learn and adapt to the systems' logic, and in the worst cases, to abandon them. This project focuses on facilitating the personalization and automation of interactive systems, such as changing the command layout in a graphical interface or setting email filters. We aim to (1) characterize types of tailoring tasks to identify their similarities and discrepancies, and (2) characterize their conceptual workflow(s) from the need to personalize a system, to actively tailor it, and test and experience the outcomes.

Context



A B

Figure 1: Software like Affinity Designer 2 (A) or Mozilla Firefox (B) enable customizing their main toolbar to expose commands: users can right-click the toolbar to open a window, then add or remove commands or widgets from the toolbar. This behavior is common to many native Mac OS X applications.

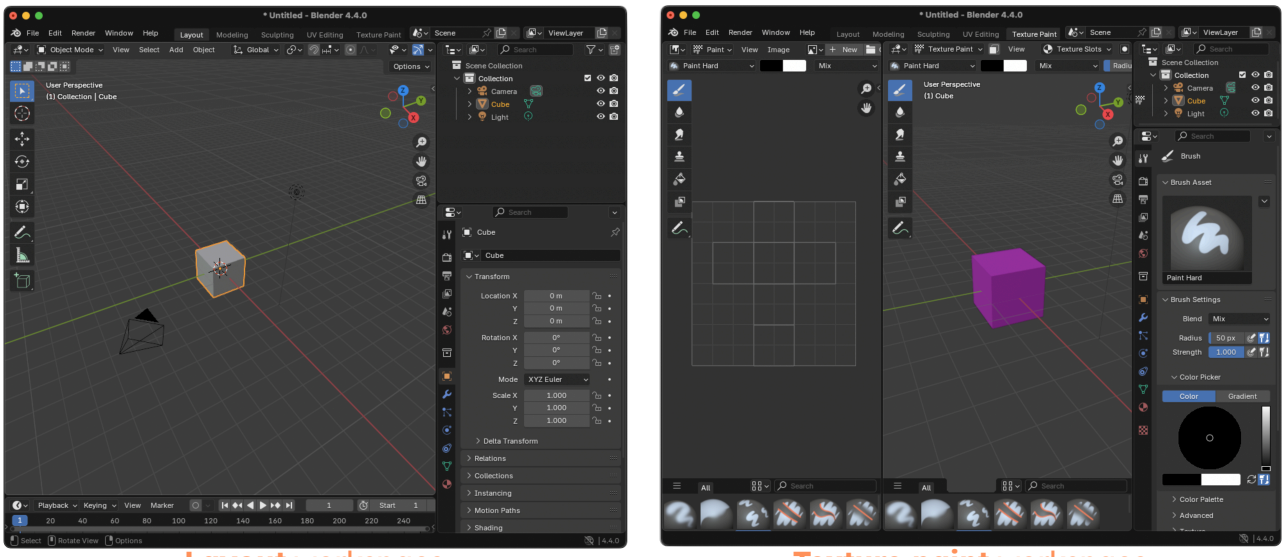


Figure 2: Two workspaces in Blender that support different tasks. Users can easily switch from one to the other by clicking options in the main toolbar. They can also drag-and-drop panels in new locations and save new workspaces.

Interactive software is often designed to support stereotypical tasks such as browsing the web, editing virtual documents, or reading and sending emails. Applications tend to rely on a one-size-fits-all strategy and fail to accommodate various use cases and preferences. As a compromise, they can facilitate customization or personalization of toolbars (Figure 1) or panels (Figure 2) to expose hidden commands or reduce cluttering to adapt the interface to their tasks. On a user point of view, these tasks can be perceived as the same appropriation of a virtual tool and requiring the same level of effort, both cognitive and time-related. We refer to them as *tailoring tasks* (sometimes referred to as "personalization" or "customization"), a concept discussed in the literature without clear definitions to date [1, 3]. We define them as "tasks performed by end-users to modify settings, appearances, and behaviors of an interactive system to better match their expectations or preferences".

Tailoring tasks can arguably take many shapes, from clicking a checkbox to set a default web browser, to changing command layouts of an application, to creating command macros, or coding plug-ins or extensions to integrate to their ecosystem. They can also have different goals and sometimes be necessary to using an application. They can relate to hedonic goals when changing a theme (e.g., font and text color in and IDE) to feel better when working with an application, to efficiency when creating macros or keyboard shortcuts to perform repetitive sequences of commands faster or when exposing and hiding commands to reduce cognitive load with bloated interfaces, to comfort when automating notification frequencies to lower interruption and overall irritation levels [5], or to accessibility when enabling someone to use an application (e.g., by increasing the size and contrast of textual information for visually impaired users). Their scope may target short-term goals such as using a bigger font once when connected on a specific display, or long-term effects such as creating text snippets for a programming language usable in all projects, contexts or environments.

Knowing what can be changed and how, identifying when to engage in tailoring tasks with varying degrees of complexity, and assessing how beneficial or detrimental the changes are to end-users remain major challenges in any context. This project thus sees them as a coherent set that can be characterized to identify their overall type, the stages of actions they imply, and the common challenges they are associated to.

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité
Inria
Université de Lille
CRIStAL
Centre de Recherche en Informatique, Signal et Automatique de Lille

Goals

We aim to **build theoretical foundations to identify and expose characteristics of tailoring tasks** to study more precisely their benefits and limitations. We particularly want to **(1) identify types of tailoring tasks and characterize them**, and **(2) characterize their stages to identify conceptual workflows**.

For the first goal, we want to distinguish different task types to assess their potential *duration*, their *challenges*, and their potential *impact* on the systems' structures (e.g., changing the behavior vs. changing the graphical layout). We propose to first survey the existing commercial tools and literature on end-user development [1] and software customization [2, 4] to identify a comprehensive list of approaches to tailoring. With a systematic review, we will produce a taxonomy of tailoring tasks exposing their significant characteristics (e.g., what do they affect, how long do they last).

For the second goal, we propose to build on the previously collected examples to characterize stages of tailoring tasks such as answering automatic suggestions from the system, navigating menus to find options, testing outcomes of actions, and applying them. We present tentative stages on Figure 5 with examples of tailoring tasks' representations. Using this methodology, we hope to identify conceptual workflows for tailoring tasks. To validate these workflows, we may interview knowledgeable end-users (e.g., HCI experts or power users of specific applications) and ask them about their practicality. We then expect results in the shape of a general framework detailing concrete stages and workflows used to tailoring software, exposing when and ideally how to support end-users in tailoring tasks.

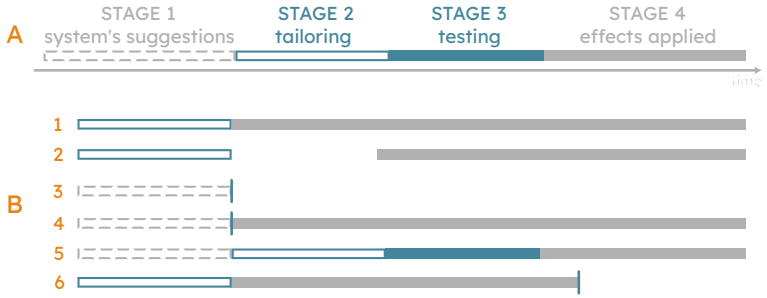


Figure 3: (A) Tentative primary stages of tailoring tasks and (B) examples of (1) a command added to a toolbar, (2) changing a setting that will take effect after restarting the software, (3) refusing and (4) accepting to set a default web browser, (5) testing and setting the audio and video input on video-conferencing tools, and (6) deleting a command macro. Colored boxes and lines indicate when users take actions.

Hosting Laboratory

The postdoctoral candidate will join the Inria centre of the University of Lille and be part of the LOKI research group, specialized in Human-Computer Interaction. It is affiliated with the CRIStAL laboratory (UMR 9189) and includes professors and assistant professors of the University of Lille, as well as Inria researchers. Lille is at the northern tip of France and its metropolitan area, situated at the crossroads of northern continental Europe, is the 5th biggest in France. Loki is a dynamic and multicultural team with members coming from different countries (Germany, Canada, China, Iran, France, etc.) and communicating daily in English.

Profile and Application

A successful candidate must hold or be about to obtain a PhD, ideally in Human-Computer Interaction or Computer Science, and show great interest in performing high quality research. We value overall creativity, independence, team spirit and communication skills. The candidate does not have to speak French, but a good level of technical and scientific English is required.

To apply, send your resume and a cover letter by email to Bruno Fruchard (bruno.fruchard@inria.fr) and Mathieu Nancel (mathieu.nancel@inria.fr) with "[Application] Software Appropriation: Characterizing Tailoring Tasks and their Workflow(s)" as object of the e-mail. In addition to what is generally expected, the cover letter should highlight what you find particularly interesting in this topic, why current solutions are limited, as well as describe your overall vision for this project. Ideally, it should also elaborate on why you are interested in working in academic research.

All applications are welcome, regardless of age, gender, social or ethnic origin, sexual orientation, or disability. For the integration of people with disabilities, we are working on possible adaptations of the positions to be filled - within the limits of the applicable rules for the safety of people: do not hesitate to contact us to tell us about your situation.

References

[1] B. R. Barricelli, F. Cassano, D. Fogli, and A. Piccinno. End-user development, end-user programming and end-user software engineering: A systematic mapping study. *Journal of Systems and Software*:101–137, 2019. DOI: 10.1016/j.jss.2018.11.041.

[2] W. E. Mackay. *Users and customizable software: A co-adaptive phenomenon*. PhD Thesis, Massachusetts Institute of Technology, 1990.

[3] A. MacLean, K. Carter, L. Lövstrand, and T. Moran. User-tailorable systems: pressing the issues with buttons. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '90, pages 175–182, Seattle, Washington, USA. Association for Computing Machinery, 1990. DOI: 10.1145/97243.97271.

[4] A. Mørch. Three Levels of End-User Tailoring: Customization, Integration, and Extension. In *Computers and Design in Context*. The MIT Press, Nov. 1997. DOI: 10.7551/mitpress/1966.003.0004.

[5] S. Ohly and L. Bastin. Effects of task interruptions caused by notifications from communication applications on strain and performance. *Journal of Occupational Health*, 65(1):e12408, June 2023. DOI: 10.1002/1348-9585.12408. eprint: https://academic.oup.com/joh/article-pdf/65/1/e12408/58563340/joh212408.pdf.