

RESEARCH PAPER

Investigating the Elaboration of User Journey Maps: Learning from a Study with Digital Tools

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Abstract. The user's interaction path with a software is essential for identifying aspects related to the user experience. Among the techniques available for this analysis, user journey mapping stands out, which provides a detailed view of the user's actions, as well as their thoughts and emotions throughout the interaction. However, the journey map is a complex artifact to elaborate due to the variety and different interpretations that can be had of its elements, making it essential to investigate aspects of its construction. This article presents a comparative study on the construction of digital user journey maps using two tools, JourneyEasyMap and Custellence. A controlled experiment involving 31 participants was conducted to investigate how different tool characteristics influence the effectiveness of journey map construction and users' acceptance of the tools. Among the findings, the structural characteristics of the tools emerged as key factors influencing both the ease and effectiveness of journey map creation. Also, lessons learned for the design of future User Journey Mapping tools were derived.

Keywords: Journey Map, User Experience, Tool, Interaction Design

Edited by: Saul Delabrida  | **Received:** 03 June 2026 • **Accepted:** 07 September 2026 • **Published:** 28 September 2026

1 Introduction

In software product design, it is essential to understand the trajectory that users take in certain interaction scenarios. Exploring these trajectories allows product design to focus on relevant aspects to provide a better user experience [Väänänen-Vainio-Mattila *et al.*, 2008]. According to Hassenzahl [2018], User eXperience (UX) is defined as the personal and subjective experience of individuals resulting from interaction with products. These experiences are influenced by perceptions, emotions, and preferences that emerge before, during, and after product use.

There are several ways to explore the user's trajectory with software. One technique is scenario description, which defines narratives that illustrate user interaction with the product through their actions, identifying problems and solutions [Rosson and Carroll, 2002]. The trajectory can also be studied through *use cases*, which detail the flow of user actions, from their intention to task completion and the results obtained [Malan and Bredemeyer, 2001]. The user trajectory can also be investigated through traditional techniques such as interviews, analysis of data collected in logs, among other techniques [Rogers *et al.*, 2023].

When investigating the user's trajectory with a product, elements such as user emotions and thoughts are relevant aspects that must be considered, as they significantly impact their product-related actions throughout the interaction [Huo *et al.*, 2023]. Furthermore, a detailed view of the trajectory is important to promote understanding about the user, identify problem points and improvements, and assist in decision-making. In this sense, the construction of User Journey Maps (UJMs) emerges as an important practice in user experience

design, allowing the designer to have a holistic view of user interaction with a product [Lemon and Verhoef, 2016].

A UJM is a technique that produces a visual representation of an interaction scenario through which a user goes when interacting with a product [Tueanrat *et al.*, 2021]. For the designer, this artifact enables a better understanding of the user's experiences, feelings, thoughts, and behaviors at different stages of interaction. They are generally represented in a graphic and textual structure that describes the journey stages from the user's perspective, identifying interactions, touchpoints, emotions, and difficulty points [Lallemand *et al.*, 2022; Tueanrat *et al.*, 2021]. In the literature, applications of UJMs are found in different areas, such as healthcare [Ly *et al.*, 2021; Maddox *et al.*, 2019], social service programs [Connell *et al.*, 2023], product design [Moretti *et al.*, 2022], among others. However, few studies have focused on evaluating the facilities and difficulties of developing UJMs.

This type of investigation is fundamental, as the UJM artifact is complex to elaborate. An artifact is composed of visual elements that carry various meanings and include the dynamics of user interaction [Haltom and Kamdar, 2026].

The objective of this article is to investigate factors that influence the construction of User Journey Maps through digital tools by comparing a purpose-built tool (JourneyEasyMap) and an established market tool *Custellence*¹ regarding effectiveness and user acceptance. Based on the results, we derive lessons learned for the design of future UJM tools.

¹Available at: <https://www.custellence.com/>. Accessed on 28 September 2026

The remainder of the work is organized as follows: Section 2 presents related work in the area of User Journey Mapping; Section 3 presents the fundamentals of UJM, as well as an analysis of UJM tools, which served as the basis for building the JEM tool; Section 4 presents the experimental study conducted to evaluate the use of JEM and Custellence tools; Section 5 presents the experiment results and Section 6 presents a discussion and the lessons learned from this experience.

2 Related Work

Several works explore different aspects of UJM construction, from defining terminologies and frameworks to applying UJMs in specific contexts. Følstad and Kvale [2018] and Tueanrat *et al.* [2021] point out that, despite growing interest in the topic, the literature presents a great diversity of methods, which hinders knowledge consolidation. They highlight the need for greater theoretical and methodological integration to improve the understanding of UJMs.

Nunes and Quaresma [2018] highlight the challenges involved in creating maps that accurately represent user interaction in different contexts. Still as a proposal to represent user interaction more accurately, Pumpurs [2022] proposes an automated method to extract information from user reviews. These extractions allow identifying relevant themes and categories about user interaction, facilitating qualitative analysis and the construction of UJMs with more detail. Alvarez *et al.* [2020] propose the combination of explicit data (i.e., obtained directly from user interactions) and implicit data (i.e., inferred from behaviors and attitudes) to build more complete maps.

Halbach *et al.* [2023] highlight the importance of considering inclusion and diversity in UJM construction, ensuring that the needs of all users are met across diverse areas. Regarding the application of UJMs in various areas, Samson *et al.* [2017], Endmann and Keßner [2016], Haltom and Kamdar [2026] and Benz *et al.* [2024] demonstrate the applicability of the technique in library services, healthcare, and different industrial sectors, evidencing the versatility of UJMs for understanding user experience.

Meanwhile, Lallemand *et al.* [2022] explore an alternative approach to UJM construction, using physical representations. By creating a tangible representation of the user journey, this approach provides a more immersive experience and facilitates the identification of nuances and details that may be lost in digital representations. The use of digital tools that support UJM construction has become popular, with studies such as Borycki *et al.* [2020] that explores the integration of drawing software, collaborative platforms, and data analysis tools in this practice.

The presented works focus mainly on techniques complementary to UJMs (Følstad and Kvale [2018]; Nunes and Quaresma [2018]; Pumpurs [2022]; Alvarez *et al.* [2020]; Lallemand *et al.* [2022]) and on the application of UJMs in other areas (Samson *et al.* [2017]; Endmann and Keßner [2016]; Haltom and Kamdar [2026]; Benz *et al.* [2024]). However, the literature lacks studies that analyze the use of the UJM technique to explore the facilities and difficulties of constructing its artifact in digital tools. In this sense, this

work was motivated by this gap in studies, since the elaboration of the UJM artifact is complex due to the various elements of different nature that compose it.

Recent research conducted within the Brazilian HCI community has also explored different approaches to supporting UX activities. Although these studies do not specifically focus on User Journey Mapping, they provide relevant insights into how interactive systems can facilitate UX-related tasks and improve the quality of design artifacts.

Konopatzki Filho *et al.* [2022] conducted a systematic mapping study on usability and user experience evaluation methods for multi-touch systems. The authors identified the most frequently adopted evaluation techniques and discussed how different approaches can support the assessment of interactive systems. Their work contributes to understanding how UX-related activities can be systematically supported through established evaluation methods.

Meanwhile, Oliveira *et al.* [2024] reported the redesign of USINN Modeler, a tool created to support usability inspection activities. By addressing usability and accessibility issues identified in the original version, the authors demonstrated how interface improvements can increase the effectiveness and accessibility of tools intended to support UX practices.

Finally, Mafra *et al.* [2024] proposed a set of Usability-UX technologies to support the design and evaluation of text-based chatbots. Their work highlights the importance of providing methodological and technological support for practitioners performing UX-related activities and reinforces the role of interactive tools in improving design processes.

Collectively, these three studies demonstrate the growing interest of the Brazilian HCI community in developing methods, technologies, and tools that support UX activities. Our work complements these efforts by investigating how digital tools can support the construction of User Journey Maps and by identifying design characteristics that influence effectiveness and user acceptance during journey mapping activities. Furthermore, the investigation of digital support for User Journey Mapping contributes to the GrandIHC-BR 2025–2035 agenda by providing evidence on how interactive technologies can support UX methods and design activities.

3 User Journey Map: definitions and tools

According to Borycki *et al.* [2020], the construction of UJMs using digital tools has become popular. The elaboration of UJMs can be performed using general-purpose tools such as Miro² or tools specialized in UJM construction such as *Custellence*. With the objective of better understanding the use of UJM digital tools, this study: (i) investigated the fundamentals and elements that compose a UJM (subsection 3.1); (ii) analyzed digital tools for UJM elaboration and their main characteristics (subsection 3.2); and finally, considering the two previous investigations (i.e., i and ii), (iii) developed a tool called JourneyEasyMap, i.e., JEM (subsection 3.3). The decision to develop such a tool was due to observing in investigations (i) and (ii) some difficulties in using ex-

²Available at: <https://miro.com/>. Accessed on 26 September 2026.

isting tools.

3.1 User Journey Map Fundamentals

The literature defines the UJM artifact as a composition of seven main elements [Lallemand *et al.*, 2022; Tueanrat *et al.*, 2021]: interaction scenario, actor, journey phases, user actions, emotions, thoughts, and touchpoints.

The interaction scenario describes the situation addressed by the UJM, being associated with the goals, needs, and expectations of a specific actor [Yoo and Pan, 2014]. The actor or persona is a fictional representation of a potential user who will interact with the product or service for whom the journey is designed [Nunes and Quaresma, 2018]. The scenario and persona elements are not represented in the map, as they are considered inputs for its construction. An example of scenario and persona is presented in Figure 1. The remaining elements are illustrated in Figure 2.

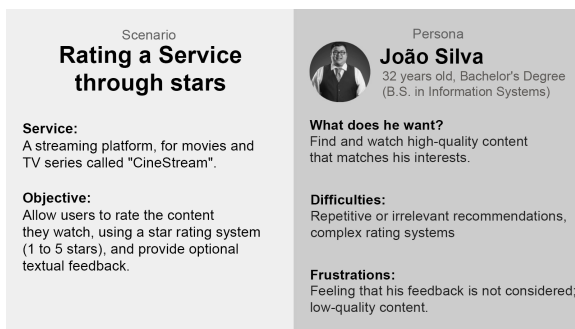


Figure 1. Example of Scenario and Persona.

According to Lallemand *et al.* [2022], the journey phases element (first row in blue in Figure 2) represents the timeline of a UJM, following the chronology of user actions in a specific scenario. User actions (illustrated in Figure 2 in the second row, in orange) is an element that describes the actual behaviors and steps performed by users in the evaluated scenario. The emotions element (third row of Figure 2 in yellow) provides a view of the user's emotional experience that occurs throughout the journey; and thoughts (fourth row of Figure 2, in purple) correspond to users' motivations, questions, and information needs at different stages of the journey. Finally, Rosenbaum *et al.* [2017] define that a UJM must present touchpoints (represented in Figure 2 in pink, in the fifth row), an element that represents the means by which the actor in the map actually interacts with the product or service.

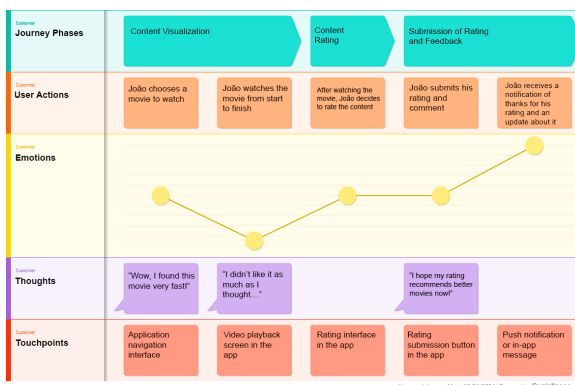


Figure 2. Example of UJM for the scenario "Rating a Service through stars".

3.2 Digital tools for UJM construction

Considering that there has been growth in the use of digital tools in UJM elaboration, an analysis was conducted of three tools (Custellence, Miro, and Smaply³) that are used in the software development market Studio [2025], using the Eliminate-Reduce-Raise-Create (ERRC) matrix technique Kim and Mauborgne [2005] and considering the seven fundamental elements of a UJM artifact (see subsection 3.1). The ERRC matrix helps identify necessary characteristics that are absent (Create), aspects that can be improved (Raise), elements that require less attention (Reduce), and items to be eliminated (Eliminate). The matrix related to the Custellence tool is presented in Figure 3, as an example extracted from the complete set of matrices⁴.

Increase - Many elements of the <i>site</i> hidden behind the hamburger menu - Allow collaboration between users in the free version of the app	Add - Add a way to use <i>templates</i> obtained from the internet - Reuse maps created by other users - Add more instructions to help users navigate the tools and the app
Reduce Number of features blocked by the paid version	Eliminate - Remove the action of archiving elements instead of just deleting them - Update the user interface, which is very outdated compared to modern interfaces

Figure 3. Eliminate-Reduce-Raise-Create Matrix developed for the Custellence tool.

The matrices allowed identifying potential improvements in the analyzed tools for UJM construction. A need was observed for cleaner interfaces, with fewer visual elements per screen, aiming to reduce cognitive overload during map editing. Additionally, it was found that navigation can be improved through more visible and labeled side menus, facilitating access to main functionalities. The absence of a feature that allows revisiting and editing previous maps with ease was also identified, which compromises the continuity of the user's work. Among the functionalities considered excessive or unnecessary, the following stand out: the presence of multiple redundant options for customizing visual elements and excessive simultaneous panels on the screen. Finally, it is emphasized that the tool being free is an aspect valued by users, as it expands access to the resource by different profiles, including teams with limited budgets.

3.3 JourneyEasyMap

Considering the investigations presented in subsections 3.1 and 3.2, the JourneyEasyMap (JEM) tool⁵ was conceived. JEM is a specific tool for UJM construction, developed in a *web* environment. On the front-end, the React.js framework⁶ was used in conjunction with Vite⁷, in addition to the React Konva library⁸. The back-end was implemented

³Available at: <https://www.smaply.com/>. Accessed on 28 September 2026.

⁴Available at: https://drive.google.com/drive/folders/1HCzulyXRJr9-BXCW2620mVcQLyloJtNJ?usp=drive_link. Accessed on 28 September 2026.

⁵Available at: <https://journeyeasymap.vercel.app/>. Accessed on 28 Sept. 2026.

⁶Available at: <https://reactjs.org>. Accessed on 28 Sept. 2026

⁷Available at: <https://vite.dev>. Accessed on 28 Sept. 2026.

⁸Available at: <https://konvajs.org/docs/react>. Accessed on 28 Sept. 2026

in JavaScript and runs on the Node.js environment⁹, using the Express framework¹⁰. For data management, a MySQL relational database¹¹ was chosen.

During the development of JEM, Claude and ChatGPT were used as assistive tools for drafting and reviewing code fragments. The authors reviewed, tested, and validated all suggestions before incorporation and remain solely responsible for the software and the reported results.

Figure 4 illustrates the view of a UJM created using JEM. Map construction is performed through *cards* that can be added to each row, have their size adjusted, and their textual content modified. Each *card* has a color aligned with the row to which it belongs. A row represents, for each element, the interaction path over time (i.e., in the "Journey Phases" row, there is the "Menu Navigation" phase before the "Order Customization" phase). Each *card* has an icon in the upper left corner that identifies its function in the map (i.e., in the Thoughts row, the icon is a small thought bubble). In this row, *cards* are defined in yellow, and it is possible to write the thought in question inside the card. It is also possible to remove the thought ('x' icon, in the upper right corner)). The emotions row uses *emojis* to represent user emotions, varying between three intensity levels: high (i.e., very satisfied), medium (i.e., moderately satisfied), and low (i.e., slightly satisfied), with a continuous line running through all of them. There are various options to represent emotions due to the wide variety of *emojis*. The JEM tool has a fixed map structure (i.e., predefined elements in each row), with a simple and objective interface, seeking to facilitate UJM construction. JEM also allows the user to save and access multiple maps, these being some of the characteristics for UJM tools described in section 3.2. Considering JEM, a study was conducted as described in the following section.

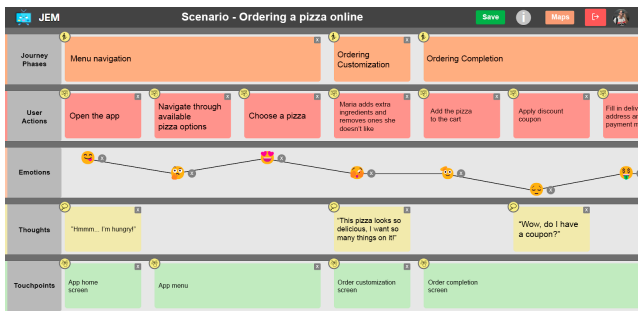


Figure 4. Example of UJM created in the JEM tool for the scenario "Ordering a pizza online".

4 Experimental Study

The experimental study design followed the guidelines from [Lazar et al., 2017] on defining study variables, formulating hypotheses, sample type (i.e., paired or unpaired), elaborating the study script, and defining statistical methods. The study aimed to evaluate the construction of UJMs using digital tools. JEM was developed specifically for this study from the structural characteristics identified in the preliminary analysis of existing UJM tools.

Custellence was selected as a specialized journey-mapping tool, among different general-purpose tools such as Miro, widely adopted in UX practice. Miro was not selected for the experiment because it is a general-purpose visual collaboration platform that supports a broad range of activities beyond journey mapping [Soman et al., 2025]. In contrast, Custellence was chosen because it is specifically designed for creating and managing UJM. It provides native support for core journey mapping elements and workflows, making it a suitable benchmark for evaluating digital support for UJM construction.

Therefore, comparing JourneyEasyMap with Custellence allowed a more controlled evaluation focused on the support provided for journey map construction itself, reducing the influence of features associated with generic collaboration environments and enabling a more direct comparison between tools designed for the same purpose.

For the study, the following sub-objectives were defined: (i) evaluate the effectiveness of creating UJMs by comparing the JEM and Custellence tools; and (ii) verify JEM's acceptance based on the dimensions of Ease of Use, Perceived Usefulness, and Intention to Use, in relation to the Custellence tool. The following subsections present the planning, execution, analysis, ethical aspects, threats to validity, and results of the experiment.

4.1 Planning

The study involved 31 undergraduate Computer Science students from the Federal University of Alfenas (UNIFAL-MG). Students were invited in person to participate in the study through a presentation conducted in a course unrelated to the elective UX discipline associated with this research. During the invitation, participants were informed about the study objectives, the activities to be performed, including the creation and evaluation of User Journey Maps, and the collection of feedback regarding the tools used. They were also informed about the voluntary nature of participation, data confidentiality, anonymity, secure data storage, and their right to access the research data and results at any time. All these aspects were described in the Informed Consent Form (ICF), which also stated that the collected data would be used exclusively for research purposes.

The sample was composed primarily of novice users with limited prior experience in User Journey Mapping, which was considered appropriate given the objective of evaluating how different tool characteristics support map construction. Inclusion criteria include: to be enrolled in the university's Computer Science program—specifically in the course where the presentation related to the study was given - Object-Oriented Programming course; voluntarily agree to participate by signing the Informed Consent Form (ICF). Exclusion criteria include: did not complete all experimental activities; failed to submit the User Journey Map artifact produced during the experiment; presented results identified as statistical outliers during data analysis (see subsection 4.3). Considering this last exclusion criterion, only one sample element was excluded.

The sample size is consistent with previous studies in the HCI and UX literature. For example, Díaz-Oreiro et al. [2021] reported that studies employing standardized

⁹Available at: <https://nodejs.org>. Accessed on 28 Sept. 2026.

¹⁰Available at: <https://expressjs.com>. Access: 28 Sept. 2026.

¹¹Available at: <https://www.mysql.com>. Access: 28 Sept. 2026.

UX evaluation questionnaires commonly involve around 20 participants, while journal publications present a median of approximately 30 participants. Therefore, the sample of 31 participants adopted in this study is aligned with participant numbers frequently reported in empirical UX research.

Considering that the objective was to compare two tools, it was decided to divide participants into two independent groups, i.e., unpaired sample. One group used the JEM tool (N=15), and the other Custellence (N=16), the latter being the control group. To achieve better balance among participants, before the experiment began, the researchers applied a profile questionnaire⁴ to assess the participants' general level of experience and familiarity with UJMs. The questionnaire was made available online to participants using the Google Forms tool.

Table 1 presents an overview of the participants' profile, where it is observed that the majority of participants were novices regarding professional experience. Regarding prior knowledge about UJMs, only 5 participants reported not knowing about them, and a total of 16 indicated having acquired knowledge through an elective course in the UX area offered by the program. The remaining 10 stated they were familiar with UJMs before taking the course; others indicated familiarity without having taken it. When asked about which tools for UJMs they had already used, they mentioned: Custellence, Canva¹², Figma¹³, Miro, Lucidchart¹⁴, and Smaply. Canva and Figma stand out as the most popular tools (25 and 21 participants, respectively), while Smaply and Custellence were the least used (1 and 3 participants, respectively).

Table 1. Heat map relating time in the program and professional experience.

Time in the course	Without professional experience	3-6 months	6-9 months	9-12 months
One year or less	16	1	0	0
Two years	6	0	1	1
Three years	0	1	1	0
Four years or more	2	1	0	1

To guide the study and considering its nature of comparison between tools, the following research questions (RQ) were defined: **(RQ1)** Does the JEM tool assist in greater effectiveness in executing the task of creating a UJM when compared to the Custellence tool?; and **(RQ2)** Do participants show greater acceptance of the JEM tool compared to the Custellence tool? To answer **(RQ1)**, an analysis of the quality of UJM artifacts produced by participants was performed (described in detail in subsection 4.3 and the results in subsection 5.1). With the objective of collecting tool acceptance and answering **(RQ2)**, a questionnaire based on the Technology Acceptance Model (TAM, in its version 3) [Venkatesh and Bala, 2008]⁴ was adopted. Table 2 presents the statements of the applied TAM3 model. The *Ease of Use* dimension evaluates whether user interaction with the tool is perceived positively; *Perceived Usefulness* evaluates the tool's impact on task execution, verifying

whether the tool is useful for the user in constructing a UJM; and the *Intention to Use* dimension seeks to understand the probability of the user using the tool in the future. Responses to TAM3 statements were provided on a 7-point Likert scale, ranging from strongly agree to strongly disagree and including neutral.

Table 2. TAM3 model dimensions and respective statements.

Dimension	ID	Statement
Ease of Use	F1	My interaction with the tool is clear and understandable.
	F2	Interacting with the tool does not require much mental effort.
	F3	I find the tool easy to use.
	F4	I find it easy to get the tool to do what I want it to do.
Perceived Usefulness	U1	Using the tool improves my performance in task execution.
	U2	Using the tool to execute the task increases my productivity.
	U3	Using the tool improves my effectiveness in task execution.
	U4	I find the tool useful for task execution.
Intention to Use	I1	Assuming I have access to the tool, I intend to use it.
	I2	Given that I have access to the tool, I predict I would use it.
	I3	I plan to use the tool in the coming months.

For each RQ, a set of hypotheses was defined. For **(RQ1)**, the following hypotheses were formulated, with H^0 being the null hypothesis and H^A the alternative hypothesis:

- H^0 : There is no significant difference in the effectiveness of executing the task of creating a UJM using JEM compared to the Custellence tool;
- H^A : There is a significant difference in the effectiveness of executing the task of creating a UJM using JEM compared to the Custellence tool.

For **(RQ2)**, hypotheses were defined based on the dimensions of the adopted TAM3 model as presented in Table 3, with H^0 being null hypotheses and H^A alternative hypotheses.

Table 3. Hypotheses for TAM3 Dimensions.

TAM3 Dimension	Hypotheses
Ease of Use	H^0 : There is no significant difference in the Ease of Use of the JEM tool compared to the Custellence tool; H^A : There is a significant difference in the Ease of Use of the JEM tool compared to the Custellence tool.
Perceived Usefulness	H^0 : There is no significant difference in the Perceived Usefulness of the JEM tool compared to the Custellence tool; H^A : There is a significant difference in the Perceived Usefulness of the JEM tool compared to the Custellence tool.
Intention to Use	H^0 : There is no significant difference in the Intention to Use of the JEM tool compared to the Custellence tool; H^A : There is a significant difference in the Intention to Use of the JEM tool compared to the Custellence tool.

Considering the defined hypotheses, the UJM construction tools (Custellence and JEM), the browser used to run the tools (Firefox 127.0.2), and the fictional persona and scenario used for map construction (details in section 4.2) were established as independent variables. It is worth noting that the study factor is the UJM creation tool and that two treatments were applied, i.e., Custellence and JEM tools. As dependent variables, for conducting the hypothesis test of **(RQ1)**, *effectiveness* was defined (details about the calculation in section 4.3), and for the tests of **(RQ2)**, the *acceptance* of the tools, calculated from responses to TAM questions.

4.2 Execution

After completing the profile questionnaire and agreeing to the Informed Consent Form (ICF)⁴, the 31 participants were divided into two groups, each using one tool (JEM and Custellence). The study was conducted over two days. On the first day, the study's objective was recalled and a theoretical presentation of approximately one hour was given, explaining the basic concepts of a UJM to make participants'

¹²Available at: <https://www.canva.com/>. Access: 28 Sept. 2026.

¹³Available at: <https://www.figma.com/>. Access: 28 Sept. 2026.

¹⁴Available at: <https://www.lucidchart.com/>. Access: 28 Sept. 2026.

knowledge homogeneous. The introduction covered the concept of *persona*, scenario identification, UJM structure and planning. Participants were informed that in the next stage they would be randomly organized into two groups and that each group would be allocated to a separate laboratory.

On the second day, participants constructed UJMs using the respective tools assigned to each group — JEM group (N=15) and Custellence group (N=16). As a warm-up, a brief presentation of the JEM and Custellence tools was conducted. Still in the warm-up phase, participants created UJMs based on a fictional scenario: "Service Rating" (as shown in Figure 1). Following this, the experiment began and participants created UJMs based on another scenario, which would be evaluated: "Ordering a Pizza through a Delivery App". The provided scenario included the specific service and defined objectives, as well as a detailed persona, both serving as a starting point for map construction, as shown in Figure 5. The experiment, on its second day, lasted one and a half hours.

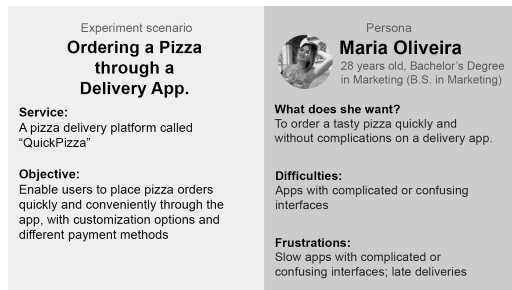


Figure 5. Scenario and persona provided in the experiment.

After completing the map creation, participants submitted their maps through the Google Forms tool. After this, participants answered and submitted a questionnaire based on TAM3, made available online, also through the Google Forms tool.

4.3 Analysis

In total, 30 of the 31 recorded responses were considered for statistical tests. One response was discarded as it was considered an *outlier*, since, for the *outlier*, the sum of corrected map scores (i.e., Total Score equal to 3.5) differs significantly from the others observed (i.e., Total Score between 7.5 and 9.5). These values can be seen in Table 6, which represents the final scores extracted from the map correction analysis artifact⁴. As a form of analysis, procedures and methods similar to those used in the work of [Zaina et al., 2022] were adopted.

Considering (RQ1), the dependent variable *effectiveness* was defined. The effectiveness of UJM construction using the tools was analyzed through the quality of UJMs based on five Analysis Criteria (AC). These criteria were defined from the elements considered fundamental to compose a UJM (see section 3.1): Journey Phases (AC-1), User Actions (AC-2), Emotions (AC-3), Thoughts (AC-4), and Touchpoints (AC-5). The scenario and *persona* were excluded from the criteria as they were provided to participants at the beginning of the experiment for UJM construction. Inspections were conducted on the UJMs produced by the 30 participants, based on the ACs. First, each researcher

independently evaluated a group of maps (Custellence and JEM). In the next stage, cross-review was performed: each analyzed their colleague's group of UJMs without access to previous evaluations. Finally, the researchers met to resolve discrepancies and define consensus scores. For each AC, the researchers assigned a value that identified whether participants had used the elements correctly or not according to the following scoring: Correctly Applied (CA) – 2 points; Partially Correctly Applied (PA) – 1.5 points; Incorrectly Applied (IA) – 1 point; and Not Applied (NA) – 0 points. Since each evaluated criterion had a scale from 0 to 2 points, the sum of these scores generated a *Total Score*, independent variable, for each map ranging from 0 to 10.

For (RQ2), responses to the TAM3 questionnaire were analyzed, with the dependent variable *acceptance* being defined. The acceptance of each tool was calculated based on satisfaction levels for each question, exploring the statements of the dimensions defined in Table 2. A seven-point Likert scale was used: strongly agree (SA), moderately agree (MA), partially agree (PA), strongly disagree (SD), moderately disagree (MD), and partially disagree (PD), in addition to a neutral value (N), where the participant neither agrees nor disagrees. The analysis considered the degrees of agreement (Agr) and disagreement (Dis), calculated by Formulas 1 and 2 (Table 4). Based on the results of degrees of agreement (Agr) and disagreement (Dis), the average Degree of Agreement of a Question (DAQ) was calculated, according to Wilder Wilder [1978], for each dimension, in order to determine the Degree of Acceptance Factor (DAF) in each analyzed dimension, according to Formulas 3 and 4 (Table 4). From the DAQ and DAF data, independent variables, the data are interpreted according to the table proposed by Wilder (Table 5).

Table 4. Calculation of Agreement and Disagreement.

Definition	Formula
Agreement	$\text{Agr} = \frac{\text{SA} + \text{MA} + \text{PA} + \frac{\text{N}}{2}}{2} \quad (1)$
Disagreement	$\text{Dis} = \frac{\text{SD} + \text{MD} + \text{PD} + \frac{\text{N}}{2}}{2} \quad (2)$
Degree of Agr. of a Question	$\text{DAQ} = 100 - \left(\frac{100 \cdot \text{Agr}}{\text{Dis} + 1} \right) \quad (3)$
Degree of Acceptance Factor	$\text{DAF} = \sum \frac{\text{DAQ}}{n} \quad (4)$

Table 5. Interpretation of DAQ and DAF values [Wilder, 1978].

Degree of agreement/disagreement value	Interpretation
≥ 90	Strong agreement
80 to 89,99	Significant agreement
70 to 79,99	Medium agreement
60 to 69,99	Low agreement
50 to 59,99	Insignificant agreement
40 to 49,99	Insignificant disagreement
30 to 39,99	Low disagreement
20 to 29,99	Medium disagreement
10 to 19,99	Significant disagreement
$\leq 9,99$	Strong disagreement

4.4 Ethical Aspects

The experimental study protocol was approved by the Research Ethics Committee (REC) of Federal University

of Alfenas⁴, following the guidelines of Resolution No. 510/2016 of the *Brazilian National Health Council*¹⁵, which regulates research involving human participants in the social and human sciences. The following reports the ethical procedures followed during the study.

As mentioned in subsection 4.1, the study involved 31 undergraduate Computer Science students from the Federal University of Alfenas (UNIFAL-MG). Students were invited in person to participate in the study. A presentation about the study objectives was made in a class of a discipline different from the elective course in the UX area, whose instructor is a partner in this work. In the presentation, invitees were informed that during the study they would create UJMs using specific tools for this purpose, and that subsequently these artifacts would be inspected with the objective of analyzing their correctness. It was also informed that feedback would be collected on the use of the adopted tool. In addition to being informed and assured of everyone's anonymity throughout the process, invitees were informed that the data would be stored securely, with access permitted only to the researchers. Invitees were made aware that they would have access at any time to the research data and results, should they wish. Such information was described in the ICF, which also informed that the collected data would be used exclusively for research.

To voluntarily attest participation, before conducting the study, participants who voluntarily accepted to participate completed and signed the Informed Consent Form (ICF), made available through the Google Forms tool. They were then informed about the location and date of the study.

The study was conducted in two laboratories that participants usually used for their didactic activities. The laboratories had an adequate number of computers for the participants, and the necessary software was installed beforehand so that everyone had access to the same configurations for the study. To mitigate participant fatigue and stress, it was decided to conduct the study over two days, first conducting the theoretical presentation about UJMs and involved concepts (duration of approximately one hour), and on the second day conducting the study effectively (duration one and a half hours).

Regarding the non-obligation to participate or continue participating in the experiment, this information was contained in the ICF and in the presentation where the participant was invited. Care was taken so that the participant would not feel pressured or influenced, so that the subject of UJMs was not related to the discipline taught by the professor who made the invitation to the study. It is worth noting that there was no reward related to the volunteers' participation and the disciplines they were taking.

4.5 Threats to Validity

The recommendations of Wohlin *et al.* [2012] were considered for discussion of four threats to validity (i.e., conclusion, construct, internal, and external).

The UJM analysis was conducted by two different experienced researchers, individually and cross-checked (i.e., each researcher analyzed the UJMs of both groups independently, meeting afterward to resolve discrepancies and define

consensus scores), allowing greater reliability in the *conclusions* of the UJM effectiveness analysis results. Questionnaires regarding tool acceptance were also examined to draw further conclusions about our study. To mitigate *construct* problems, the same script was followed for creating maps. The same artifacts were used (i.e., the interaction scenario and persona provided in the warm-up session and in the experiment session), as support for all participants to construct the maps. A warm-up session was also conducted, providing concepts about journey maps to participants. This activity helped mitigate the impact of participants' limited knowledge about journey maps. The JEM and Custellence tools adhere to the purpose of using the provided scenario and persona to construct UJMs. To mitigate fatigue and *internal* validity threats, a short warm-up session of no more than 1 hour was conducted. The experiment session also lasted no more than 1.5 hours.

Regarding *external* validity, study participants were students who were mostly novices regarding professional experience, in addition to the vast majority not knowing the Custellence tool, and none of them knowing the JEM tool, which reduces bias. However, although the use of a relatively homogeneous group helped reduce variability associated with different levels of expertise, it may limit the generalizability of the findings to professional settings. Experienced UX practitioners often work with more complex projects and may have different expectations regarding flexibility, customization, and collaboration features. Therefore, the results should be interpreted primarily in the context of novice users. Future studies involving UX professionals are needed to investigate whether the observed results remain consistent across different levels of expertise and real-world project scenarios.

Another factor that should be considered is the potential influence of the novelty effect. Since participants had no previous experience with either evaluated tool, their perceptions of ease of use and usefulness were based on a first-contact interaction. Initial impressions may differ from perceptions developed after prolonged use, particularly in tools that offer a larger set of functionalities and require a longer learning period. Therefore, the reported acceptance results should be interpreted within the context of short-term exposure to the evaluated technologies.

The duration of the experimental sessions also represents a limitation. Participants interacted with the tools during a relatively short period and performed a single journey mapping activity. As a result, the study primarily captures initial experiences rather than long-term usage patterns. Features that require greater familiarity or become beneficial during more complex projects may not have been fully explored within the experimental timeframe. Longitudinal studies could provide a deeper understanding of how perceptions and performance evolve over extended use.

Another limitation concerns the fact that JourneyEasyMap was developed by members of the research team. Although the study followed a predefined experimental protocol, employed objective evaluation criteria, and used independent statistical analyses, the possibility of unintended bias cannot be completely ruled out. Knowledge acquired during the design and development of JEM

¹⁵ Available at: <https://www.gov.br/conselho-nacional-de-saude/pt-br/>. Access: 28 Sept. 2026.

may have influenced decisions regarding the experimental design, task definition, or interpretation of the results. To mitigate this threat, both tools were evaluated using the same procedures, tasks, and assessment criteria. Nevertheless, future replications conducted by independent researchers and involving additional journey mapping tools would strengthen the external credibility of the findings.

5 Results

5.1 Effectiveness in UJM creation (RQ1)

Table 6 presents the results on UJM construction after artifact inspection as described in subsection 4.3 (i.e., RQ1). Each participant was individually identified by an identifier (ID). It is observed that the results presented for the two tools, JEM and Custellence (Table 6), are quite similar, with the average Total Score of the group that used JEM being 0.63 points higher than the Custellence group, making it possible to affirm that, on average, the UJMs produced in the JEM group had slightly better results.

Table 6. Total Score of maps for JEM and Custellence groups.

JEM							Custellence						
ID	AC-1	AC-2	AC-3	AC-4	AC-5	Score	ID	AC-1	AC-2	AC-3	AC-4	AC-5	Score
1	IA	PA	CA	IA	PA	7.0	16	PA	PA	PA	CA	CA	8.5
2	PA	PA	CA	CA	PA	8.5	17	PA	CA	PA	CA	CA	9.0
3	CA	CA	CA	CA	PA	9.5	18	PA	PA	CA	CA	PA	8.5
4	CA	CA	PA	CA	PA	9.0	19	CA	PA	CA	PA	PA	8.5
5	IA	PA	CA	CA	PA	8.0	20	IA	CA	PA	CA	PA	8.0
6	CA	CA	CA	CA	PA	9.5	21	PA	CA	CA	CA	CA	9.5
7	CA	CA	PA	CA	CA	9.5	22	IA	PA	PA	CA	PA	7.5
8	CA	PA	CA	CA	CA	9.5	23	PA	PA	PA	CA	PA	8.0
9	CA	CA	CA	CA	PA	9.5	24	PA	PA	CA	IA	PA	7.5
10	PA	CA	CA	CA	CA	9.5	25	IA	PA	CA	PA	CA	8.0
11	PA	PA	CA	CA	PA	8.0	26	CA	CA	CA	CA	PA	9.0
12	PA	CA	PA	PA	CA	8.5	27	PA	CA	PA	PA	CA	8.5
13	CA	CA	CA	IA	CA	9.0	28	PA	CA	CA	CA	PA	9.0
14	PA	PA	CA	PA	CA	8.5	29	PA	PA	CA	CA	PA	8.5
15	PA	PA	CA	PA	IA	7.5	30	CA	PA	PA	CA	PA	8.5
Mean (μ)						8.73	Mean (μ)						8.10
Standard deviation (σ)						0.82	Standard deviation (σ)						1.39

With the objective of comparing the *effectiveness* of the tools in creating UJMs, the data presented in Table 6 were statistically analyzed⁴. In order to evaluate the normality of the distributions obtained from the *Total Score* in each map, the Shapiro-Wilk test [Sirqueira et al., 2020] was applied, with a significance level of 0.1, as it is a small sample. The test showed (see Table 7) that the p-value of the Custellence group indicates data normality (i.e., $p = 0.37 > 0.1$), while the JEM group presents $p = 0.025$, a value that suggests a non-normal distribution of the data.

Given this, to compare the medians of the ACs between groups, the non-parametric Wilcoxon test (Table 8) was chosen due to its robustness against violation of normality [van den Brink and van den Brink, 1989].

Table 7. Shapiro-Wilk Test.

Group	W	p
JEM	0.861	0.025
Custellence	0.936	0.370

Note. $p < 0.1$ (significance level), the null hypothesis is rejected, indicating evidence that the data do not follow a normal distribution.

According to the results of the Wilcoxon test (see Table 8), no significant differences were found between groups in questions related to User Actions, Emotions, Thoughts, and Touchpoints. However, the question regarding Journey Phases presented a p-value below 0.1 ($p = 0.052$), indicating

Table 8. Wilcoxon Test.

Evaluated Criterion	W	p
AC-1 (Journey Phases)	145.5	0.052
AC-2 (User Actions)	116.0	0.597
AC-3 (Emotions)	122.0	0.382
AC-4 (Thoughts)	98.5	0.748
AC-5 (Touchpoints)	105.0	1.000

Note. $p < 0.1$ (significance level), the null hypothesis is rejected, indicating a statistically significant difference.

a statistically significant difference between groups, confirming the alternative hypothesis for RQ1 that there is a significant difference in the effectiveness of executing the task of creating a UJM using JEM compared to the Custellence tool.

5.2 Tool acceptance (RQ2)

Table 9 presents the results of the analysis of questionnaires related to tool acceptance according to the TAM3 model⁴, as described in section 4.3 (i.e., RQ2). The obtained data were organized and analyzed from a grouping perspective. The questions were classified according to the dimensions *Ease of Use* (F), *Perceived Usefulness* (U), and *Intention to Use* (I), numbered in ascending order, following the organization presented in Table 2. Based on the data in Table 9, it is observed that the collected agreement and disagreement values are quite similar.

As was done for RQ1 hypotheses, the Shapiro-Wilk test was used (see Table 10) to verify the normality of distributions. The normality test revealed that the *Ease of Use* dimension presents normal distribution, while the *Perceived Usefulness* and *Intention to Use* dimensions present deviation from normality. Considering this difference in distributions, it was decided to apply the Student's t-test Mishra et al. [2019] to compare the means of the *Ease of Use* dimension. The Wilcoxon test was performed to compare the medians of the other dimensions.

Table 9. Grouping perspective of TAM3 questionnaire responses for JEM and Custellence.

JEM											
Question	SA	MA	PA	N	PD	MD	SD	Agr	Dis	DAQ	DAF
F1	7	6	1	0	1	0	0	14	1	93.33	95
F2	10	3	2	0	0	0	0	15	0	100	
F3	9	5	0	1	0	0	0	14.5	0.5	96.67	
F4	10	2	1	1	1	0	0	13.5	1.5	90	
U1	6	5	3	1	0	0	0	14.5	0.5	96.67	95.84
U2	7	4	2	1	1	0	0	13.5	1.5	90	
U3	8	5	1	1	0	0	0	14.5	0.5	96.67	
U4	12	2	1	0	0	0	0	15	0	100	
I1	3	3	6	3	0	0	0	13.5	1.5	90	81.11
I2	4	4	5	1	1	0	0	13.5	1.5	90	
I3	0	3	3	7	0	1	1	9.5	5.5	63.33	
Custellence											
Question	SA	MA	PA	N	PD	MD	SD	Agr	Dis	DAQ	DAF
F1	7	8	0	0	1	0	0	15	1	93.75	92.97
F2	6	4	5	1	0	0	0	15.5	0.5	96.88	
F3	9	5	2	0	0	0	0	16	0	100	
F4	6	3	4	0	3	0	0	13	3	81.25	
U1	5	3	5	2	0	1	0	14	2	87.5	89.06
U2	7	3	3	2	0	1	0	14	2	87.5	
U3	6	7	0	2	1	0	0	14	2	87.5	
U4	10	2	3	0	0	1	0	15	1	93.75	
I1	8	3	1	2	0	1	1	13	3	81.25	75
I2	7	3	3	1	0	1	1	13.5	2.5	84.38	
I3	2	3	2	5	1	1	2	9.5	6.5	59.38	

Note. SA = Strongly Agree, MA = Moderately Agree, PA = Partially Agree, N = Neutral, PD = Partially Disagree, MD = Moderately Disagree, SD = Strongly Disagree, Agr = Agreement, Dis = Disagreement, DAQ = Degree of Agreement of a Question, and DAF = Degree of Acceptance Factor.

Table 10. Shapiro-Wilk Test.

Dimension	Group	W	p
Ease of Use (Agr)	JEM	0.993	0.972
	Custellence	0.887	0.369
Ease of Use (Dis)	JEM	0.993	0.972
	Custellence	0.887	0.369
Perceived Usefulness (Agr)	JEM	0.895	0.406
	Custellence	0.895	0.406
Perceived Usefulness (Dis)	JEM	0.630	0.001
	Custellence	0.630	0.001
Intention to Use (Agr)	JEM	0.750	0.000
	Custellence	0.842	0.220
Intention to Use (Dis)	JEM	0.750	0.000
	Custellence	0.842	0.220

Note. $p < 0.1$ (significance level), the null hypothesis is rejected, indicating evidence that the data do not follow a normal distribution.

Table 11. Wilcoxon Test.

Dimension	W	p
Perceived Usefulness (Agreement)	9.500	0.765
Perceived Usefulness (Disagreement)	1.000	0.053
Intention to Use (Agreement)	5.500	0.814
Intention to Use (Disagreement)	2.000	0.376

Note. $p < 0.1$ (significance level), the null hypothesis is rejected, indicating a statistically significant difference.

The Student's *t*-test for the *Ease of Use* dimension did not reveal statistically significant differences, neither in agreement levels nor in disagreement between the analyzed groups. According to the results presented in Table 11, the Wilcoxon test indicated that there are no statistically significant differences in the Intention to Use dimension, both in agreement and disagreement. However, although there is no statistically significant difference in agreement, the disagreement rate in the *Perceived Usefulness* dimension presented a *p*-value below the significance level of 0.1 (i.e., $p = 0.053$), indicating a statistically significant difference between groups, confirming the alternative hypothesis for RQ2, regarding Perceived Usefulness, that there is a significant difference in the acceptance of the JEM tool compared to the Custellence tool.

6 Discussion and Lessons Learned

Taking into consideration RQ1 (*Does the JEM tool assist in greater effectiveness in executing the task of creating a UJM when compared to the Custellence tool?*), the results reveal that the JEM group demonstrated greater *effectiveness* in constructing Journey Phases compared to the Custellence group, confirming the alternative hypothesis for RQ1 that there is a significant difference in the effectiveness of executing the task of creating a UJM using JEM compared to the Custellence tool.

The quantitative results regarding Journey Phases are reinforced by observations collected during the experimental sessions. Participants using Custellence frequently required additional time to identify how Journey Phases should be created, modified, or organized within the tool. During task execution, several participants expressed uncertainty about

the available options and reported difficulty understanding which interface elements were directly associated with the definition of journey phases. In contrast, participants using JourneyEasyMap generally identified this functionality more quickly, since the structure of the map and its main elements were explicitly presented in the interface. These observations suggest that the differences in effectiveness are not solely related to the availability of functionality, but also to how clearly the tool communicates the role and location of essential journey mapping elements.

Considering RQ2 (*Do participants show greater acceptance of the JEM tool compared to the Custellence tool?*), the results indicate greater acceptance regarding the *Perceived Usefulness* of JEM compared to the Custellence tool. These results may be associated with how effectively each tool supported participants throughout the mapping process. Several participants reported that JourneyEasyMap helped them understand what information should be included in each part of the journey map, reducing uncertainty during artifact construction. This perception was particularly evident among participants with limited previous exposure to User Journey Mapping. These observations indicate that usefulness may emerge not only from the functionalities offered by a tool, but also from its ability to guide users in applying the underlying UX method.

The experience allowed the elaboration of lessons learned arising from both the results and the application of the comparative experiment between the JEM and Custellence tools. The lessons learned contribute to the improvement of future investigations in the area and to the development of tools aimed at supporting UJM construction. The following presents the lessons and the discussion related to them.

Lesson Learned 1: The definition of a standardized fixed structure of elements facilitates map creation. It is suggested that the tool follow a previously established element standardization, in order to minimize complexity in map elaboration.

Whether in a digital medium or not, the definition of a fixed and standardized structure of map elements facilitates map creation, considering this is already a quite complex artifact. As discussed in the RQ1 results, the Custellence tool offers greater flexibility to users in UJM construction, allowing free definition of row and card content. During the experience, it was observed that this confused participants who used the Custellence tool, generating doubts. A recurring doubt was how to add a new journey phase to be mapped, since the tool, according to them, was 'full of items'. It was also observed that many steps were needed to perform something simple like adding a card to a certain *lane* in the Custellence tool. Many stated that they felt 'lost' and that the tool was 'confusing'. On the other hand, the same did not occur with participants who used JEM, which has a fixed and standardized structure for map elaboration.

The observation that the tool using a map structure pattern generated fewer doubts suggests that map elaboration needs to be guided by the artifact itself that is used in its construction. In the case of using digital tools for map creation, such as those used in the study, it is understood that interfaces with elements that communicate objectively what should be

done tend to facilitate use, and consequently generate better effectiveness in UJM construction. When designing a user interface for map elaboration, one should consider that excessive functionalities can be counterproductive, especially if they are not well integrated or if they require improved prior knowledge about the concept involved, in the case of the study, in UJMs.

Finally, most difficulties were associated with identifying how concepts should be represented within the tool, which suggests that challenges in User Journey Mapping may often arise from interface design decisions, in addition to taking into consideration the complexity of the method itself. Therefore, future tools should focus not only on providing journey mapping functionalities but also on making the relationship between interface components and conceptual UJM elements more explicit.

On the other hand, it is important to emphasize that since most participants had limited prior experience with User Journey Mapping, the guided structure provided by JourneyEasyMap may have reduced uncertainty and facilitated decision-making during map construction. In contrast, the greater flexibility and number of configuration options available in Custellence may require a deeper understanding of journey mapping concepts to be fully leveraged. Consequently, some of the observed advantages of JEM may be associated not only with the tool itself, but also with the interaction between its design characteristics and the experience level of the participants. Future studies involving professional UX practitioners are needed to further investigate this relationship.

Lesson Learned 2: The emotions element is better represented using alternative forms to text. Due to its subjectivity of interpretation, it is suggested that the emotions element be represented in forms other than textual, such as through images or emojis.

During the first day of the experience, when journey map fundamentals were presented, some doubts arose related to what the emotion element in UJM would be and how it could be better represented in the map, showing the subjectivity of concept interpretation. Another doubt was regarding the representation of negative emotions, whether it was possible to imagine negative scenarios since, according to them, these were important scenarios to be identified. This reflection that emerged from participants about mapping negative emotions demonstrates a critical view of participants and a greater understanding of the purpose of a UJM. It is worth noting that doubts decreased considerably for the JEM group on the second day, when the graphical representation of emotions with emojis was used in the tool. The Custellence tool, however, does not use emojis, only emoticons to represent emotions. In this context, a curious fact was that one participant learned on their own to place images instead of emoticons in emotions to better express user emotion, which shows the need for improvement in the standard emoticon representation (i.e., in the Custellence tool). This representation may have negatively impacted the acceptance of the Custellence tool, or positively for JEM in terms of Perceived Usefulness (RQ2). It is therefore suggested that the representation of emotions using emojis be utilized, both in tools and in other

approaches.

Lesson Learned 3: The Journey Phases element needs to be better defined. It is suggested that the Journey Phase element be well delimited in the map visualization so that it can be elaborated correctly.

The experiment results regarding RQ1 indicate that the JEM group demonstrated greater *effectiveness* in constructing Journey Phases compared to the Custellence group. This result points to an indication that this element was not as well understood by participants. During the study, doubts emerged about when a journey phase begins and ends for participants using the Custellence tool, even after explaining journey phases during the study warm-up. In the Custellence tool, there is no initial *template* that directs the user to understand and visualize the journey phases element. The user must define the phases themselves. The doubt that emerged reveals that there were difficulties in understanding the delimitation of the journey timeline in the map. Therefore, it is suggested that the Journey Phase element be defined with an initial *template* in the tool, so that it can be visualized and better identified by users.

However, it is important to point out that observations also suggest that predefined structures may constrain the representation of information in scenarios that require adaptations beyond the supported model. These findings reinforce the existence of a trade-off between guidance and flexibility, indicating that future journey mapping tools should support different levels of customization according to users' expertise and project requirements.

Lesson Learned 4: The development of knowledge about the purpose of UJMs and the elements that compose them can bring greater efficiency to artifact construction. It is suggested that map construction tools present alternative ways to instruct users about the map and its elements.

Examining the maps, it was observed that even conducting a prior warm-up, there were many doubts regarding the elements that compose the map. Additionally, when exploring the maps generated by participants and relating them to their profile, it was observed that the greatest *effectiveness* was obtained by maps generated by participants who had prior knowledge of other design area tools, such as Figma. This prior knowledge with tools that have several elements and have a greater learning curve, such as Figma, suggests that the complexity of the map construction task can decrease with practical experience with these tools. It is therefore suggested that the UJM tool have functionalities that guide the less experienced user to facilitate UJM construction.

In summary, the quantitative analysis and the observational data suggest that the differences between JEM and Custellence are largely associated with interface clarity, visibility of journey mapping elements, and the degree of guidance provided during task execution. These evidences strengthens the interpretation that structural aspects of digital tools play a central role in supporting User Journey Map construction.

7 Final Considerations

This article presented an investigation of user journey map elaboration with digital tools. The experience included the participation of 31 people, using two tools, JourneyEasyMap (JEM), developed by the authors, and Custellence, already established in the market. The results indicate greater effectiveness in elaborating Journey Phases (RQ1) and greater acceptance regarding the Perceived Usefulness of JEM compared to Custellence (RQ2).

It was possible, from the experience, to derive lessons learned, which allow us to perceive that the effective construction of the map is directly related to the definition of a prior and fixed structure of elements, which facilitates and reduces the scope to be considered. In specific terms, emotions are better understood when represented as emojis and the Journey Phase element needs to be better defined in the map, leading to better understanding and facilitation in its construction. Finally, we found that the development of knowledge about the purpose of UJMs and their elements can bring greater efficiency to artifact construction, so that tools need to instruct users about the map and its elements.

From an HCI perspective, this study provides four main contributions. First, it offers empirical evidence regarding factors that influence the construction of User Journey Maps in digital environments, a topic that remains relatively underexplored in the literature. Second, it presents a comparative evaluation of two journey mapping tools, contributing to a better understanding of how different interface and structural design decisions affect effectiveness and user acceptance. Third, the study identifies practical lessons learned that can support researchers, practitioners, and educators in selecting, designing, and teaching User Journey Mapping techniques. Finally, the findings provide design implications for future UJM tools, highlighting the importance of balancing structural guidance, usability, and flexibility when supporting journey mapping activities.

More broadly, the results contribute to ongoing discussions in HCI regarding how interactive systems can support complex design activities. The findings suggest that the effectiveness of digital tools depends not only on the availability of functionalities but also on how domain concepts are represented, communicated, and integrated into the interaction process. In the context of User Journey Mapping, providing clear structures and reducing interaction complexity may facilitate the creation of artifacts without compromising their analytical value.

Furthermore, the contributions of this study can also be viewed in light of the research agenda proposed by GrandIHC-BR 2025–2035. In particular, our findings relate to the Grand Challenge on New Theoretical and Methodological Approaches in HCI, which calls for the development and investigation of methods, techniques, and technologies that support HCI practice and research. The lessons learned and design implications reported in this work contribute to this agenda by providing empirical evidence on how digital tools can better support User Journey Mapping activities and UX-related design processes.

As future work, it is suggested to compare the results of this experience with results obtained in Lallemand *et al.*

[2022], which presents an alternative approach, using physical representations for creating UJMs, seeking to verify the differences, advantages, and disadvantages of using the two approaches. It is also suggested to consider in a new version of the JEM tool, functionalities that take into account the inclusion and diversity of users in map elaboration, as pointed out by Halbach *et al.* [2023], with the objective of improving UJM quality.

As future work, another study is suggested comparing the use of the JEM tool with other tools that do not have the primary purpose of constructing journey maps, such as Miro, Figma and Canva. Additionally, qualitative studies such as case studies and contextual observations of JEM tool use can provide a detailed use narrative to explore other perspectives of journey map use.

Considering the limitation related to the combination of a novice participant profile and the evaluation of a tool developed by the research team, the characteristics of JEM, such as its predefined structure and guided workflow may be particularly beneficial to users with limited prior experience in User Journey Mapping. Consequently, the observed advantages may be associated not only with the tool itself but also with the interaction between its design characteristics and the experience level of the participants. Future studies should investigate these factors separately by involving participants with different expertise levels and comparing a broader set of journey mapping tools.

Beyond the comparison between JourneyEasyMap and Custellence, the results provide insights into characteristics that may support the design of future User Journey Mapping tools. The findings suggest that the effectiveness of map construction is strongly influenced by how journey mapping concepts are represented and made available to users. In particular, clearly structured interfaces and explicit representations of core UJM elements appear to reduce ambiguity and facilitate artifact creation. Therefore, future tools should not focus exclusively on providing a large number of functionalities, but also on helping users understand and apply journey mapping concepts throughout the construction process. It is also important that future studies investigate how UX practitioners could select, configure, and adapt journey mapping tools according to the level of guidance and flexibility required by their projects.

Finally, the findings contribute to the broader discussion on how interactive systems can support UX methods and design activities, providing implications for both researchers and practitioners involved in User Journey Mapping.

Declarations

Funding

This research received no external funding.

Authors' Contributions

Luca Ferro Oliveira contributed to formal analysis, data curation, investigation, software, validation, visualization, writing—original draft, and writing—review and editing. Guilherme Henrique Pereira Serafini contributed to formal analysis, data curation, investigation, software, validation, visualization, and writing—original draft. Mariane Moreira de Souza contributed to conceptualization, methodology, project administration, supervision, writing—

original draft, and writing—review and editing. Rodrigo Martins Pagliares contributed to methodology, formal analysis, software, supervision, and writing—review and editing. Luciana Zaina contributed to conceptualization, methodology, supervision, writing—original draft, and writing—review and editing. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

The anonymized datasets, questionnaires, study materials, analysis artifacts, and the ethics-approval record related to this study are available at the paper publication page and at https://drive.google.com/drive/folders/1HCzulyXRJr9-BXCW2620mVcQLyloJtNJ?usp=drive_link. Accessed on 28 September 2026. The JourneyEasyMap tool is available at <https://journeyeasyapp.vercel.app/>. Accessed on 28 September 2026.

Further relevant information

Gemini and ChatGPT were used during manuscript preparation for language and drafting support. Claude and ChatGPT were used during the research execution to assist with drafting and reviewing code fragments for JEM. The authors reviewed and validated all AI-assisted content and code before use and retain full responsibility for the manuscript, software, analyses, and conclusions.

All procedures involving human participants were conducted according to applicable ethical standards, and informed consent was obtained from all participants before data collection. The study protocol was approved by the Research Ethics Committee of the Federal University of Alfenas; the approval record is available in the materials repository.

Citation Diversity Statement: The authors reviewed the related work for directly relevant research across international and Brazilian venues, including JIS and SOL. Citation choices were based on scientific relevance, and no demographic identity was inferred from authors' names.

The authors declare that this submission is original, has not been published previously, and is not under consideration for publication elsewhere.

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