VINO

Report

Demo: http://unwired.pw/vinotest/

Presentation: https://prezi.com/view/tVg1RWCrSjKkufzx9nqY

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CS5340: HCI
8th December 2019

1. Problem

During the brainstorming session to identify a suitable project, the idea of a wine selection website was discussed. The present-day scenario on similar applications of websites is that they are pretty scarce. Anyone interested in finding a suitable wine will either have to perform a Google search or should inherently know at least the names of wines to learn more about them.

The team started by asking each other questions to identify the range of problems that the proposed project could solve. Among the many questions asked, three questions were identified that had a common theme among them.

1. Do you know what wines best pair with your favorite food?
2. Have you ever wanted to celebrate an occasion and did not know what wine to get for the celebration?
3. Do you know where Merlot is from?

When asking these questions, the team soon realized that they did not know the answers to them. Even if an external source such as a website or mobile application was referred to, the team would have to go through the process of filling out long and complex forms. Eventually, the common theme realized among the three questions above was wine knowledge. Therefore, the mission was set to create an interface that will serve as a one-stop shop for information on wines.

In short, the problem that VINO - as the product has been named - will address is the users' need to learn more about wines in an easy-to-understand and quick manner. To achieve this, the proposed user interface was divided into three tasks.

1. Allow users to pair wine with their food.
2. Allow users to pair wine with their mood.
3. Allow users to explore the world of wines and gain knowledge on wines.

Given that the minimum legal drinking age in the United States is 21, the target user for this UI is individuals aged 21 and up. Any individual with access to the internet can take advantage of the services offered by VINO. During the design stages of the UI, the potential users were divided into three primary categories based on their knowledge and consumption of wines. The three categories range from novice, to intermediate, to expert users, who may commonly be known as wine connoisseurs. On the other end of the spectrum to a wine connoisseur, is where a novice user would fall. Such users have little to no knowledge on wines and are using VINO as a tool to learn more about wines while using the tools in the UI. From day one of project brainstorming to today, the goal of VINO has been to ensure its UI appeals to the needs of all three user categories.

With that in mind, the three primary tasks listed above were developed. Users will be able to use VINO to pair the correct wine with the food they are having or find the best wine to match their desired mood, and lastly, users will be able to enhance their knowledge of wines using the Wine Explorer tool available in the UI.

2. Design

One of the key design goals of the VINO interface was to ensure simplicity of use and to avoid cluttering of each page. This design principle is prominent throughout the UI and can be observed from the landing page of the website shown in Figure I.

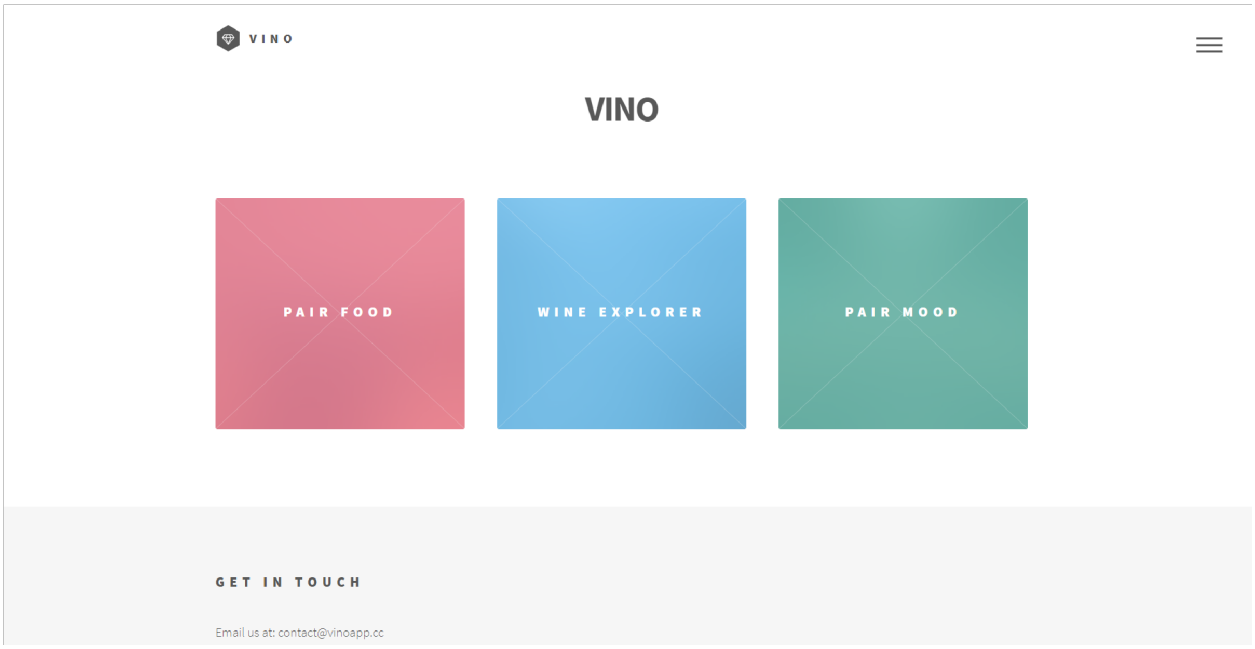

Figure I: The home page of the VINO website.

The three tools that VINO offers are clearly indicated on the home page: Pair Food, Wine Explorer, and Pair Mood. The team designed the home page in such a way to reduce the burden on the user to find the tool they are looking for. Figure II below, shows the previous version of the home page that used a scrolling carousel to display the tools offered by the UI.

Figure II: Previous version of the VINO home page.

Comparing figures, I and II, the major improvement seen is the method by which the tools are displayed. By removing the scrolling carousel and instead displaying the tools on one page, the UI makes navigation much easier for the user. This change was made based on the feedback received during the user evaluation stage. All users that tested the prototype struggled to use the scrolling carousel to navigate across the different tasks.
From the home page, the user has three options to choose from based on the reason they are visiting the VINO website.

Some additional design considerations and design decisions are discussed for the VINO interface.

2.1 Pair Food

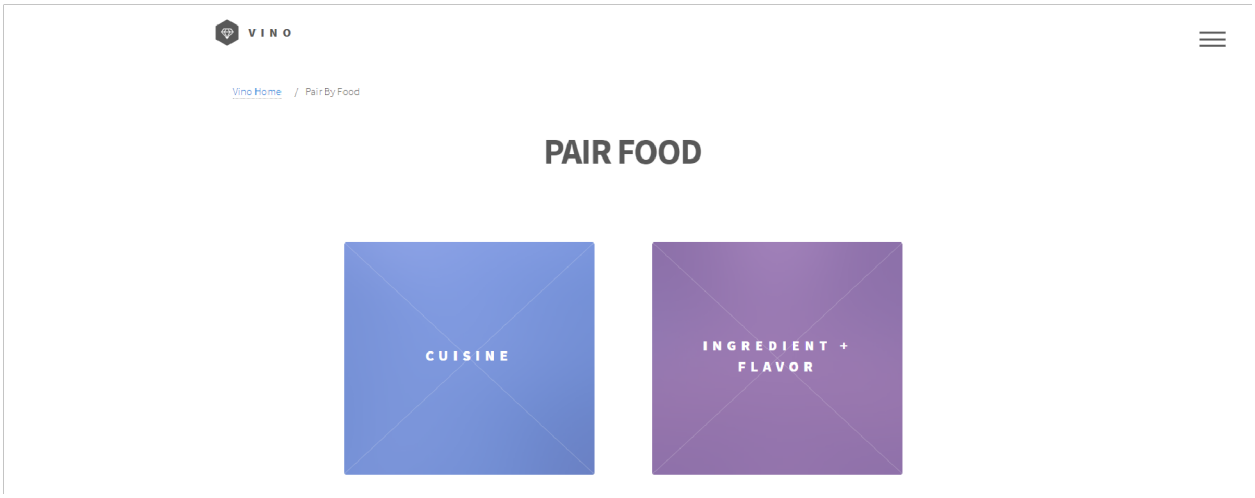

Figure III: Pair Food page of VINO interface.

When users choose the “Pair Food” option in Figure I, they are directed to the page shown in Figure III. This page follows the same theme and layout as the home page. This increases the learnability of the UI as the user can learn to navigate the home page and use the same learned skills to navigate the “Pair Food” page as well. The old prototype had a separate section for “Ingredients” and “Flavor”, however, during the analysis of the design, the team decided to merge these sections together as “Ingredient + Flavor” as shown in Figure III. This was done due to the fact that the “Ingredient” and “Flavor” tasks had many similar aspects to them which meant combining them as one would maintain their practical benefits, while reducing the number of options the user had to choose from. In short, by merging the two sections, the interface makes it easier for the user to select their desired task.

2.1.1 Cuisines

Figure IV: Cuisines selection page of VINO interface.

Figure IV contains the variety of cuisines from which users can select to carry out the wine pairing process. Only five cuisines are currently shown for demonstration purposes but ultimately, this page will contain a comprehensive list of cuisines for users to choose from. The use of an automatically scrolling cover-flow scroller creates a streamlined look for the page while still maintaining the practicality of displaying multiple options to the user. Users can use their mouse and keyboard as well as touch screen to interact with the scroller. This enhances the flexibility aspect of the UI design principles as it leaves it to the user to use their preferred scrolling method to navigate the page.

2.2 Navigation

Figure V: Breadcrumbs in the top left section of the VINO UI.

During the heuristic evaluation of the UI, the team noticed the lack of navigation options on every page. In the previous prototype, the only navigation option provided to the user was to navigate to the home page by clicking on the VINO logo. This feature was included as it made the UI compatible with the users' expectations. Nearly all websites on the internet offer the option to navigate to the home page by clicking on that website's logo (for example: Facebook and McMaster-Carr). However, the team realized that this was

not enough, therefore breadcrumbs were introduced in the revised prototype as shown in Figure V. Breadcrumbs significantly improve the navigation of the UI. It allows users to navigate to any previous page they visited to get to the page they are now. This is especially useful if the user changes their mind with the selection they have made on a previous page and wish to return to change it.

In addition to the breadcrumbs, the menu tab shown in Figure VI, was added at the top right section of every page in the UI. This tab uses figure-ground to direct the user's attention to it. Using this menu, users can instantly navigate to the home page as well as the 3 primary tools that VINO offers. In short, by addition of breadcrumbs and a navigation menu, VINO ensures ease of navigation of the UI.

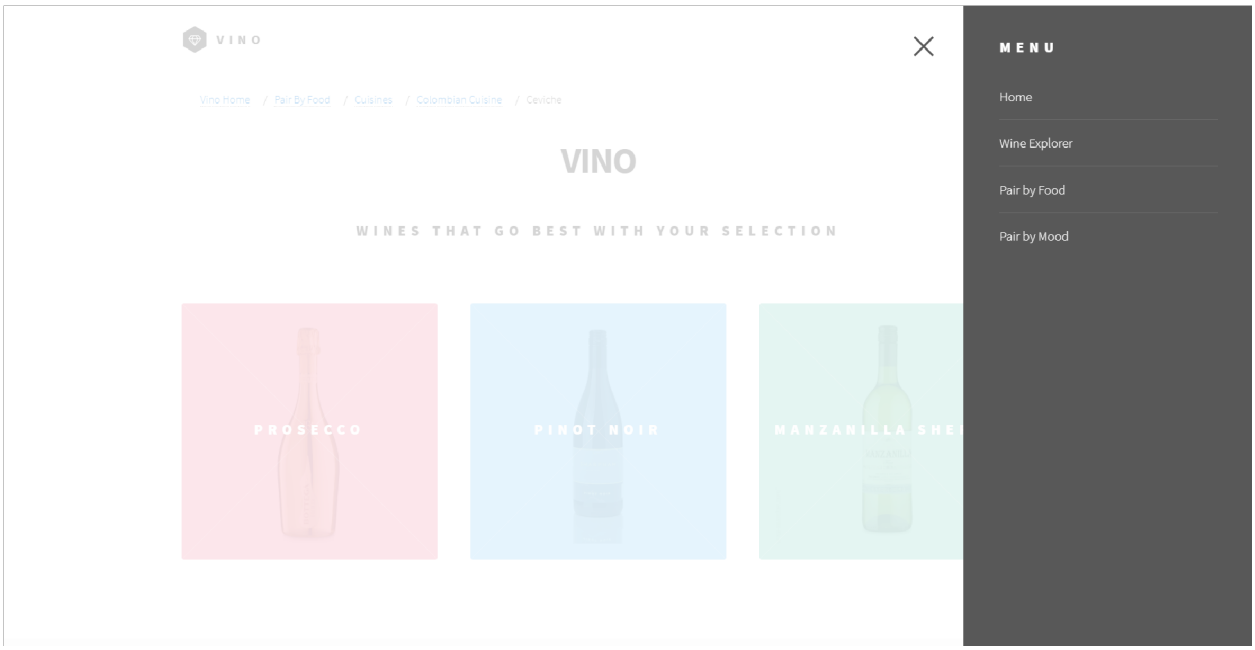

Figure VI: Menu tab in the top right section of the VINO UI.

2.3 Results Page

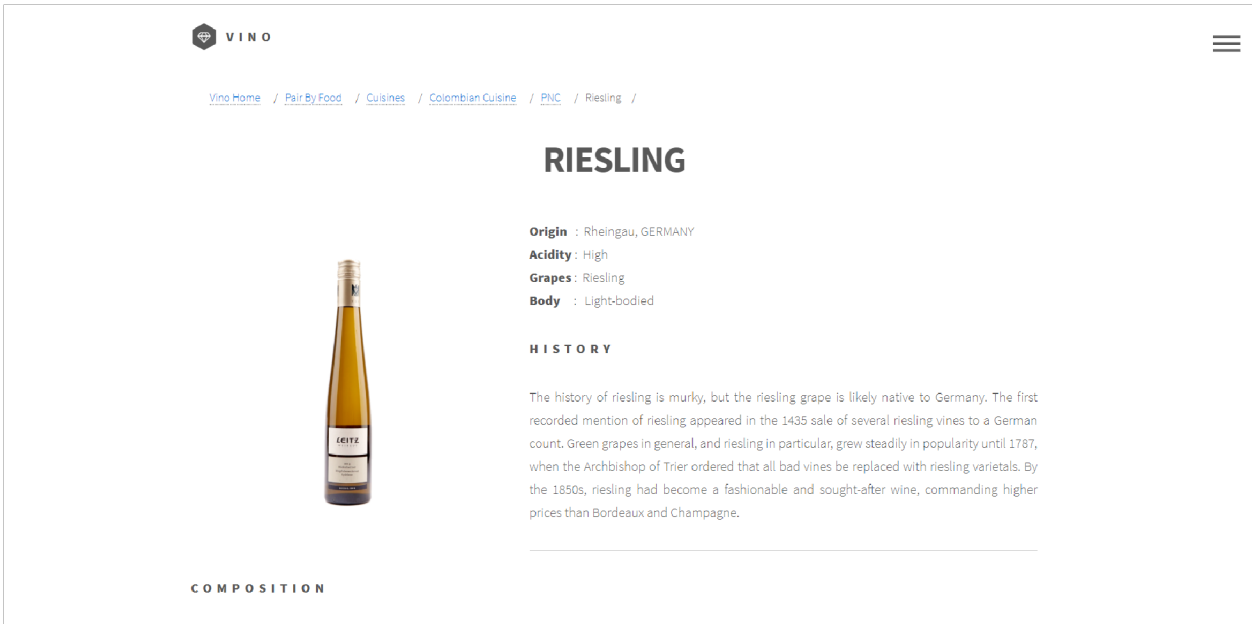

Figure VII: Wine recommendation page of the VINO UI.

Figure VII shows the final page that users are directed to in the VINO UI. This page contains information about the recommended wine that the user has selected. At first glance, the user is provided a quick snapshot of relevant information about the wine such as origin and acidity, among other information. This snapshot is intentionally located at the center of the page as based on the UI design principles; users tend to first look in the middle of the page when they are first directed to it. Therefore, VINO takes this design principle into consideration and provides the user with a brief description of the selected wine in the part of the page where the user would first glance at.

3. Implementation

The prototype developed on InVision was an elementary one with no backend functionality. It helped chart out the functionalities and the flow of control between pages. There was minimal thought on design aesthetics or on the elements used to depict the tasks that were to be portrayed. For example, for the flavor page, the first idea of using a slider as a measurement was used without consideration to how it would fit in the overall design. After the first testing phase, a lot of the design choices were revised based on the feedback obtained. The concept of similarity was enforced throughout the product by multiple factors - color, font type, font size, icon positioning, breadcrumb positioning etc. The three subtasks under the first main task (food pairing) were reduced by combining two of the subtasks (flavor and ingredient). This was done keeping in mind that the two subtasks strongly complemented each other and would only cause difficulty in decision-making for the user. The implementation of the product was carried out using the following technologies:

i. HTML5
ii. CSS & Bootstrap
iii. JavaScript
iv. jQuery
v. Vue.js
vi. Apache
vii. Webserver
viii. MapBox (https://www.kepler.gl)
ix. JSON (document database)
x. Magic Scroll (Magic toolbox)

Given the actual time schedule (versus the initial anticipated timeline), a dummy database was created using responsive html pages for wine results. The mood and food pairing results redirect to these html pages. However, for the flavor and ingredient subtask, a variant of the initial approach was implemented by using dropdowns to provide user with ingredient choices. This decision was made keeping in mind the principle of instant gratification and minimal cognitive burden on the user by providing a select set of options. The implementation of the combinational search was done using a JSON grid that was linked through a looped RESTful API to produce the resulting wine pairing and to allow the user to submit suggestions as well.

It was decided to keep the interface accessible with minimum information required from the user, hence the absence of a login page. However, it is mandatory for the user to verify their age (Vue.js) to ensure legal compliance and set a cookie tracker with an expiry period of 24 hours. Indirect access to the website would deter users because it would add an additional step that would require time to complete. This instant gratification of having access to the website by simply clicking enter (if the user is above 21 years of age) would maintain the user's interest in exploring further.

Perhaps one of the most impactful decisions was to keep the design minimalistic by using subtle shades of color in the background and foreground. This was done to avoid the Vegas effect. Also, the change from a reddish background in the prototype to white was done to maintain focus of the user on the task elements and to avoid any potential issues with deuteranopic users or other visual impairments. This meant that the style and shape of the whole website was reengineered to account for the changes.

The greatest problem faced during implementation was the wine explorer task. MapBox was integrated with our interface to provide the mapping layers but its design conflicted with the existing layout. Adding a navigation panel - whether menu or breadcrumb or even the header - would result in a break in the continuity of the map design. This would be quite jarring to the user's vision and would break the immersive experience of the explorer. Implementing the map on the entire screen was the best decision that could be made to keep the user's experience optimal without compromising design aesthetics. The browser's back button functionality was set using Javascript to return to the previous page (i.e. home page). This was also the most appropriate solution given that the explorer was a direct task
that did not require any user input.

4. Evaluation

VINO Usability Test

Date of Report:	December 8, 2019
Date of Test:	November 2019
Location of Test:	Boston, MA

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4.1 Executive Summary

Usability tests were conducted on three participants to screen current UI performance and prototyping of the VINO product. Users were exposed to three key tasks from the VINO product, all purposed to streamline user understanding of wine while reducing information overload, indecisiveness, and related anxieties to wine consumption. Tasks were designed to accommodate novice and intermediate users, operationally defined as those who either do, or do not, frequent wine products. Across user tests, subjects reported frustration with lack of contextual cues for the product; also with regard to task complexity. Subjects requested sub-tasks be consolidated to reduce user work and number of clicks to the culminating results page. Similarly, subjects requested task designs remain consistent with the VINO design pattern, to increase the product's learnability. Only one of three participants were able to complete any of the three tasks without intervention of the facilitator. These critical design flaws are discussed in more detail in *Data Collection* and were addressed in the VINO final product.

4.2 Methodology

Three participants evaluated the VINO product, according to the profiles listed below:

Audience Type
User Profile 1
User Profile 2
User Profile 3
TOTAL participants

Wine Usage

0 to 2 glasses per week.
2-4 glasses per week.
4+ glasses per week.
TOTAL participants

Age
21-25
TOTAL

TOTAL participants

Gender
Women
Men

participants

4.3 Participant Task

Participants were instructed that all findings throughout the visibility of usability testing would be used solely for usability testing, and for no other purpose whatsoever; that review of the VINO InVision prototype is testing the logic and workflow of the concept itself, not the user. Users were to answer honestly and demonstrate clear cognitive workflow, calling out to facilitators their honest thought process when interacting with the VINO UI, and calling out any frustrations, observations, etc. whenever able. For the purpose of the usability testing, the prototype itself disclosed to the recipient would not be considered confidential material. Facilitator intervention was absolutely forbidden, unless otherwise requested by participants, and it was clear to facilitators a given task or tasks would not run to completion.

Upon participant agreement, three tasks were provided to participants; subjects were requested to complete each task in observation of two of the project team members. Completion of each task was operationally defined as follows: subjects were to navigate to a generic result landing page, by election of one of three task-options on the home page.
Each option represented one key task of the VINO product, to better provide streamlined information for understanding wine, theoretically specific to the consumer. By performing all three task scenarios, participants were to replicate all means to which a user may receive a wine recommendation.

Task order was randomized across participants conducting usability tests (n=3); users were requested to gather a wine recommendation per their mood (i.e. Pair Mood); per their appetite (i.e. Pair Food); and per exploration of the globe (i.e. Wine Explorer). Upon performing each task, participants were requested to narrate each interaction to their observers such that the observers could better assess the VINO product in respect to usability. Facilitators were only able to intervene in the interaction when subjects were unable to progress further, upon instruction of the subject, and careful note of the product interface's failure to direct the subject to the task's completion. For each usability test, two facilitators were assigned to a participant, with a third dedicated to just observing subject interactions (Appendix II for reference). Participant sessions were no more than ten minutes in length. All tasks were designed in accordance to target user personas constructed for the VINO product (Appendix III for reference).

4.4 Data Collection

I. Pair Mood

Task Description

Participants (n=3) were instructed to navigate from the homepage to the results page, via the Pair Mood task. To begin the Pair Mood task, participants were to elect the option for wine pairings per their mood.

Election of the Pair Mood Task would position users in a subpage with three uniquely defined moods. Mood selections were operationally defined as follows: "Feeling Great!"; "It's a rainy

day"; "Relaxed". Selection of any three mood options was of subject volition; upon selection, subjects would move to a subsequent window containing suggested wine pairings per the mood. Final selection of a wine pairing resulted in task completion (Appendix IV; Pair Mood).

Task Results (n=3)

Participants reported confusion across all three mood selections; that "Feeling Great!"; "It's a rainy day"; and "Relaxed" options were especially vague and could be simplified to more familiar concepts such as "Happy"; "Sad"; and "Calm" instead. Subjects also reported that lack of dialogue boxes and feedback increased user frustration. Furthermore, subjects had no confirmation of their mood selection when presented wine suggestions. Overall subject frustration with the task resulted from lack of UI cues; without facilitator intervention, subjects would have been unable to complete the assigned task. Subject III specifically called out frustration with the lack of task reversibility; that the subject needed to navigate back to the homepage, to ultimately elect a different mood (Appendix II for reference).

II. Pair Food

Task Description

Participants (n=3) were instructed to navigate from the homepage to the results page, via the Pair Food task. To begin the Pair Food task, participants were to elect the option for wine pairings per their food craving.

Election of the Pair Food Task would position users in a subpage with a search bar. Below the search bar was a contextual cue, prompting users to scroll for further options. Intermediate/Expert users were expected to only utilize the search bar tool to streamline navigation to the results page. Meanwhile, novice users were expected to scroll for further option. All options, or subtasks rather, were meant to assist subjects in task completion; the search bar tool reinforced the recall memory strategy, while the potential options tool reinforced recognition instead to reduce work on novice subjects' mental model.

Subject use of the search bar tool would result in direct navigation to the results page; otherwise, scrolling for additional options would require users select one of three subtasks. Subtasks were listed as follows: "Flavor Lab"; "Cuisines"; "Ingredients". Task completion for novice users required only the user complete one of the three subtasks. Completion of any subtask redirected users to the results page (Appendix IV; Pair Food).

Task Results (n=3)

Across VINO usability testing subjects, users reported difficulty in navigating the Pair Food task, primarily due to the first window users were redirected to, after opting to begin the task. All three users were unsure of what would be valid input in search bar provided and expressed frustration due to the lack of dialogue from the UI. Subjects were also unaware of the scrolling feature of the window to expose new options, or sub-tasks rather. As all three subjects were unable to proceed in the task without direction, this feature was noted as a critical design flaw and demanded revision in the final, evolved product. Users had suggested some sort of contextual cue to direct users towards what would be considered “valid input” for this task. One of the three subjects was offered facilitator intervention to navigate to one of the sub-task windows. Upon navigation, the subject reported a similar frustration; that the UI made assumptions about the user interaction, and was not clear, let alone inconsistent in UI patterns with other tasks available on the VINO site (Appendix II; Subject I & II).

III. Wine Explorer

Task Description

Participants (n=3) were instructed to navigate from the homepage to the results page, via the Wine Explorer task. To begin the Wine Explorer task, participants were to select the option for wine pairings per exploration of the globe. Wine pairing suggestions are listed in the rightmost panel, whereas the globe is housed on the left panel. Suggestions on the right are contingent on the country elected on the globe. The default country was set to Italy.

Subjects may either select one of the wine recommendations listed on the right panel per the default country or select a different region on the globe. A search bar is provided for more exploratory and/or intermediate/expert users.

Task Results (n=3)

Subjects reported from the InVision prototype the interaction with the globe in the leftmost panel was unclear; that users were unaware that they could interact with the globe. Instead, user attention fixated on the rightmost panel, and instead reported similar frustrations to the Pair Food task with the above search bar; that the search bar with no contextual cues increased user frustration and was unclear about VINO considered valid input. For instance, a testing subject called out that it was unapparent whether users in this task were to enter a particular wine, country, or region. Without facilitator intervention, all subjects would have been unable to complete the Wine Explorer Task, as it furthermore was not clear that

subjects could elect one of the wine suggestions below the search bar. Due to required intervention by facilitators across test subjects, this was considered a critical design flaw.

4.5 Major Findings and Recommendations

I. Major Issues and Findings

- **InVision prototype assumed age of the user**. Prototype landing page did not confirm whether a user was of 21 years of age or not.
- **InVision prototype lacked dialogue boxes and contextual cues for search boxes**. Search boxes were intimidating across novice, intermediate, and expert users, as well as ambiguous. Users were unable to discern what would be valid input. This occurred both in the Wine Explorer and Pair Food tasks across users.
- **InVision prototype UI was not reversible**. Subjects reported difficulty not only moving between tasks, but within them.
- **InVision prototype design patterns between tasks were inconsistent.** Failure to build upon the same template significantly reduced the UI's learnability, and increased user work. Utilization of a carousel scrolling feature in the Pair Food and Pair Mood tasks, but not in the Wine Explorer, did not reinforce user expectations.
- **InVision prototype Pair Food task was too complex for users**. Subjects reported significant ease in navigating the Wine Explorer and Pair Mood tasks, relevant to the Pair Food Task. This dissuaded users from utilizing the Pair Food feature of VINO.

- **InVision prototype Pair Mood task offered little feedback.** Users were not reminded of their mood selection when returned with wine suggestions. This forced users to engage in recall, rather than recognition, memory strategies. This increased work on users' mental models.
- **InVision prototype Wine Explorer task was not clear.** Facilitator intervention was required for all subjects to interact with the globe on the leftmost panel. Subject attention instead fixated on the rightmost search bar, and the wine suggestions, or recommendations, listed below.

II. Solutions

- **InVision prototype assumed age of the user**. A popup window was added on the VINO landing page for users to confirm their age (Figure VIII).

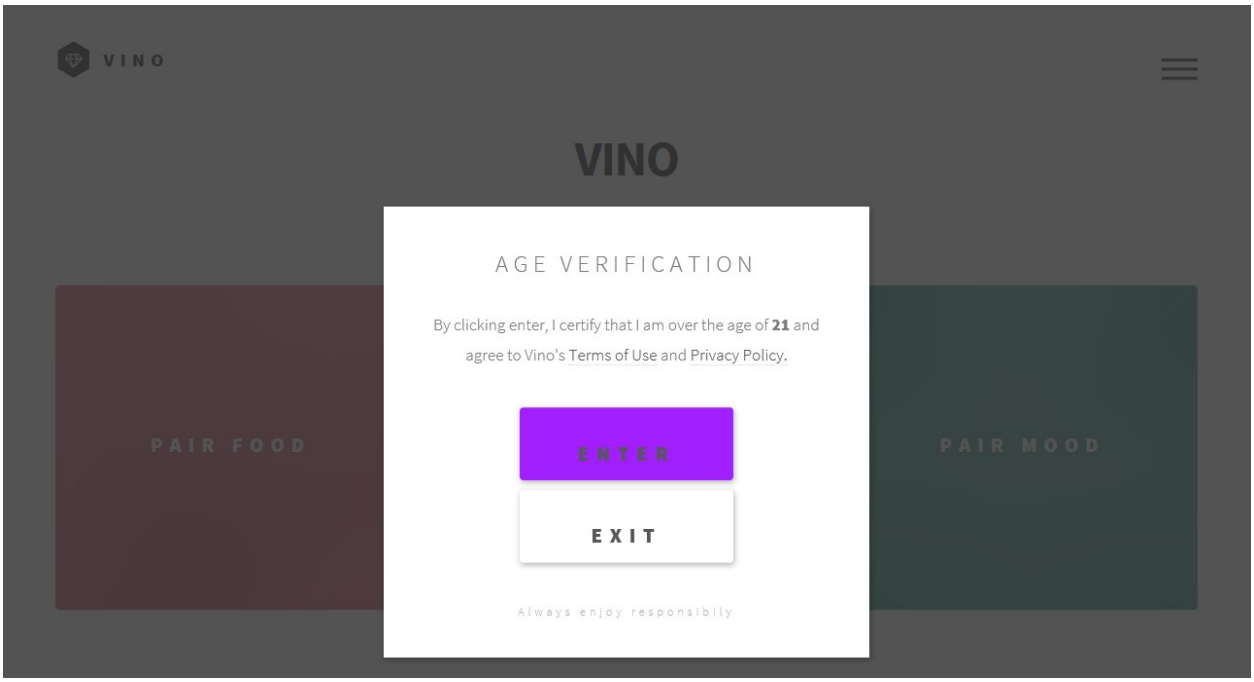

Figure VIII. Age Verification Pop-Up. Subjects are presented with a pop-up window upon entry of the VINO site.

Subjects cannot continue interacting with the UI until confirming whether of 21 years of age or not. Subjects below the age of 21 are redirected from the site. Meanwhile, subjects of 21 years of age or older are able to continue. The

pop-up does not control for honest in subject self-reporting.

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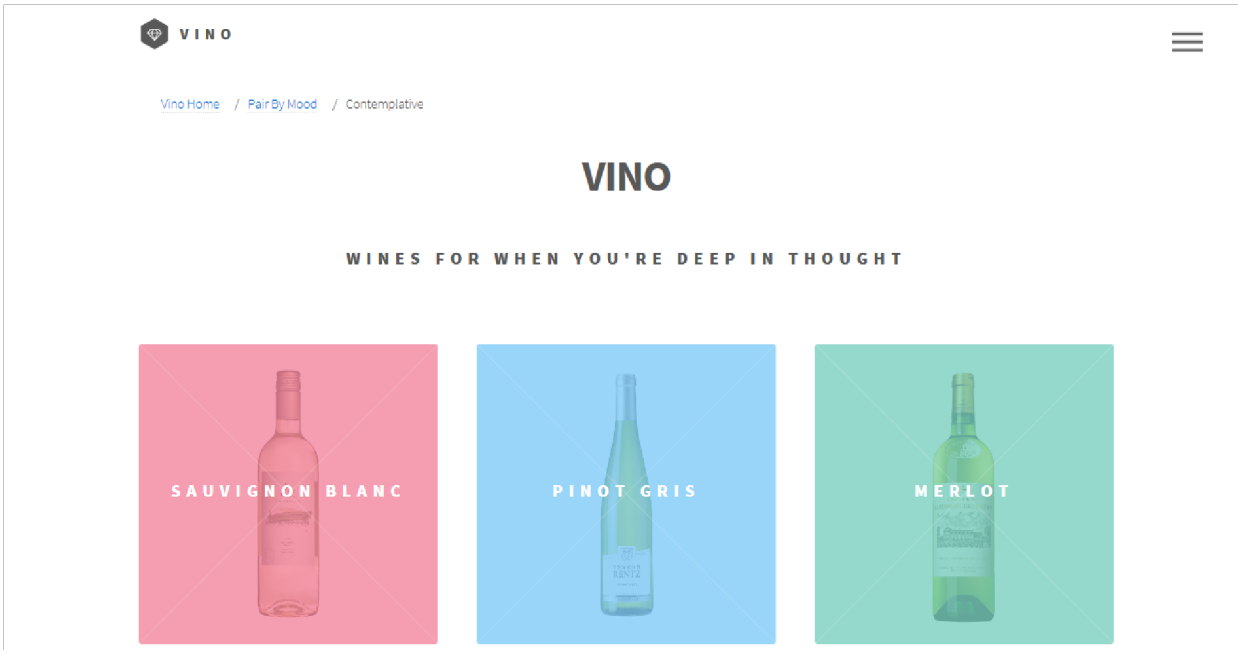
- **InVision prototype lacked dialogue boxes and contextual cues for search boxes**. Search boxes were removed from VINO, and dialogue boxes, with hovers for additional information, were added to all pages.

  InVision prototype UI was not reversible. Breadcrumbs were added on all pages, such that subjects would quickly navigate within tasks, or between them (Figure IX).



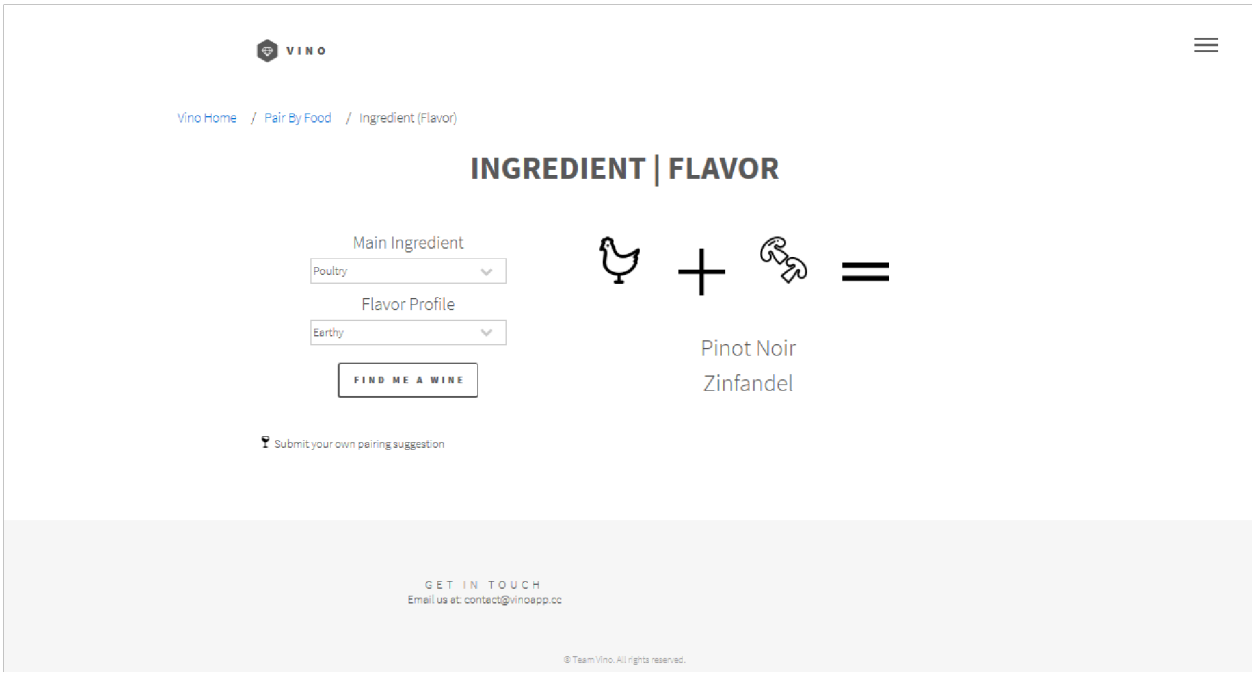


Figure IX. Examples of UI Breadcrumbs in the Pair Food and Pair Mood Task Windows. Subjects can utilize the

breadcrumb feature to navigate within tasks, and between them.

InVision prototype Pair Food task was too complex for users. The Ingredients and Flavor Lab sub-tasks of Pair Food were consolidated into a single window to reduce the number of navigation paths a user could take towards task completion. The search bar from the Pair Food task was also removed. This reduced the number of minimum steps a user could take to the results page from 4 to 3, and the number of sub-tasks in the task hierarchy from 3 to 2.

- **InVision prototype Pair Mood task offered little feedback.** Users are reminded of their mood selections in the UI breadcrumbs. This allows users to engage in recognition-based memory strategies, rather than recall.
  Additional cues are added above wine recommendations to call out mood selections as well (Figure X).

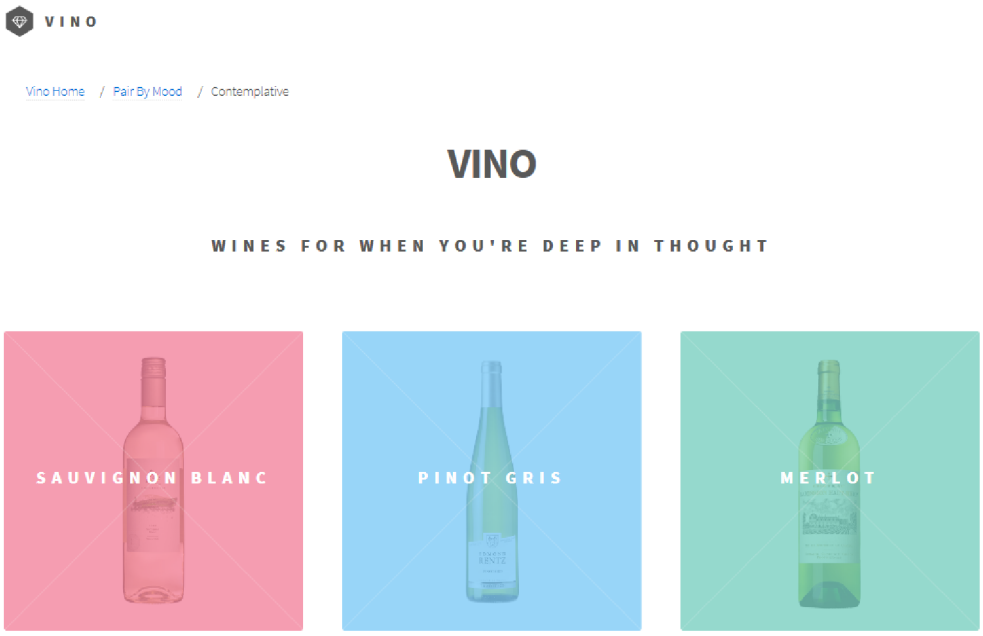


Figure X. UI Feedback reminds users of selections. Feedback from the UI both in the UI breadcrumbs, and in-line, above wine suggestions, allows users to engage in recognition-based memory strategies rather than recall. This is deliberate to reduce work on the user's mental model and reduce the UI's ambiguity within tasks.

- **InVision prototype Wine Explorer task was not clear.** Previously, user attention was fixated on the rightmost panel, with little to no attention paid to the leftmost panel to explore the globe for wine suggestions. As the globe was the central part of the task, redesign of the Wine Explorer task removed the rightmost panel, forcing user interaction with, and exploration of, the globe (Figure XI).

Figure XI. Redesign of the Wine Explorer Task. The original task is listed above the revised task.

4.6 Detailed Findings and Recommendations

I. Heuristic Evaluation

Fatal Design Flaws | Inability to Complete Pair Food and Wine Explorer Tasks

Subjects (n=3) were unable to complete the Pair Food and Wine Explorer tasks without facilitator intervention. Intervention in the Pair Food task was related directly to the Pair Food search bar; the first window of the Pair Food task. Though the search bar was initially provided

to the expert user target audience, offering direct manipulation of the UI and reducing the number of clicks from 4 to 1, the search bar itself lacked the contextual cues necessary to even be used by an expert user. In all three usability tests, users were unknowing of what was considered valid input to the task (i.e. a food, cuisine, ingredients, etc.). Inability to complete the Pair Food task, let alone progress to one of the three sub-windows to better aid users in finding wine recommendations, was considered a fatal design flaw of the InVision Prototype, and assigned a usability rating of 5 (Figure XII). Similarly, users within the Wine Explorer task reported similar frustration; lack of dialogue boxes or contextual cues specifically related to the search bar left users asking facilitators directly what was considered valid input; moreover if the input was actually necessary, as wine suggestions were already listed below the search bar (due to Italy being assigned as a default country). As the Wine Explorer task was noted especially unclear, a usability rating of 5 was also assigned (Figure XII). This was in-line to the initial agreement of the VINO usability tests between facilitators and users that intervention was absolutely forbidden unless otherwise deemed appropriate (Figure XIII). In revision of the VINO product, the search bar within both tasks was ultimately omitted. This was purposed to fixate user attention towards the globe in the Wine Explorer task and reduce the complexity of the Pair Food Task. In doing so, the Wine Explorer task now forces users to explore for wine suggestions, its original intended feature; meanwhile the removal of the search bar from the Pair Food task allows users to immediately navigate to one of the two
(originally three) subtasks; “Cuisines” and the “Ingredients/Flavor” windows. This design choice with the

Pair Food task specifically consolidated similar tasks, and further reduced UI task complexity across users.

Major Design Flaw | No Feedback Across VINO Key Tasks

Subjects (n=3) reported frustration in that the VINO InVision Prototype did not offer immediate feedback upon election of any of the VINO key tasks, or within tasks (Appendix II; Subject I). Subjects specifically called this out during the Pair Mood task, in which there was no way of telling upon election of a particular mood, what that mood was when prompted with wine suggestions or recommendations. This demanded users engage in a recall-based, rather than recognition-based, memory strategy, increasing work for the user. Similar sentiments were echoed at task completion upon landing on the generic results page; subjects were not able to discern what navigation path was taken to get to the results page, without engaging in total recall. As this impacted user workflows, but did not technically bar it, a usability rating of 3

was assigned (Figure XII; Figure XIII). Had the lack of feedback resulted in any breaks in workflow specifically, a higher rating on the usability scale would have been assigned,

To remedy this in the VINO product, breadcrumbs were assigned to every window to allow quick navigation within, and between tasks. Additional context cues were also added such that users were reminded of how they ended up at a particular page within a task, and the consequences of that selection. For instance, selection of a mood would showcase on the wine recommendations page what that mood selection had been, in addition to a tagline, such as “Wines for when you are deep in thought”. In the Pair Food - Ingredients/Flavor task specifically, additional context cues appear on the page as a user selects a particular ingredient and accompanied flavor profile (Figure IX).

Minor Design Flaws | Age, Reversibility, and Inconsistency

Subject I called out to facilitators that the InVision Prototype was inherently flawed as it failed to account for the age of its target audience; assumed to be at least 21 years of age or older. As the prototype did not account for user age, the subject noted the site could theoretically promote underage drinking. Though the VINO product cannot control wine consumption, the addition of a pop-up window, overlaid over the VINO landing page, could force users to take ownership of their subsequent interactions with the VINO system. As such, entry to the VINO site prompts users with a pop-up window requesting confirmation that the user is of 21 years of age or not. If the user is not of 21 years of age, the user will be redirected from the site, preventing the user to view any additional content. As this issue was not workflow related, nor pertinent to any of the three VINO key tasks, a usability rating of 1 was assigned with no other workaround available (Figure XII; Figure XIII).

Participants also highlighted that the UI was not inherently reversible, at least within tasks; that if a user wanted to switch moods, or sub-tasks within the Pair Food task, the user was required to navigate back to the VINO landing page. Though this was a clear escape hatch to users, they were frustrated as this easily increased the number of clicks required to navigate to the final results window. A usability rating of 1 was also assigned here (Figure XII), as it less so interrupted user workflow, rather just reduced the UI’s directness and ease of use (i.e. with workarounds being available; Figure XIII). As aforementioned, addition of breadcrumbs to the VINO UI now allows this navigation both within, and between, user tasks.

Finally, subjects noted that design patterns between tasks were not consistent, reducing the learnability of the VINO UI. Subjects made note of the Pair Food task particularly, as each sub-window had its own design pattern. By consolidating two of the three windows, while also following the same structure as the Pair Mood task now, VINO aims to increase familiarity and

the product's learnability. As this issue was not workflow related, but could be remedied before any other future releases, a usability rating of 1 was also assigned (Figure XII; Figure XIII).

Rating	Description	Rating Scale
Fatal	Block; Prevents Use.	**5**
Critical	Workflow Break	**4**
Major	Impacts User Workflow	**3**
Serious	Normal Status for Issue	**2**
Minor	Non-Workflow Issues	**1**
Not an Issue	Considered in Future Enhancement	**0**

Figure XII. Usability Severity Scale.

Issue	Frequency	Impact	Persistence	Workaround Available	Rating (0-5)
Pair Food Search Bar Inhibits Task Completion	**100%**	**High**	**100%**	**Yes**	**5**
Wine Explorer Task Unclear and Inhibits Task	**100%**	**High**	**100%**	**Yes**	**5**

Completion					
No UI Feedback Across Tasks	**100%**	**Med**	**100%**	**No**	**3**
Assumes User Age	**100%**	**Med**	**100%**	**No**	**1**
UI not reversible within tasks	**100%**	**Med**	**100%**	**Yes**	**1**
Inconsistent Design Patterns	**100%**	**Low**	**100%**	**No**	**1**

Figure XIII. Heuristic Evaluation of InVision Prototype Usability Testing.

II. Introductory Questions & Tasks Used for Usability Testing

Introductory Questions

Sample Questions	Sample Responses
Do you have a favorite food? Have you ever wondered what kind of wine goes with it?	**Sushi! To be honest, I'm not sure I've ever had wine with sushi.**
Have you heard any good news recently? What are you going to do to celebrate?	**I've never really thought about what I'm going to do. I typically just feel it out.**
Have you ever wondered where Merlot is from?	**France, right?** **That's a good question. I haven't!**

Scenario 1 - Pair Mood

You are by no means a wine connoisseur. Sometimes by the end of the week, you're feeling defeated, ecstatic, or somewhere in-between. You want to find a wine that helps you take some much needed mental-health time. Try finding a wine that best fits your mood.

Number of participants	**3**
Percent successful	**100%**

Sample Findings	Sample Recommendations
3 participants completed the task with ease. **1 participant stated that the task lacked feedback and was not easily reversible.**	**Simple enough. Be careful with the "Happy" election though. I feel compelled to click it every time because it has more weight than the other two emotions.** **How do I know that the wine suggestions ARE for the mood I selected?**

Scenario 2 – Pair Food

You enjoy the finer things in life, reading, the arts. Tonight, you have invited someone over for dinner, and it's very important that you impress your guests. You need to find the perfect wine that goes with your meal and are in a bit of a crunch. Find the wine that best pairs with your dinner.

Number of participants	**3**
Percent successful	**0%**

Sample Findings	Sample Recommendations
3 participants could not complete the task without facilitator intervention	**What do I enter in the search bar? How do I see the results?**
2 participants stated that the task lacked contextual cues, and was unclear	**How does this get me to a wine recommendation?**
1 participant stated that the task consisted of too many windows.	**This task takes forever.**

Scenario 3 – Wine Explorer

You are starting to wrap up your academic career and have always been curious about various wines and flavors associated with each wine. You have only been of legal drinking age for about a year or so, so you haven't had a chance to really explore yet. The only problem is you don't know where to start! Travel the globe and find the wine that best suits your needs.

Number of participants	**3**
Percent successful	**0%**

Sample Findings	Sample Recommendations

3 participants could not complete the task without facilitator intervention	**Remove the search bar or add contextual cues.**
3 participants did not know they could interact with the globe	**If the globe is the main feature of the interaction, bring it to the forefront.**
2 participants stated that the task lacked contextual cues, and was unclear	**Add dialogue boxes, or something. I don't know what to do next.**

III. Exit Questions and User Impressions for Usability Tests

Participant Impressions and Results

Sample Questions	Sample Responses
What did you like best about the site?	**The Wine Explorer Concept.**
What did you like least about the site?	**The UI is clunky and the design is inconsistent. Find a pattern and stick with it.**
What is your overall impression to VINO on a scale of 1-5?	**4**

What is your overall impression of the Wine Explorer Concept on a scale of 1-5?	**4.5**
What is your overall impression of the Pair Food Concept on a scale of 1-5?	**3.5**
What is your overall impression of the Pair Mood Concept on a scale of 1-5?	**3**

Appendix II

I. Subject I Usability Test | InVision Prototype | Novice User | Rarely Consumes Wine

A. Initial Impressions and Observations

1. Subject stated a pop-up window must appear, overlay over the VINO landing page, to confirm whether a user is of 21 years of age or not. Subject explicitly called out that the InVision Prototype failed to account for user age, and assumes the age of the target audience. The window would assume the user take ownership of subsequent user interactions with the VINO system and would grant users below 21 years of age an escape hatch otherwise not provided within the VINO browser itself.
2. Search box within the Food and Wine Pairing sub window of the InVision Prototype is intimidating to novice users; being a novice user himself, the user was confused with the search bar, and unable to proceed in the task without direction. The search bar itself not only assumed the user had some knowledge of food and/or wine pairings, but also some idea of what a “valid” input would be. The user requested some sort of dialogue box or contextual cues be added to facilitate interactions for new users. The user was asked for demonstration to enter “prosecco”; the user replied, “what is prosecco?”.

B. Interaction Scenarios

1. Subject was requested to change tasks, and instead learn about wine. The subject immediately called out to observers that he was unable to find a “back” button built within the UI; or at least some way to reverse the interaction. The user was directed towards the home button on screen, to then navigate to the wine explorer task.

a) Within the wine explorer task, it was unclear to the user that the globe on the leftmost panel could be selected to find a particular wine by region/province/country. Instead, the user immediately fixated on the search bar in the top right panel and echoed similar sentiments as before.

b) The user also requested what would be “valid” input in this case. For instance, would a subject need to enter a wine, or a location in the search bar? What would happen if the location did not return results? The subject explicitly stated that for this given task, a search by country name would be the most intuitive to users.

c) Below the search bar was a running feed of wine selections immediately available to the user. In the InVision Prototype, these wine offerings were fixed for basic usability tests. Given this, the subject was confused on how to select a wine. The user requested additional dialogue windows be available, calling out to the user that there is a potential for interaction here.

C. Results

1. Subject was intimidated by the length of the results page, and that the results page was the same across all tasks. It was unclear to the subject why this was the case. Content within the results page also seemed unnecessary to the user. For instance, the user asked by the composition of a particular wine ever need to be shared, as it seems like too much information. The subject recommended we either consolidate information within a window, or only make relevant information to the user available; all other information would be presented out of the user's volition.

II. Subject II Usability Test | InVision Prototype | Intermediate User | Frequents Wine on Social Occasions

A. Initial Impressions and Observations

1. Subject took note of VINO object on each page and called out to observers that it was not clear that this button would redirect the user to the homepage, as it was not titled "Home". The subject suggested revising the title to increase familiarity to the user by reducing the buttons ambiguity.
2. The subject required guidance from facilitators to navigate between tasks. It was not clear to the subject how to begin a particular task, nor what the end goal of each task would be. The subject requested facilitators direct him to at least the task starting points, emphasizing greatly that the InVision Prototype did not seem to reflect the final product as described.

B. Interaction Scenarios

1. In exploring Food and Wine Pairings, the user was unable to discern the difference between the "Flavor Lab", "Cuisines", and "Ingredients" subpages, especially in relation to the Search Bar. To the user, navigating from the search bar to these three sub windows instead did not seem intuitive, nor was the user certain of what to enter in the search bar. The user also called out

that though the search bar in practice made sense, due to the nature of the InVision Prototype, the recent items below the search bar constantly listed seemed more or less as a drop-down menu - and confused the user further.

2. The subject did not report immediate issue during the Wine Explorer task; the subject reported that the wine explorer seemed clear, and was more interested in the globe object, than the provided search bar itself.
3. The subject reported that in the Mood task, the carousel scrolling feature between moods was not apparent. The user was quick to note also that in the task, the listed moods seem to abuse Gestalt's Figure-Ground Principle; as the "Happy" mood was apparent upon initial landing, the user felt more inclined to always elect that option as it was the focal point of the page. The subject reported that though this may be advantageous for the lazy user in expediting recommendations, it defeated the purpose of the VINO task.

C. Results

1. The subject was asked by facilitators to rank each of the three tasks from 1 to 5, with 1 being the least intuitive, and 5 being the most. After rating each task, facilitators then asked the subject to rate the overall VINO experience.
    a) Food and Wine Pairing: **3.5**
    b) Wine Explorer: **4.5**
    c) Mood Pairing: **3**
    d) Overall experience: **4**
2. The user stated that the overall experience was slated by the Wine Explorer and its novelty. The Food and Wine Pairing task felt like it could be consolidated into fewer windows, increasing the directness of the UI and reducing user work, while the Mood Pairing task felt too simplistic and dependent on the UI's carousel scrolling feature. Moreover, the user felt compelled to always report being "happy" in the Mood task, as upon landing that object

is given considerable weight and lies at the center of the window.

III. Subject III Usability Test | InVision Prototype | Intermediate User | Enjoys Wine and Food Pairings

A. Initial Impressions and Observations

1. Subject attention immediate fixated on the wine explorer task. Subject reported that had she not read the font above the task icon, she would not have been aware that she could scroll to other tasks, or that there were tasks first and foremost. The subject also reported that the design choice seemed inconsistent across user tasks the Food and Wine Pairing, and Food and Mood tasks utilize a carousel for scrolling in a similar fashion to the landing page, however the wine explorer does not.

B. Interaction Scenarios

1. Upon electing the Food and Wine Pairing Task, the user reported that it was not apparent that the user had the option to scroll for additional sub-task options. Instead, user attention fixated on the scroll bar. The user reported that the design was inherently confusing, as there were no contextual cues prompting the user to search for anything in particular in the search bar. The user upon facilitator's direction then understood the search bar to be for more intermediate or experienced users, meant to expedite the Food and Wine pairing process. With facilitator direction, the subject navigated to the Food Pairing. In a similar vein, the user reported that the tasks were unclear, and that little contextual cues or dialogue boxes forced the user to be more exploratory in nature. The user was unable to discern the differences between the Flavor Lab, Cuisines, and Ingredients windows without further exploration. The subject requested that the tasks be consolidated, as it requires significant work from the user to “complete” a Food and Wine pairing task.
2. The subject stated that the Food and Mood cues seemed directed at how the user currently felt, rather than what the user’s desire mood would be - contrary to the floating dialogue box above the carousel. The subject also reported that the window had little feedback, or reversibility. For instance, if the user were to elect a particular mood, the user would then be directed towards another carousel of wine choices. Meanwhile, the UI in no way reminded the

user of the current selection or allowed the user to return to the beginning of the mood task without navigating all the way back to the home page.

3. The subject was unaware that one could interact with the globe in the leftmost panel of the wine explorer task. Though the subject was informed the globe would facilitate the same functionality as the more direct approach on the right (i.e. the search bar), the lack of feedback from the InVision prototype frustrated the user. After clicking around the globe without change, the user navigated back to the home page.

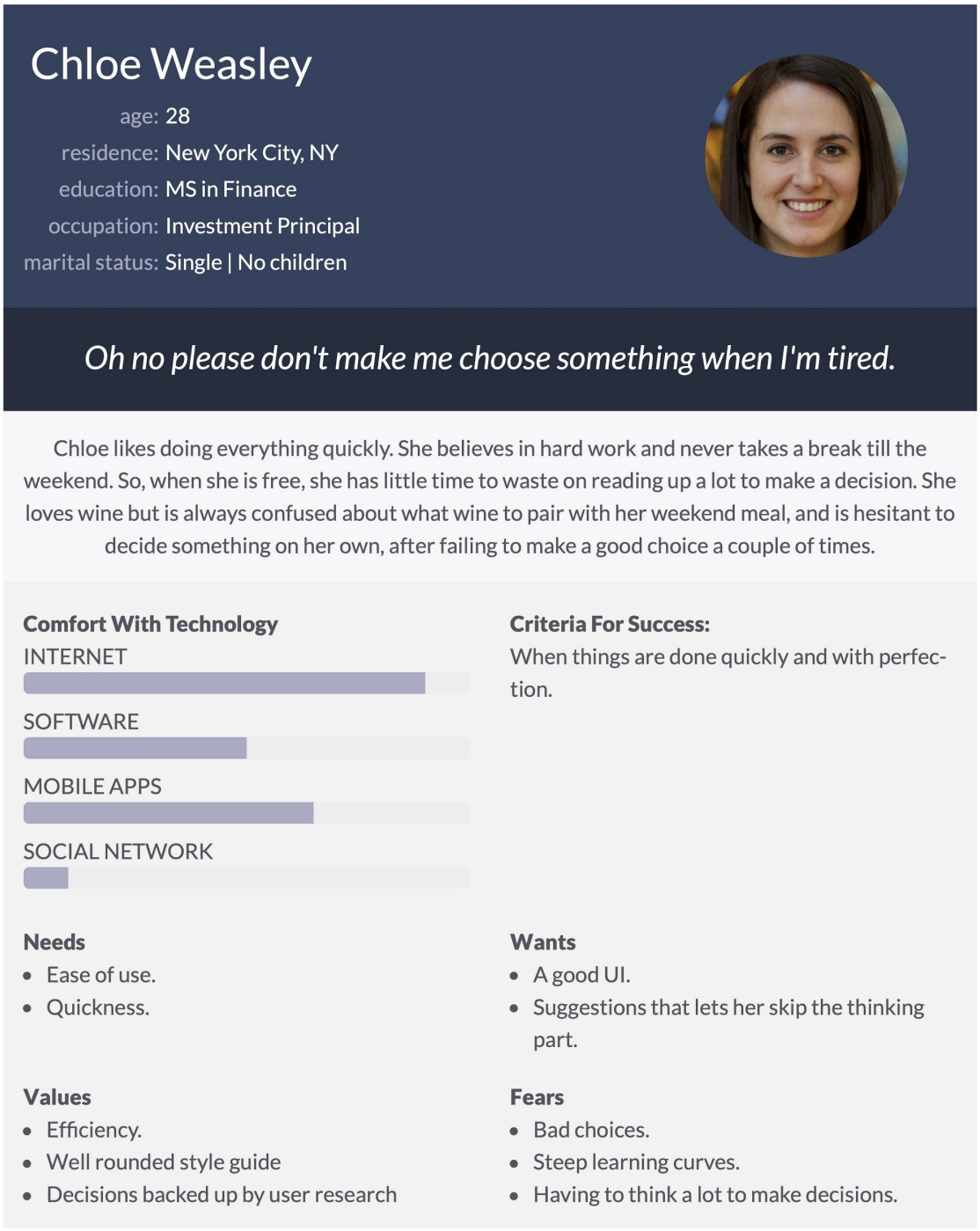
C. Results

1. The subject reported that similarly to the task pages, the results page is inconsistent in design. The subject suggested the VINO team focus on a particular design pattern, and instead build upon that pattern between windows; that doing so would increase familiarity to the user, rather than requiring the user to learn how to navigate each page. The user was also surprised by the composition pane, the contents of the pane were inconsistent with all three tasks.

Appendix III

User Task Personas

I. Pair Mood | Target User Persona | Exploring Wine Pairings per Mood



Chloe is a young professional in fin-tech (age 28). The occasional beer/wine hours on Fridays after the market-close have let her dabble, however she would by no means be an ascribed

wine connoisseur; by the end of the week, she can be either defeated, ecstatic, or somewhere in-between. Often, she has a tough time navigating this space - so picking the right drink to close out the week can either be hit or miss. Her office also provides both red and white options, to further complicate her dilemma. Chloe recently discovered VINO and uses it to better understand what wine better pair with her mood may. VINO helps Chloe find closure in her week, and ready to take some much needed mental-health time. Since using VINO, Chloe has begun experimenting with her own wine-mood pairings, and less-so dreads her end-of-week gamble.

II. Pair Food | Target User Persona | Enjoys Wine and Food Pairings

William Dawlish

age: 50
residence: Arlington, VA
education: Postdoctoral Degree
occupation: Professor of History
marital status: Married | Two Children

The beauty of the old world, chivalry and its arts must be preserved.

William is a History professor at Georgetown University. He is a world renown authority on the history of arts and the medieval period. He constantly challenges his students to explore hidden meanings in the old world arts and how those works shaped the present day world.
He believes that today's ways of life lacks finesse. He is a voracious reader, enjoys classical music, debates and a good game of chess.

Comfort With Technology

INTERNET

SOFTWARE

MOBILE APPS

SOCIAL NETWORK

Criteria For Success:

Must have a deep understanding of everything he comes across in life to feel that he has succeeded.

Needs

- Something that helps him lookup for all the details about every kind of wine so that he kan make an informed choice.

Wants

- Something that is easy to navigate and does not take too much of his time.
- A tool that feels classy and refined.
- Something that is extensive and covers various aspects of a product.

Values

- Knowledge.
- Elegantly designed products.
- Great conversations and trivia.

Fears

- Cutting into already sparse free time.
- Factual inaccuracies.
- Bad aesthetics.

William is a 50-year-old college professor who reads a lot, enjoys visiting art exhibits, enjoys the finer things life has to offer. He has invited a Ms. Illaria, a colleague from Italy for dinner. It is very important for him to impress his guest, as she is the head of a search committee to find a new professor for a prestigious academic chair in Europe. He is a connoisseur of wine, but he can't put a finger on which one of three best wines he has in mind, should he offer her. William visits VINO and uses the VINO Wiz component of the website that lets him search for various dishes, select any, and see what wines are suitable for serving with them. It also lets him pick different wines from our extensive database and see what dishes have been reported to be a good combination with any of those. The interface presents to him information on user satisfaction, visuals that represent data on the suitability of a particular type of wine for the occasion, the mood it evokes etc. The site also lists interesting facts, history and fun trivia about each type of wine, that he can use in his conversation with the guest, to make a lasting impression.

III. Wine Explorer | Target User Persona | Enjoys Wine and Food Pairings

Annie Granger

age: 22
residence: Boston, MA
education: Finance Major at Boston University
occupation: Student
marital status: Single | No children

When I'm with my friends, I should be the smartest one in the room!

Annie loves hanging out with friends and exploring new restaurants. She plays Cello in her spare time. She lives her life on the internet writing elaborate reviews on her personal blog and instagramming whatever she does. She hates websites with a lot of clutter. This has motivated her to work on alternatives for data visualizations in the finance sector. She finds it difficult to understand the various variants of wines, as she is new to the world of drinking. She is willing to spend extra time and learn about anything that she doesn't know, so that she can be the one telling hr friends about it.

Comfort With Technology

INTERNET

SOFTWARE

MOBILE APPS

SOCIAL NETWORK

Criteria For Success:

When a product can keep the user engaged, giving all the details that can be provided, while helping the user make a decision without overwhelming her with a lot of options.

Needs

- Excellent User Experience
- Something that does not confuse her with a lot of content.

Wants

- Focus.
- To see statistics about different choices available.
- Information in an uncluttered format.

Values

- Efficiency.
- Clean design and UI.
- Decisions backed up by user research.

Fears

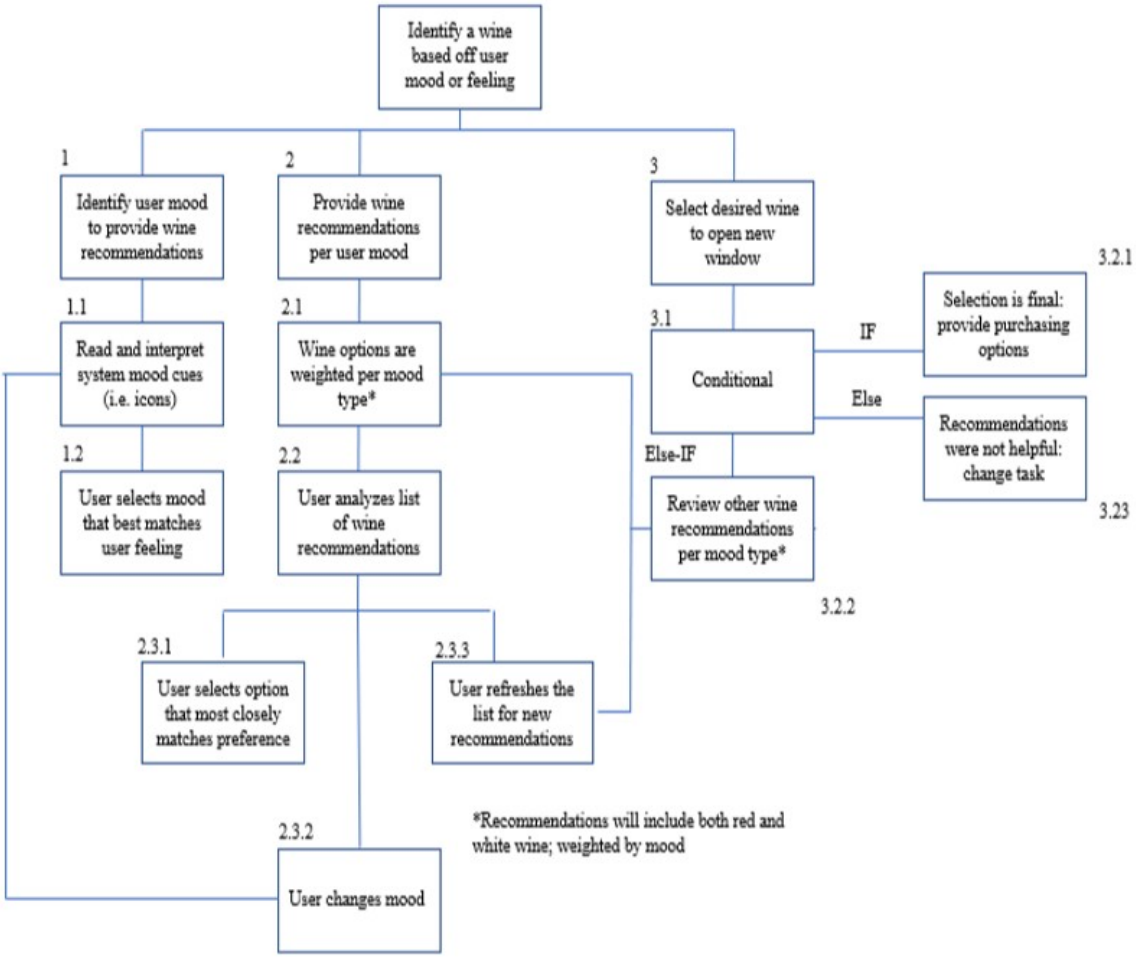
- Not knowing something when she is with her friends.
- Waste of effort.

Annie is a 22-year-old senior in college, and she has always been curious to learn about various wines and flavors associated with each type of wine. Given that she has only been of legal drinking age for a year, she has not had the chance to try a variety of wines yet. She is looking for a tool or system that could help familiarize her with various types of wines. Annie can use VINO to learn about various types of wines and help educate herself about recommended food and wine pairings. VINO also helps Annie learn about the origins of different wines and allow her to identify the various geographical locations where winemaking processes happen.

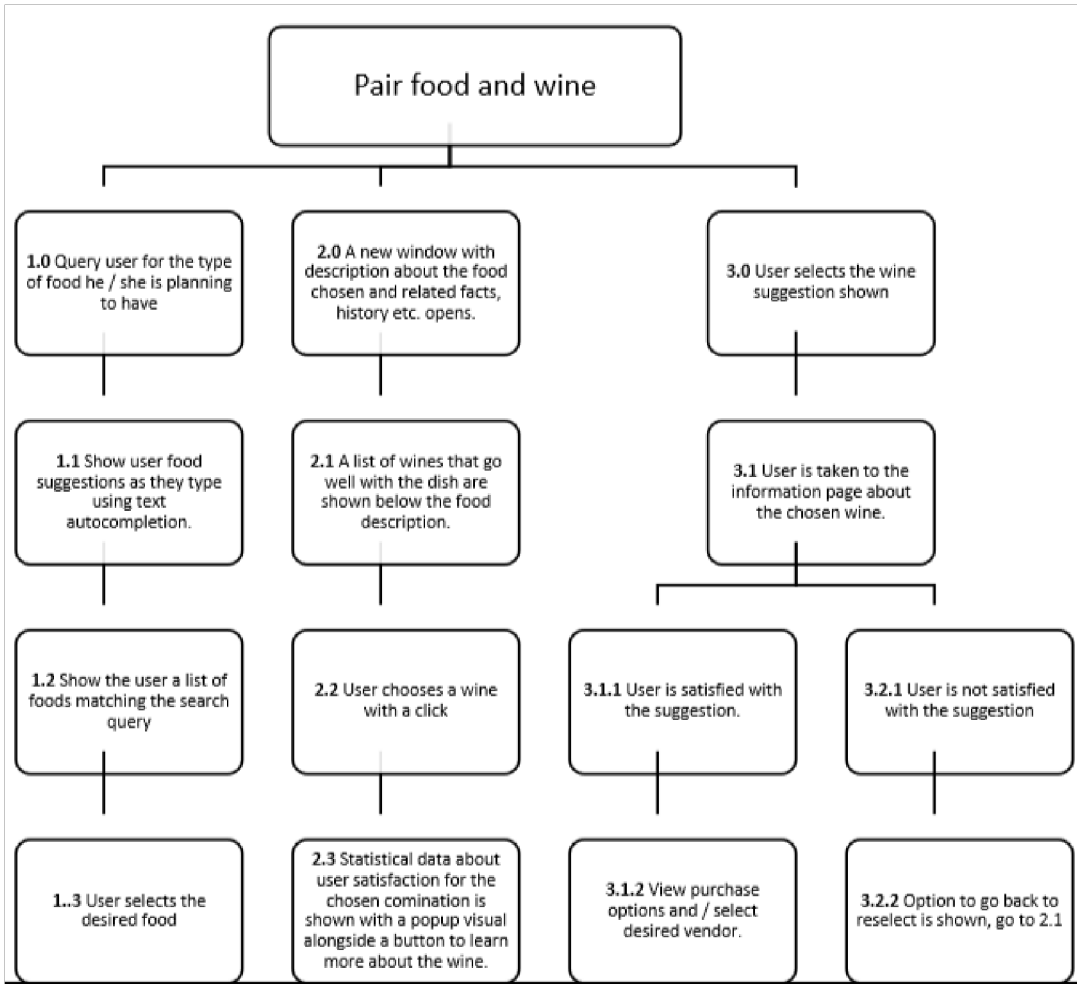
Appendix IV

InVision Prototype Task Hierarchies

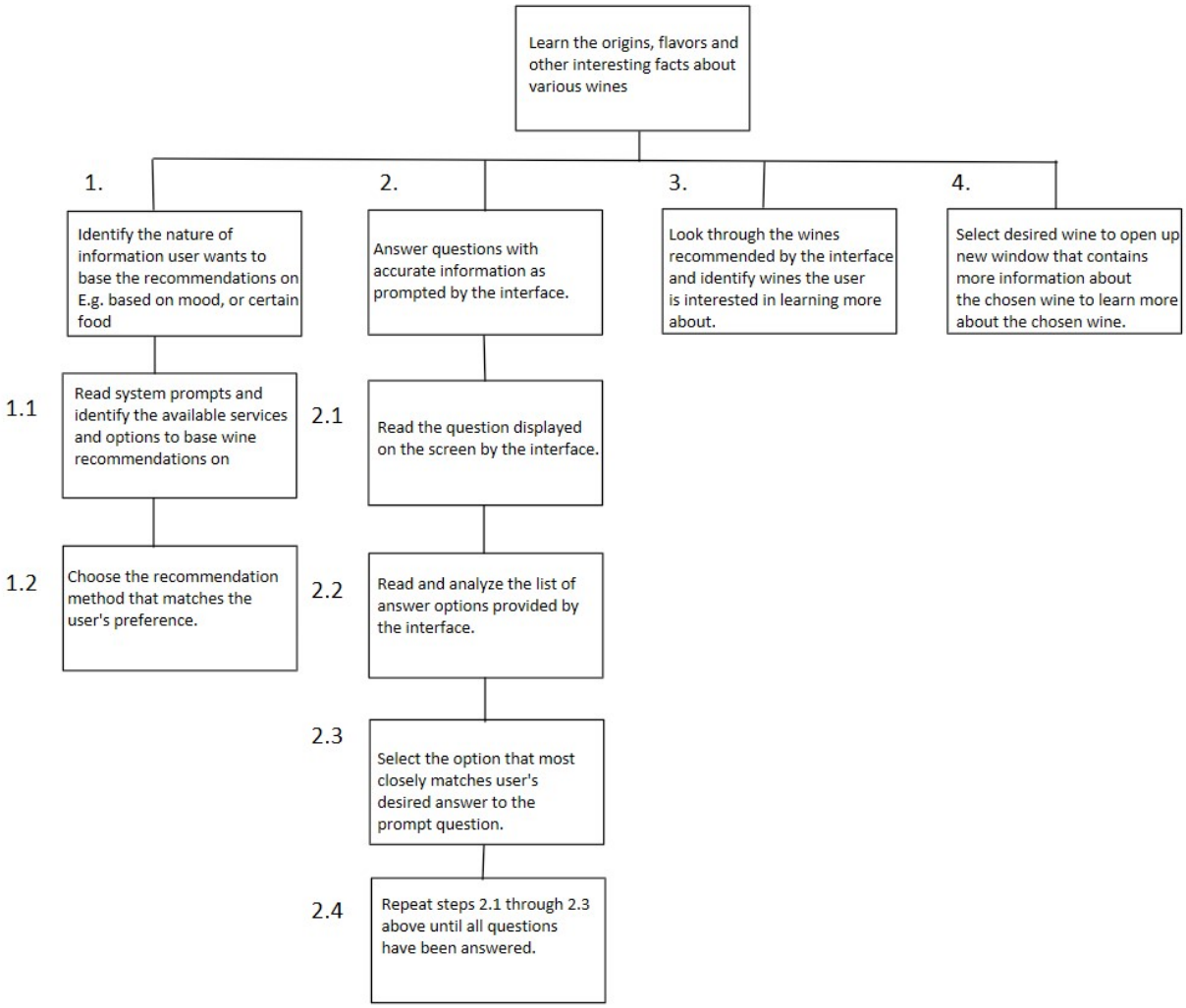
I. Pair Mood



II. Pair Food


Pair food and wine
1.0 Query user for the type of food he / she is planning to have
2.0 A new window with description about the food chosen and related facts, history etc. opens.
3.0 User selects the wine suggestion shown
1.1 Show user food suggestions as they type using text autocompletion.
2.1 A list of wines that go well with the dish are shown below the food description.
3.1 User is taken to the information page about the chosen wine.
1.2 Show the user a list of foods matching the search query
2.2 User chooses a wine with a click
3.1.1 User is satisfied with the suggestion.
3.2.1 User is not satisfied with the suggestion
1..3 User selects the desired food
2.3 Statistical data about user satisfaction for the chosen comination is shown with a popup visual alongside a button to learn more about the wine.
3.1.2 View purchase options and / select desired vendor.
3.2.2 Option to go back to reselect is shown, go to 2.1

III. Wine Explorer



5. Reflection

The original VINO concept offered a comprehensive, one-stop-shop solution to the wine purchasing process; beginning with better educating consumers in making informed decisions that would quickly redefine wine heuristics; previous works in the online marketplace are driven by taxing wine recommendation services (i.e. via extensive questionnaires), however fail to account for the total picture; VINO hoped to change that. Moreover, many of these sights suffered greatly from Las Vegas style design choices, overwhelming users with aesthetics and little utility. VINO quickly became an opportunity to redefine the aesthetics of the process as well.

Considering this, the original VINO concept sought to tackle four key concepts, integral to the wine purchasing domain. These concepts were as follows: (i) purchasing wine by mood (i.e. how the consumer was currently feeling); (ii) purchasing wine by food (i.e. what the consumer was looking to have with their meal); (iii) purchasing wine from exploration (i.e. offering options for a more adventurous user); and (iv) purchasing wine from the best vendor (i.e. an alternative means of search to the VINO audience). Quickly the VINO concept was reinvented however when the design team was faced with the reality of actually implementing the interface.

VINO was instead reimagined to offer a more comprehensive understanding of its target audience about wine products, however, would leave it up to its audience to take creative license in actually obtaining the wine product. In doing so, this immediately reduced the number of key tasks from four to three, and instead allowed VINO to redirect the three remaining tasks toward a single, generalized results page - where each task served as a means a navigation to get there. Once the concept was reimagined, the VINO team was ready to begin prototyping. Instead of developing an evolved prototype however, a throw-away prototype was designed for usability testing - even after weeks of wireframe and mockup designs. Though this allowed for quickly vetting the logic of the VINO system, the usability tests became no longer reflective of the VINO product, at most just guidelines for its implementation and design. As usability tests were conducted on the throw-away prototype near the end of VINO's conception, this left significantly little time in actually developing the VINO product; had the VINO team utilized an evolutionary prototyping approach instead, VINO usability tests could have instead been performed on a more comprehensive prototype, not to mention features be more refined before VINO's release.

Vetting of the throw-away prototype so late in the VINO prototype lifecycle also lead to a greater design problem for the VINO team: the inability to conduct more defined usability tests on the final VINO product. As the usability tests themselves were designed in respect to the throw-away prototype, they really did not assess the integrity of the final product. Especially as the final product was made from scratch, however the InVision Prototype utilized third party software for drafting (a fundamental difference between the two). Moreover, had usability tests been conducted as well on the final VINO product, not only would the sample size for testing increase in size, but the VINO team would have had deeper insight into how the changes in design or implementation may have actually impacted the product. Perhaps even tasks would have been clearer to users conducting tests, offering deeper insight into where the product could adapt elsewhere. Ergo, as usability tests had not been conducted on the final product, there was no way for the VINO team defend the final design choices other than as "corrections" from the InVision Prototype. Had this been addressed sooner in the VINO life cycle, perhaps an even more comprehensive solution to understanding wine may have been offered.

Finally, in respect to the usability tests themselves, they had not been well-defined for testing the throw-away prototype itself. As such, though there were questions standardized across subjects, controlling the timing of testing each subject had not been considered, nor reading from a talk-track or transcript. Naturally then, there was variability in observations across subjects due to experimental error. Had this not been a confounding factor, it's completely possible the VINO team may have been provided additional insight to better augment the final product.

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