THE CONSCIOUS FOODIE

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ABSTRACT

The "Conscious Foodie" App is destined to highlight the importance personal grocery shopping data has on helping people lead a balanced consumption lifestyle. The idea behind its creation is that an appropriate management solution is missing from enabling users keep a balance and consume any kind of food in the right amount. The app allows users make shopping lists and reflect upon their consumption patterns only with the use of their smartphones. In this report we present the core concept and our way of implementing it, additionally we describe experiments for testing and improving the idea in practice. The ultimate goal of the project is to pave the way for a tool that can promote behavior change in human buying patterns.

Index Terms— Personal Informatics, Consumption, Buying Patterns, User Experience, Interaction

1. INTRODUCTION [AN]

Throughout the history and evolution of Human-Computer Interaction (HCI), various attempts have been done to enable self-optimisation and governing of self, as quoted in "Know Thyself" [1, 2, 3], with a methodology called self tracking [4]. Deriving from HCI, self-tracking started as a practice to further understand individuals cognitive or behavioural psychology as an attempt for self-reflection and self-knowledge [5]. Nowadays, with the integration of mobile phones in daily lives of people, self tracking has gained enormous potential to enrich one's life and well being [6].

The "Conscious Foodie" is HCI research prototype that is thought through the scope of a personal informatics system [7]. Personal informatics is a class of systems in order to collect and reflect on personal information through personalized data. A proposed stage-based model is used and is composed of five stages, preparation, collection, integration, reflection, and action and can be seen in the Fig. 1. These five stages are the "backbone" of the implementation of the "Conscious Foodie" and will be further analysed in the Analysis part (Section 1.1).

Research in HCI has integrated quality, effectiveness and efficiency of the self tracking interfaces with variations of GUI implementations [2]. In order to inspire the creation of a robust personal informatics platform and reach a high level of usability, an experiment and an evaluation took place. The users are consistently involved in the design processes by putting their needs and goals at the center of the engineering process (section 3).

The prototype section defines our "Conscious Foodie" prototype and the method section describe the usability's evaluations and experiments carried out to reveal characteristics of self tracking users who would be interested in tracking their groceries. The result and discussion section discuss the results of the evaluation and experiments. The future work prospects concludes this paper.

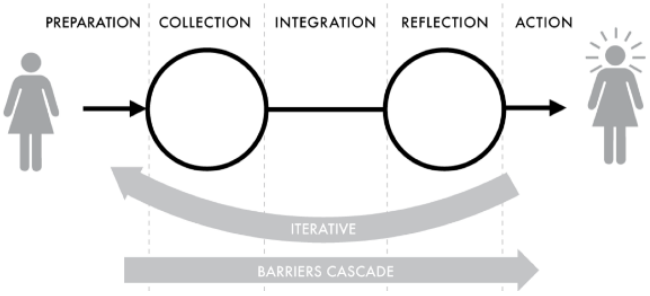

Fig. 1: The Stage-Based model of Personal Informatics Systems and its five stages; preperation, collection, integration, reflection and action.

1.1. Analysis [AN]

The motivation behind the prototype is to build a personal assistant that promotes a balanced consumption. Through these troubling times, mainly during the COVID-19 global pandemic, every individuals reality became a challenge. We learned a new way of living with self-quarantine and that most certainly impacted drastically our routines and that caused an impact on well-being. Self-control and a balanced consumption is now very easily looked upon comparing to challenges that we daily face.

"The Conscious Foodie" is being build upon the aforementioned principles of self-tracking and personal informat-

ics and is a prototype that tackles the problem of over-consumption of certain food products. As humans are habitual creatures, habits influence different aspects of their everyday lives including food consumption. Food consumption is an exhausting task for many everyday, thus the humans nature to habituate eating is profound. Individual habits propose an easy alternative that is quick to activate in human memory over alternatives that most of the times propose a "slow-to-modify" memory trace [8]. Considering the challenges that modern reality proposes, with its complexity, stress and exhaustion, self-control can be thought as a very challenging thing to maintain. However, habits can be learned through actions, by pursuing goals daily through strategically implemented moves and self-controlling. It is an iterative process and "The Conscious Foodie" scopes to implement exactly that.

People consume out of habit, many times over-eating things that they truly like for long periods of time. Past a threshold this "routine consumption" might have a bad impact in the user, leaving him uninterested in even thinking about consuming the same food ever again (even if the food is nutritious!). This is the problem that the Conscious Foodie tries to tackle and rephrased in a sentence is, "What can the user do to continue enjoy the things that he likes, maintaining a consumption balanced". The prototype with a methodically managed consumption provide personal informatics in order to eat consciously while maintaining the appeal of certain foods for longer periods of time.

As mentioned in the Introduction (Section 1), the proposed personal informatics system, apart from its five stages, carry specific characteristics [7]. The "Conscious Foodie" is mainly a *user-driven system* in its core that demand attention from the user. It is also a "uni-faceted system" that it only collects information about consumption (items bought and quantity). This means the user self-tracks his buying history (*preparation stage - user driven*) with a clever implementation of a to-do list that also serves as a shopping management tool that "cleverly" engage the user (*collection stage - user driven*). The integration stage is considered *short* as it does not need any preparation from the user to proceed into the reflections, thus is considered *system-driven*. Going into the reflections stage, the user can engage *long-term* as there is a Monthly, Yearly and Seasonal view of statistics (but more on that on Prototype section 1.2) (*system-driven*). Based on the reflected outcome the user is able to proceed into action with statistics that inform him about contributing factors that disturb a balanced consumption. This last stage is considered *user-driven*, as the user is responsible for deciding on actions to take depending on their conclusions from the data.

1.2. Prototype [EAV]

The first time the user opens the app is welcomed with a playful intro screen for reminding the core purpose of the app which is nothing else than achieving a balanced consumption. The main screens for logging groceries to be bought are the "Basket" where the groceries appear before they are crossed out at the store and the "Grocery Bank" which works as a pool of logged groceries, either added by the user for later use or the ones that have been already bought (buying history). After the intro, and whenever after the first-time-use the user enters the app is directed to the "Basket" screen for easy access. The main user flows presented in our Figma prototype are (i) Adding a new grocery to the "Grocery Bank", (ii) Crossing out a grocery at the store, (iii) Viewing "Reflections" including statistics of previous buying behaviour.

For the first flow, the user starts from the "Basket" screen, which is empty in the first place and taps the "+" button which navigates to the "Grocery Bank". There the user has the options of either choosing to add groceries to the "Basket" from the existing ones in the list (meaning the ones added for later use or those that have been previously bought) or add a new grocery to the list. By tapping the "Add New Grocery" the user is directed to the screen for adding the new grocery name, category (which is a predefined list for now) and optionally the quantity and then either save the new grocery and add it to the basket ("Save & Add to Basket" option which is also followed for the prototype purposes) or just save in the "Grocery Bank" for later use.

In the second flow, crossing out a grocery at the store (after a fast-forwarded basket filling by tapping the "+" on screen 8 in the Figma prototype) the user is presented with some selected groceries that are in the basket, by tapping at one (i.e. "Milk Full Fat" in our prototype) the screen for finalizing and crossing out the grocery is shown. There is the final step where the user can add the quantity of the bought product (both having the option of adding its weight "gr" or volume "l") and is presented with the possibility of choosing from "Shortcuts" which are predefined values based on previous acquisitions of the same product. A tap to the "Cross from List" button returns to the "Basket" screen while in the background the bought grocery is added to the top of the "Grocery Bank" screen.

Regarding the flow for previewing the reflections, the user taps on the "REFLECTIONS" tab opening the screen where all the statistics of past buying behaviour can be seen. In the current state of the prototype, the user can see the most/least times bought a product, the most increase/decrease and the top categories, with the possibility of visualising them based on "Monthly", "Yearly" or "Seasonal".

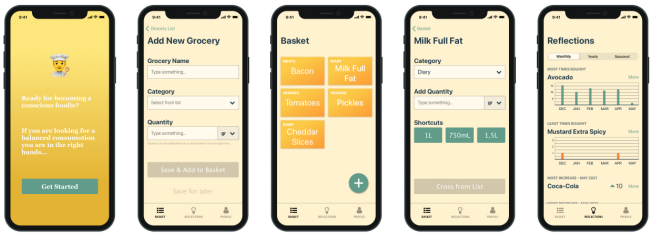

Fig. 2: Screens of the Conscious Foodie App prototype.

2. RELATED WORK [AN]

The idea of "Conscious Foodie" is inspired and improves upon the existing implemented mobile application, "Bring!" that can be found on the digital store platforms. The "Bring!" app focuses on simplifying the planning of your grocery shopping with others that share the same platform. You can create, share and collaborate on other shopping list. It can also provide recipes something that is not in the scope of the "Conscious Foodie". It is mainly used as a management tool and as a recipe provider.

The "Conscious Foodie" builds upon this idea by integrating the stage-based model of personal informatics system, made for personal data collection and self-reflection [7]. As described in the Analysis and Prototype part, the organization of the "Bring!" style to-do shopping experience implementation, is used to engage the user into the data collection part but this time, in order to do more truthful and close to reality insights, the user has the option to depict the exact quantity of the specific food bought. This serves as a means in combining two different tasks into one; providing a tool into organizing the shopping experience and engaging the consumer elegantly into the personal data collection stage providing him with useful reflections later on. As this "twist" in the concept of a shopping experience was missing and the "Conscious Foodie" fills this gap, providing the need for self-exploration. Summarizing, the "Bring!" idea is centered around collaboration, food management and recipes where as the "Conscious Foodie" is centered upon the self and the ideology of a balanced consumption.

3. METHOD [PG]

We selected food tracking in particular grocery shopping as the self tracking domain that we wanted to study. The selection had a four way objective of tracking consumption, health, expenditure and food waste. Consumption was selected as it is not a recognized topic of self-tracking yet and has not been studies much when talking about personal informatics. Health was selected as what we eat is central to our health.Expenditure could help promote better financial habits reducing wasteful spending. Also tracking groceries could help reduce food waste through improved meal planning , helping mitigate financial and environmental impact.

3.1. Participants

We surveyed relatively younger population ranging from 18 and 45 years and have at least gone to high school, translating into a more technologically literate population. We believe this is consistent with demographics of current self-trackers.50 percent of surveyed people were students, 25 percent were full time workers and the rest was covered by part time workers, self employed and unemployed people.

3.2. Apparatus

The data was collected using two methods. First, a questionnaire was prepared on "www.freeonlinesurveys.com" regarding the goals and reflections that would influence the buying behavior of the consumers. Secondly, two different apps were created with Ionic Framework and were used to collect data regarding the effectiveness of different UI setups for entering shopping to do list data. A phone stopwatch was used to measure task completion time and a phone was used to record the video of them doing the task in a thinking out loud setup.

3.3. Procedure

The questionnaire was shared through various groups of experts and non-experts people and responses were collected. The groups were targeted through WhatsApp and Facebook and through other social media channels due to concerns about safety during the current COVID-19 pandemic.

The experiment is to be carried out at home of the participants where they would be asked to input a predefined list of groceries into different versions of the conscious foodie app and their performance will be measured in task completion time and accuracy.

Due to the pandemic the procedure of carrying out the experiment is as follows:

1. The participant will be first called on zoom, teams or other video calling channels.

2. The apps will be shared with them in accordance with their phone platform and they will be asked to install them.

3. Instructions will be given to them about the task they need to perform which will be to create a shopping list for the groceries inside the app which would be shared with them in the next step. They will be told that they would have to repeat the task with three different grocery list, each corresponding to a different version of the app

4. They will be asked to open the first app and grocery list-I will be shared with them containing 10 items. The timer will be started at this point as soon as the list was shared

5. The timer will be stopped when they will be able to input the entire 10 items in the app.

6. The same procedure will be repeated with a new version of the app and a new grocery list, two more times.

7. A questionnaire will be shared with them in the end, asking questions about their experience, state of mind while doing the task etc.

8. The participants will be congratulated for completing the experiment and thanked for their time.

3.4. Design

Usability Evaluation Questionnaire: The questionnaire was designed keeping in mind the goals that people would want to achieve through tracking their grocery shopping and to gauze their current behavior regarding grocery shopping along with collecting demographic information.

They were asked the following key questions:

If "Conscious Foodie" were a person, which of the following adjectives do you feel would best describe their personality?, *What would you want to accomplish through a conscious food buying experience?*, *What information would you be curious about in your consumption pattern?*, *What timescale would you think your consumption pattern would be meaningful?*, *Do you keep track of your monthly food budget?*, *Do you know your most consumed product?*

Experiment: The user spends most of his time on the main screen where he sees the list of groceries he can choose to buy. As this page is important for the interaction of the user and the app, the experiment was designed to figure out the best UI Design for creating a To-do List at Home. The attributes of the experiment are as follows:

- Goal: What is the best user interface for creating a grocery list?
- Dependent Variable: Task completion time, Accuracy
- Independent Variable: UI Button Layout
- Test Conditions: (i) UI Setup 1- Long rows with one item per row (ii) UI Setup 2- Square boxes, three in one row (iii) UI setup 3- Two items in one row.
- Participants: Developers(Experts), DTU students

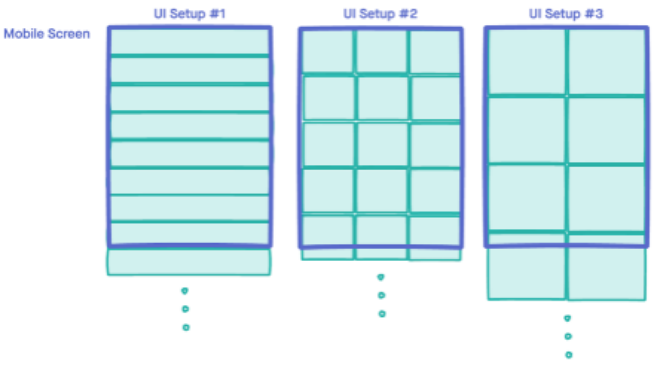

Fig. 3: Different UI designs

4. RESULTS [PG]

Experiment: The usability experiment has been designed but due to the COVID-19 pandemic, the participants for the experiments couldn't be recruited impartially. Also since the experiment needed to be done on the user interface and the task was to create to do lists in different apps, all of the different applications having the ability to be deployed on multiple platforms to run an impartial study, the experiment results have been deferred to Future Work. We are able to develop one app in Ionic, which could be deployed on Android, iOS and web as part of the course and the development of the other app would be part of the future work. Based on the observed results, we proposed design and functionality recommendations that can be used for the development of mobile apps for the personal grocery tracking system to support their goals.

Usability evaluation: Feedback from participants showed the users requirements for a range of different types of refection from their grocery data (Method: Thinking-Out-Loud).

Question	Popular answers in order
Conscious Foodie Person	Thoughtful, Aware, Balanced
Shopping Frequency	Bi-Weekly, Weekly
Number of people buying for	1,2
Meal cooked per week	7-14, 3-7
Goal from using Conscious Foodie	Better Health, Less food waste, Lower expenditure
Consumption Pattern Interest	Nutritional value, Environmental Impact
Consumption Timescale	Monthly, Weekly
Tracking monthly budget	50-50
Most consumed product knowledge	50-50

Table 1: Questionnaire Results

5. DISCUSSION [AN, EAV, PG]

Evaluating the concept through the scope of the Personal Informatics System, we need to point out that the users should be highly motivated in order to self-track their food buying history. The proposed tool is very user-driven hence requiring a fair amount of engagement added to a normal daily task such as shopping at the grocery store. However, data collection is tackled with the implementation of a to-do list that serves as the main management and organization tool. The integration part is met seamlessly making the user efficiently reflect on personal statistics. Regarding the action part, the quality of the reflection passes the responsibility of taking action to the user successfully.

Looking at the questionnaire results, we find that most meals people have are home-cooked, hinting towards a correlation between food consumption and grocery buying. By using the app the users can also reduce the shopping trips needed as our research indicated an unnecessary number of them. Because most people don't always buy for themselves only, it is not possible to calculate individual consumption with zero degree of error. Also, as we are creature of habits, people actually are not aware of their most consumed product. This could give out some new revelations. Finally, people were generally interested in the nutritional value and environmental impact of their consumption which ties directly into their goals for using the app.

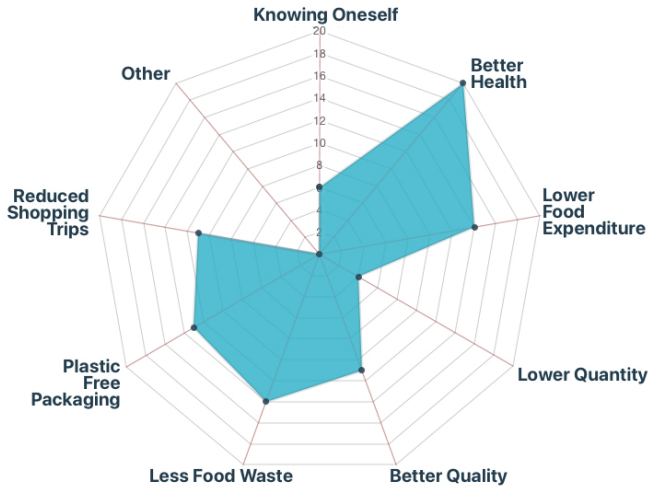

Fig. 4: Results to the question "What would you want to accomplish through a conscious food buying experience?"

It is important to note though that in the data collection stage of our personal informatics system, currently we are collecting the following data points (table 2). Taking into account what reflection is desired, it can be said that more dimensions need to be added to the product in the database, mainly health index. Also shopping expense could be captured through scanning of the bill. Another layer that could be added which would keep track of your home inventory and automatically add items to your shopping list that you always want at your home. This could help reduce food waste.

Name	Type	Comments
Product	String	Unique item name in the database
Quantity	Float	User input, can be edited while creating to-list or shopping
Timestamp	timestamp	Created at time of shopping automatically
Category	String	Has a group of products under it

Table 2: Data Collection

Last but not the least, the difficulties in completing this HCI research revolved around the idea of managing food waste. Collecting the information around sustainability mainly food waste still remains an unsolved issue as it needs greater efforts from the user in preparation and collection of the data.

6. FUTURE WORK [EAV]

The core of what will drive our future work is understanding perfectly what the users would like to achieve through our app, and this definitely will not be singular. Through contacting more potential future users we will get insight and redesign the reflections part so that it matches well with the demands of the majority of users. This is directly tied to a mandatory database restructuring, which involves adding and editing to the grocery features, currently being only grocery name, category, quantity and timestamp bought. Last but not least, the user flows can be refined so that the app is enjoyable and handy in use. To do so more experiments and A/B testing is needed, targeting particular functionalities and UI elements that the user would come across for accomplishing a particular task. Specifically, a countdown timer that resets monthly is thought to provoke the user into action for increased engagement.

7. CONCLUSIONS[AN, EAV, PG]

With this report, we can conclude that "Conscious Foodie", a grocery informatics system can be implemented. Data is being collected through a to-do shopping list and relevant reflections are generated using some key data stored in the database that can provoke a change in human behavior. One of our key findings is that even though the app was designed around consumption the users were more interested in health information and sustainability which could be built on top in the future.

8. REFERENCES

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9. APPENDIX

The functional app was developed but the needed more UI improvement and work on reflection page. Here are the screenshots of the current app screens which would be later made to mimic the Figma prototype

Fig. 5: Functional App Screens.