

Experience Prototyping: Evaluation Protocol and Testing Plan

In parallel to development and design of FridgePrint, I continued to collect more data through probes into behaviours to evaluate how well FridgePrint's features reduce food waste and change consumer behaviour the most.

In order to evaluate whether FridgePrint is achieving its aims and hitting the outcome of reducing food waste and ensuring the features are adding value, I conducted three prototypes and evaluations in order to evaluate the following features of my medium-fidelity prototype:

1. Expiry Reminder/Notification
2. Food item ownership colour tags
3. Household foodprint visualisation and comparison

In this way I can evaluate the features of the system in the context and location where it would be implemented, and this allows for users to evaluate it with consideration of their environment and lifestyle. This provides me with more details on any arising social and mobile issues that need to be considered moving forward. Therefore, I can get a better understanding of what it is like to engage with such a system in a location and context specific space (i.e. kitchen/share house environment, social context of housemate interaction/food sharing).

Method

1. Initially over few days to a week observe and measure user food waste behaviours (what foods throw own, expiry)
2. Then introduce the system's prototypes (as outlined below) for a few days to a week and observe/measure the food waste behaviours and impact on users.
3. Compare findings and identify insights.

Prototype 1 – Expiry Reminders

- Aim:
 - To validate and strengthen the findings to date about the effectiveness of including a feature that notifies the user/housemates about the expiry and tracks it.
 - To determine the impact of awareness and presence of the food item expiry on food waste and user behaviours.
- Method:
 1. After user consent, go through their fridge and note down the expiry dates.
 2. Send the user text messages before the expiry.
 3. After conducting over the time period, interview the user to see the if the notifications change their behaviour.

Prototype 2 – Food Item Ownership tags

- Aims:
 - FridgePrint has a unique feature of colour tags for identifying whether an item is individually owned or shared.
 - Evaluate if raising organisation, coordination and visibility of the household member's food item ownership status and expiry date are effective in reducing food waste and changing user behaviours.
- Method:
 1. After user consent, go through their fridge and add coloured labels to food items with the expiry date and who owns that item.
 2. The user then is provided with coloured tags and adds to items when add to fridge.
 3. After the period of testing, interview user on impact of the tags on their behaviour and food waste.

Prototype 3 – Foodprint Visualisation & Comparison

- Aims:
 - Validate that changes made from previous iteration to include self-as-other comparison and social comparison among the household on the food waste statistics assists in raising awareness and evoking actions to reduce food waste.
- Method:
 1. After user consent, get the user to track the item they threw away the most that week, the item they quickly consumed before its expiry and the item they consumed the most.
 2. Then get them to do the same for the second week/time period.
 3. Gather the self-reported statistics and bring the household members together and display a visualisation on their fridge (where can see frequently throughout the day).
 4. After a day, discuss with users the impact of the visualisation and comparison – their feelings, thoughts, motivations and next steps.

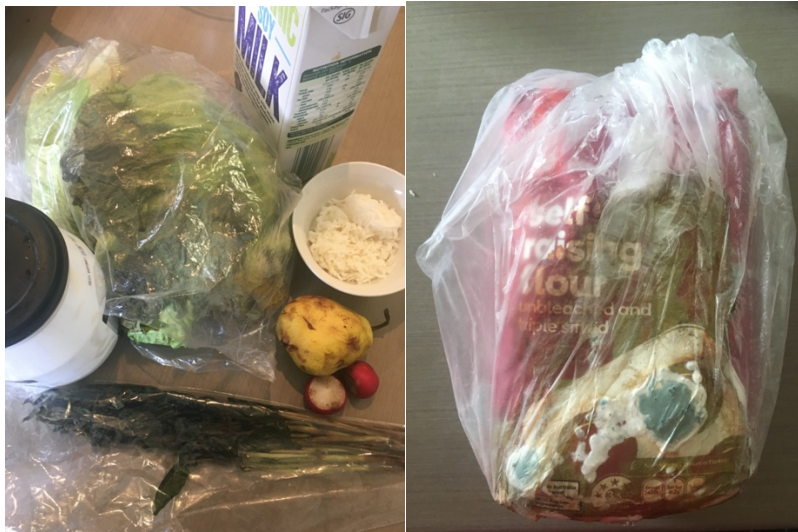
Experience Prototyping: Evaluation Results

Pre-prototype food waste behaviours – observation and interview notes:

Users: one multi-household with student users evaluated

- Fresh raw mince – left over raw from pack, used some and rest forgot so it went over expiry and threw away as a result
- Chicken breast – same as mince, some left and threw out
- Yoghurt – two thirds eaten, rest forgotten and expired and still in fridge – found and threw when installing prototypes
- Yellow cheese – pushed to back of fridge in cling wrap and was not visible so had moulded from few weeks ago – didn't realise
- Cucumber – ate some and one cucumber was left and was in bottom of draw hidden among bags and had rotten a bit and was yellowing and soft – threw away as didn't want to eat
- Broccoli – forgot and was going bad – didn't use in time and threw
- Lettuce – half remained in bad and was browning
- Few radishes had cut up to eat and was in small bag hidden away behind other items in fridge
- Pear – single remaining, softening and rotting
- Leftover – little bit of white rice in bowl – didn't eat in time
- Soy milk – about a third of bottle remaining – opened another milk and didn't consume in time and left it
- Basil – way past expiry – brown to black rotting in bag purchased, unused – was squashed at bottom of draw and didn't know about it until went through fridge during setup

Below are photos of the food that was found in the fridge spoilt. The users were shocked about the visible mould and surprised by the other ingredients like the yoghurt as they hadn't had a chance to first get it out from the back shelf and look at its expiry and eat it in time. They were surprised by the amount spoilt/expired food that they had in the fridge that they said they wouldn't have really found until they cleaned it out here and then.



Prototype 1 & 2: Notes of expiry dates of items in fridge (18/10)

Item	Date cooked or opened	Expiry	Eat within #days from opening/cooked	Expiry date (used on sticker added to fridge)
Leftover sweet potato x2	Cooked 2 days ago		5-6days	21/10
Leftover vegetable stir fry	From last night		3-4days	21/10
Chicken breast		21/10		21/10
Passata	Opened 16/10		3-4 days	20/10
Almond milk	Opened 15/10		3-4 days	19/10
Blueberries	Purchased few days ago			25/10
Carrot	Purchased about a week ago			20/10
Leek (1/2)	Purchase about 3 days ago			26/10
Cabbage (1/4)				25/10
Avocados x2	Purchased some days ago			21/10
Paw paw (1/2)	Ate some today			20/10
Apples				
yoghurt	Opened 1today		5 days	22/10
Zucchini vege balls	unopened	25/10	3 days	25/10
hummus	Opened yesterday	6/12	3 days	20/10
Buk choy				26/10
pickles	Opened about 2 weeks ago		3 weeks	28/10
2 slices yellow cheese	Opened weeks ago,			31/10
Pancakes x2	Cooked 17/10			22/10
Bread (1/4 loaf)		30/10		30/10
Caesar dressing	Opened weeks ago	01		-

**note: fridge contained some items with long shelf life including jams. For the purpose of this evaluation those were not included as after looking at the state of the items they would remain good for a while and so would not be able to provide as beneficial data during this short period of testing.*

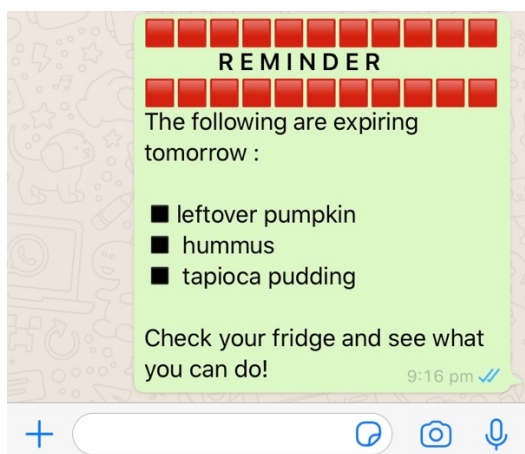
Prototype 2 Setup:



- Household member 1: pink sticker tags
- Household member 2: green sticker tags
- Shared items: yellow sticker tags with expiry date

Note: fridge was 'cleaned out' as setting up this as off items were removed.

Example message sent to users:



Feedback Results After 5 days:

- Users liked to be reminded about the items in their fridge and their associated expiry
- Commented it helped them – thought could eat that day got text message
- It kept them in check – like the structure and routine – this reflected in earlier research
- They felt at times they needed a bit more of a push rather than just a passive notification to actually make them attend to the item -Reflecting on this, could consider timely prompts that are location-specific to the kitchen when a user is there.
- Found the coloured tags to be beneficial in improving visibility and awareness of items – however as they were actually in physical fridge it was mentioned some fell off (due to cold), got squashed or hidden at the bottom. Especially the vegetable drawer. This hindered the full effect to be seen.
- Manual labour if locating the coloured sticky notes, writing date on it every time purchased was time consuming as labels continually fell and was difficult to manage. Commented that manual entry of dates was time consuming – need for something more automated
- Reflecting on this, it seems that adding labels and writing dates physically to track the items is more consuming as it requires more resources and actions to be taken compared to a simple interface screen which only requires a few taps.
- Users commented that they actually used few items sooner than they usual would as they saw the bright pink label. The green and yellow labels were noted to be too pale to identify.
- While users liked the approach of the prototype idea, they noted that it may not be practical to firstly physically write and add paper tags also having physical tags in the fridge – the items pile up and get mixed. They preferred an interface that would display the items in one screen rather than having to go through fridges shelves.
- Reflecting on this, could consider recommending to users to organise their shelves in the fridge based on housemate. However, this should not be enforced as earlier from the photo study and user research, different share houses like to organise their fridge in a particular way. Still, FridgePrint uses the common shelving organisation identified to categorise the interface display.

Prototype 3 Notes from user interview:

Results:

Week 1 (5 days):

- User 1
 - Most wasted
 - Half a block of cheese from about a month ago
 - Most saved
 - sauce
 - Most fav
 - Watermelon
- User 2
 - Most wasted
 - Almond milk
 - Most saved
 - yoghurt
 - Most fav
 - dates

Week 2 (5 days):

- User 1
 - Most wasted
 - passata
 - Most saved
 - Hummus
 - Most fav
 - Tapioca dessert
- User 2
 - Most wasted
 - mango
 - Most saved
 - Yellow cheese
 - Most fav
 - Yellow cheese

User Feedback:

- When sharing the information with household member and making it apparent what the waste, the user felt a bit responsible and guilty
- It was mentioned that tracking the food wasted against 'saved' would be intriguing and convincing data to make users think however the users commented that this approach was too basic and didn't have much impact on their food waste behaviours.
- Just knowing one of the foods they wasted the most doesn't tell me much – what if I wasted multiple items – maybe it should highlight the amount rather than the one I wasted the most, although I do like to know what I did waste more often as that would help to improve on that

- Didn't see benefit of favourite item and felt it was redundant and added no real value to the aim of the system no to the users themselves
- Visualisations were mentioned to me more useful, especially if simple as can see progress and track it
- The ability for the user to reflect and see what they wasted, this concept proves to assist in changing user behaviours as they are more aware of actions as tracked and noted