DESIGN RESEARCH PAPER:

Visual Laundry Sorter

Abstract

This article discusses the concepts, interviews of a user flow, comparisons, limitations, and the future goals for the app, "ViSorter"- (Visual Laundry Sorter). Discussing how the app can effectively sort, wash and dry their clothing, avoiding damaging and risks, and extending how long they are usable and providing benefits for the environment.

Sin Wa Lao (71838)
Emily Carr University Grad Project of
Core Studio Interaction Design
Professors Ben Unterman & Haig Armen

10 Mar 2020

Sin Wa Lao (71838)
Professors Ben Unterman & Haig Armen
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Many people find washing labels[1] hard to understand which is the main point when they are sorting laundry. Sorting laundry has many benefits: extending the life of clothes[2] for improving the quality of life, reducing the chance of bacteria exchange for keeping people safe and hygienic, using the correct laundry method can also protect the environment[3]. People can get these benefits by using my application design "ViSorter" – (Visual Laundry Sorter).

Product Overview:

This app will help people to analyze, sort, wash and dry their clothing effectively. One of my design purposes: to convince those non-sorting laundry users to start to sort their laundry. By attracting them to use an int elligent application, that simplified the traditional sorting steps and provide additional laundry tips. Using this app will help laundry stop being a complicated chore and help the environment through a more thoughtful method of doing laundry (see fig 1). My design also extending how long the washing tags are usable. This app has additional features, such as personal laundry calendar.

Fig 1. App Designed by Sin Wa Lao

[1] Affairs, Office of Consumer. "Guide to Apparel and Textile Care Symbols." *Office of Consumer Affairs*, Innovation, Science and Economic Development Canada, 28 June 2019, https://ic.gc.ca/eic/site/oca-bc.nsf/eng/ca02009.html.

[2] "Clothes Last Longer and Shed Fewer Microfibers in Quicker, Cooler Washing Cycles: First Research into Impact of Wash Cycle Times Shows Benefits of Shorter, Cooler Washes." *ScienceDaily*, www.sciencedaily.com/releases/2020/01/200114173110.htm. Accessed 02 Feb. 2020.

[3] The Santa Barbara Independent. "Wash Clothes on a Quicker, Cooler Cycle to Reduce Environmental Damage, Says Study." *The Independent*, 14 Jan. 2020, www.independent.co.uk/life-style/washing-machine-clothes-microfibre-pollution-best-cycle-temperature-a9282901.html.

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Professors Ben Unterman & Haig Armen
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Canadian scholars, Tammi Feltham & Laurel Martin, proposed that the proportion of women using the care labels on clothing is higher than that of men. Studies indicate that a quarter of people ignore this symbology directly, most of the men and young people.[4] Therefore, my design simplified the laundry sorting process and combine it with an intelligent application, adding fun and convenient functions to the laundry steps can make men and young people more actively participate in the laundry. The cool, new technology can decrease their feeling of disgust then encourage them to actively participate in family housework activities. This is why I choose my main target audiences are youth teenagers. I hope to some degree: reduce the pressure on housework from women and mothers which is also a way to training and improving young people's independent living ability. In the process of using the app, users can learn the better way of doing laundry, which can promote the idea of protecting our environment, while saving money and having a better healthy life.

Survey, the first research method that I choose, did not give me useful information (User Flow) that I am looking for, so I move to interviews and some research for example from Consumer Reports[5] how the expert do their laundry. I interviewed 50 people by phone and face to face interview from the 18-65 age range (see fig 2: Interview Research Statistical).

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[4] Feltham, Tammi & Martin, Laurel. (2006). Apparel Care Labels: Understanding Consumers' Use of Information. Marketing. 27. https://www.researchgate.net/publication/228295594_Apparel_Care_Labels_Understanding_Consumers'_Use_of_Information

[5] Janeway, By Kimberly. "10 Ways to Save Energy Doing Laundry." *Consumer Reports*, 2 Oct. 2019, http://www.consumerreports.org/laundry/energy-saving-laundry-tips.

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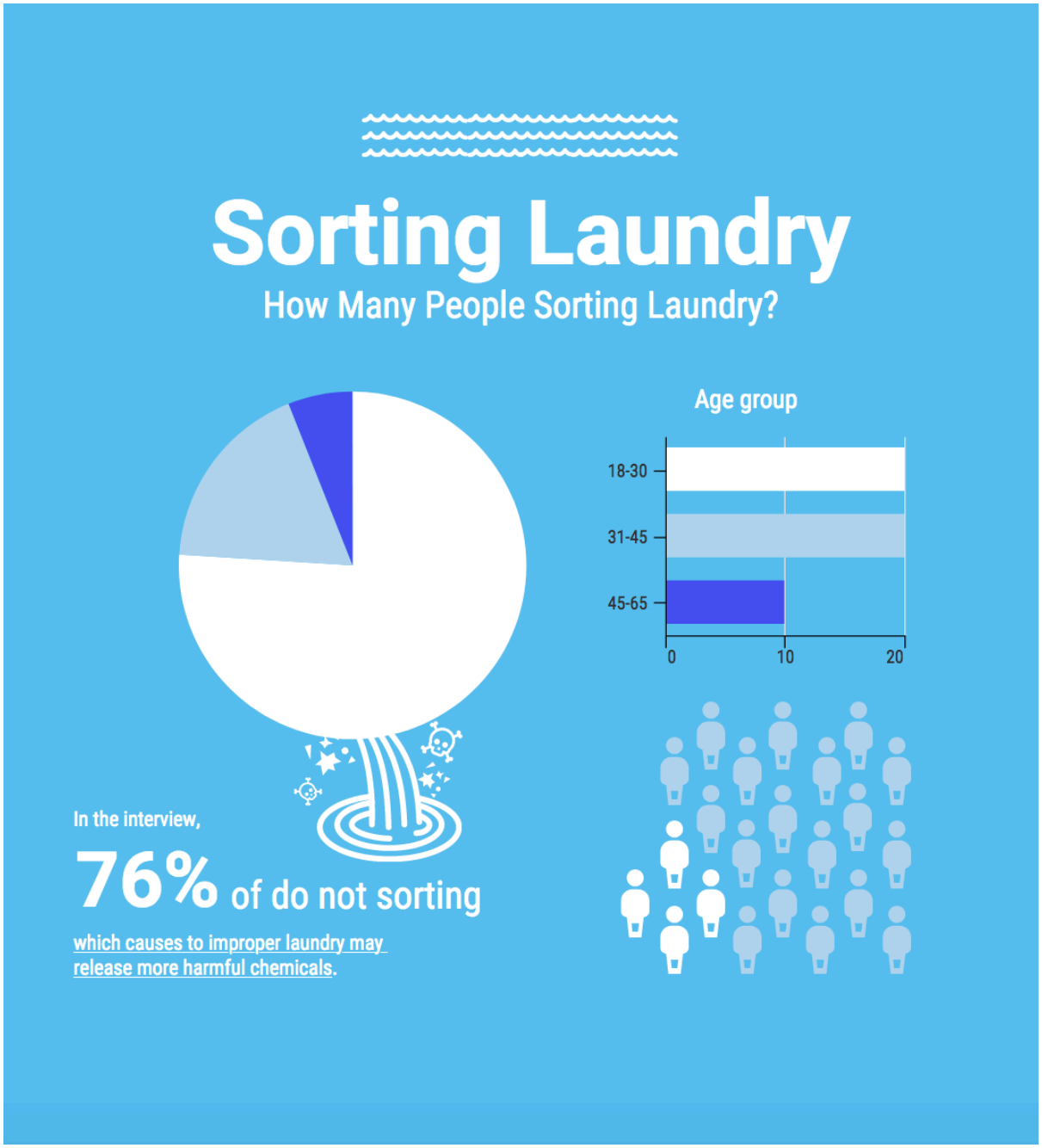

Fig 2. Interview Research Statistical by Sin Wa Lao

The interview is about asking them how they do their laundry. Their laundry user flows helping me to analyze both advantages (see Appendix 1: Benefits of Comparison for 3 Types of User Flow), gain and pain points (see Appendix 2: Users' Gain and Pain Comparisons). I divided them into in groups based on their behaviors

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(see Appendix 3: User Journey Map Comparison of 3 Types of User Groups): the first group (see User Flow 1) is traditionally sorting laundry experts, I found that they were usually elderly female and mothers with rich laundry experience; on the other hand, the second group (see User Flow 2) do not sort their laundry and usually young men or living alone. In Appendix 2 Comparison of Users' Gain and Pain Points, by analyzing different groups identified the gain and pain points of non-sorting laundry people through observation, simplifying the traditional sorting steps, should attract the non-sorting people to use the intelligent application to perform laundry classification. The third group (see User Flow 3) is an imagination of how the technology can help if the second group people to use my smart app with laundry sorting.

I found that the second group of respondents is generally very interested in this app, so they are my main target users. Besides, the first group of respondents still are my potential future users, because the result showed they will use the app if in these two situations: a) to organize garments, b) no additional mobile app is needed. I change my design idea based on these results. First, adding the care function, which provide information of caring clothes. Second, to make the system built-in the washing machine is a limitation of nowadays technology (see Appendix 4: Differences Between App, Sync App, RFID Built-in Laundry). So I focus my design to the laundry schedule instead, which I found neither group having the concept of laundry schedule. This finding highlights the importance of this feature.

Based on the interviews, users' main pain point is a laundry sorting time (see Appendix 2: Users' Gain and Pain Comparisons). People would not spend much time

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Professors Ben Unterman & Haig Armen
10 Mar 2020

and the sorting garments, so I try to streamline the user flow to keep everything nice, easy and simple because it is an app based on scanning. My design uses image recognition technology to integrate laundry tags with the same meaning but different images. The laundry instruction is performed on the app when users scanning tags on clothes. I try to not interrupt users' processes and behaviors; it just shows up when users need help for the clothes they don't know how and when to care for.

But my design idea is more than that: Laundry schedule[6] -> **Laundry Calendar**.

One of the habits of the experienced group is the use of laundry schedules. Different articles of clothing need to be washed with different frequencies, and the app will help users track this. As well, the app will use the date on time, date, location and weather to provide additional suggestions about washing frequency. Even though some people who know when they should do their laundry, they will still forget to do it for a special event sometimes. To benefit even the most experienced users the app will also integrate events from their calendar, reminding them to wash the specific clothing they need. For example, to prepare a swimsuit for beach party; to wash clothes more often during flu season and summer; to clean his clothes when he comes home from the hospital, based on the information that the app got from maps; to do the laundry machine maintain. These reminders push information on time, which increases the relationship between the user and the app.

[6] Willett, Megan, and Florence Fu. "Here's How Often You Should Wash and Dry Clean Everything in Your Closet." *Business Insider*, 21 July 2016, http://static.businessinsider.com/how-often-wash-dry-clean-clothes-2016-7

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Product Interface:

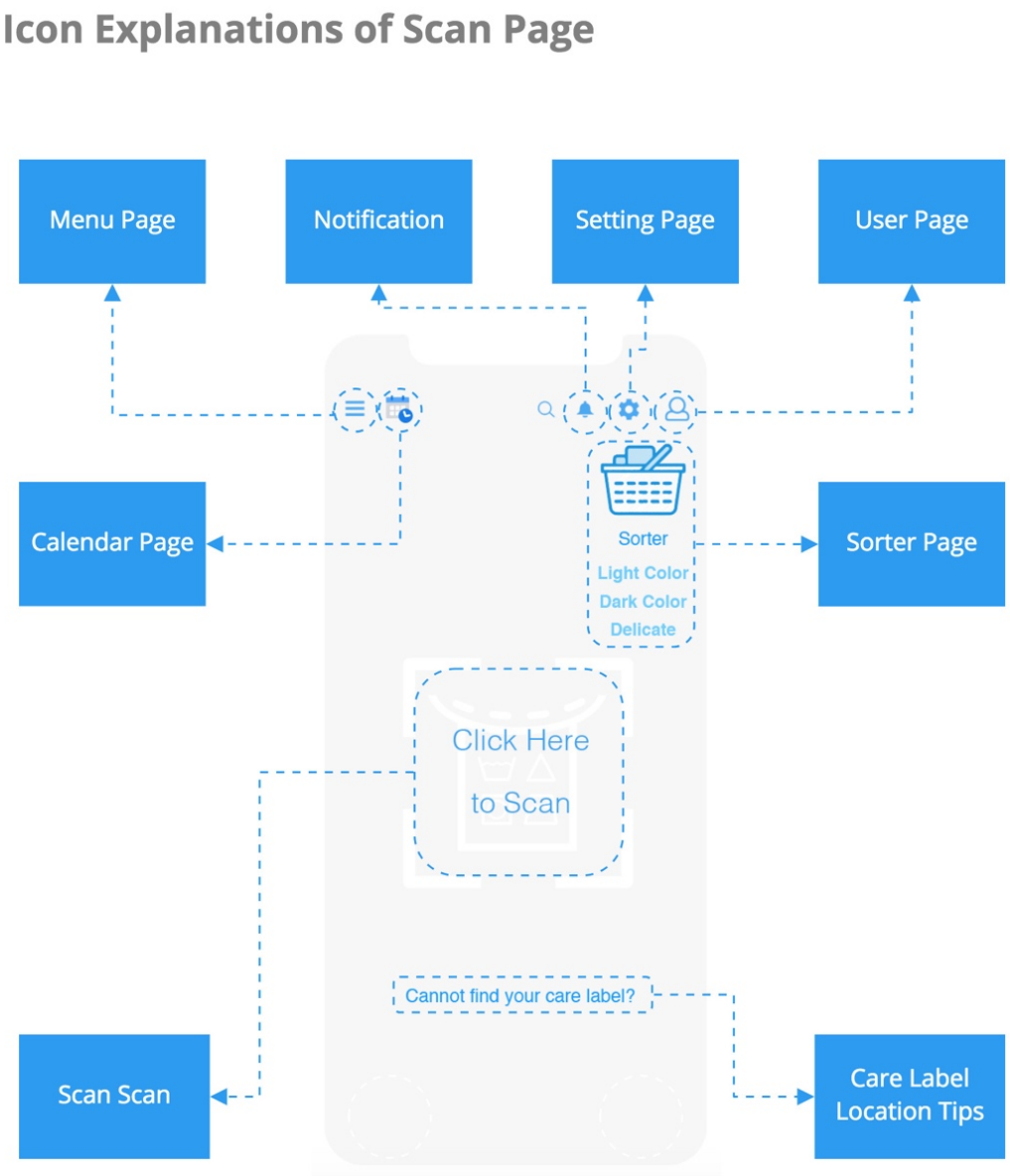

Fig 3. Icon Explanations of Scan Page Designed by Sin Wa Lao

- **User icon**: can build and select each name whom users do laundry for, or build a laundry category for a special person, such as baby, infectious disease penitent. By changing the user base, the different types of loads will be changed. Users can save and name the preferences for next time.

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- **Searching icon**: can quickly search base on scanning labels or searching keywords for the urgent situation that not happen before: such as: how to clean period blood stains, makeup stain, coffee, ink, baby poop, etc.; and let users choose if it happens on special materials wool, silk, etc.

- **Setting icon**: general users can choose the model of their laundry machines. After connecting the smart home system. Users can tap to scan and let users pick up the clothes which should not wash in the same load. It warns if an overload or lighten the load.

And the login function will apply in the app as laundry suggestions of new clothes from linked the shopping website or app. Shopping reminders to remind users with sensitive skin to choose a certain material that avoids allergies or choosing green product brands and materials to increase users' enthusiasm for purchasing environmentally friendly clothing.

Development plan is to add more functions in the future:

1. Built-in technology: in the future, we hope to combine intelligent RFID label technology[7] with built-in (Scan to Sort) auto-scanning and sorting steps.
2. Personal preference: for example, they give a high rating to a garment based on a personal attachment.

[7] Alvarez, Edgar. "How RFID Tags Became Trendy." *Engadget*, 18 July 2019, https://www.engadget.com/2017/08/22/rfid-tags-in-fashion/

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3. Correct ways to discarded: the app also advises on the proper disposal of used clothing
4. Promote eco-friendly fashion: the app will promote and support the eco-friendly clothing (which will be a big fashion trend for future) on the shopping reminder function.
5. Another problem that only a few people noticed is the proper use of laundry machine maintenance, which can reduce the chance of laundry machine damage. There are different levels of risk as safety issues. One is the safety of human health. The other is home safety, such as a fire caused by overloading and unclean dryer fillet.[8] Modern people rarely read the instructions book, so they will ignore the information on taboos, safety instructions, and maintenance methods. So I will embed this information into my application to remind users to pay attention and avoid problems.

My initial design: adding a board of sorter in the washer sorting by RFID care labels automatically. This design assumed that all users owned my smart laundry machine at home and all of their clothes with smart washing labels which allow laundry machines to read. But the responses of this design was not very satisfied and I lost a huge number of users by limitation of technology. I summarized the reason for the failure because I ignored the need for the assistant of laundry in the present. Although with the increasing popularity of smart home appliances, more home appliances can be connected to mobile phones and have more diverse interactions

[8] "Clothes Dryer Fires | HomeTek Home Inspections." *HomeTek Home Inspections*, www.hometekhomeinspections.ca/news-article.php?id=9. Accessed 15 Mar. 2020.

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with people[9], I need to focus on not only the future but also the transition design between now and the future popularity of smart appliances so my goal is provide higher value and more personal services in my app.

[9] Fitzgerald, Matt. "Top 14 Top Mobile App Development Trends to Expect in 2020." *Towards Data Science*, 23 Sept. 2019, https://towardsdatascience.com/top-14-iot-mobile-app-development-trends-to-expect-in-2020-7fd7718155dc

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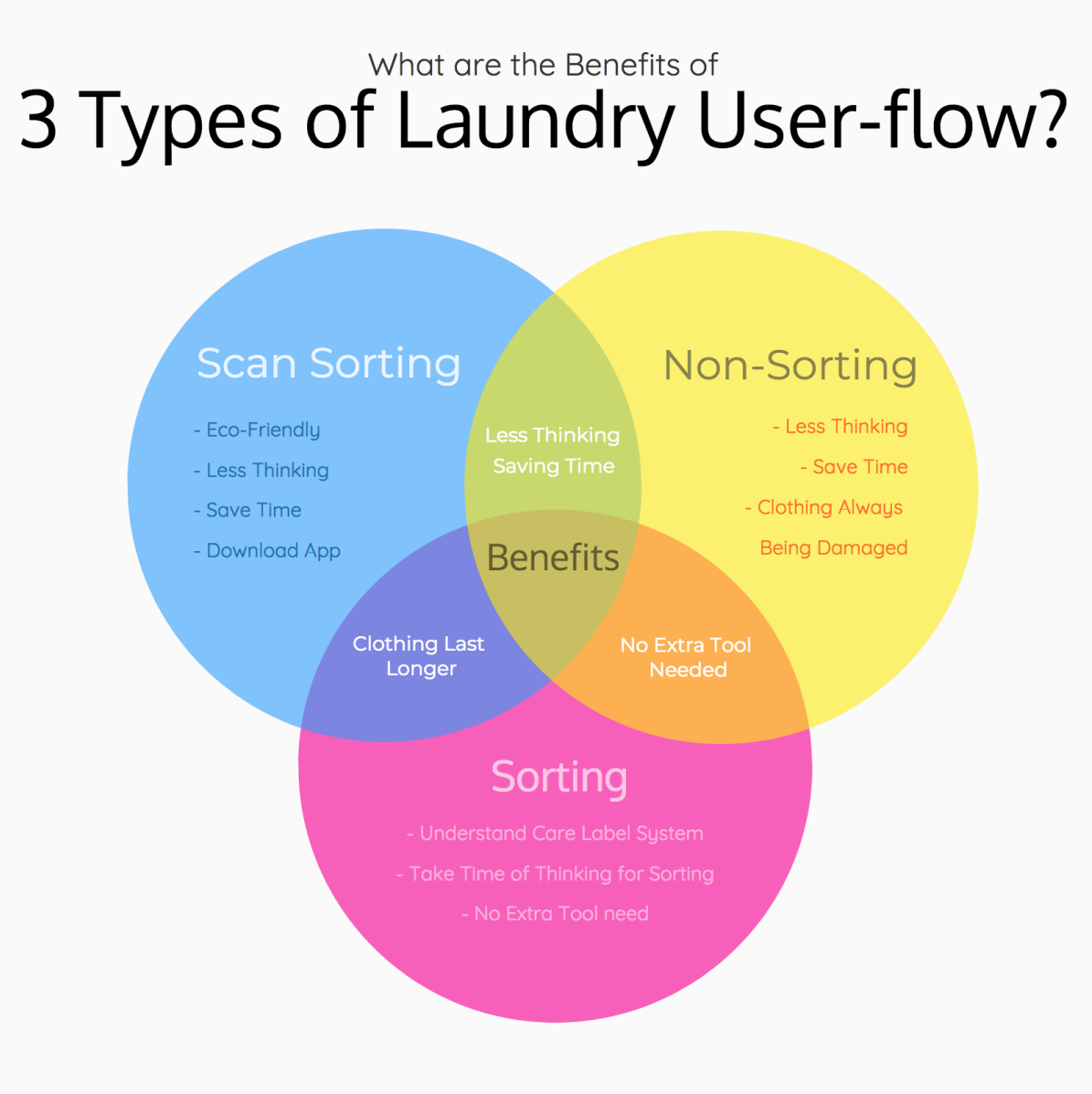
Appendix 1: Benefits of Comparison for 3 Types of User Flow



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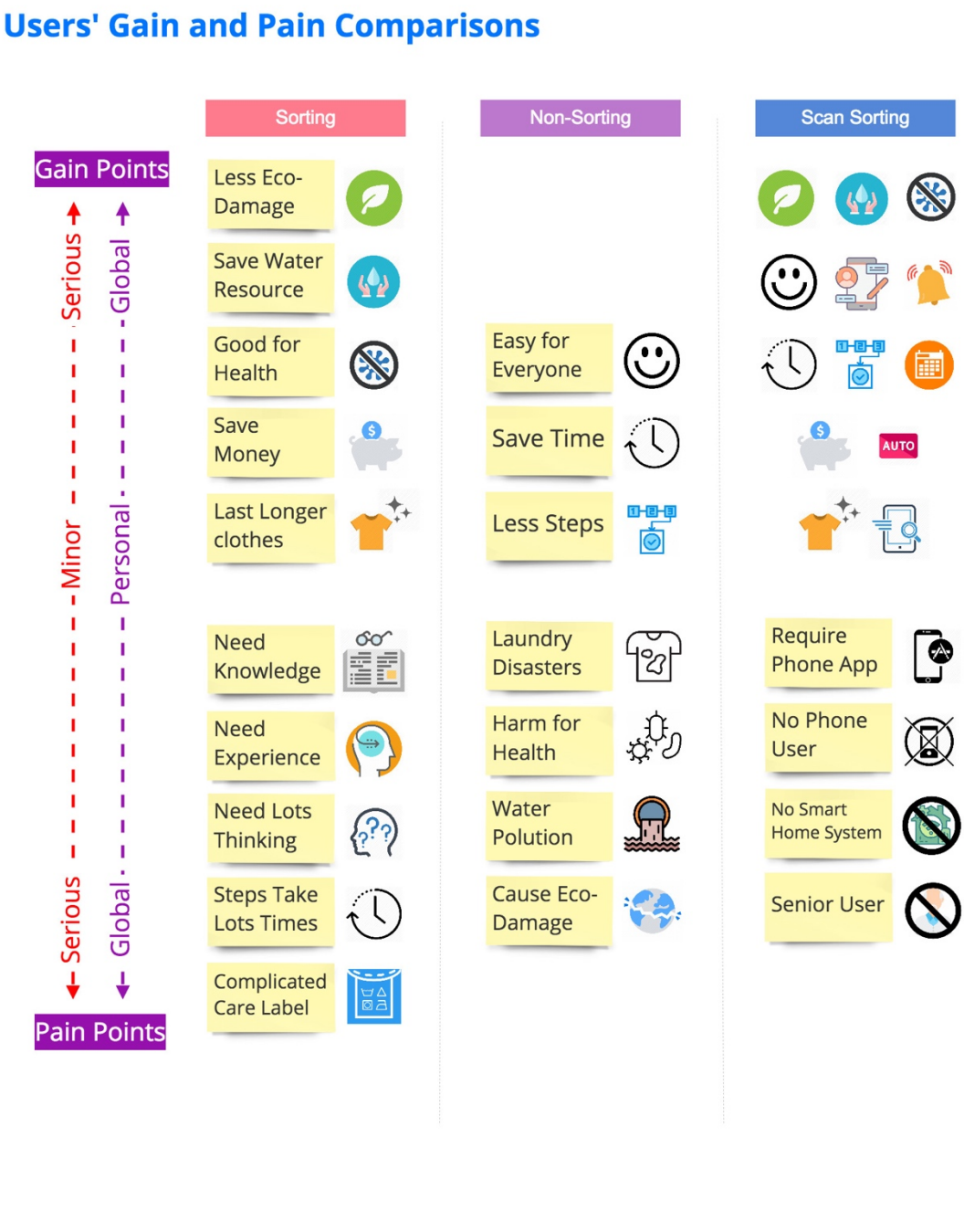
Appendix 2: Users' Gain and Pain Comparisons



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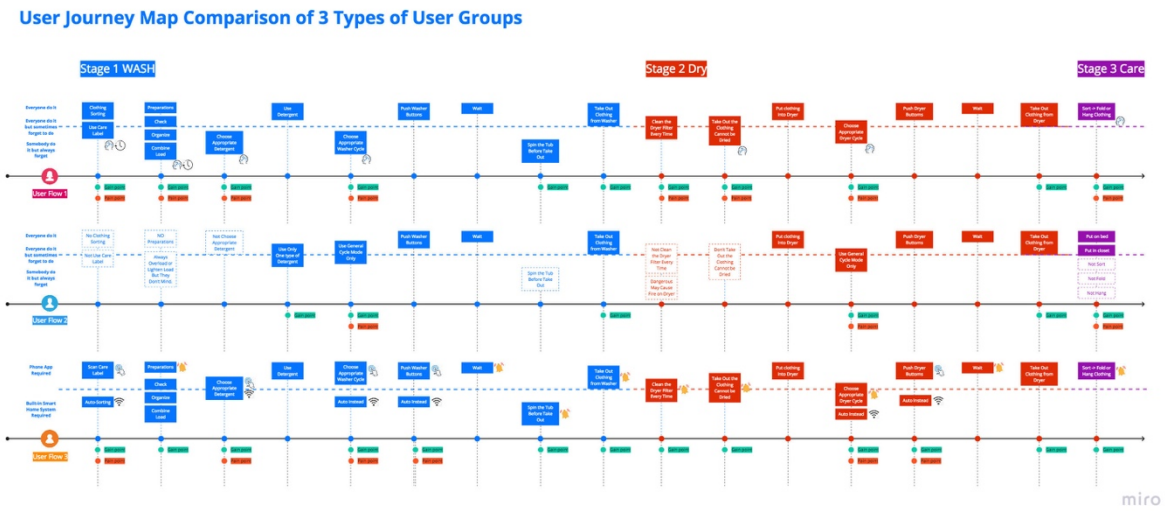
Appendix 3: User Journey Map Comparison of 3 Types of User Groups



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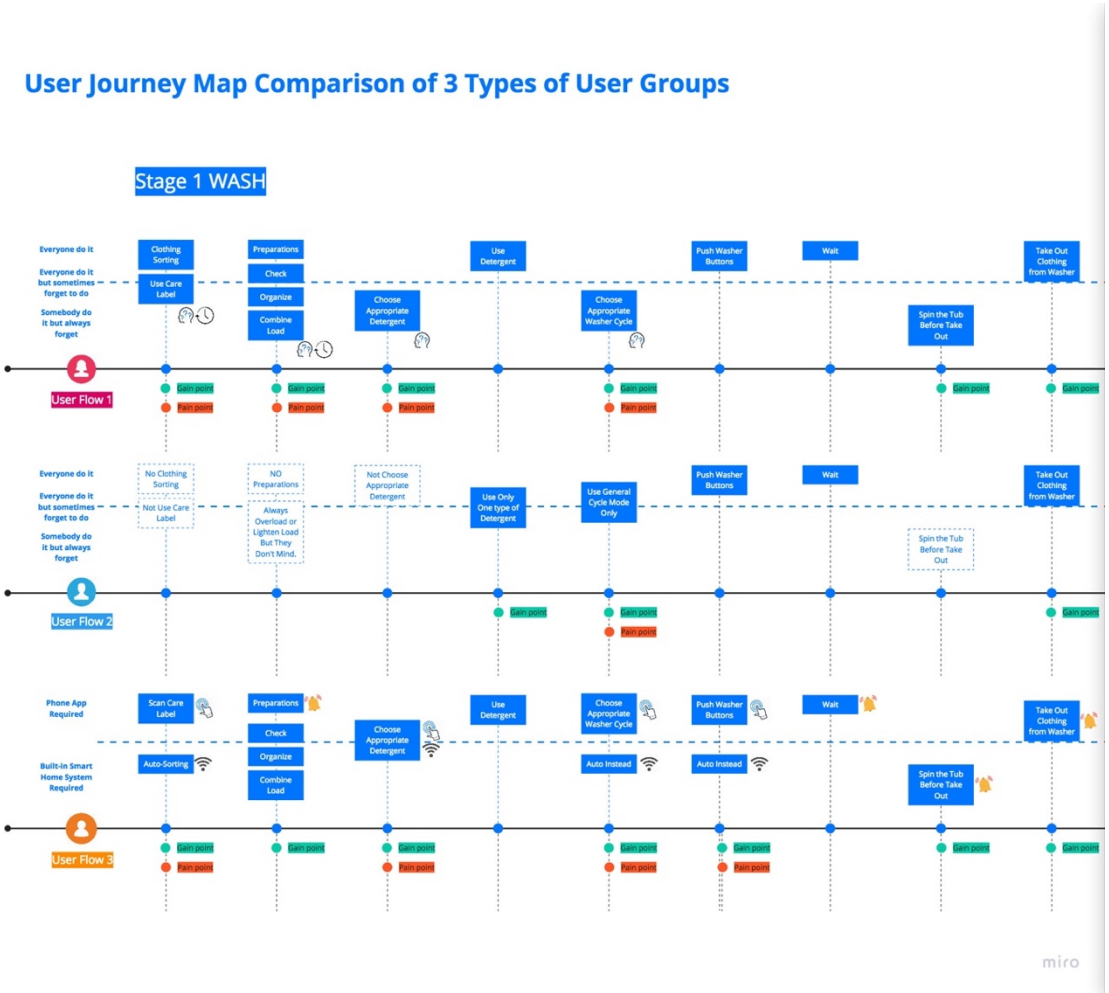

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Professors Ben Unterman & Haig Armen
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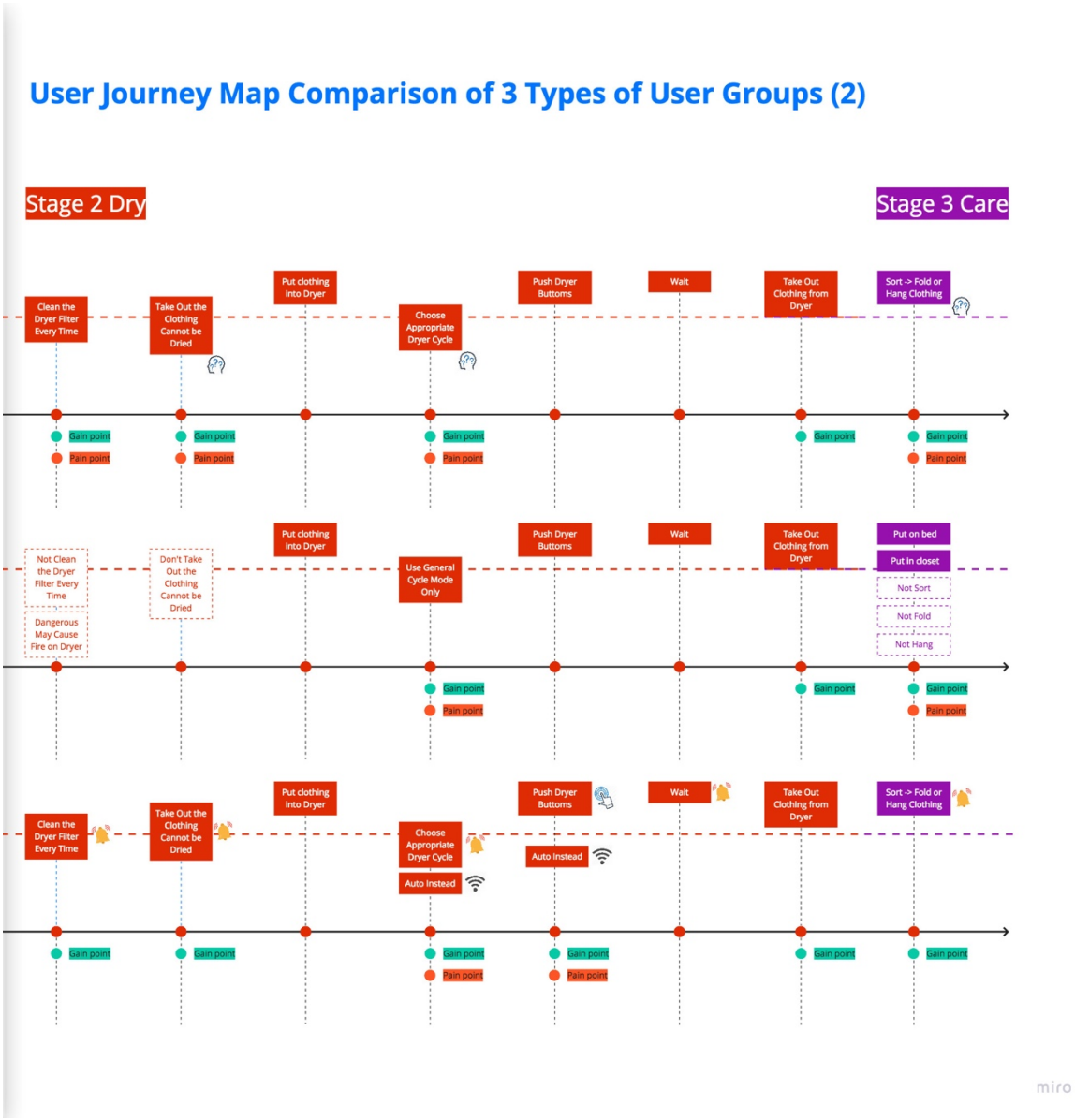

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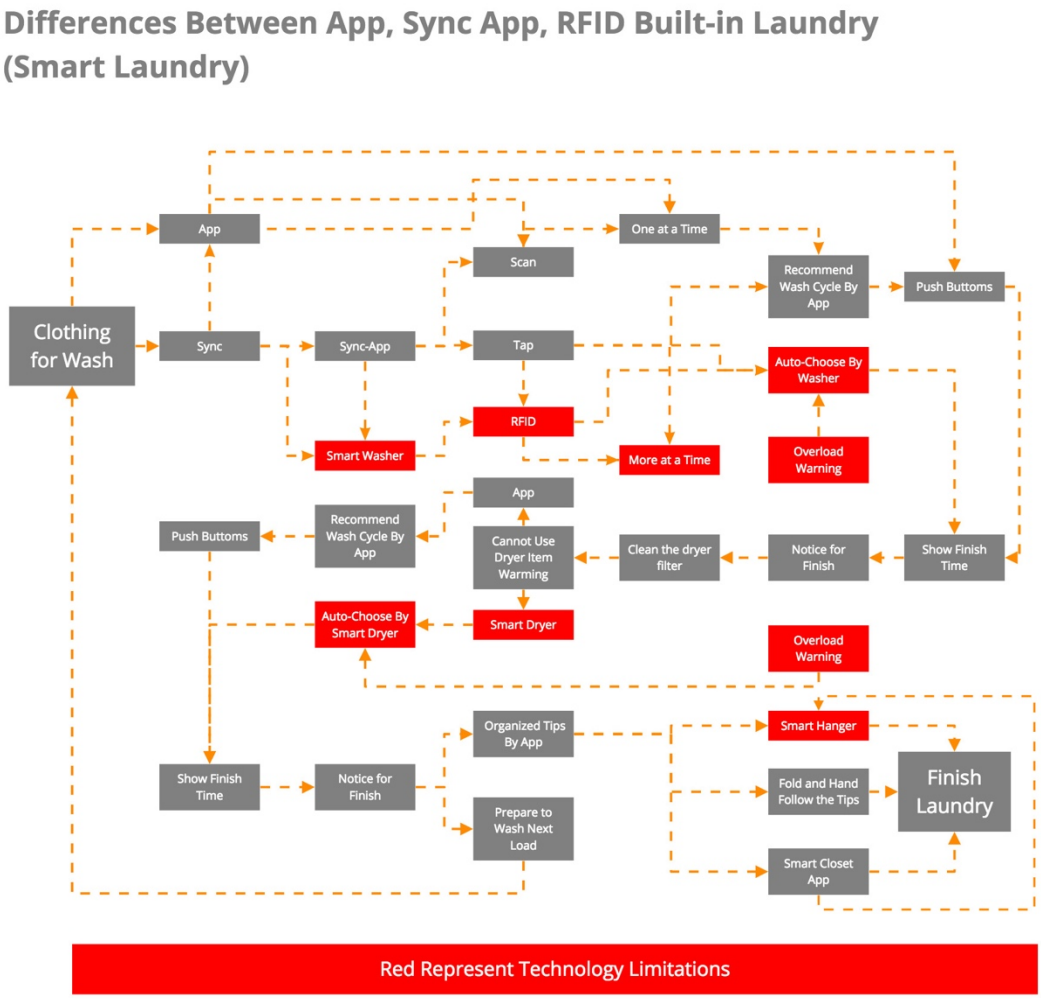
Appendix 4: Differences Between App, Sync App, RFID Built-in Laundry



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Appendix 5: Result Data from Interviews

The first is traditional classification, usually they are expert for laundry. 1. Clothing sorting: Usually they will use three or more laundry baskets for clothes. a) Skimming by eyes. First, sort by color, soil, fabric (denim, silk, woolens and cashmere). sub-categories (ex: baby garments, work cloth, underwear, sock, bedding and towel). b) Read the care label if don't know which category the garment should be. c) Just by guessing if the label cannot be read. 2. Preparation before using washer. a) Inside out the garment if print on it. b) Check all the pocket before put it into washer. c) Use mesh laundry bags for delicates and socks. d) Combine the load with small and large if possible (wash jeans with darker towels) 3 Choose appropriate washer cleaner for lighten and darken colors. 4 Choose appropriate washer cycle mode. 5 Push button for washing process and wait for finish. 6 Put garments from washer to dryer. 7 Clean the dryer filter. 8 Put garments from washer to dryer. (Sometimes not sure should some items can be use dryer or not, need to check care label again or just guessing) 9 Push button for Dryer process and wait for finish. 10 Take out and fold the garments.	**The second group is the characteristics of no classification,** 1. Put all garments in the washer without sorting. 2. Use a single type of washer cleaner. 3. Use a general cycle mode for all garments. 4. Always Overload or lighten load but day don't mind. 5. Push button for washing process and wait for finish. 6. Put garments from washer to dryer. 7. Push button for Dryer process and wait for finish. 8. Take out and put all garments on the bed or in the closet, because they don't know how to organize and fold them.	**The third group to be sort garments by intelligent applications.** 1. Sync app with washer and dryer. * 2. Choose few types of viral laundry sorters for different sort of garments. a) Sort the garments with real sorter. b) Scan the care label or garment surface if don't know which category the garment should be. Next, the app will analyze and recommend the sort type for garment being scanned. c) Click the new garment photo from the shopping bag icon if you connect the app with your online shipping account. * d) Auto scan Rfid label. * 3. Preparation notices before using washer. The checklist for washing tips (inside out for print, use mesh laundry bags, be careful for lint losers), checklist will be hidden if user always use the app for washing process. 4. User put the washer cleaner and volume that the app recommended. (User can scan to ask the app what cleaner should be use for this load of garments) a) The app will automatically choose * b) app will show the recommended wash cycle mode then start wash. 5. Notifications send if finish washing process. (Washer done, don't forget to spin the tub to loosen twisted up garment) 6. Preparation before using dryer. a) Checklist for Clean the dryer filter (lint screen) before put garments into dryer. b) Warning if that sort can not put into dryer. c) Scan the care label if don't know can it uses dryer or not). 7. Preparation before using dryer. a) The app will automatically choose * b) app will show the recommended dryer cycle by the sort of garments (warning if overload) c) Scan the care label if don't know can it uses dryer or not). 8. The app will automatically choose* b) app will show the recommended dryer cycle by the sort of garments (warning if overload) 9. Notifications send if finish dryer process. 10. Take out and fold the garments and user can search for how to fold and organize tips.
		* If you want to realize the application with so many advantages above, the following functions should be implemented on the hardware of the washing machine and dryer: firstly, you need to synchronize with the mobile phone application, and then you need to automatically detect the weight and volume of the clothes.

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Cons: 1. Always need to check care label or guess before washer and dryer process, so it takes more time. 2. It is complicated to understand and hard to remember meaning of care label. 3. Take many steps. It's not easy someone to follow the all the steps every laundry. 4. It is possible to make mistakes mainly by human judgment, which requires a lot of knowledge and experience.	Cons: 1. Increase the chances of bacterial exchange can be harm for health. 2. Increase laundry disasters (damage, color bleeding). 3. Waste water resource and more environmental damage. 4. Decrease the product life of garments.	Cons: Need to install app on your phone, not friendly for people who don't use smart phone. Need to connect with smart home system, smart washer and dryer.
Pros: 1. Cleaner clothes (prevent Bacterial exchange good for health). 2. Prevent laundry disasters (damage, color bleeding). 3. Save water resource for environment and less environmental damage. 4. Garments last longer (save money).	Pros: 1. Save time. Lazy people like it.	Pros: 1. To save energy, always wash a full load or match the water level setting to the amount of clothes being washed. 2. Eco-friendly cycle priority (quick and cold water). 3. All Automatic choose, less confusion. 4. Notifications when finish. No need to check in front of the machine. 5. Reduces the chance that clothes will become wrinkled or germs will cause clothes to have a strange smell due to being left in the washing machine and dryer for too long. 6. Cleaner clothes (prevent Bacterial exchange good for health). 7. Prevent laundry disasters (damage, color bleeding). 8. Save water resource for environment and less environmental damage. 9. Garments last longer (save money). 10. Checklist remind users and tips for washing, drying, folding and storage. 11. The advice for washing new clothes is very handy. 12. Remind users to clean the mezzanine and filter tank / mesh of the washing machine. 13. User can scan to ask the app what is the appropriate washer cleaner.