Sticky Fingers

10 Design Principles for Updating Software Interfaces

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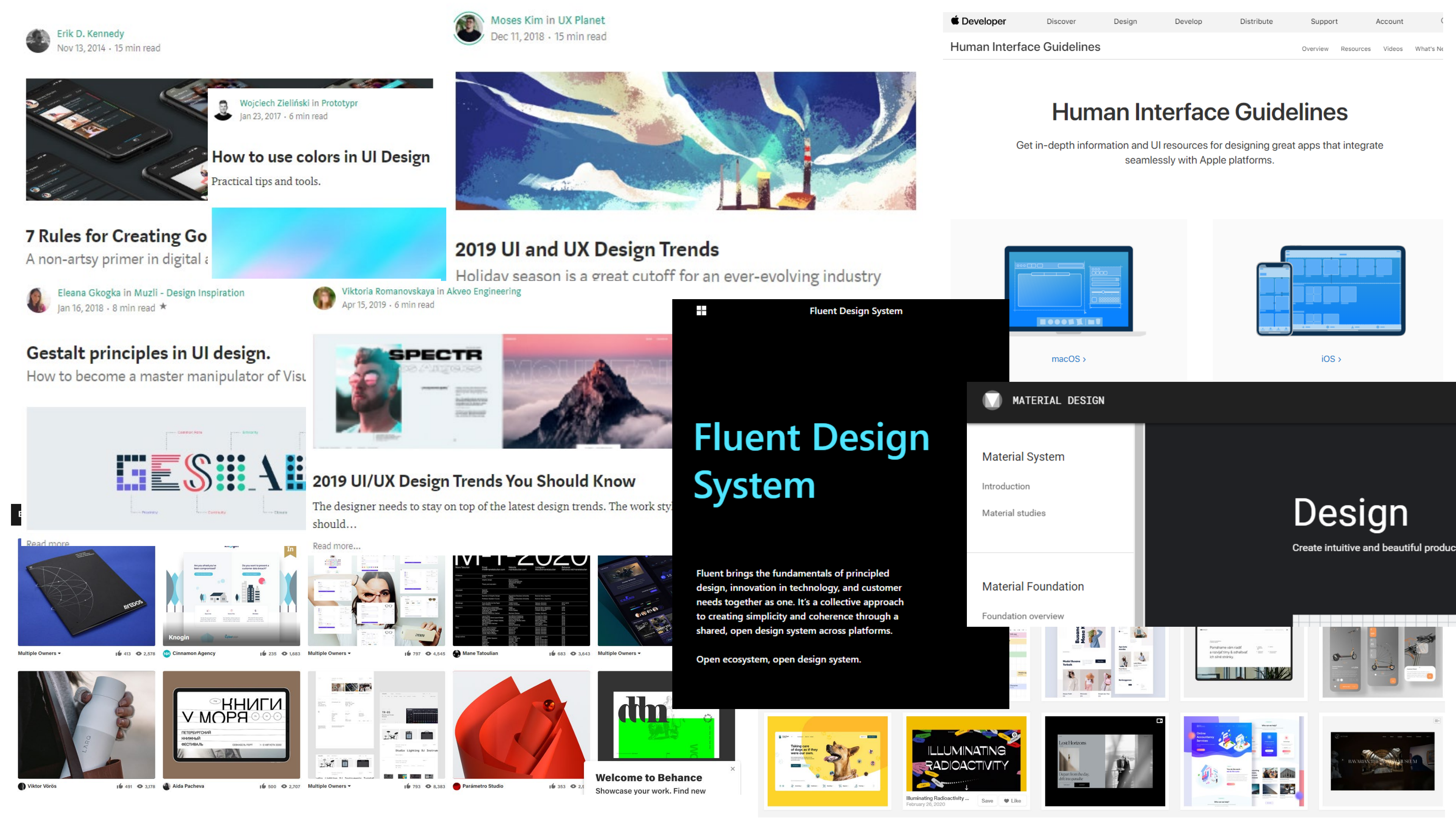
Not a dev! :O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Context

RIS

Radiology Clinics, Radiology Information Systems, and the context of inquiry

Upgrading RIS is stressful, expensive, inefficient

RIS facilitate booking appointments, billing payers, managing clinic resources

Past RIS upgrades have been rocky

Research Questions

What are the interactions that remain most ingrained and difficult to overcome when asked to upgrade to a new version of a system?

Are there underlying psychological or mental models that explain which interactions are most difficult to learn anew and why?

How can we design and develop a system that facilitates the adoption of a new solution?

Background Research

Cognitive Mapping

And familiarity

- User map interfaces like they map their city
- Know where to look to find the important things
- Familiarity can increase speed of recognition and action

Cognitive Automation

Procedural Mapping, Coping, Affordances

- Users automate repetitive interactions
- Micro-interactions are memorized
- Users only learn enough to complete their intended goals
- Rely on what a system allows them to do to know how to do things

Negative Transfer

- Bring old habits with them
- Old maps make new layouts harder to work with
- Interface elements that mirror old ones are expected to do the same thing moving forward

Self-Efficacy

- User who feel in control are more confident in their interactions
- Confident users have a more positive perspective on your system
- When they understand something they feel more agency around it

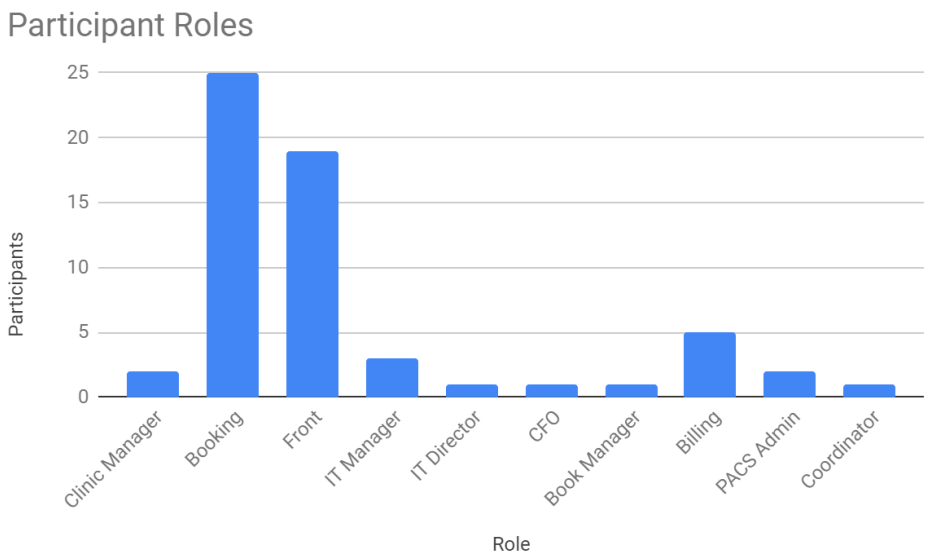
Methods

Grounded Theory (Straussian)

Data Collection:
Semi-Structured Interviews
Observations
Keystroke Level Modelling
Usability Tests

Analysis:
Open Coding (atlas.ti, dovetail)

Participants:
6 clinics
60 users



Results

Semi-Structured Interviews

2 interaction styles
Correlated to client size

Appointment Search vs. Calendar booking

Strict rules vs. Allowing personal adjustments

Users had conflated their needs with the interaction methods allowed by the system

Pexels/pixabay.com

Key-Stroke Level Modelling

We traded off the efficiency of workflows with the update

Old RIS takes longer on everything but new patient creation (20 sec vs. 23)

Search may start faster, but trades off with creating patients taking much longer

Location Recall (Hick-Hyman Law):

$$T_d = b_a \times log_2(\frac{1}{p_i}) + a_d$$

Mouse Movement (Fitts's Law):

$$T_m = k\ + I * log_2(\frac{D}{S} + 0.5)$$

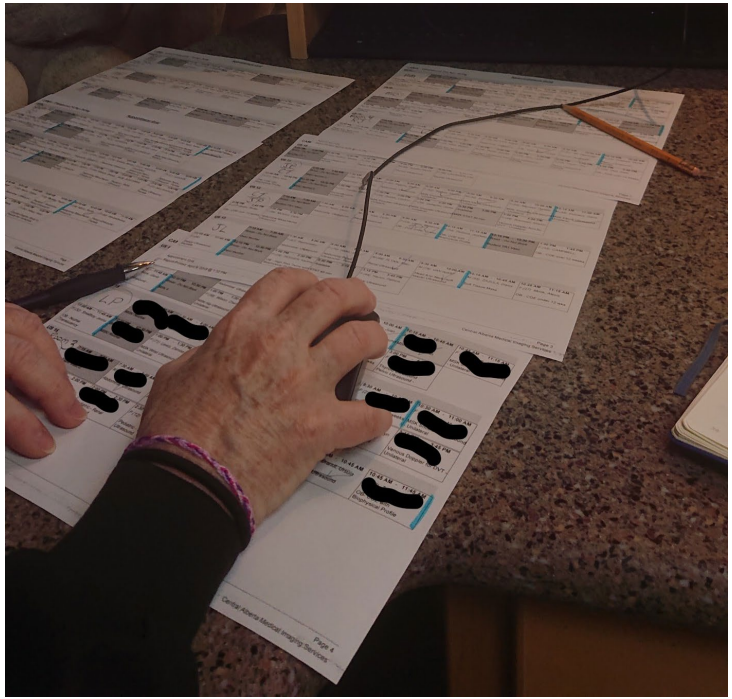
Observations

Workflows were clinic specific

Old RIS workflows were insufficient, each clinic repurposed pieces of the RIS to suit them or used paper

Clerks with more self-efficacy would customize

Pop-ups or anything taking away from the flow of interaction is distracting and disliked



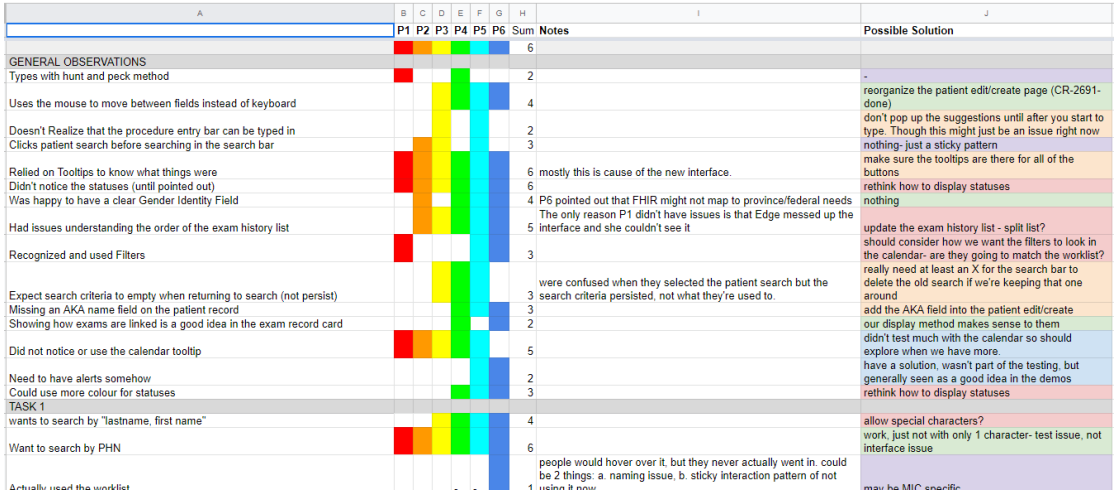
Usability Testing

Older clerks were more hesitant to try things out

Everyone double clicked, tried to click and drag to multi-select, wanted to select the calendar, and looked for actions where they had been

Status labels and colours were not understood, ignored, or unnoticed

Appointment search clerks didn't like the calendar, schedule grid clerks didn't like the booking wizard



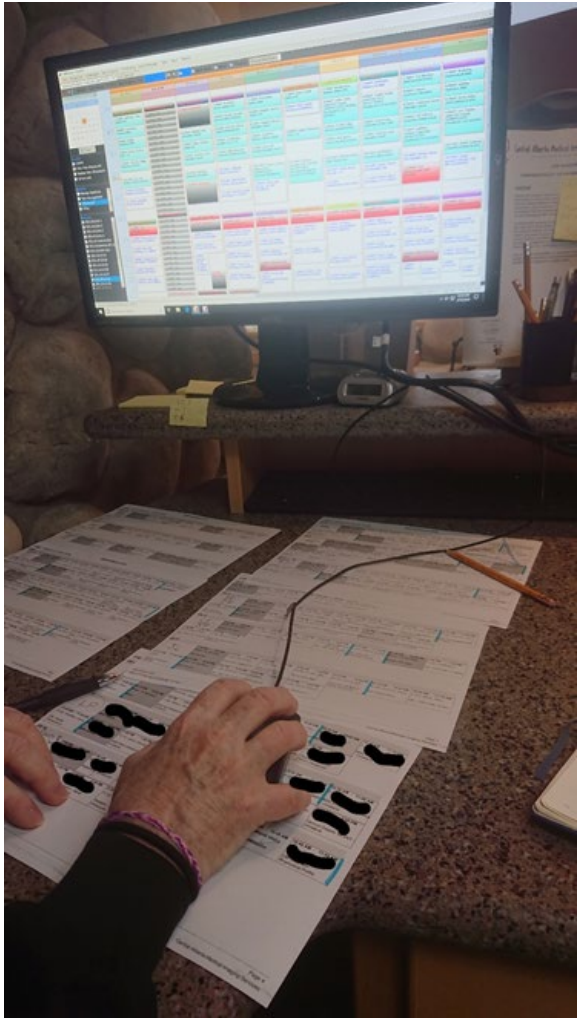
	P1	P2	P3	P4	P5	P6	Sum	Notes	Possible Solution
							6		
GENERAL OBSERVATIONS									
Types with hunt and peck method							2		-
Uses the mouse to move between fields instead of keyboard							4		reorganize the patient edit/create page (CR-2691- done)
Doesn't Realize that the procedure entry bar can be typed in							2		don't pop up the suggestions until after you start to type. Though this might just be an issue right now
Clicks patient search before searching in the search bar							3		nothing- just a sticky pattern
Relied on Tooltips to know what things were							6	mostly this is cause of the new interface.	make sure the tooltips are there for all of the buttons
Didn't notice the statuses (until pointed out)							6		rethink how to display statuses
Was happy to have a clear Gender Identity Field							4	P6 pointed out that FHIR might not map to province/federal needs	nothing
Had issues understanding the order of the exam history list							5	The only reason P1 didn't have issues is that Edge messed up the interface and she couldn't see it	update the exam history list - split list?
Recognized and used Filters							3		should consider how we want the filters to look in the calendar- are they going to match the worklist?
Expect search criteria to empty when returning to search (not persist)							3	were confused when they selected the patient search but the search criteria persisted, not what they're used to.	really need at least an X for the search bar to delete the old search if we're keeping that one around
Missing an AKA name field on the patient record							3		add the AKA field into the patient edit/create
Showing how exams are linked is a good idea in the exam record card							2		our display method makes sense to them
Did not notice or use the calendar tooltip							5		didn't test much with the calendar so should explore when we have more.
Need to have alerts somehow							2		have a solution, wasn't part of the testing, but generally seen as a good idea in the demos
Could use more colour for statuses							3		rethink how to display statuses
TASK 1									
wants to search by "lastname, first name"							4		allow special characters?
Want to search by PHN							6		work, just not with only 1 character- test issue, not interface issue
Actually used the worklist							1	people would hover over it, but they never actually went in. could be 2 things: a. naming issue, b. sticky interaction pattern of not using it now	may be MIC specific

Recommendations

Research (Workflows)

Results
Each clinic developed own workflows
Users adapt the system to their needs, understand the workflows to understand the needs
Designs captured only few workflows, no space for discovered

Recommendation
Understanding an upgrade project requires overview
Find the workflows that have developed
Know all workflows to focus on a few
Don’t get lured in by the next big design fad

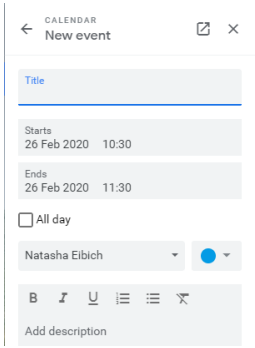


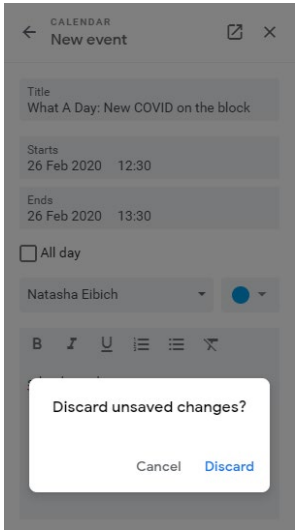
Small Interactions; big impact

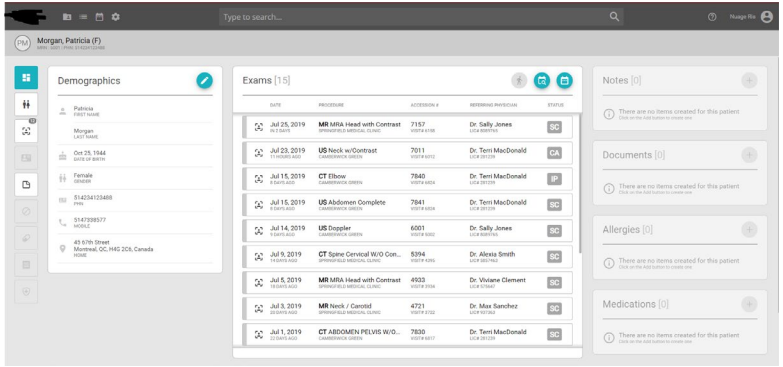
Theory
Cognitive Automation and Procedural Memory, Negative Transfer

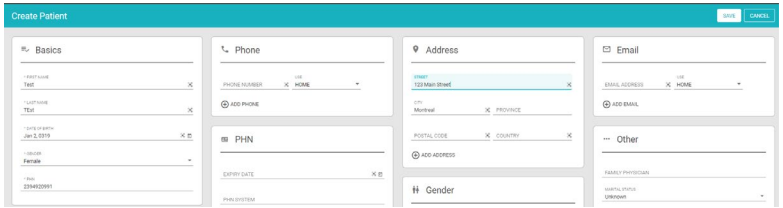
Results
Try to double click everything
Select everything on the calendar
Multi-Select with click and drag

Recommendation
Consider and honour selection interactions
Users can't experience a system if they can't select the element they want









Order

amazon.com

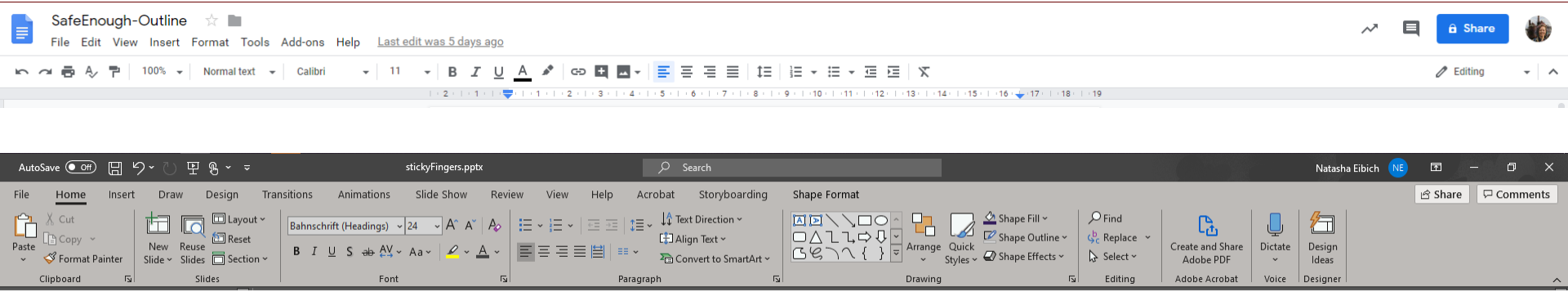
SIGN IN SHIPPING & PAYMENT GIFT OPTIONS PLACE ORDER

Theory
Procedural memory, Negative Transfer

Results
Expect to enter the same information in the same order each time
Procedure helps memory
If expected step is not available, users hesitate

Recommendation
Keep the same procedural order unless new is more efficient
Be transparent about changes

Amazon.com, Pexels/pixabay.com



Location

Theory
Cognitive Mapping, Negative Transfer

Results
Users look to the same location for the same actions
Always want action items at the top
Ignore items that aren't where they expect

Recommendation
Keep the general location where possible
Prototypical interfaces are faster to use

Google Docs, Microsoft Word

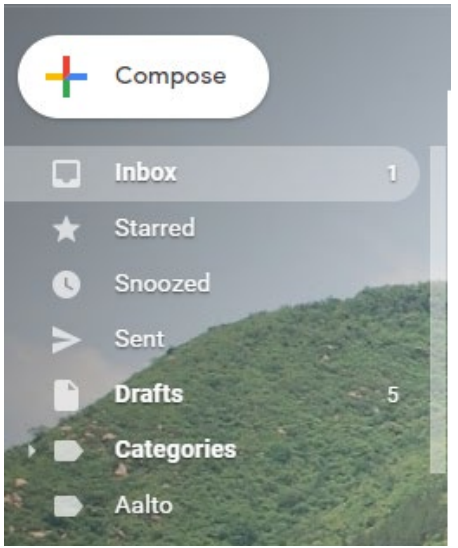
Taxonomy

Theory
Familiarity, Signalling, Negative Transfer

Results
Users didn't know HL7 statuses, so using them was ignored and not understood
"Advanced booking" vs. "Appointment search"

Recommendation
Keep good terms
Change only if something new will be better- "Waiting for exam" vs. "Arrived"

Old RIS	New RIS
Advanced Booking	Appointment Search
Calendar Grid	Schedule
SC - Waiting for Exam	Scheduled
-	Arrived
IP – In Progress	In Progress
CM - Waiting for Report	Completed



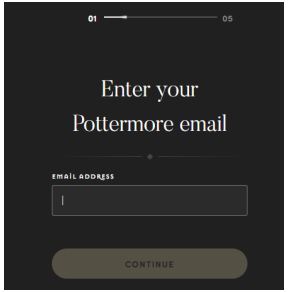
Adobe Acrobat, Gmail

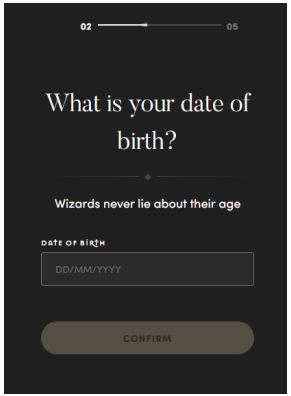
Guide Users

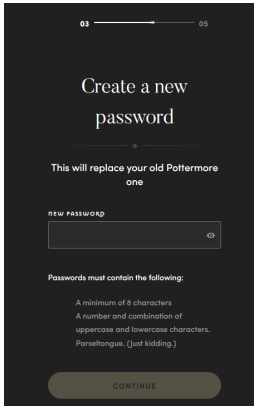
Theory
Affordances, Coping, Self-Efficacy

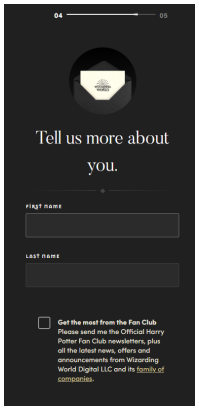
Results
Forgot to add required information (address, referring physician) in RIS
Doing things out of order made it take longer
Liked having imposed order from new RIS

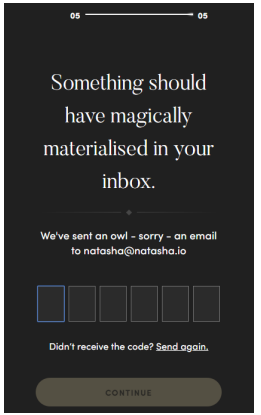
Recommendation
Add guidance, even for common workflows - prevent errors before they happen
Guide passively, no popups

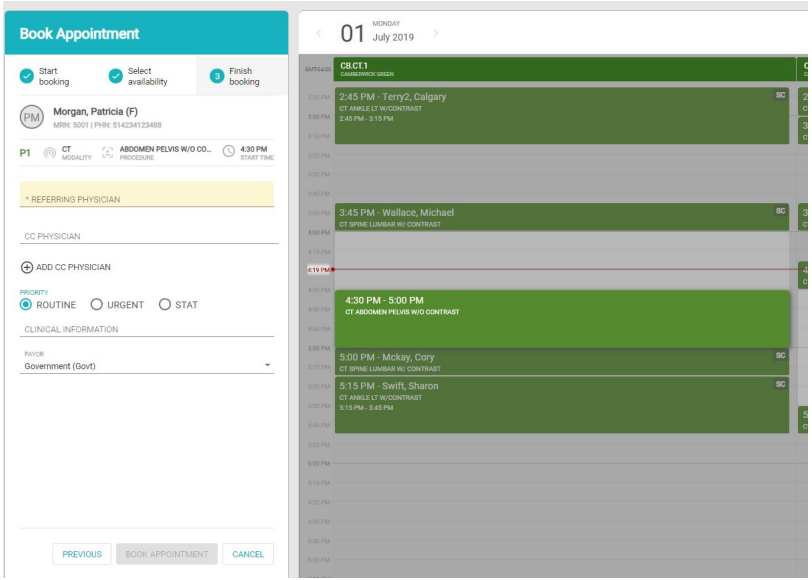










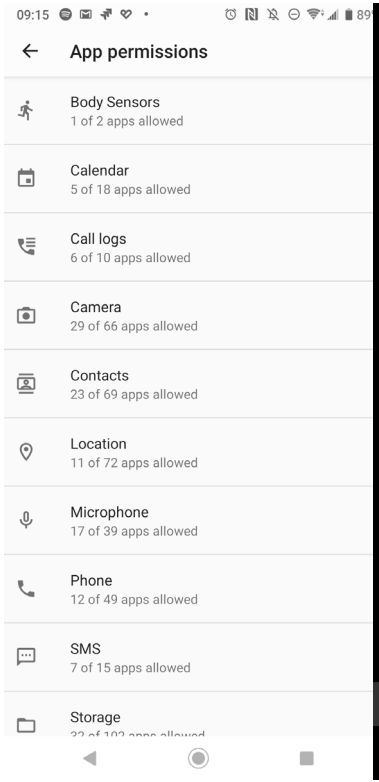


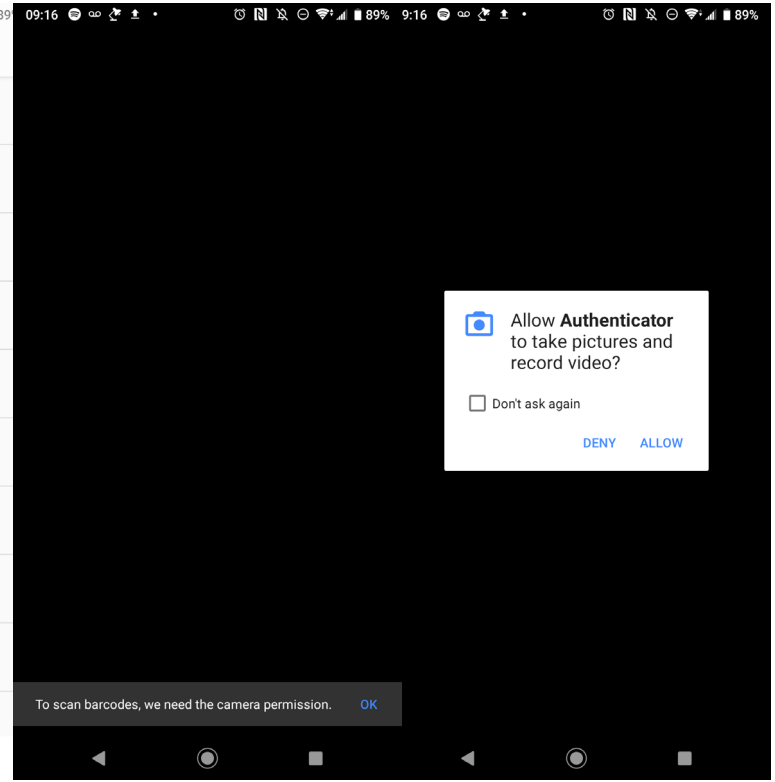
Contextualize

Theory
Signalling, Affordances, Self-Efficacy

Results
Multi-tasking is common, especially for front desk clerks
Constantly shifting between workflows, need context to know what's happening

Recommendation
Display information where and when needed
Titles, tooltips, process specific info is good, dumping all info everywhere is not



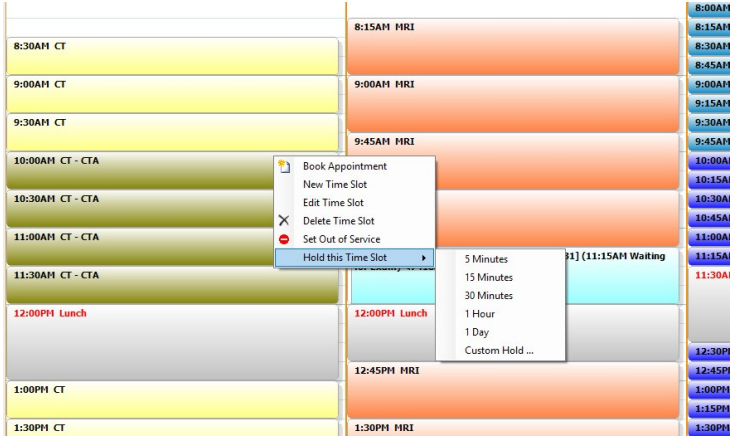


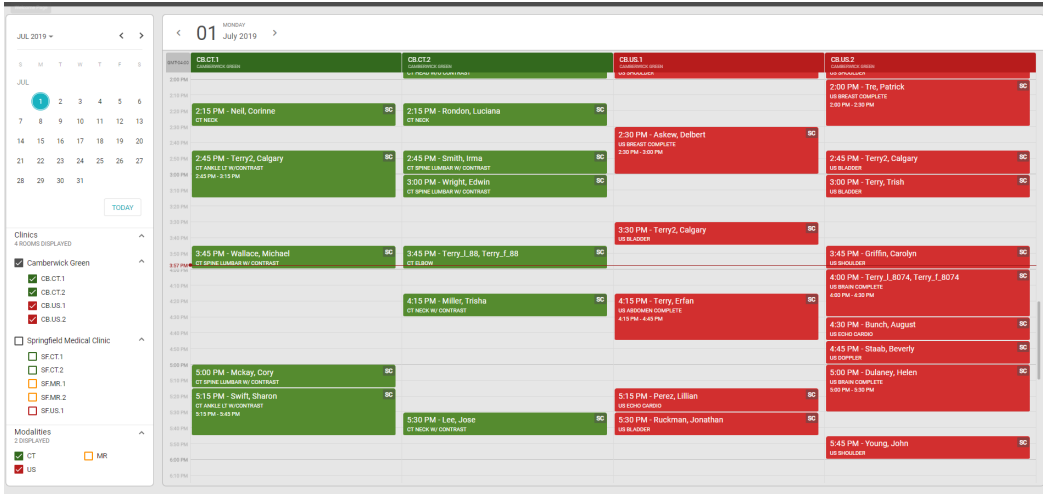
Colours

Theory
Affordances, Coping

Results
Colours have cultural significance- users saw Christmas when they were booking
Used to dark interface, found light very bright

Recommendation
Consider the context of use when choosing theme colour
All other colours should not detract from job to be done



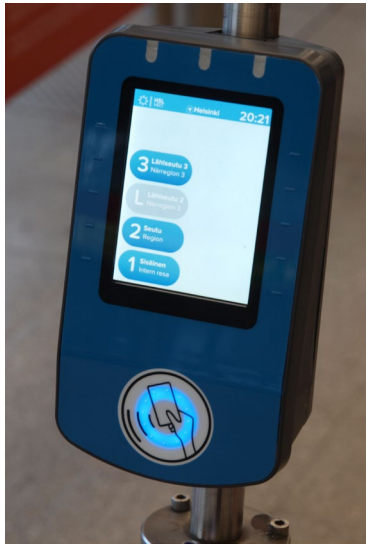


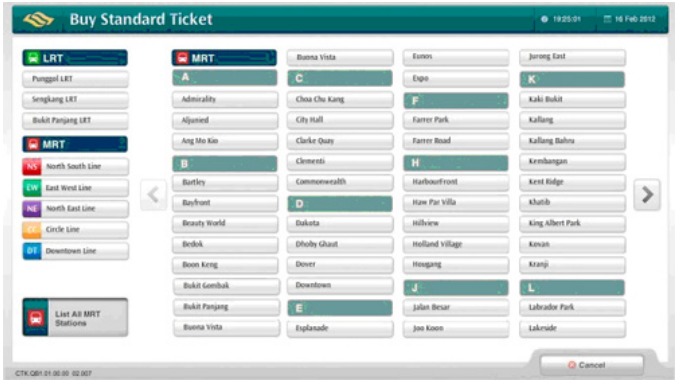
Simplify

Theory
Signalling, Affordances, Self-Efficacy

Results
A few confident users liked to customize their display
Generally were customizing because there was too much information
Less confident users didn't customize as they were scared they would break something

Recommendation
Reduce customization, design so it's not necessary. Or leave it at the admin level





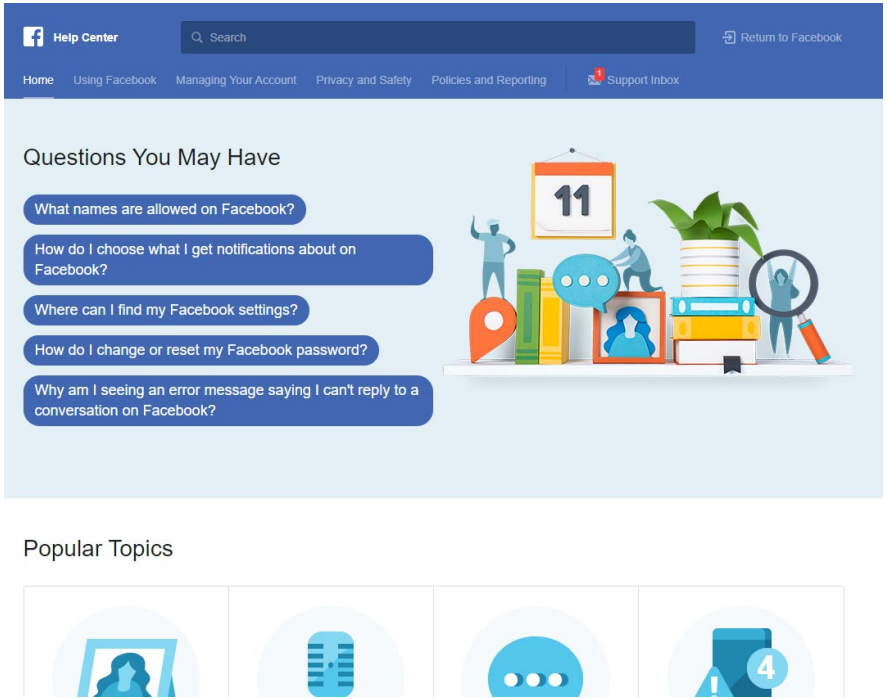
Transitlink.com.sg, HSL, STM

Training and Help

Theory
Self-efficacy

Results
Limited training and no manual left users deciding themselves what workflows to use, which fields had what meaning, and requesting existing features

Recommendation
Training, Help documentation, manuals, have them
Reduce support costs, increase self-efficacy, ensure usage matches expectations



Facebook.com

Conclusions

Research!

There are many sticky interaction patterns

Most are explained through: Cognitive Mapping, Familiarity, Cognitive Automation, Procedural Memory, Affordances, and Coping

They are an issue because of: Negative Transfer and Self-efficacy

We can mitigate the effects by following some simple recommendations