“School Run”

A ride-sharing system for families with children

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1992 Words (excl. 4, 5)

All images are my own unless otherwise stated.

1 Fieldwork Report (549 Words)

This section details the methods used to derive bespoke requirements for the project.

On-site Observations

On-site observations were undertaken in order to consider the distributed context of the environment, in addition to building a profile of the target demographic to dispel assumptions held as a team. The process was conducted at three separate households in low income neighbourhoods, each with two parents, and between two to four children all attending primary education. At each, their evening and morning routines were observed in a manner akin to action research, and valuable insights were derived that helped scope and justify the project's motivation.

The key finding was that most households suffered from a lack of available time for organisation. Consequently, the atmosphere in the evening was markedly different to the morning. The evening was spent planning in order to allay stress in the latter; all parents utilised a combination of notebooks and physical calendars, and two dedicated floor space to collecting the children's uniforms and bags in anticipation of a frantic commute. The children played little to no role in this, simply following instructions.

Fig 1. Necessary measures to promote efficiency

Another observation was that space within such households is often constrained, partly due to children accruing clutter. Furthermore, the make-up of each individual room varied drastically depending on the age of the inhabitant. Resultantly, most parents tidied and decorated frequently.

In conversation, it also became apparent that access to transportation was a common concern, and that some couples, especially those with only one car between them, remained in regular contact with close relatives and other parents (via social media) in case of emergency. Even with providence of a car, congestion in small neighbourhoods often prevented timely fulfilment of responsibilities, which negatively impacted their lives at home in a cyclical fashion.

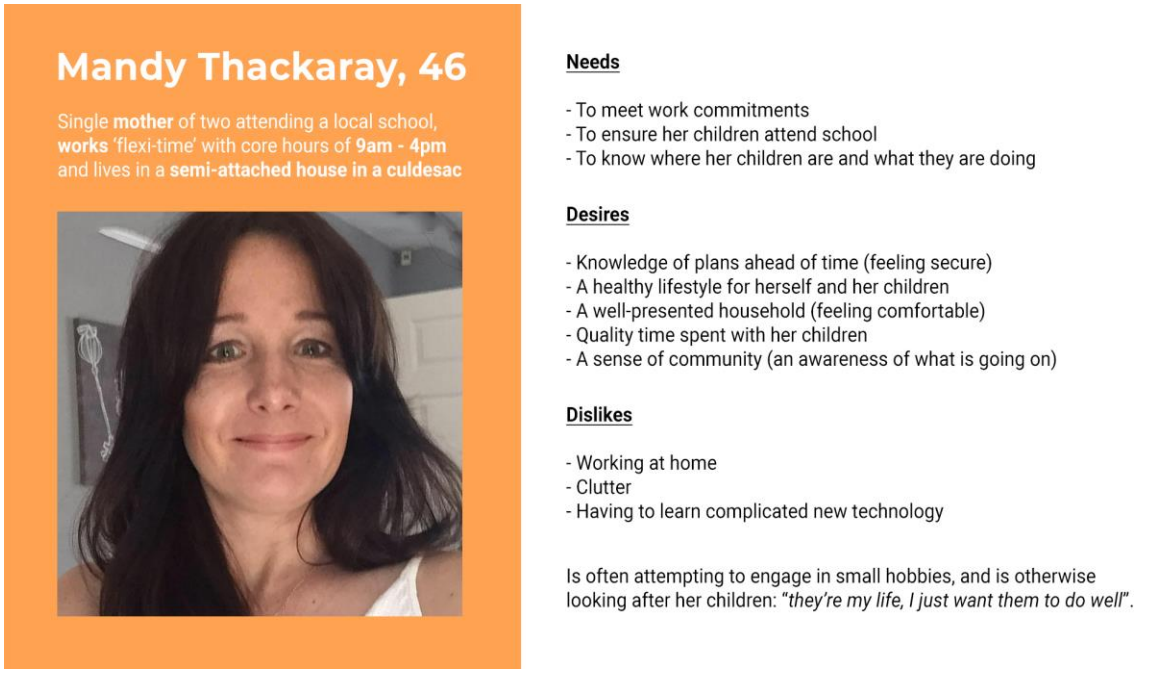

Fig 2. A persona of the primary client was able to be produced to drive ideation.

Survey

A survey was conducted in order to inform decisions throughout the iterative design process. Six participants were asked a number of open ended questions to identify qualitative opinion on the concepts underpinning each design, and the results were used to filter features to produce a better amalgamation for the final proposal. Additionally, concerns and constructive suggestions regarding reliability and security were unanimous.

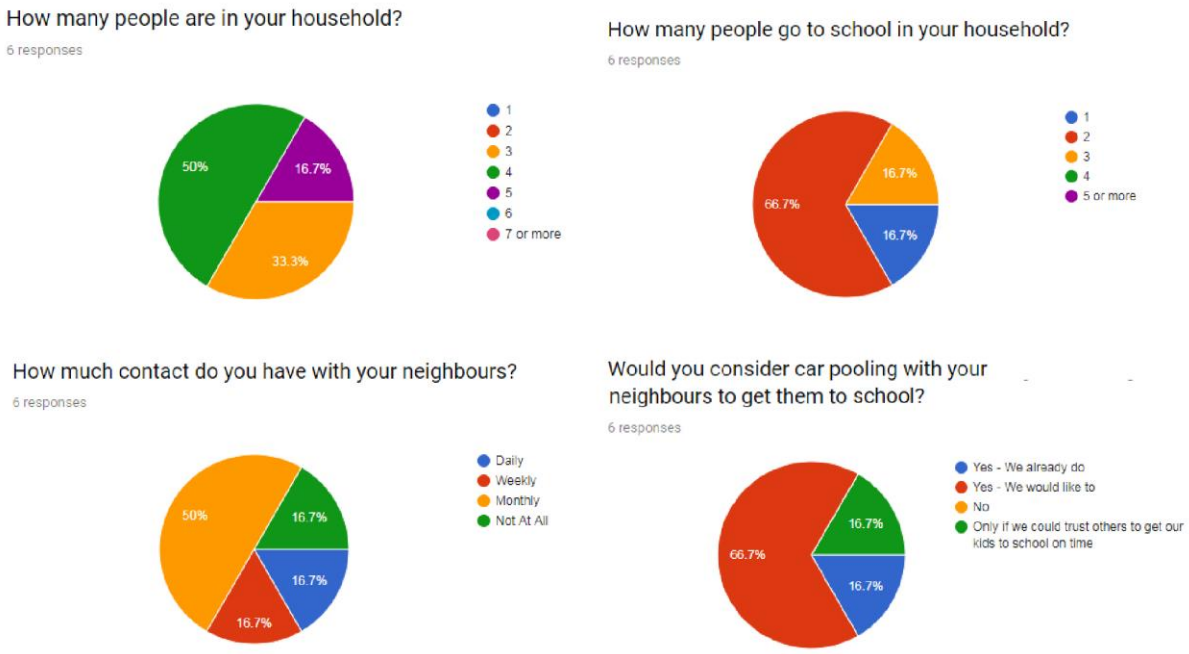

Fig 3. The survey's demographic, showing that participants have marginal contact with their neighbours.

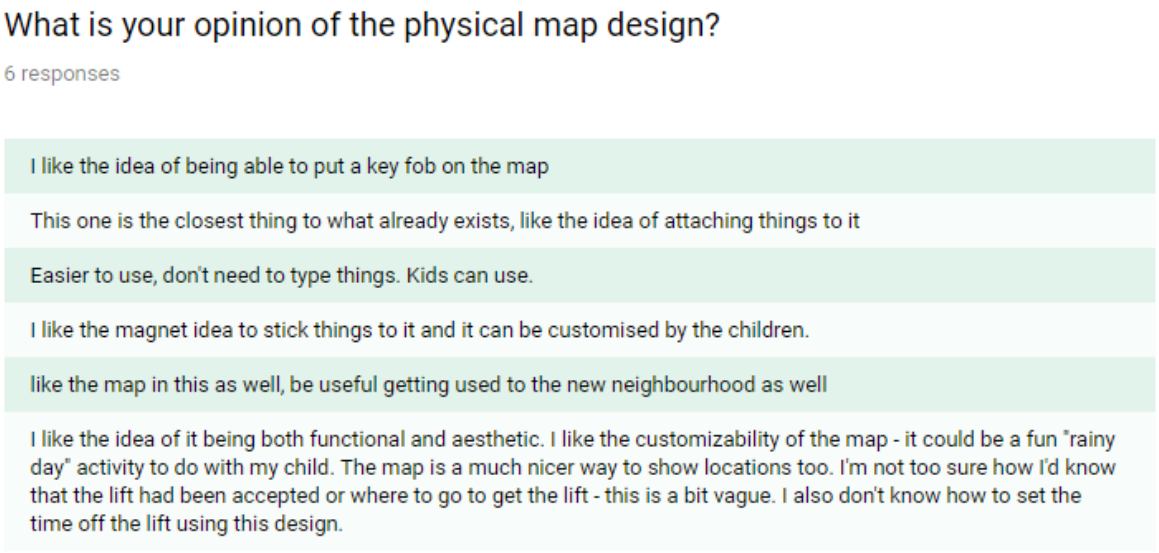

Fig 4. The 'physical map' presented the strongest candidate due to its minimal design, with potential caveats of usability.

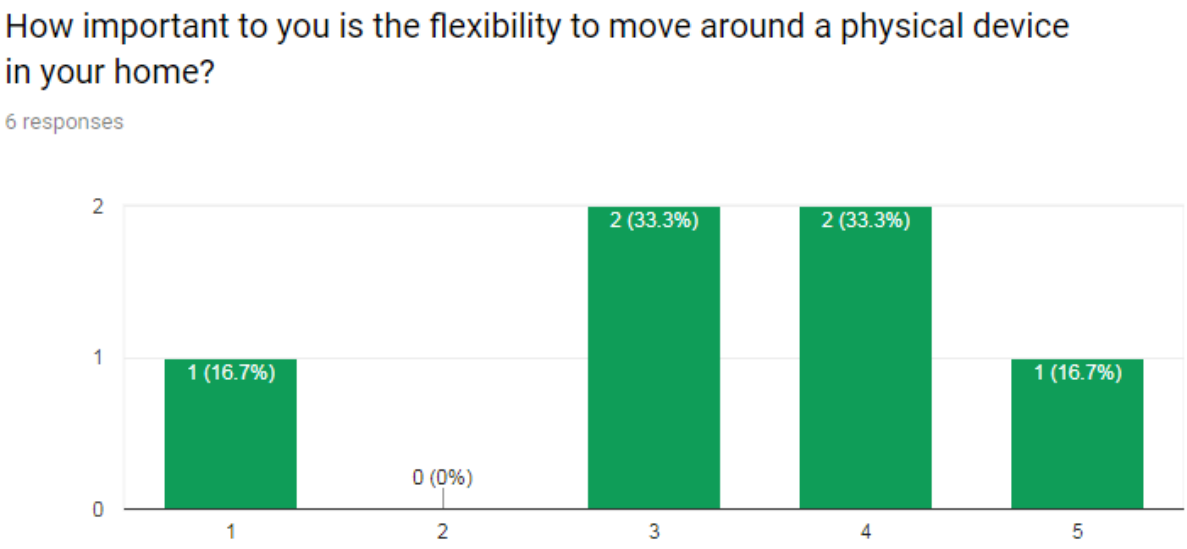

Fig 5. Portability is shown to be somewhat desirable on the 'likert' scale.

Fig 6. A 'word cloud' of potential concerns highlighted by participants.

Interview

An interview was conducted late in the design process in order to evaluate the product, and identify remaining issues with its process afresh. The participant, a 40 year old mother of three, was shown a prototype demonstrating the product's desired use-case, and provided proceeding feedback indicating edge cases and barriers to understanding that needed to be resolved.

She found the overall design to be useful, remarking that "*I could definitely see a place for this […] if I had neighbours willing to help*" and "*the kids would love it"*, however highlighted the need for guidance during on-boarding: "*I was somewhat confused until you explained it to me - I hope it comes with instructions"*.

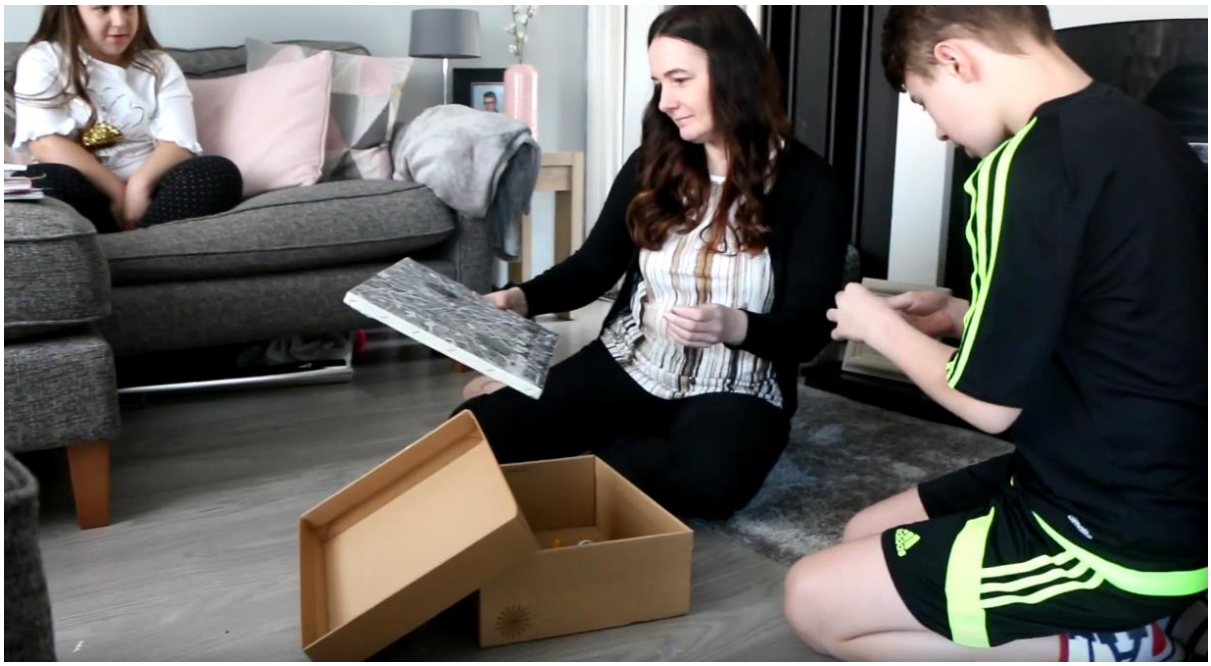

Fig 7. The participant interacts with the prototype during a hands-on demonstration.

2 Design Sketches (400 Words)

This section provides an illustrative journey of the iterative design process conduct alongside fieldwork.

Initial Ideation

Each member of the group contributed to the final design through initial sketches. While none manifested in the same way past this early stage, unique and favourable qualities were drawn from each.

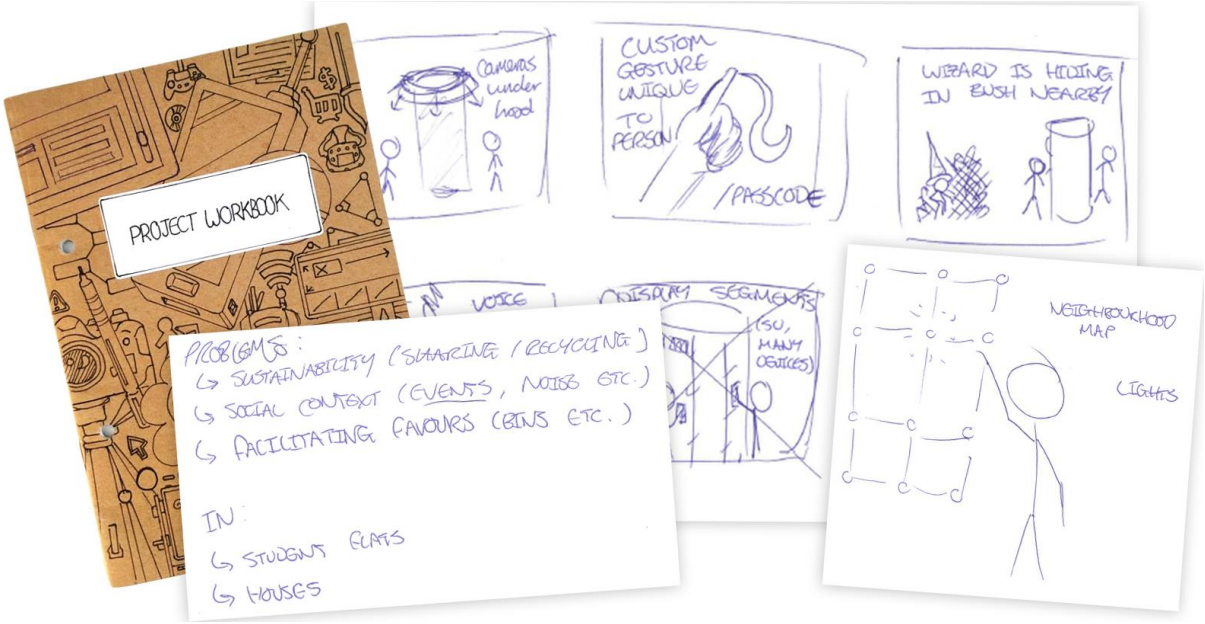

Fig 8. An abundance of requirements-gathering and prompts kick-started discussion.

My most considered idea was derivative of a children's toy. It incorporated modular blocks representing skills that members of a community could connect together to indicate willingness to share. It was discontinued due to its requirement on a singular public space, however the notion of facilitating charitable acts through an enhanced awareness of immediate sociality contributed to the final design.

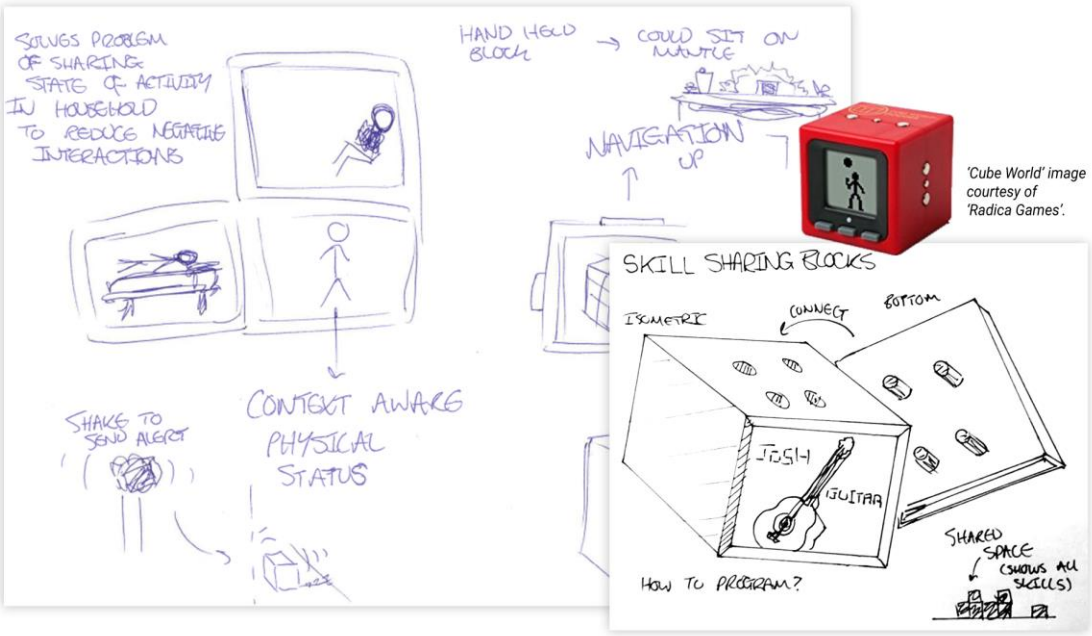

Fig 9. The aim of these blocks evolved from simple environmental awareness to connecting them together to physically organise events.

Group Ideation

Together, a concept was wrought that captured our general intent; we believed that in its base form it might have been able to solve some of the problems unearthed during early stages of research.

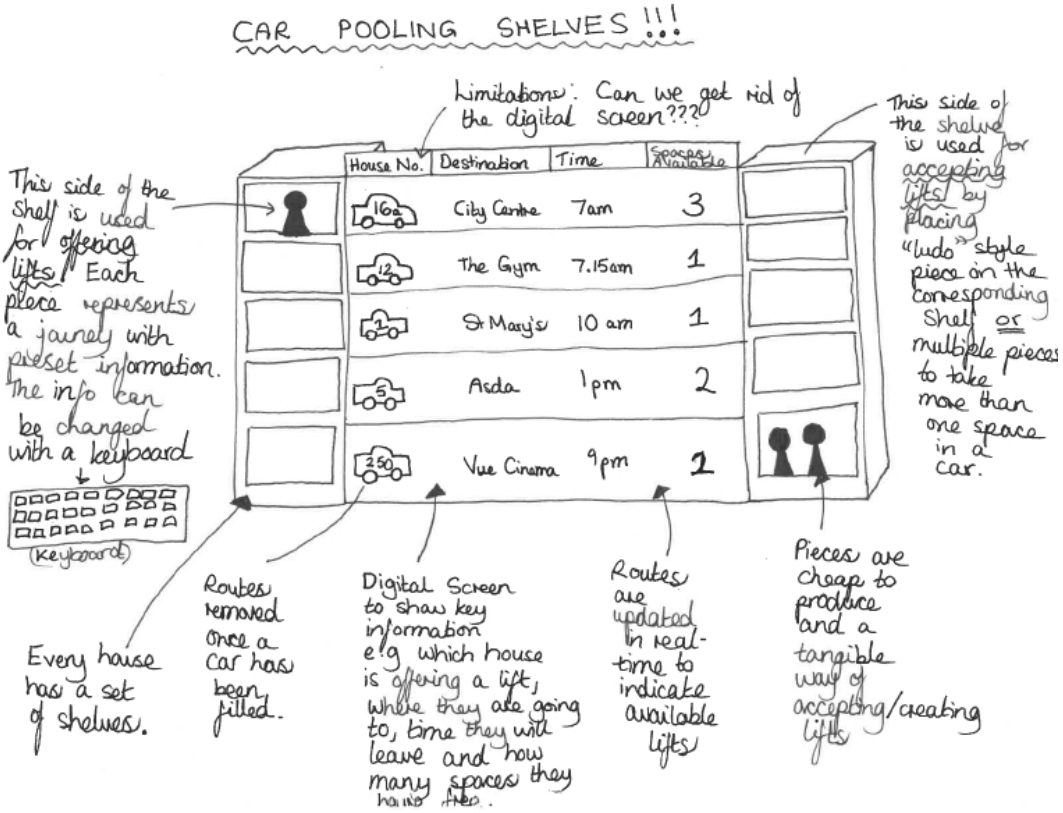

Fig 10. Drawn by Kerry Lewis, a car-sharing system emerged as a prevailing design with great potential.

Refinement

With the overall avenue chosen, aspects of it were explored and hardened through a combination of additive research, white-boarding and sketching.

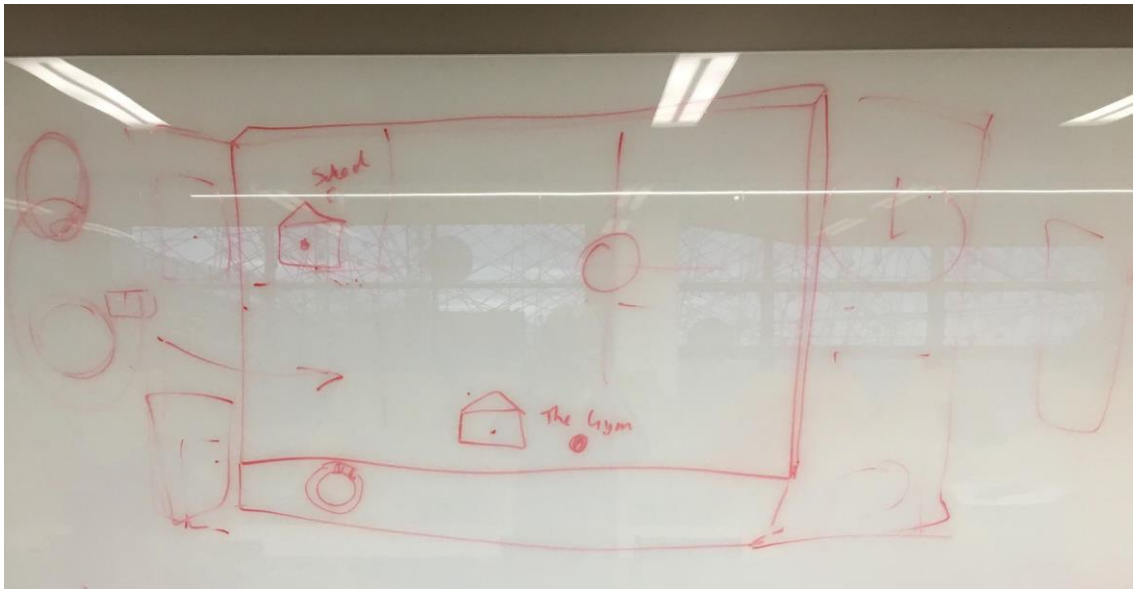

Fig 11. The design is decomposed into its component parts.

At each step, a specific problem was addressed. In this way, progression towards the project's criteria was maintained.

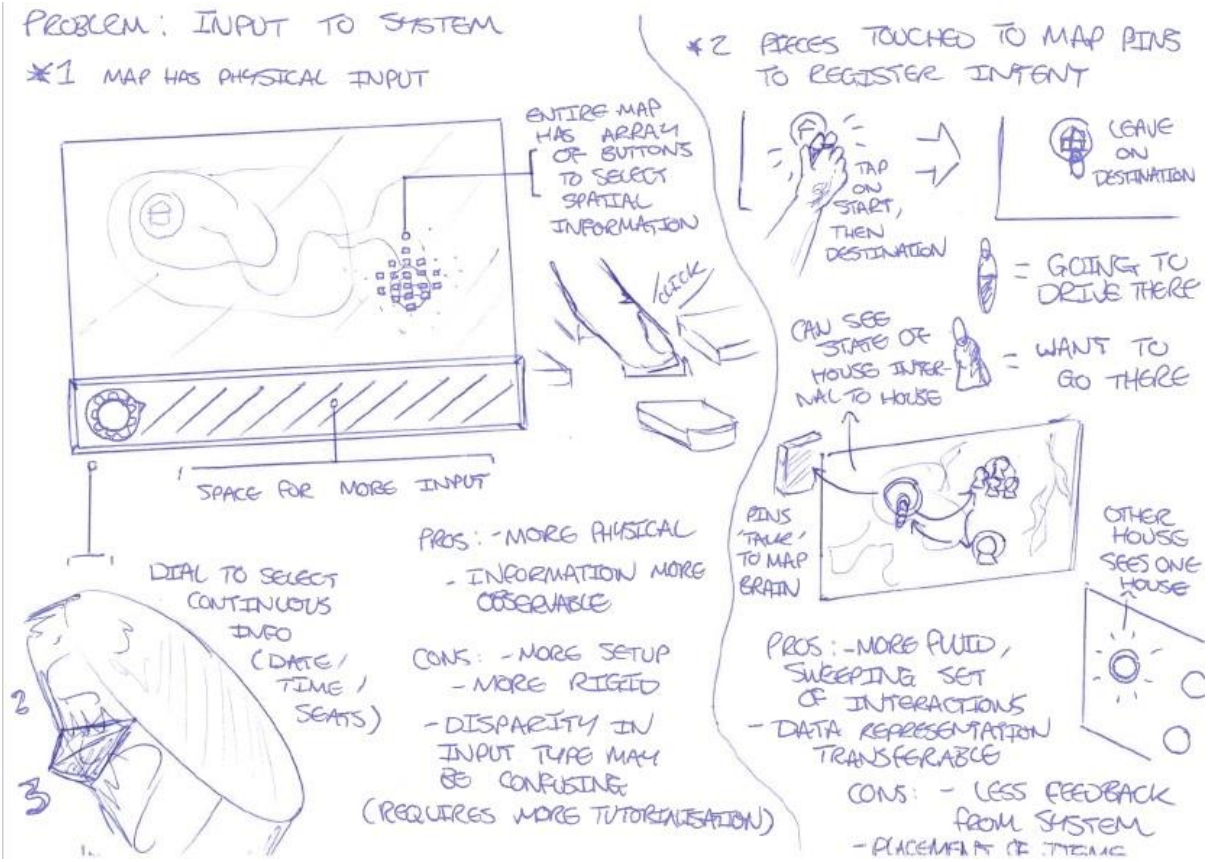

Fig 12. Input to the system as a design issue to address is explored. Here, gestures were weighed against physical buttons.

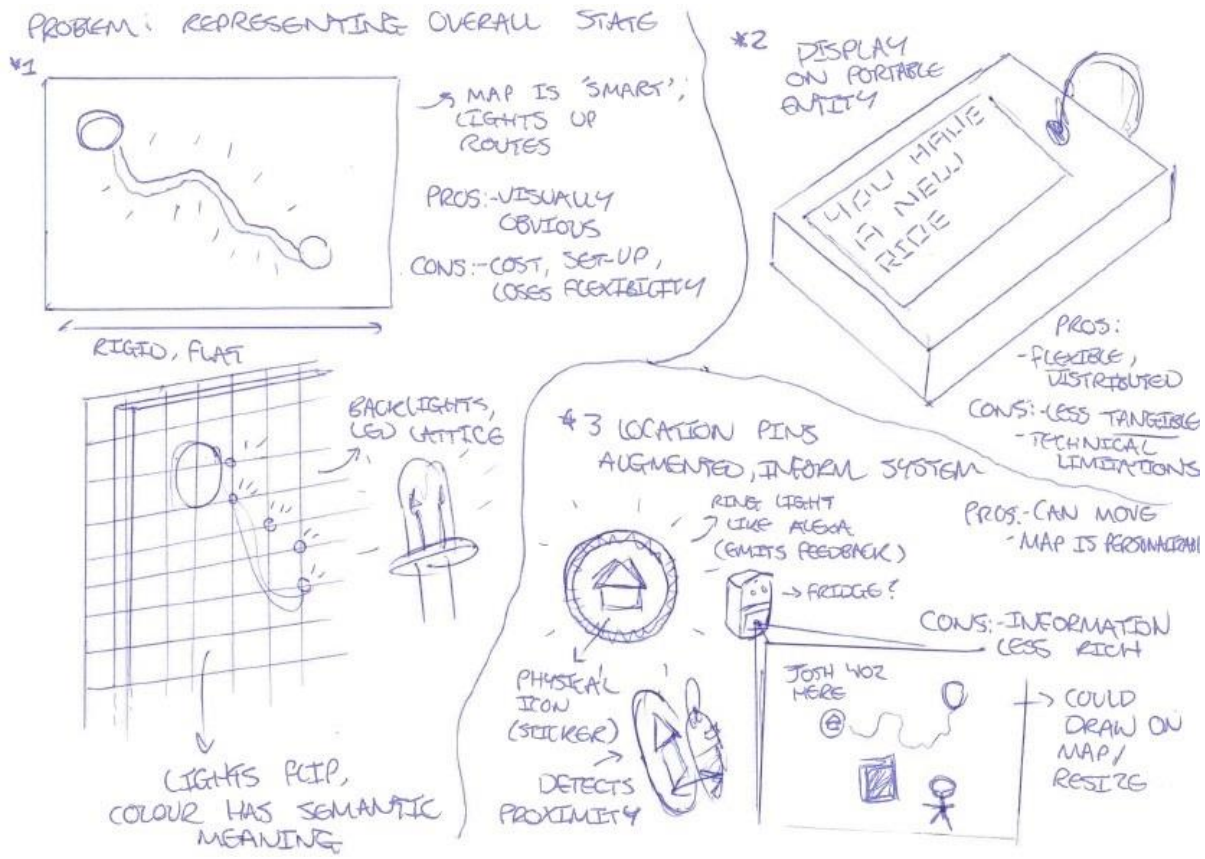

Fig 13. Representation of state as a design issue to address is explored. Here, screens, lights and more were considered.

Storyboard

A story-board was produced to illustrate the use-case of the minimum-viable-product, and maintain a focus on users.

Fig 14. A story-board provides a digestible visualisation of process-flow.

Final Concept

Once issues raised during feedback were deemed to have been addressed, the design was finalised.

In it, each house has a 'map' with 'pins' and pieces corresponding to 'drivers' and 'passengers'. The map is assumed to be preloaded with information about the nearest School. By placing a driver piece against a destination, a light from that pin will indicate an available ride in all other houses. Passengers can accept a ride by making the same motion with their piece.

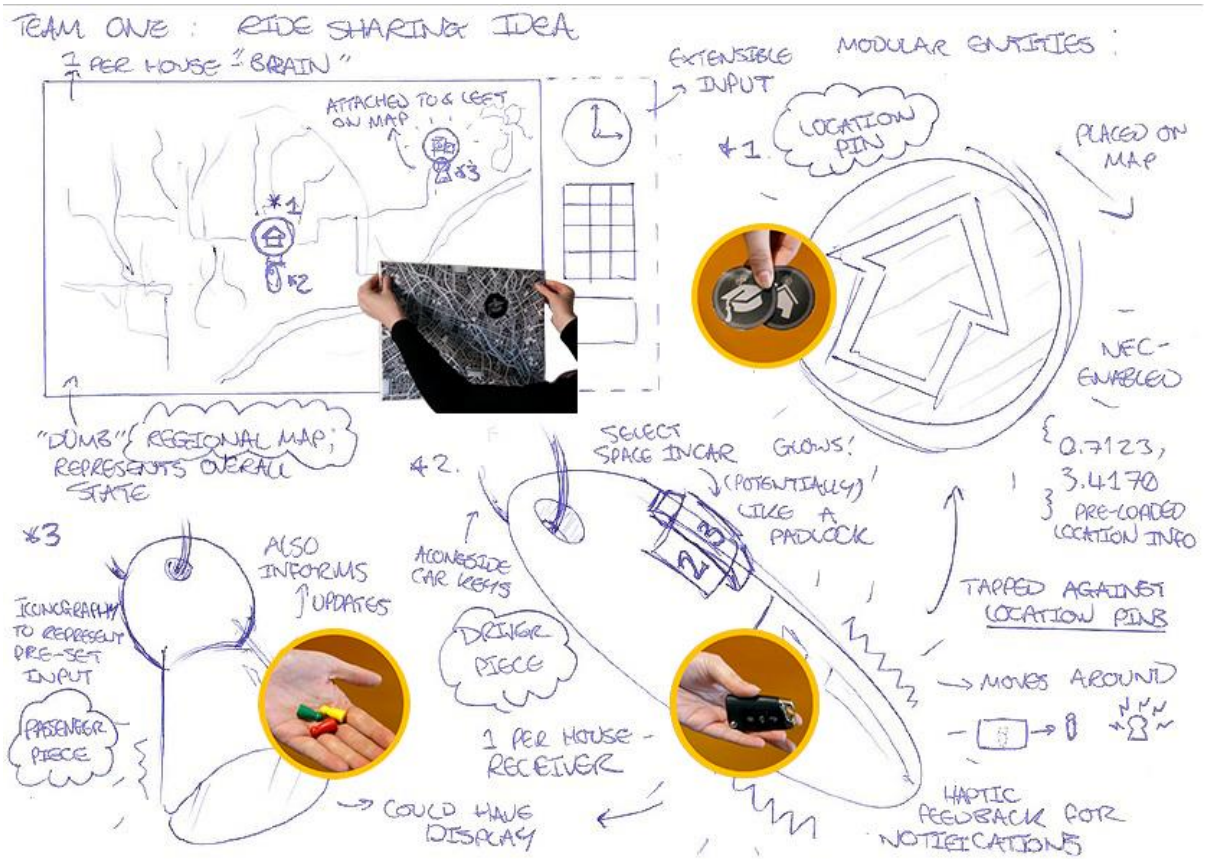

Fig 15. The final design, its artefacts and their correspondence to the prototype.

Fig 16. The final systematic process for requesting a ride.

3 Design Rationale (966 Words)

This section compartmentalises all prominent decisions made during the design process that resulted in the finished product, along with their academic justification.

Physicality

There are many aspects of theory underpinning the physicality of the final design. In-house communication is co-located, and there are layers of abstraction present that give individual users agency depending on their role. This presents a cascade of increasingly granular considerations to address.

The map can be attached to any flat surface, and since it is a structural entity, can vary in size, shape and aesthetic with no loss of functionality. This was sought to ease assimilation into a home environment, where pictures and notes have already been observed to adorn walls, promoting the usability principle of flexibility. Furthermore, the presentation of the main display as a geographical map was favoured over shelves, as it mimics the nature of the underlying information in a way that conveys its spatiality as a logistic mental model[1] (Smith). The result is an unobtrusive unit that provides task support through its personalisation and monitoring, and pivotally achieves its overarching goal of facilitating social support[2] (Oinas-Kukkonen).

Pins on the map respond to gestures that incorporate objects (using NFC technology). Alternative options were explored as methods of input, with stimuli such as buttons, dials and touch-sensitive, visual interfaces. The bipolarity of the target audience necessitated that the design be efficient, as both parents inexperienced in technology, and children in sociality, might otherwise struggle to learn how to use it. The decision space in this instance was reduced using criteria derived from research, and, furthermore, lights were added to pins as a visual affordance to emphasise feedback.

	Criteria		
Options	**Intuition w/out text**	**Extensibility**	Maintenance
Buttons	-	-	+
Gestures w/ pieces	+	+	-

Fig 17. Since some information has been denoted as 'pre-loaded' into the system, the prevailing gesture-based method of input can forego the labelling of intricate data.

The user pieces have been designed to remain on the map (using magnetization) to maintain a representation of the internal state of the system, promoting the usability heuristic of 'recognition over recall'[3]. They are therefore portable, history-enriched digital objects that can be used to 'externalise intent'[4] across what is essentially a smart-surface. The decision to separate the input device from the main display allows them to enhance the perception of the system through their location on it, and abides by the tenet of awareness that transitively "encourages face-to-face interaction"[5]. Furthermore, the disparity in the design of driver and passenger pieces helps identify and regulate their collaboration, creating a persuasive ecology of pieces that imitate examples of other successful technology[6] (Fogg), notably digital car keys and security tokens used for banking. Since metaphors are liable to break down[7] (Mihnkern), iconography is further applied to the pins, to add additional and universal clarity.

Process

The ultimate process of using the system was designed with *experience* in mind. In accordance with the brief, transactions occur between houses remotely (many-to-many), and, although technically asynchronous, enforce a sequence of linear interactions similar to traditional conversational turn-taking. The chronology of these interactions was ordered using the 'peak-end' rule[8] (Kahneman) in order to provide immediacy; by allowing users to offer or accept rides the night prior, 'touchpoints' of interaction with the system can be instigated at their behest. For children using the system, this may also lead to 'anticipation'[9]; their pieces resemble toys, and they will presumably be travelling to school with other children they know. This allows users to achieve their goal with minimal effort before reaping its benefits, and therefore the final design alleviates traditional barriers to organising transportation in a manner congruent with their emotional needs of security and comfort.

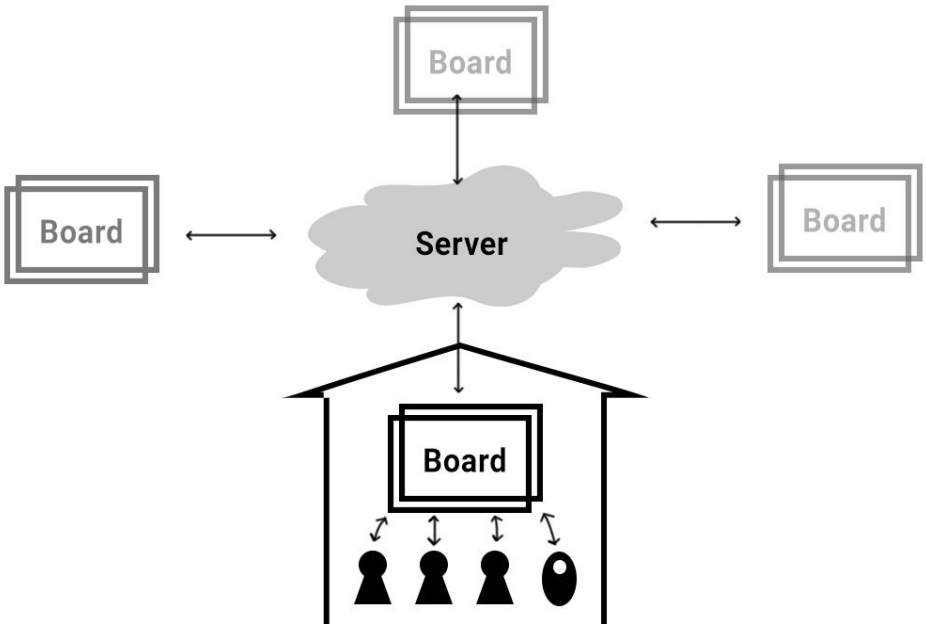

Fig 18. The technological aspect of the final design as a distributed service.

A major decision regarding process was that of denying users the ability to request rides before they are offered. A relational model was adopted to allow communities to commission their own services, with a 'grass-roots' spirit in mind. By placing the responsibility of governance with drivers, the system is therefore moderated by adults who are not unethically incentivised into offering rides, and concerns of similarities with contemporary services such as 'Uber' are abated.

The design of the *data* to be used in the system was also an influencing factor on the overall process. By considering the taxonomy of information necessary to achieve its intended feature-set, and the errors that might have arisen, unexplored edge-cases were identified. One such circumstance was a driver wanting to cancel a trip. It was decided that by removing the driver piece from the map before the trip's start time, this would revert the offer (and display warning lights on maps with users having already accepted rides); this was cross-applied to the case of users wanting to decline an already accepted offer. This is a method of 'design for appropriation'[10] (Dix) which accounts for the natural physical affordance of simply removing pieces, and improved the robustness of the finished product.

Furthermore, in exploring the data required by the system with potential users, safety concerns were raised. To respond to this through the design, it was opted to augment the system with mobile notifications that inform both parties of the state of the trips. This was indicative of a separation of concerns, as the system transfers responsibility for contacting drivers to a communications device built for such a purpose. By augmenting the system with these 'directive', personal informatics[11] (Rooksby), parents always know where their children are, and there is less reliance fostered on the main unit.

Conclusion

In summary, the final design represents a solution to a real and common problem, produced using a formalised methodology. Its simplicity is a result of the complexity of the problem being addressed incrementally, and in its tangibility compresses the first three patterns of computer-supported collective-action (identifying a problem, generating a solution and co-ordinating and preparing for action) into one[12]. Its efficacy has been demonstrated through prototyping, and it exhibits a potential for expansion in its applicability to more general ride-sharing.

4 References

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[12] Shaw, A., Zhang, H., Monroy-Hernández, A., Munson, S., Hill, B., Gerber, E., Kinnaird, P. and Minder, P. (2014). Computer Supported Collective Action

Note: The survey results can be found at https://goo.gl/4j16b6

5 Reflective Log

Date	02/02/2018
Event	Seminar
Title	Videos on Interaction Design
Overview	The first seminar focused on identifying different styles of interaction design by watching three videos of professionals describing their methodology for approaching a new design challenge. For each we identified interesting points and criticisms, and discussed these with each-other.
Reflection	It was useful to begin the module by coming to terms with the idea that there is no discrete correct approach to it. This was evident in the different ways in which established professionals approach the subject, as detailed by their musings on how to classify kinds of interactions. As such, it appears that if at least the aim and outcome is mutual (ostensibly 'good' interactions), then the methodology is subjective and rooted in the context of the problem. The ability to discern the kind of abstraction and representation which is best suited for a specific problem appears to be a desirable if troublesome skill to attain. I found Gillian's logistic proposal of mental models to be most in-line with my predisposition to look at a system functionally, which contrasts both Bill's vaguer terminology. Whereas they asked questions of an idea to assess if it was all-encompassing, Gillian attempts to explain how she constructs an idea out of existing criteria and constraints, and this guidance in thinking is more useful as a student whose 'toolkit' is already full with terminology. It was useful to share these thoughts with my peers. We had similar gut instincts, and it was only through discussion that this intuition became an informed opinion.

Date	09/02/2018
Event	Seminar
Title	Doing Ethnography
Overview	We discussed a rather extensive paper by John Hughes wherein he details the experience of adopting ethnography in different working domains. Inviting peers to highlight their most distinct findings, we discussed the different categories he had produced, the efficacy of the methodology itself, and the context of the paper's publication.
Reflection	This seminar was useful for a variety of reasons. Most obviously, it effectively summarised the topic of ethnography as aspect of fieldwork, which helped identify the important points. Chiefly, the case for ethnography being to observe things in their 'natural' surroundings may be taken for granted otherwise. I found 'evaluative' to be the use

	case with the most reach, as modern organisations tend to take an already envisioned design as the basis for a project (whereby work to provide justification for requirements etc. would begin). Their frantically evolving nature necessitates an almost retrospective undertaking of such data generation. I also found the notion of of a single-site for focus poignant, as I had not previously considered that research may be invalid if it is conducted in a research setting, or muddied by more data from more sources. I also found the discussion regarding how to critique and cross-apply the findings of a paper useful, as it had been a long time since I had forced myself to interrogate the validity of sources. These are apt soft-skills for our group projects.

Date	16/02/2018
Event	Lecture
Title	Analysing Fieldwork Data
Overview	We were taken through the different analytical perspectives that can be applied while analysing fieldwork data. After revisiting ethnomethodology, we were taught of distributed cognition, which focuses on the distribution of objects and events in space to provoke design considerations. Furthermore, and in some contrast, we were shown how activity theory can be applied to the same scenario to yield different, more formalised observations regarding conscious and unconscious actions and operations – there were lots of diagrams. Finally, we compared the perspectives.
Reflection	I made several pivotal notes during this lecture. I had been looking for a way to ascertain which elements of broader theory to apply to which problems. It was described as “like using glasses to focus on specific things”, and I now feel like I can determine which to use and when as we complete our coursework. Having disliked the concept of smart tables, it was eye opening to see how, when grounded in the context of distributed cognition, they can ‘externalise thinking’ and bring tangible benefits to a process. The idea of visibly breaking down tasks is something that resonates with me as a programmer, and it ties in nicely with the consideration of the level of thought put into each event when assessed using activity theory. I am looking forward to applying the same kind of assessment to our own designs.

Date	16/02/2018
Event	Seminar
Title	Internet Cohousing and Marble Answering Machine
Overview	We were given prompts to guide our thought process when digesting the source material for this session. We discussed the answers to those questions, in addition to identifying pros and cons with each design. At each step, we cross-referenced the ideas posited with our

	coursework, in order to derive meaningful conclusions from our discussions.
Reflection	As the material was quite short, I had already made notes on them before considering the questions. The determination of the type of paper was interesting to me – 'research through design'. I had got the feeling that the purpose of the paper was to enlighten people as to the misconceptions in emergent design. Although we did not focus on the 'ecology' of objects, our discussion of how it differed from cohousing to our own brief of a 'normal' neighbourhood emphasised the boundaries to these ecologies. It was helpful to note potential hang-ups – privacy, accountability etc., in addition to the affordances and constraints on the physical representation of data. In fact, my main take-away was to be able to break out of the notion of data being rooted in a system and modified by a tangible interface, but rather to explore awareness of state itself via physical means.

Date	22/02/2018
Event	Seminar
Title	Social Displays on Mobile Devices
Overview	We discussed with the author of the paper which we had read the context behind the study. Aside from sharing anecdotes, we discussed different categorisations of considerations that can be applied to a novel design problem. Our group then revisited ideation using her feedback as a support structure.
Reflection	Although relatively few students attended this seminar it was an invaluable session for our group as a whole. It was interesting to come to understand the process of publishing a paper and to be able to assess whether the assumptions and observations I had made while reading it were true – in talking us through the co-design process, I was able to envision how I would conduct my own. Furthermore, to look at design from the standpoint of other people being participatory, it took me out of the mindset of attempting to envision a final product immediately, but rather as a set of open questions derived from a framework of prior decisions.

Date	09/03/2018
Event	Lecture
Title	Data Design
Overview	Guest lecturer Andy talked us through a history of data design for evolving technologies both anecdotally from his own projects but also framed in the context of morality and privacy, with the intention of getting us to think about the types and transfer methods of data in our own systems.

Reflection	I thoroughly enjoyed this lecture. The scientific aspects were a relief after so many things rooted in theory. To look at the tenets of big data, and furthermore explore how the ubiquitous and omnipresent nature of quantitative metrics influence our daily interactions was eye-opening; not in the sense that it necessarily taught me new information, but gave agency to some things we'd all been noticing interpersonally for years but often overlook. It made me want to focus on the data more explicitly in our group project – not only how it is structured but when it is communicated and how.

Date	20/04/2018
Event	Lecture
Title	Designing for User Experience
Overview	We covered how users experience the end-product, how the field of interaction design has developed towards this point of consideration, and how different holistic factors driving their experience affect their recollection of interactions with a product.
Reflection	I found this lecture interesting because it was very different in its approach to theory than the previous lectures – the idea pre-empts even design. By considering the kind of experience you want people to have, you can control to some extent the subjectivity that has made many aspects of our design coursework (for example) difficult. The distinction made between services was useful as a computer scientist who often deals with 'moments of interaction' rather than a discrete object. Furthermore, quantifying the elements by how disruptive they may be helps design a system with a chronology. This is something I had never considered but can already imagine use for.

Date	20/04/2018
Event	Seminar
Title	Designing for User Experience
Overview	We applied the principles learned in the lecture along with a more in-depth conceptual model presenting in the reading material.
Reflection	This seminar was useful because practically applying concepts in discussion helped wring out misconceptions I had about the model – I thought that a lot of the wording was ambiguous, but applying it to movies and then our own project it is evident that this ambiguity is more a flexibility in consideration that allows for more complicated relationships (such as subjective personal bias in film critique) to be expressed with in a simpler vocabulary. Examining how experience is represented by our own project's design, we determined that the 'why' was to suit the needs of people in a community; their desire to be connected and therefore feel secure, and their desire to have a plan to the same effect. This is represented in the motor goals of building the knowledge representation (and therefore perception) tangibly.

Date	27/04/2018
Event	Lecture
Title	Designing for Play
Overview	Guest lecturer X tutorialised the process of designing something inherently ‘playful’, with steps including properties, flow, modes, and a high-level framework.
Reflection	Having worked in the games industry, it was interesting to see the process for making something gamified from the perspective of qualified emotions as opposed to literal content. Describing levels of expression was enjoyable if impractical method of evaluating the success of a playful product in affecting the user’s feelings. Aspects of what he called ‘object play’ are present in our team’s design, which involves children, and therefore the potential impact of this deserves exploring.

Date	04/05/2018
Event	Lecture
Title	Designing for Collective Action
Overview	We examined the differences in the co-ordination of a community by technology, categorised into different models. All pertained to crowds, however key factors of governance and ownership differed between them.
Reflection	I found this lecture interesting as it focused on things of emergent interest in the public space. Crowd-sourcing technological decisions were the focus of my dissertation, and the examples of community-based-innovation were colourful. I had never considered the definition of ‘digital civics’ before, having heard it in conversation. The notion of assessing HCI as a construct against a large body of people brings with it significant change in methodology. The requirement of data science to and the fiscal implications of such applications involved in community empowerment were interesting considerations, and I wonder if a collective of people can perform better than experts in all cases.