SYSTEMS 4 ALL

Hotel Kiosk Design

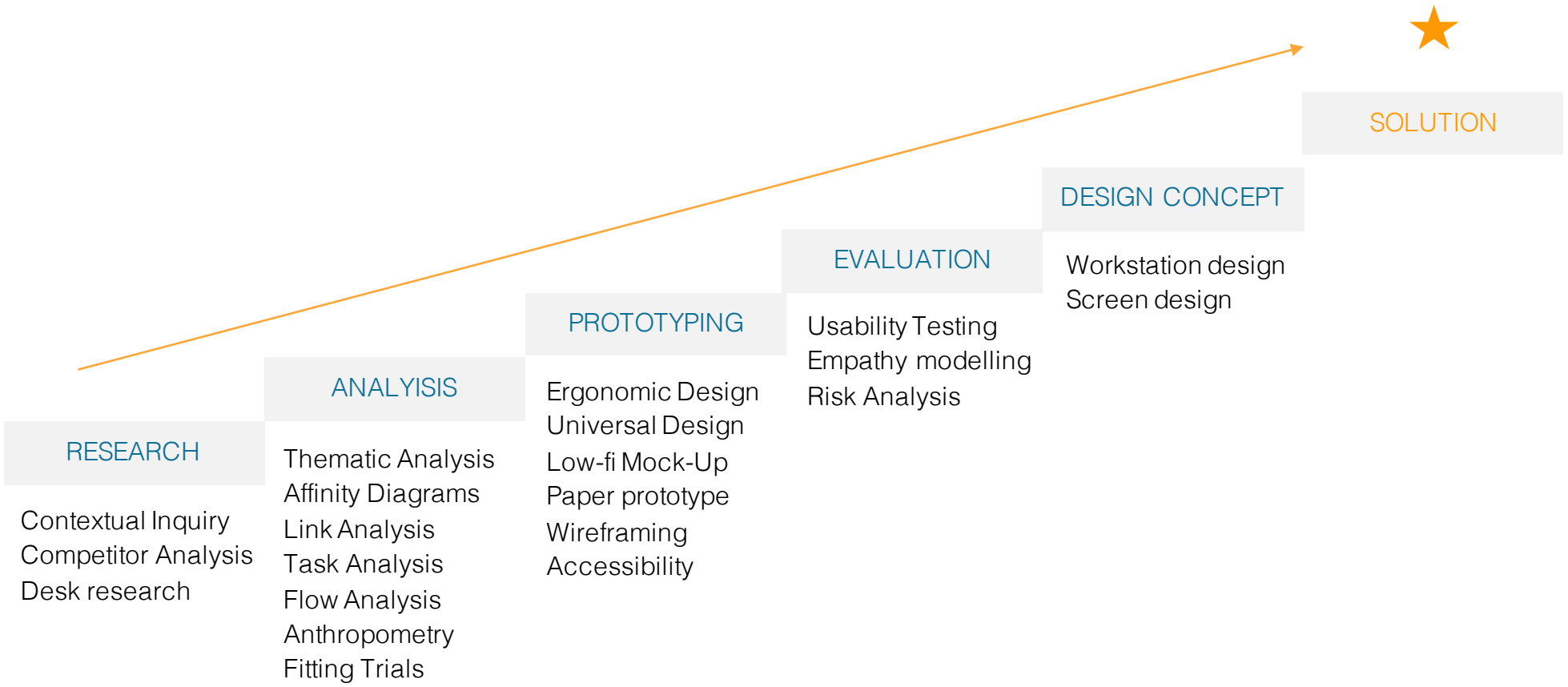
Ergonomic design concept

To ease the check-in/check-out process for business travellers, an ergonomic design concept for kiosk was developed using universal design approach by complying to Equality Act to accommodate users of all capacities and abilities

RESPONSIBILITIES

Contextual Inquiry
Task Analysis
Link Analysis
Thematic Analysis
Persona Creation
Ergonomic Fitting Trials
Low fidelity mock-up
Wireframing
Usability Evaluation
Risk Analysis

CONTENT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Desk research
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Link Analysis
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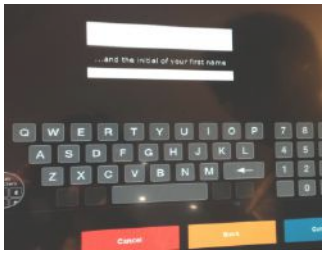
Screen design
SOLUTION

COMPETITOR ANALYSIS

Contextual Inquiry with the customers and staffs was conducted to discover issues in competitor Kiosks

"People tend to queue up at reception. They're not sure what they can do on the terminal."

"Some people think it's an ATM"



"Sometimes they can't find their reservation because of spelling mistake in their name"

"Children like playing on the wheelchair kiosk"

- Luggage hinders orderly queueing and flow
- Dark screens cause reflection
- Screens time-out in the middle of check in
- Lack of multi-lingual support
- Fixed text size which may be too small for some users

LINK ANALYSIS

Rapid link analysis technique was implemented to find ways to avoid overcrowding in the foyer and hence, determine the possible placements of Kiosks in relation to other entities like reception desk, lifts, entrance and staircases.

Link Analysis- Kiosk adjacent to reception desk

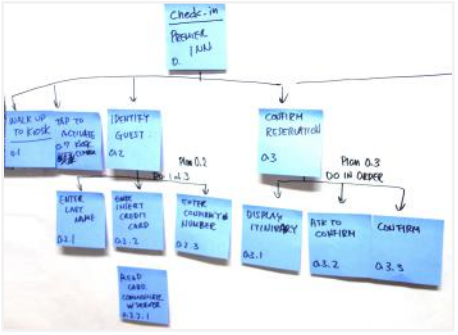
Link Analysis- Kiosk opposite to reception desk

AFFINITY DIAGRAM

Top-down Thematic Analysis of gathered data was performed using Affinity Diagram to find positives and negatives of existing systems

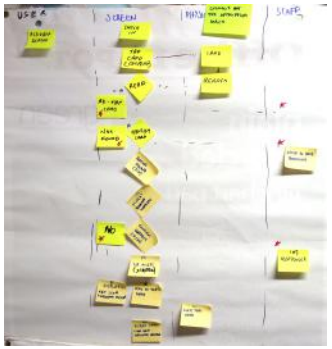
TASK ANALYSIS

Check-In and Check-out tasks were broken into subtasks using Heirarchical Task Analysis to determine each micro step involved for tasks. Below is the HTA for Check-In.



FLOW ANALYSIS

Flow analysis of tasks identified in HTA was conducted implementing Partitioned Operational Sequence Diagrams (POSD) to determine the actions involved to accomplish tasks and influence of external factors like hotel staff, Kiosk screen, queueing people and luggage on these actions. Image shows POSD for Check-In.



USER REQUIREMENTS

Primary user

As business traveler I want to:

- Want to check in as quickly as possible
- Need to check out easily in the morning
- Don't want to fill in paperwork

Other stakeholders

As hotel receptionist I want to:

- Be able to take time with customers
- Help customers if they are facing any problems, by having access to their booking and contact details through a duplicate screen

ERGONOMIC FITTING TRIALS

Height of screen from the ground, width of Kiosk, screen-width and screen angle for the Kiosk were obtained by complying to Universal Design principles to accommodate target users of all abilities.

Anthropometric Data

The age group for target population was identified as 18-65 years. Anthropometric data to determine width of Kiosk, screen-width and the base range for the height of screen from the ground keeping following types of users into account

- **Limited users** - Users which fall under 5th percentile and over 95th percentile of target users. For example shortest wheel-chaired elderly woman and a male taller than 190cm would fall into respective categories.
- **Average users** - Users from target population other than Limited users are average users
- **Abusers** – Users which don't use system in approprite manner. For example, children.

Fitting Trials

The base range obtained by anthropometric data were used as starting point for Fitting Trials of the height. Participants from both Average Users group and Limited users group were asked for comfort/discomfort at each height interval in the range. Subsequently for each comfortable height comfort/discomfort was asked for a range of screen angle. Image shows Fitting Trial for comfortable height for a participant

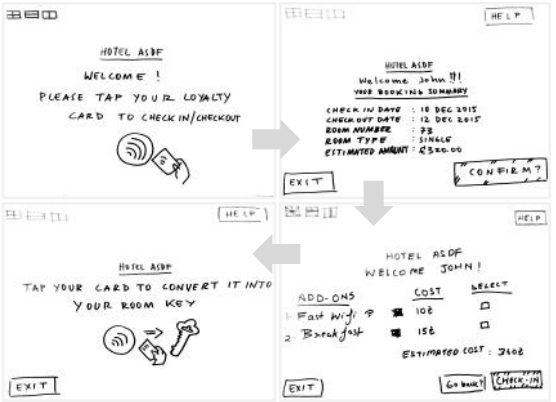
LOW FIDELITY MOCK-UP

A cardboard based low-fi prototype was developed based on dimension obtained by following below given measures

- **Height of screen from the ground & screen angle** - common comfort settings derived from fitting trials for both Average users and Limited users were used
- **Width of Kiosk** - was determined by obtaining the anthropometric value of Optimally Visual Zone for 5th percentile users
- **Screen-width** - to hide transactions from person next in queue screen-width was kept just under anthropometric shoulder width of 5th percentile user
- **Hand luggage shelf** - standard dimensions used in Airlines were used

PAPER PROTOYPE

The paper-prototypes for Kiosk screens were created by complying to Web Content Accessibility Guidelines followed by UK Legislation for accessibility. Image shows the partial screen flow for Check-In process.



USABILITY EVALUATION

Empathy Modelling

Design was evaluated by diversifying limited and average users the participants by including blind/ partially sighted, frequent business travellers, wheelchaired, and elderly users. Due to limited availability of varied users empathy modelling technique was implemented to emulate characteristics of these users. Participants were presented with test scenarios and were asked to Role Play accordingly to complete the tasks.

Average user role playing as a business traveler

Elderly user with visual impairments

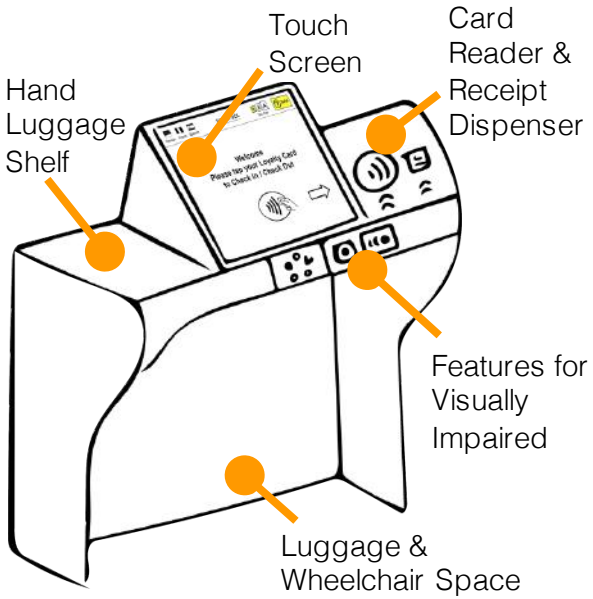
Postural Risk Analysis

REBA technique was used to evaluate postural risk in terms of neck-bending, trunk-bending and upper arm, lower arm and wrist position while completing a task

Based on findings from analysis and evaluation, Kiosk workstation design concept was developed by focusing on following factors:

- Better user experience for customers
- Quick check-in, check-out and payment transaction for loyalty customers
- Compliance with Equality Act
- Reduction on reception staff load

However, it's practically unrealistic to design one solution to fit whole target population. Emphasis was given on comfort level of Average users while laying out the recommendations. Although, it was ensured that Limited users are able to use the system without much difficulty.



DESIGN RECOMMENDATIONS

Hand Luggage Shelf

1. Provide sufficient space for handbags. Suggested minimum
   - Width×Depth = 20×35 (cm)
2. Allow guests to have their bag in sight and ready to hand

Touch Screen

1. Provide the screen angle in conjunction with height. Suggested measurements
   - height of top of screen -120 cm
   - inclination - 65°
2. Consider screen width less than 32.5cm (approx. 15.4inch) to provide sense of security

Card Reader & Receipt Dispenser

1. Needs to be at same height and angle, and adjacent to touch screen

Kiosk integration to hotel foyer

1. Provide clear sightline to kiosks from the entrance
2. Ensure easy access of wheelchair users to all kiosks
3. Avoid installing kiosks adjacent to reception desk

Features for Visually Impaired

1. Provide physical alternative control panel
2. Provide audio instruction functions
3. Consider usage of raised ridge around the socket, funnel into the centre of socket, protrusion, and/or groove to indicate locations of interaction points
4. Provide audio feedback for card reader when card read

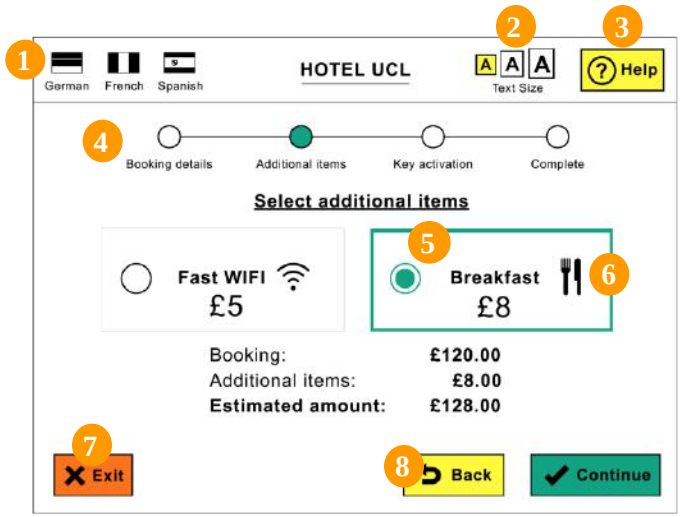
Luggage and Wheelchair space

1. Suggested minimum
   - Height×Depth = 90×35 (cm)

FUTURE WORK - KIOSK

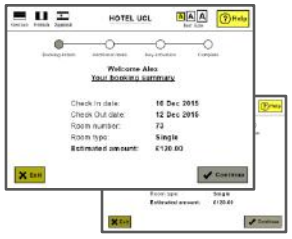
- Height of hand-luggage shelf and placement of features for visually impaired to be determined
- At least 2 rounds of usability evaluation with actual users will be required to formalise final specifications for the Kiosk

Touch screen designs were developed by considering common design patterns to match users mental model, ergonomic considerations for kiosks and accessibility legislations.



1. **Multilingual support** for non-speakers of English following design pattern used on a number of ATMs and self service kiosks in airports
2. **Adaptive font-size** for users with visual impairments. The icons follow common design patterns which are familiar to these type of users
3. **Help button** - If user needs assistance from reception staff. This would alert the staff member, either via a duplicate screen or their own software on their machines
4. **Progress indicator** gives feedback on users current status in the process. This improves completion rates.
5. **Large selection area**, to help users without fine motor control.
6. **Icons** to introduce redundancy and make screens more comprehensible
7. **Exit button**, in case the user doesn't want to complete the process
8. **Placement** for Exit, Continue and Back following design patterns used in ATMs and other self service kiosks.

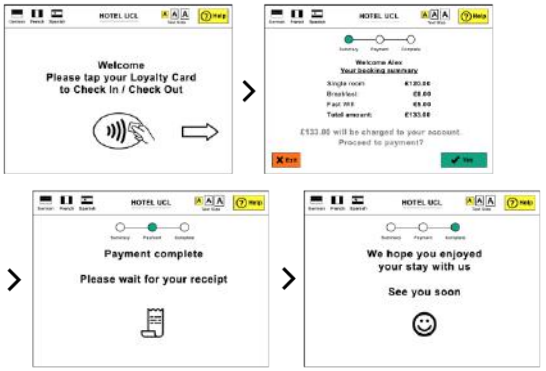
COLOUR BLINDNESS SUPPORT



Approx. 1/12 males posses some form of colour blindness Since majority of business travellers were males, colour blindness emerged as most prominent disability to address. Image shows the appearance of above described screen to users with Deuteranopia and Protanopia and indicates clear differentiation in button colours for them.

WIREFRAMES

Wireframes for screens were created using Balsamiq and Adobe Illustrator. Below image describes complete Check-out flow.



FUTURE WORK - SCREEN

- Extensive evaluation with users and reception staff
- Size of buttons are unknown, these buttons need to be large enough to provide adequate selection area
- Multilingual support option will depend on frequency of visits of non English speakers