Fault Reporting App

INTERIM REPORT

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I hereby declare that this interim report is all my own work, except as indicated in the text

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1 <u>Introduction</u>

For this project, we will be working closely with an IKEA subsidiary called IKEA Kitchen Services (IKS) who focus on kitchen installations and planning. The project aims to create a solution for companies similar to IKS that allows customers the ability to discuss with the company about kitchen design, installation and aftercare sales and maintenance requests. While also providing company staff with a unified way to view, manage and filter these customer requests and liaise with contracted third-party installers.

While our project will not be specifically tailored to the requirements of IKS, we will be in continuous communication with IKS to understand what companies that specialise in kitchen services require. IKS will allow us to gain an insight into the issues that they encounter, allowing us to create a solution that can benefit IKS or similar companies in the future.

Our intention in this project is to be able to create a solution for companies similar to IKS that allows customers to be able to discuss with the company about kitchen installations. IKS offers kitchen installations to their customers which are split into the stages [1] listed below –

- Measurement Meeting –
  - This meeting is with a customer and an IKS technician to ensure that the customer's plan for their kitchen is as accurate as possible.
  - IKS offer this as an in-person appointment but are now also planning on virtual measurement meetings.
- Kitchen Planning –
  - IKS offers customers help to plan their kitchen installation so that the customer's kitchen will look exactly like they desire. [2]
- Survey –
  - An IKS approved installer will complete a survey of the customer's current kitchen space and check this with the plans submitted in the previous step.
  - The installer will also tell the customer the kitchen installation timeline and what to expect in the coming weeks.
- Installation –
  - The installer(s) will then commence the installation of the kitchen after the customer has let the installer know that all the products have arrived.
- Post-Installation –
  - Once the installation is complete, customers can then report any faults they have with any of the products they have bought.
  - Some products and services come with a warranty and support provided.
  - A meeting needs to be organised with an installer so that the fault can be resolved.
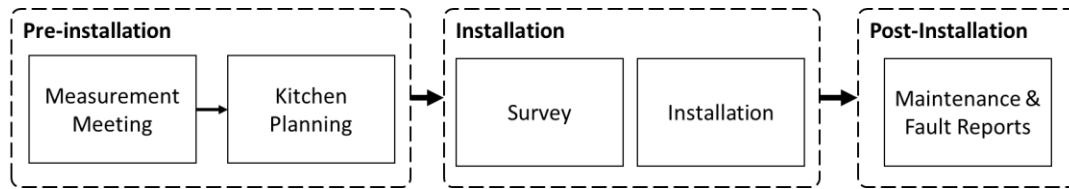
Figure 1- IKS Customer Life-Cycle

IKS refer to this as the customer life-cycle, which takes the customer through various phases of pre-installation, during installation and post-installation. This life cycle makes it clear to the customer on the future steps and relationships they will have with IKS.

For the remainder of this report, we will use Nottingham Kitchen Services (NKS) as a fictitious company that works on kitchen installations, like IKS. This is because our solution is not tailormade for IKS but instead our solution should be useful for all companies that focus on this industry. Another key factor to this is the legal ties that are imposed between us and IKEA.

Our proposed solution should allow NKS –

- Improve communication between the customer and NKS, allowing NKS to utilise their resources more efficiently.
- Reduce delays between organising meetings in all of the stages mentioned above, allowing NKS to respond to more customers and thus reducing the costs in the customer service department and increasing profits.

Our solution also needs to allow trusted installers to be updated about an installation request or a fault reported by the customer.

To achieve this, our solution will have separate software implementations for customers, installers and staff –

- Customers will have a mobile app to communicate with NKS and installers. Customers should be able to request kitchen installation services and be able to request repair for faults of products they have bought.
- NKS staff members will have a website where they can access the information that is passed by the customer through the app and perform the required action to solve customer requests.
- NKS approved installers will have a mobile app where they can access information about which customer they must perform an installation for, or which fault they must repair.

The process of how our product meets these criteria and our reasoning for using these technologies will be explained in the remainder of this report.

2 Motivation

From our discussions with IKS about their current systems and work processes, we were able to identify several key issues that need resolving; these are as followed:

Kitchen Installation –

- Currently, customers need to navigate through IKEA's website to find information about kitchen installations. Finding this information is not straightforward, a customer must spend a considerable amount of time navigating the site to find the information that they need. This could result in customers picking a different company for kitchen installations that have the information more accessible and easier to find.
- Secondly, communication between the customer and IKS is done via email. Although this is not a bad solution, it makes it extremely difficult for IKS staff members to know which customer is at what stage and what they require. This means the system has very little automation and requires a lot of tedious work from the IKS staff members.
- The current kitchen installation process is quite complex and requires the customer to perform a lot of actions –
    - The customer first needs to have the measurement phase organised with IKEA or measure their space out themselves.
    - The customer then needs to organise a planning meeting with IKS about the layout of their kitchen.
    - The customer then needs to organise an installation with IKS to install their new kitchen, this stage is also split into multiple stages –
        - A pre-installation check by the installer to visit the location compared to the proposed plan, making sure the plan is feasible. The customer needs to organise an appointment for this service
        - Installation of the new kitchen at a future date once all the products have been delivered to the customer. This appointment needs to be organised by the customer.

    In addition to this, the current IKEA website does not have an intuitive method to direct the customers to perform these actions. The IKEA website allows the customer to book these appointments but does not show the customer clearly the processes involved and at which stage of the process they are at.

Reporting a fault with their product –

- IKEA only has a general fault reporting email address; this means that a customer reported fault will not be investigated by an IKS staff member immediately but instead is looked at by a general customer service team and triaged. This leads to delays, as the fault must be passed to the appropriate department.
- IKEA staff members are responsible for going through emails and responding to these faults. Emails are not automatically ordered based on the urgency of the fault. The process of adding a priority to each fault is assigned to a staff member. This

could lead to high urgency (and potentially dangerous) faults being missed and taking an unacceptably long time to resolve.

- Once a fault is reported to IKEA, an installer is then assigned to drive to the customer's location to investigate the fault reported by the customer. IKEA will only fix faults of products if the fault can be deemed as a product defect. If a product is damaged by the customer, intentionally or not, the installer cannot fix the fault. The cumbersome process of sending an installer out reduces the efficiency installers work at, costing IKEA more money and resources than needed.
- Currently, a customer could report a fault for easily fixable issues. For faults like this, an IKEA staff must spend time scheduling and then virtually meeting these customers to explain simple solutions to them. In some cases, they must also schedule and send an installer to the customer's location to fix simple issues. This whole process is resource-intensive and inefficient.

These issues listed are responsible for reducing IKEA's profit margins but are all solvable through software. These issues are universal to all kitchen service providers and so are our basis for the project's motivations.

3   Aims and Objectives

This project aims to create a set of software solutions that allow staff, installers, and customers to efficiently communicate seamlessly and reliably.

The main objectives of the project are as follows –

The Customer mobile app:

1. Must allow customers to be able to report any faults they have with the products they bought easily and reliably. This process should be done independently of emails.
2. Must allow new customers to sign up and log in using the app.
3. Could allow existing customers to be able to verify that they are existing customer to update the product list of that customer.
4. Should allow customers to be able to discuss kitchen installations with the company in a manner such that the next steps a customer must perform are clear.
5. Should allow customers to communicate with a staff member of the company they have bought a product from. This can be done with an in-built messaging system, allowing faster communication between a staff member and the customer.
6. Should allow installers from companies to inspect product faults without an in-person visit. Our current solution for this is to have an in-built photo uploading feature, allowing the installer to make a judgement on if the fault is a product defect or if the product has been damaged by the customer.
7. Should be able to evaluate if a fault reported by a customer can be resolved without the requirement of an installer travelling to the customer's location. If this is possible, then our app should help the customer with a step-by-step self-help guide on how to rectify the fault.
8. Must be intuitive and simple, allowing for users with little to no technical skills to use the software.

The installer app:

1. Must be able to sign up in the app. The app should do a security check to ensure that the installer is from a verified subcontracted company.
2. Must allow installers the ability to set their work availability and have jobs assigned to them from NKS.
3. Must allow installers to view job details, supplementary files and customer information about a job.
4. Should allow installers to communicate with both the customer and NKS about progress updates or any difficulties they are facing.
5. Should have the functionality to reschedule and request to cancel an appointment.

The company facing website:

1. Should allow company staff members to look at faults reported by a customer. Our current method to solve this problem is to use a website that staff members can use to extract information about a fault reported by a given user and then be able to perform the desired action to resolve the given fault.
2. Must be able to automatically prioritise a fault that is reported by the customer. This will give the company an idea of how urgently they need to respond to a specific fault reported by customers.
3. Must allow staff to be able to quickly communicate with any party concerned with the kitchen installation. This will be done using a set of group chats.
4. Should allow staff to create self-help guides that will be visible to users on the mobile app.
5. Should allow staff to view the availability of all concerned parties.
6. Must be easy to use and allow any information to be located reliably and quickly.

4 Related work

In the early stages of this project, we spent a significant amount of time using the customer relationship manager "Salesforce" [3]. IKS currently uses this to manage appointments, installations, and all customer tasks. While Salesforce provides many of the features IKS desires, it is unintuitive and cumbersome to use.

During our meetings with the IKS, it was made very apparent that tasks could be easily automated, and their current methods were slow and error-prone. IKS staff were averse to the challenging user interface and navigation.

Zendesk [4] is an industry-leading customer service & sales software, that specialises in creating a uniform place for staff to manage and respond to incoming customer service requests. It provides a ticketing system, live chat/ messaging system, integration with other systems such as Teams and Slack and routing intelligence to ensure messages end up with the right team without manual data entry.

While Zendesk is a very popular general use customer service tool, it does not specialise specifically for anyone industry. Moreover, its only customer-facing interaction is via live chat, email, and web-form entry. With our solution, we hope for a more tailored approach, that is more integrated, using a dedicated customer and installer facing app.

Ivanti [5] Service Manager is an example of a customer services system, specialised for a specific industry, the IT support industry. It allows for a highly adaptable ticketing solution and complex chaining of tasks and associated people. Some of which we hope to take inspiration from, for our industry.

5 Methodology

5.1 Customer and Installer Apps

We chose a mobile app for customers and the installers as both apps will contain a messaging system between NKS and those parties. This ubiquitous approach will allow us to use features such as push notifications, keeping customers responsive and engaged with NKS and allowing for installers to easily maintain their workload. Most demographics are extremely comfortable using a mobile app and messaging using an app thus making the process of communicating with NKS easier. Having installers working exclusively from home from different installation sites also means that using a mobile application makes most sense and allows customers and installers to communicate at more flexible times.

We also considered the use of a website and a desktop app for the customer to use instead of the app. However, we felt that using the website or a desktop app is not convenient for the customer or an installer as they may not always have a computer to view a website or a desktop app. Moreover, installers generally struggle to use complex software systems and as such an app should be familiar and simple for them to use.

Using a website or a desktop app also makes it extremely difficult for the customers and installers to send photos compared to the use of a mobile phone. IKS are also interested in having a mechanism to have a live virtual meeting with the customer through the mobile app to streamline the process of a kitchen installation for the customer.

We choose to use Android Studio and Java to create our apps in as two of our team members have significant experience in using it from previous projects and so this will help speed up our development times. Moreover, it works well with our devices and mobile phones we already own and so we require no new hardware for development. This is also making testing significantly easier.

5.2 Staff Website

NKS staff members will be working in offices with access to computers which would make accessing our website easy for them. We also had the option of creating a desktop app for staff members but decided against it. This is because installing a desktop app on so many computers will be time consuming for NKS and it is also possible that NKS staff members are not comfortable installing the desktop app themselves, thus slowing down the process of switching to our system. Another key reason we chose to use a website instead of a desktop app was that a website is easier to update compared to a desktop app thus making it a more favourable option for us.

After we decided to stop using Salesforce, we needed a new method to create our staff website. We chose to use React to create our website as one of our team members have significant experience in using React from previous projects and help to speed up our development times. React also has more documentation than Salesforce, making it easier to use React.

5.3 Database

Our solution must have a database to store customer, staff and installer information. Initially, our database was going to be implemented using salesforce to allow IKS the ability to easily integrate our system to theirs. However, Salesforce had some key pitfalls that made it difficult to use:

- Firstly, the Salesforce API had no simple Android Studio integration and thus made programming using the Salesforce API difficult. In addition, the poor documentation of the API [6] made it difficult to debug issues and understand errors.
- It was not obvious how we would authenticate users on the mobile app to access this API, without making them create a Salesforce account.
- Salesforce would require a paid subscription to develop to the level that we needed to and without IKEA sandboxes, this was not feasible.

After spending roughly two months working with Salesforce, we decided to step away from it. This meant that valuable time was lost, however, at that early stage a switch away from Salesforce was not too costly.

To make up for the lost time we wanted to create our database quickly and so choose Google Firebase as two team members are very confident using it. Firebase is also in-built in Android Studio and has better documentation allowing us to make effective use of our time creating new functionalities for the app. Firebase's tree-like structure also allows to make ownership and association for more intricate relationships between products and customers for example to be clearer and has helped us visualise the structure of our database clearly. For example, a user would be a document (node) and could contain their products in a folder (subtree) as if they have ownership of it.

Functional Requirements –

- Must store customer, staff and installer information securely
- Must ensure strict security rules that allow select users to only see relevant data to them making sensitive data secure.
- Must allow companies to easily add customer information to our database, making it easier for customers to start using the app straight away

Due to recent client requests, the structural component of our database is unclear and requires revising and thus, the requirements need reviewing and will be further explained in the end of year report.

6 Design

To design our software systems, we made medium-fidelity prototypes that demonstrated our intentions for the functionality. We would pose these to IKEA and receive feedback. In turn, this gave us insight into how we would aesthetically design our systems to meet the functional specification as well as meeting requirements of simplicity that were indicated to us by IKEA.

For example, we were informed that installers generally do not have incredible technological experience and it was recommended that we spend time considering making the installer app as simple as possible.

6.1 Mobile Applications

Conceptually, attempting to build an application that focused on post-installation fault reporting seemed simplistic with a general menu screen to allow navigation to reporting faults, viewing fault tickets and allow the user to plan their repairs as seen in Figure 2
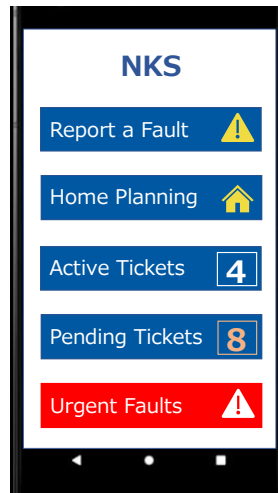

Figure 2 Initial Fault Reporting Screen

As the requirements changed to incorporate the complete customer lifecycle so did the design of the application as seen in Figure 3
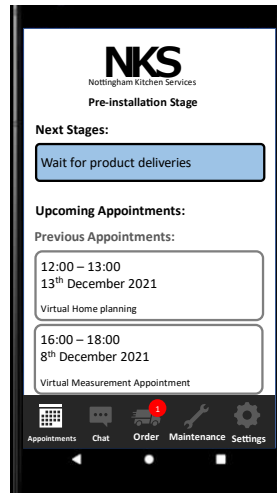
Figure 3 Final Customer App Design

It was made apparent that chats and appointments would be useful features throughout a customer lifecycle, whereas order and maintenance are useful for pre and post-installation customers respectfully. We realised that customers may be reverting to different stages, and we needed one consistent interface throughout.

The interface of the applications must therefore be easy to understand to accommodate users of different technical levels and so that NKS can ensure engagement into this system throughout the customer lifecycle to streamline how they deal with customers and installers. Using the bottom bar navigation aids this:

Firstly, by making the experience more efficient and therefore more preferable [7] for users compared to our previous design model.

Secondly, by mimicking the same navigation that most, if not all, major apps use today. Jakob's Law states [8]:

> *'Users spend most of their time on other sites. This means that users prefer your site to work the same way as all the other sites they already know. Design for patterns for which users are accustomed'*

Jakob's Law heavily influenced our design changes to ensure customers could best understand the complete lifecycle process NKS would be taking them through by displaying it in a manner that was familiar to them.

Keeping the design simple and effective drove us to have a theme that would draw attention to the contrast of new notifications that needed addressing, such as with the red notification sign on the orders tab in Figure 3. Horton explains how this is applied to help gain recognition, drive the attention of users towards relevant parts of the app when NKS would need customers to engage and address upcoming events [9].
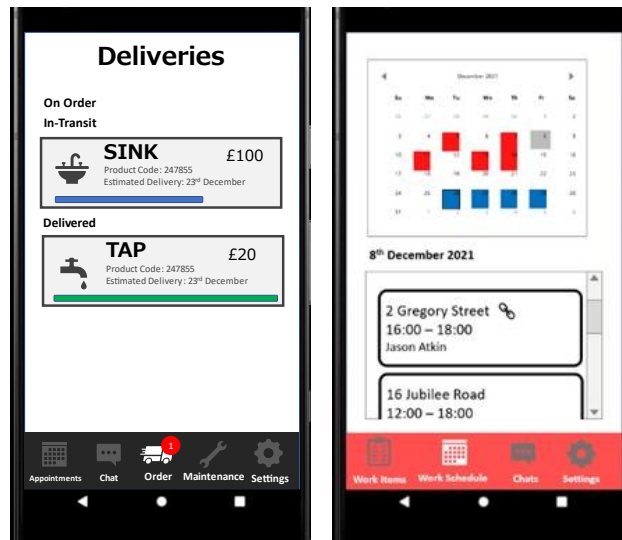
Figure 4- Importance of colour

Horton further explains how colour can convey information and we use this theory in both applications as seen in Figure 4. For example, we convey the delivery status of the delivery by slowly adjusting the colour to green as the delivery gets closer to completion. We also make the work schedule of installers clear by making busy days red, holidays blue and unavailable days grey.

7 Progress Update

7.1 Project Management

For this project, we have split the team of 4 into two groups –

- Benjamin Leaf and Siddhartha Kumar will be working on the staff website together. They are also responsible for creating a project timeline and organising sprints throughout this project.
- Jonathan Foot and Yusef Mansour will be working on both the customer and installer mobile apps. Although they are two separate apps, both apps are very similar and thus creating a second app simultaneously should not be a hindrance.
- Everyone is responsible for managing the Google Firebase database and writing reports for this project.

For this project, we will be working using a scrumban approach, where we split out our week into two-week-long sprints, with sprint-retrospectives at the end of each sprint. Where we would summarise what went well, what could be improved and any questions we may have.

Being flexible with our plans have allowed us to react to issues we faced during this project, such as client requirement-creep. The two-week-long sprints allowed us to split the project into smaller stages and thus create milestones for us to target.

We are using GitHub issues to create our sprints and assign them to team members, using it as a Kanban style board. This makes it very clear what our objectives are for the next two weeks, and which team member is responsible for which objective.

We have also split out our Git repository into three separate git-submodules, one for the website and two for the customer and installer respectively. By having them in their own repositories it makes it easier to track changes and ensures they are more manageable in size. Starting next semester, we hope to utilise GitHub pipelines and set-up a Continuous Integration pipeline onto our master and testing branch.

7.2 <u>Legal Challenges & Delays</u>

Originally, this project was intended to produce software that IKS could use in the future. The main aim was to improve operations at IKS and was focusing mostly on the post-installation stage, i.e. The fault reporting aspect.

After several discussions with IKS we presented our prototype on 22nd October to IKS which is where our working relationship changed. After the presentation, we had discussions with the IKEA legal team who were concerned about our work, IKEA's brand and the Intellectual Property for this project. IKEA also wanted to have an NDA arranged for this project, as they felt that our software might put their data and information at risk.

Before this presentation, we had a meeting with IKS every 2 weeks but due to this legal hurdle, IKS were not allowed to discuss with us their current systems and the project, making it difficult to work effectively in this time period.

This resulted in us losing contact with IKS until the 25th of November, where we were finally able to organise a meeting and discuss the project. In this meeting, we agreed upon how we were to change the project to protect the IKEA brand and how we addressed the issues the legal team had with the original prototype.

We also learned in this meeting that the head of IKS, our original point of contact within the company, was changing from 29th November and what IKS wanted from our project had changed.

7.3 <u>Changes In Client Scope & Requirments</u>

Up until this point, IKS were mostly concerned about their current system for customers to report faults. During this meeting, it became clear that the product IKS are looking for is different to what we were initially building.

IKS now wanted us to focus more on the customer life-cycle, being able to take the customer through the process of a kitchen installation and be able to report faults for their

existing products. IKS wanted a new prototype that showed how our current system would incorporate this which we demoed on the 9th of December.

Having to prepare a prototype on such short notice led us to stopping software development for this project and focusing solely on the prototype. This meeting was successful, and we gained a better insight of IKS desires. Due to these legal issues, we have had and the changes in requirements with IKS we have had to change our work plan for this project completely.

The short notice of the change of requirements with IKS, meant we had no time to plan out our next steps to meet the new requirements. We believe that the new additions by IKS are substantial such that we need to create a brand-new plan and our current project plan cannot just be simply amended with these new additions. But we hope to get back on track by doing a considerable amount of work over the Christmas break period and working out a new strategy going forwards.

7.4 Contributions and Reflections

Given the challenges we have faced with IKEA, we have done very well so far for this project. We have a prototype of all the apps which have demoed to IKS and gotten positive feedback on, indicating that we understand what IKS require from us which should allow us to focus on software development throughout next semester. We have also created functionalities for the customer app, which would allow a customer to report a fault and be able to view all faults they have reported.

We also believe that we have managed to adapt very well to the significant changes in client requirements and still managed to produce high levels of work irregardless of the challenges we have faced throughout the project so far.

We are excited to be working alongside a major global brand like IKEA and get an insight into how such a company and industry functions. This gives us a better understanding of how we should approach a project and how to create a project that is suitable for an industry to use themselves.

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