

Market Research

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1. Introduction

This document aims to detail the types of applications that are already available to patients and carers. The document will look at a subset of applications in further detail and comment on the following:

1. Compatibility
2. Design
3. Functionality
4. Ease of Use
5. Speed
6. Reliability

Security is another aspect that we will also be considering with great care and attention when producing our application however, this is something that we are not going to directly look at when carrying out market research. We will be using best practices that conform to UK data protection and privacy laws as a baseline and feel it would be inappropriate to look at the security of other applications in order to determine a baseline for our application. Therefore, this will not be discussed in this document.

2. Healthcare Applications

There are a whole range of mobile applications and websites that are available within the pharmaceutical and healthcare industries. Generally, the web applications are more sophisticated and advanced whereas the mobile applications are somewhat less sophisticated and developed within this market.

There are some very well-known web applications within the UK such as, NHS Direct website and mobile application. However, there are also many mobile applications that are less well known; some of these are produced by government organisations, some by healthcare companies such as the pharmaceutical giant GlaxoSmithKline and others are produced by charities.

The majority of these applications are geared towards patients or the general public and contain information about certain conditions, the symptoms that a sufferer may experience and some advice about what to do if you believe you may have the condition/illness.

In recent years there have been so many of these applications developed that both Apple and Google have entire sections of the app stores that are dedicated to apps categorised under 'Medical'. A report in 2013 showed that Apple's App Store has approximately 20,000 medical apps whereas Google's Android Play store lists 8,000 (Aungst, 2013).

There are also applications that are used internally within the NHS to support nurses and carers in treating patients as well as recording health information about them such as heart rate, blood pressure and medication.

3. SystmOne

SystmOne is a clinical software that is produced by a company names TPP, it was first released in 1999 and is adopted by the NHS as a part of the National Programme for IT and their vision for a 'one patient, one record' model of healthcare (TPP-UK, 2011).

SystmOne is an enterprise product that is made up of several modules; these are able to be used together or individually as a standalone solution. The module that is most similar to the vision of JustHealth is the SystmOne 'Community' module. This is used by NHS district nursing teams in 107 different Primary Care Trusts (TPP-UK, 2011), including South West Essex Community Services (SWECS) who use the software when visiting patients at home to update the software.

Before the introduction of the SystmOne Community module the carers/nurses that would visit the patients home would have to duplicate there work by recording by hand information about the patient and then when they arrived back at the hospital/clinic where they were based they would have to copy this information electronically into the system. However, SystmOne has enabled nurses to be able to do this whilst on the move as in particular SWEC have given all of their nurses an HP Toughbook to ensure that they are able to do this on the move which means that each nurse is able to see more patients and/or spend more time with the patients that they visit.

3.1. Functionality

SystmOne: Community has many features and functionalities, some of these are aimed at the carers/nurses and others are directed towards management and administrators. Management functionality is much to do with reporting on workload of the Primary Care Trust as a whole, individual nursing units, or individual members of staff. It is also capable of running reports on waiting times and referral reasons. Due to the scope, time and resources allocated to the JustHealth project it is unlikely that this functionality would be built into the application.

Furthermore, the administrators are also given full access to SystmOne so that they are able to schedule appointments and assign patients to other nurses/carers. Administrators are given full access to the system so they would be able to update patient records. This seems to be somewhat unnecessary and JustHealth believe that administrators should only need access to patient profiles; to update address/doctor/next of kin and so on and to add appointments however, they should not need access to patient information such as blood pressure, heart rate and medication and if this is required it should be read-only access.

Nurses are able to update SystmOne with a whole range of different information, including:

- Pulse
- Blood Pressure
- Height
 - Weight

} SystmOne will
calculate BMI
- Alcohol Intake per week
- Substance abuse
- Cigarettes smoked per week
- Medication
 - Name (lookup in database of drugs)
 - Dose

- Frequency
- Reason (optional)
- Date Started
- Date End
- Booking appointments
 - Update when on route
 - Update when arrived
- Group patients and nurses
 - I.e. Cardiac, Oncology, Paediatric etc.

3.2. Ease of Use

SystmOne: Community is not as easy to use or as effective as it could be. Initially, the learning curve is very steep and can often confuse users. SWECS employs around 3 IT SystmOne trained staff to show users (nurses/admins/management) how to use the system effectively and help them with any issues that they may have. The system has small buttons that often appear to be hidden away and this makes the use of the system difficult especially as the users are often not technically minded. Further to this, the colour scheme of the system is bland; it is mainly grey which also makes the system difficult to use.

Moreover, the system opens all of the text input boxes up in separate windows, which makes the application fairly slow and arduous. Oncology and Cardiac nurses/carers typically spend around 40mins with a patient so the time that it takes to fill out this information isn't quite so important although, this time should be spent with the patient. However, general nurses/carers will spend less than 10minutes with a patient and the majority of this time is spent taking the patients pulse, blood pressure and checking their medication. This leaves around 30seconds – 1minute to enter in all of the details; it would be much easier if these were all on a single page.

3.3. Performance

The performance of SystmOne is good and it has to be in order for nurses/carers to be able to make all of the visits that they are required to make and also ensure that they update records efficiently and accurately. Although, performance is crucial the auditing of the records that are committed is also very high. This is to ensure that who changed what and when is all recorded and available to view if needed. This is essential to ensure that if needed, users can be held accountable if records are inaccurate or corrupt.

3.4. Patient Interaction

SystmOne provides no patient interaction capability and patients are unable to view the information held about them in SystmOne from the nurse/carer that is visiting them. This is to ensure confidentiality of other patients too however, if a patient does request the information that is held within SystmOne about them then this can be printed and given to them in paper format, not electronically. If the system provided patient login and they were able to see information solely about themselves this would save the NHS money and also save staff the time that it takes to speak to the patient, find their information, print it and deliver it to them.

3.5. Recommendations

1. Application Speed is crucial, if this is lacking it would be impossible for the carers/nurses to use it on the move.
2. Both a web and mobile interface would be better than SystmOne as this is currently only available as a windows OS install, which consequently restricts the type of endpoint that can be used to access the system.
3. It would be good for changes to only need to be held locally and committed when a good internet connection is available.
4. 2-Factor Authentication is 100% necessary.
5. Simple, easy to use interface, large buttons with no/minimal scrolling would be best.
6. Manage access effectively, work on a need access, give access basis.

All of the above was taken from a telephone interview with Dean Markwick, a former Mobile working Assistant for NHS, South West Essex Community Services. The full interview can be seen in appendix one.

4. Analysis of identified competition

This section looks at some of the consumer applications that are produced by healthcare and pharmaceutical companies and added to the Android and Apple app stores. Below, the following applications will be reviewed and compared:

1. Piri Pollen Application, GlaxoSmithKline

This application is designed for hay fever sufferers; it gives a pollen forecast and allows the user to set medication reminders. Specifically, targeted at consumers of Piriteze, the application allows you to find your nearest store to buy the product or order online. This application was taken off of the app store in June 2014 due to technical difficulties with updating the pollen count readings based on postcode.

Note: This app has now been taken off of the 'App Store' as can be seen in an email to the application owner in Appendix 2; however as an employee of GlaxoSmithKline, I (Stephen) was given access to the application so that I could see how it worked.

2. MediSafe Meds & Pills Reminder, MediSafe Project

MediSafe is a medication reminder app, it allows you to add the medication that you are due to take and will remind you when you should be taking the pills. If you don't mark the action as complete the app will alert your selected MediSafe buddy. Also, the app facilitates a reporting feature showing if and when medication has been taken and when prescriptions need to be renewed.

3. CF Medcare

CF Medcare is an application that helps those suffering with Cystic Fibrosis. Like MediSafe it allows a user to record their medication and be reminded when it is time to take it, as well as when medication is going to run out.

4.1. Compatibility

The MediSafe and CF MedCare applications are available on android as well as iOS, although neither have a front end web interface; this is something that we thought would be particularly beneficial as a website would not restrict the user based on what device they own, as this will be accessible from any device whether it be a smartphone, tablet or PC. The Piri Pollen application is only available on iOS and although it does have a website that is able to tell you the pollen count for your local area as well as order the Piriteze drug, it does not facilitate the use of the medication reminder functionality.

Furthermore, the MediSafe application is adapted for larger screens, such as the use of tablets as well as smart phones which tend to have smaller screens. This is very useful and again makes the application accessible to people that have either android smartphones or tablets. On the other hand, the Piri Pollen app is only available on the iPhone and not on the iPad which limits the user base of the application. Although, for the JustHealth project both smartphone and tablet compatibility are crucial, smartphone compatibility should be prioritised higher than the tablet as these device have a larger user base.

The MediSafe application is compatible with android versions 2.3 and higher. This is important to ensure that users are not able to access the application if they are not on the latest version of android. We should also consider the security requirements of the application and ensure that versions that have potentially catastrophic security vulnerabilities are either mitigated by the coding of the application and/or not supported by the application.

4.2. Design

Design is extremely important within any mobile application to ensure that they are easy to use and are also appealing so that users are encouraged to firstly download the application and subsequently use it. Often design heavily influences the ease of use of an application and if too complex can impact the performance too. This will be something that we will be required to manage throughout the development life cycle of our application to ensure that we strike the correct balance.

4.2.1. Interface Design

Piri Pollen Application

The application logo is always displayed at the top of the application which helps to build the brand and gives a consistent feel and identity to the application.

The applications colour schemes make it look somewhat outdated and unappealing to the eye.

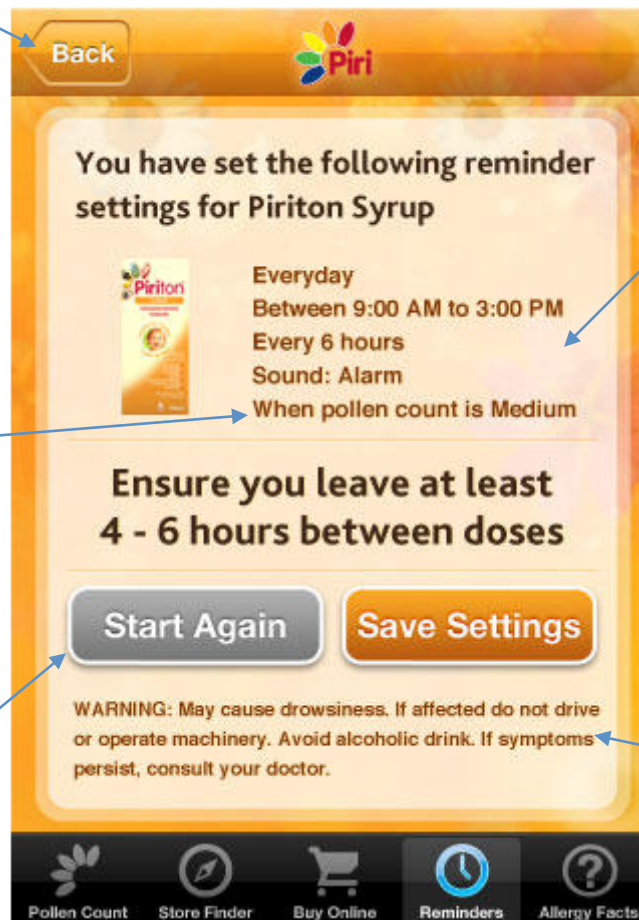


The bar at the bottom is viewable from all windows which again enforces a consistent feel to the application. This also makes the application easy to navigate.

This is a duplicate button of the 'start again' button. This may be confusing to a user.

Customary, automated inputs from the application. This is a nice feature although, may not be applicable for people with chronic health conditions.

The buttons are clear and the colour contrast between the buttons makes it clear which is to proceed and which is to go back a step.



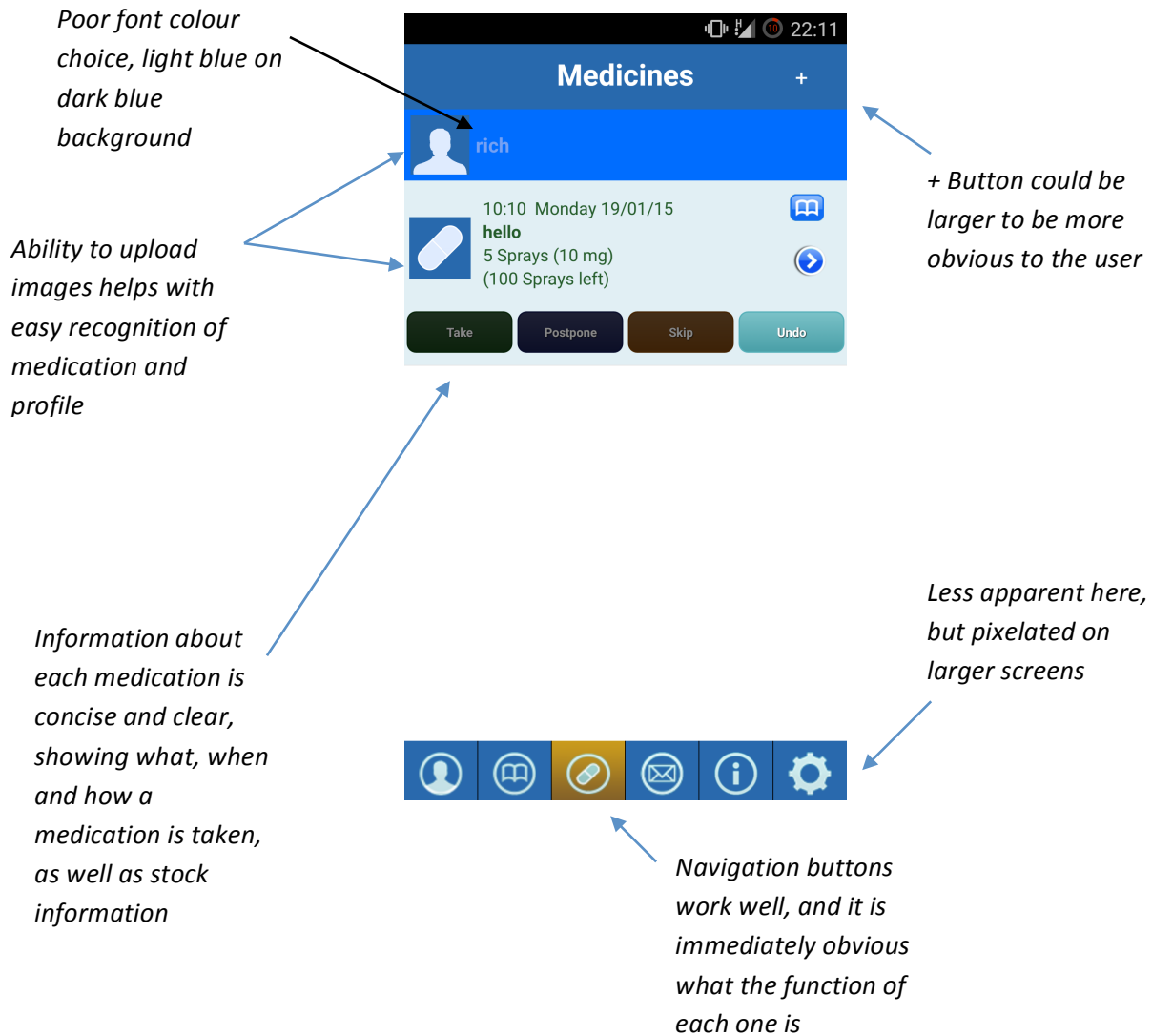
This checks that the user is happy with the decision that they have made. This adds a step in to the process that some users may find frustrating and time consuming although, this should be done to check that the reminder is as expected/needed otherwise it may have serious consequences if the patient is to miss a dose.

This warning is displayed to ensure that the user is aware of the possible side effects. This demonstrates a corporate social responsibility which users may find reassuring and build their trust and confidence in the application.

Ultimately, the Piri Pollen application has both good and bad features in its user interface design. I feel like the application looks quite dated and this is largely down to the colour scheme. I can see that this colour scheme has been adopted because this is the same colour scheme as the Piriteze medication box although; in the application I don't feel that this works. As discussed previously, the website for the Piri Pollen application doesn't have the same functionality as the mobile application and it also has a very different look and feel. Also, the branding is not consistent; the website shows the GSK logo as well as the Piriteze logo. This gives the application an unprofessional feel and that is something that the JustHealth application should aim to avoid. Having said this, the application is reasonably easy to navigate with large buttons that are suitable for the touchscreen interface.

CF MedCare has a very simplistic design, which can be considered to appear non-professional. UI elements tend to be large blocks of single colour, with no gradients or shadow effects to make them

stand out from the page. While the fonts look crisp, this is more due to the system the application is running on more than the applications doing. The icons at the bottom of the screen that are used for navigation are also somewhat pixelated on a large screen.



4.3. Functionality

The Piri Pollen app is specifically tailored for hay fever sufferers and therefore some of the functionality that this provides is not relevant to the proposed JustHealth application. Having said this, some functionality could be utilised in a different way to achieve similar requirements, only those functionalities of the Piri Pollen application that may be of use will be mentioned below:

1. Medication Reminders – this feature is well implemented on the application, it also tells a user based on logic about the pollen count when they should take a tablet. The feature is clearly laid out and easy to use.
2. Allergy Facts – This information is all integrated into the application which is very useful and provides a holistic feel to the application as everything you need to know and use is all available within the application.
3. Store Finder – This is another feature that would be great in order to be able to find out where to find the nearest pharmacist or in this case another retail outlet that sells the medication.

Like MediSafe, CF MedCare offers these core pieces of functionality:

1. Medication tracking
2. Reminders
 - To take medications
 - To refill prescriptions
3. Medication usage history broken down by each medication
4. Profiles
 - Any number of profiles can be created on the app which store medication information separately
 - Each also contains a 'history' view, which is a summary of all actions that have occurred on that profile.

4.4. Ease of Use

The Piri Pollen application is easy to use; there is no need to go anywhere else other than the application to get everything that you need with regards to a hay fever allergy. The buttons are fairly large and their purpose is clear. If you make a mistake setting the reminder this can be easily changed too which adds to the great user experience, not only can they be changed once you have set the reminder but before this there is also a confirmation screen to check that you are happy with the reminder conditions that you have specified.

Due to its overall simplicity, CF MedCare is very easy to use, although some of the help text could be a little bit clearer. For example, when filling in forms it refers to unfilled in elements by their functionality, not the label next to them on the form. While a minor issue, it can cause some confusion for a small period of time. CF MedCare also offers the application in 3 languages, which can be easily switched to at any time:

- English
- Dutch
- German

4.5. Speed

The Piri Pollen application is great in terms of speed once it has booted, however the opening of the application from the phone home screen is slow and could be frustrating to a user. It would be beneficial if there was a loading bar at boot up to at least reassure the user that the application is booting and will take 'x' amount of time to do so.

The CF Medcare application is very quick in opening and throughout all actions inside the app. Even changing the internal language takes <1 second on the tested device (64GB OnePlus One).

4.6. Reliability

The reliability of the application was affected by the failure of an automatic update feature of the daily pollen count and this was reflected in customer reviews on the 'App Store' as can be seen in the screenshot below.

Customer Reviews

OK ★★★★★

by Irish Ireland 1998

Handy, easy to use and very useful to hay fever sufferers; hint farmer ones. This app would be a good one only every time you want to see the pollen count ahead guess what? There is no DATA AVAILABLE that's like saying let's play football but without a football?????

Unsure yet... ★★★

by aag92

As it's from gsk, I hope it is fairly accurate. But straight away, one problem is that the can't find locations that are searches for, whereas the current location does work. Please fix and update.

Good ★★★★★

by Sarah 14 !!!

Handy for quickly seeing the pollen count but sometimes does say data unavailable. Would add another star if this could be fixed.

Also, as can be seen in the above screenshots one of the reviews stated that the current location feature that is built into the application did not work although this wasn't something that I was able to replicate when testing the application.

From our experience of using CF MedCare, we experienced no crashes or bugs with the application. Indeed, from a speed, functionality and reliability perspective it appears to me a model application.

Appendix 1

An interview carried out over the phone with Dean Markwick, a former employee of the NHS, South West Essex Community Services

For the purpose of recording the interview, questions asked by Stephen Tate will be in red and answers by Dean Markwick will be in black.

Could you please briefly outline your role at the NHS?

Yes, I was a mobile working assistant working within the South West Essex Community Services. I was using a piece of enterprise software called SystmOne and was a part of a rollout where community and district nurses/carers were being given HP Toughbook's to be able to use this whilst visiting patients in their homes.

Could you please outline what SystmOne is?

SystmOne is an enterprise application that has been employed by several NHS trusts throughout the UK and essentially it stores records, schedules nurses, stores patient records, manages the ordering of medication, calculates BMI and alcohol intake – essentially it does nearly everything that a hospital/GP/nurse would need to do.

Is SystmOne accessible to patients?

No, SystmOne is solely for the use of NHS staff. Patients are able to request the information stored about them however, this would have to be a paper copy.

What security is employed within SystmOne?

There will be multiple layers of Security protecting the backend servers both in line IT Security infrastructure and technology as well as physical security of backend infrastructure. In terms of what security this is, I am not too sure. However, I know that 2-Factor Authentication is used and the system comes up to NHS Data Protection Requirements, I can try to send these to you.

What does SystmOne do particularly well?

- Scheduling – ensuring nurses are aware where they have to be
- Allowing nurses to input details about a patient into the system in real time
- If a nurse is on holiday the patients assigned to that nurse will be distributed to other nurses in their pool (Note: Nurses are arranged by category e.g. cardiac, oncology, general)

How easily can the System be learnt by a new nurse for instance?

SystmOne isn't easy to use at all. Nurses find the initial learning curve to be very steep and they also find it frustrating that they are unable to fill in all of the details that they are required to when visiting a patient within the one viewing pain. For example, blood pressure in the left arm and right arm would have to be recorded in different tabs rather than all in the same window. This is the same for everything that they are required to input into SystmOne which is why some of the nurses find it hard to use.

How are patients able to interact with nurses?

In regards to SystmOne there is no way that a patient is able to interact with a nurse. If they need to contact a nurse then they would have to contact them by phone the same as anyone else. This would require them to dial the switchboard of the local hospital or NHS Primary Care Trust centre and ask to be transferred.

In your opinion, how could the system be made more user friendly?

Quite simply, a better user interface design. Although, the iOS user interface wouldn't be able to be replicated exactly, something similar to this with easy and clear buttons would be ideal. Ideally, the application should be able to be glanced at by the nurse and for them to be able to see what they want to do all on the one screen. It would also improve the speed that the nurses are able to use the system if they did not have to scroll up and down the page. This would be difficult to do because of the number of features that are available but if there were multiple tabs and features were grouped, I believe that this would be easier for users to learn.

Who has access to SystmOne aside of IT and Technical support?

Management – they utilise the reporting functionality.

Hospital Doctors – the local hospital to the patient will be able to access the system to look at patient records.

Community Nurses /Carers – obviously, they will have access to the patients that assigned to them and will be able to update records and look at all previous patient history.

Administrators – they will have access to everything as a nurse would have access, they would need access in order to be able to book appointments on behalf of nurses and carers.

How is SystmOne regulated to ensure that incorrect data is not added into the system?

The input fields are all validated to ensure that numbers cannot be entered into text fields and vice versa and also that values have to be within a certain range. This is not to say that someone that is trying to put bad data onto a patient record is unable to. Having said this, there is very high auditing on the system that tracks who made changes and when they were made.

Are there any additional mobile applications that are used?

No, there used to be an application called iNurse which pulled information such as calendar and patient information from SystmOne to the blackberry, it also allowed nurses to mark when they were on their way to a patient, when they had arrived and when they had performed the procedures that they were due to perform. This application was decommissioned soon after it was released because it was so slow and would require nurses to leave the application open overnight to be able to successfully pull the data.

Appendix 2

Email Originally Sent

From: Stephen Tate
Sent: 28 August 2014 17:16
To: Sarah Peel; Julia Bauer
Cc: sjt43@kent.ac.uk
Subject: Piri Pollen Application

Hi Sarah/Julia,

I am about to finish a 14 month placement with GSK to return to university. My final year project is going to be to build a mobile application that will act as a mobile health management system. Initially, its primary functionality will be to:

- a) Inform users of when they have appointments with medical staff
- b) Inform users of when they should be taking medication
- c) A personalised users medical profile
- d) The ability for healthcare professionals to add medication/appointments to the users profile

I was looking into what mobile applications that GSK have and come across Piri Pollen which I believe you Hannah Allchin owns, however I just received her out of office so I was hoping that you may be able to help me. I was hoping that you would be able to answer a few questions about the app, to enable me to better understand the purpose and functionality:

1. What is the primary target audience for the application? How and why did you decide this?
2. What were the main requirements of the application?
3. Why would a user use your application as opposed to just the calendar on their phone? Does the app have a unique selling point?
4. Does the app support any accessibility features i.e. Larger text etc?
5. How many users does the app have? Do you expect that this will grow over time?

Any other information that you are able to provide about the application would be useful too, including the development of the application. For example, were there any legal considerations that you had to take into account or anything in the development phase of the application that you would have any advice on. I hope that you don't mind but I have copied in my personal university email too as unfortunately, I leave GSK on this coming Tuesday.

Thanks in advance.

Kind regards,

Stephen Tate
IT Security Analyst
EIS | SANS | Security Services
CBS IT Services

GSK
Sycamore House, Stevenage, UK
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Tel +441438766490 | 07722561644



Email Received

RE: Piri Pollen Application

✕ DELETE ← REPLY ⇐ REPLY ALL → FORWARD ⋮



Julia Bauer <julia.j.bauer@gsk.com>

Wed 03/09/2014 09:23

Inbox

Mark as unread

To: Stephen Tate <stephen.2.tate@gsk.com>; S.J.Tate;

• You replied on 04/09/2014 14:47.

Hi Stephen,

thank for your below email and your interest in our Piri app. Please excuse my late reply, but I only took over from Hannah on Monday and there was quite some admin stuff to sort out the last two days...

With regards to your questions: please be informed that the app is not online anymore, as we had some trouble to update the pollen counts on a regular basis and it didn't work out properly. Therefore we decided to shut it down a couple of weeks ago and will decide on whether and how to proceed with the app during the next few months...

As I was not involved in the development of the app, I unfortunately cannot give you any background details as well, sorry for that! Maybe there are apps from other brands that you can investigate further?

Best regards,

Julia

Julia Bauer
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