# Effcal: An efficient appointment tracking and reporting

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## ABSTRACT
This paper provides a comprehensive problem review, solutions developed, evaluation and study of those solutions and the results and conclusion on the issues users face with the appointment management system from multiple online websites and sources and generating the reports on it. The idea was to reduce such issues users face while tracking their appointments from personal and social profiles these days. We analyzed the results and worked on three different solution ideas for the same, then we talked to users for their feedback, and collected and analyzed the data to evaluate the solutions to deduce the one which was more preferable.

## General Terms
Survey, Analysis, Study, Research, Development, Solution, Evaluation

## Keywords
Event tracking; Calendar information management; Appointment viewing; Calendar; Email Reporting; Schedule

## 1. INTRODUCTION
With everything that people juggle today, it's no wonder why appointment tracking have become such an important part to keep us organized. It is sometimes hard to keep a track of every appointment and social invites people receive. For business professionals, mostly Outlook or any other appointment management application is extremely important. For a personal appointment, some people prefer a to-do list with reminders and some schedule them as a personal appointment in the cellphone. Adding the social content to it, there are events circulated from portals like Google, Facebook, Meetup, etc. Today, users rely a lot on online calendars be it on laptops, tablets or cellphones. With so much happening together, people are bound to miss something important, maybe an office meeting, maybe a social gathering, or something else as a result of content sharing on multiple platforms and not a perfect single source to manage everything.

With the motivation to solve the above problem and our conversations and survey with a good number of users performed during initial data collection [1], provided us with a strong understanding on what we can improve and resolve to make appointment tracking easier and well organized.

After going through user responses of surveys we designed three different solutions. Our first solution was to make a simple Google Apps Script [2] based application to provide features of appointment tracking and reporting at one place. Our second solution was an Android application to bring all the appointment details of various appointment and event platforms in our custom calendar. The third solution was based on an idea to bring various scheduling and event platforms under one place as a JavaScript-based web application which can be accessed in PCs as well as mobiles.

After completing the design and development of our solutions we wanted to review and test our applications to deduce the one which users feel is more relevant for the to track appointments. We collected data from survey interviews, Google Analytics [3] and logs to analyze the same. For the interviews, we targeted 4 user groups. One of the groups was selected to test all the three solutions and other groups were assigned to test a particular solution. Using all the methods of collection and analysis, we deduced that our web application was a better solution amongst the three we developed. One of our takeaways regarding the Google Apps Script solution was the appointment report email scheduling, which users found really useful and they highlighted how it could be added to the main solution to make it even better in future.

The further sections would give a detail on the design and implementation of our solutions, data collection, analysis and the outcomes.

## 2. RELATED WORK
Planning and keeping track of events and activities is a very important feature among other features of electronic devices. Since 1980's, surveys have been done on professionals to discover how people in the business world kept track of their schedules.
If they get to add more accounts in just one application, they can plan their day better and further saving more time. Among the seven most popular apps surveyed by DNA India, shows the common characteristic of integrating the social events with calendar, but when it comes to professional events, not many apps support this feature and people end up checking events on different apps. A recent survey done by John Gordon suggests about half of people who are expert smartphone users, had to use both personal and employer calendars separately.
Many existing apps like CrowdCompass, EventMobi have features like activity feed, beacons, interactive maps, attendee messaging etc. So some of these useful features can be picked and included in the calendar apps for easy access of information around the event.

In their research on "An Exploratory Study of Personal Calendar Use", Manas Tungare and Alyssa Sams explored the factors that contributed to adoption of groupware calendars and the role of peer

pressure and network effects in expanding the use of a shared calendar system for meeting scheduling. [4] Also it talks about how Visualizing calendar information on desktop computers and mobile devices has been explored in several studies. Another research paper on "On Scheduling Events and Tasks by an Intelligent Calendar Assistant" states that Common commercial applications, such as Apple iCal, Google Calendar, and Microsoft Outlook, embed some artificial intelligence techniques, such as natural language parsing, but are primitive in comparison with the state of the art in scheduling algorithms.[5] Task management research efforts have concentrated on facilitating task assignment, 2 execution monitoring, and raising reminders as a very important aspect of calendar application which some users might select to give more preference over event management.

# 3. SOLUTIONS

We developed three different solutions, one towards more reporting application, one as a mobile app and one an appointment viewing web application. This would give us an idea of even the browser and platforms users prefer to use the same. Our three solutions were:

## 3.1 Google Apps Script

This solution is google app script based web interface that provides a hassle-free google appointment tracking and reporting at one place. From our initial survey, we found that most of the users prefer using Google for their appointments, so we thought of creating an appointment reporting and scheduling system for the same. There are five features provided together to make lives of Google Calendar users easy.

1. **Create a new appointment**: The user can simply create a new appointment by clicking on the tab and entering the event details.
2. **Set a daily appointment reminders:** User can also generate daily appointment reminders on minutes and hourly basis which can also be easily deleted by one click.
3. **Generate the appointments report**: By selecting the option of appointment report generation, the user can receive a consolidated report of all his appointments within a specific timeline as well as with a specific search criteria directly in his mailbox.
4. **Subscribe to calendars**: The app also lets the user to subscribe to various public google calendars
5. **See your calendar**: Finally, the user can view his complete calendar on the same page.

The idea behind this app is to simplify the Google Calendars and appointments for the user and provide all the features on a single location for better report management.

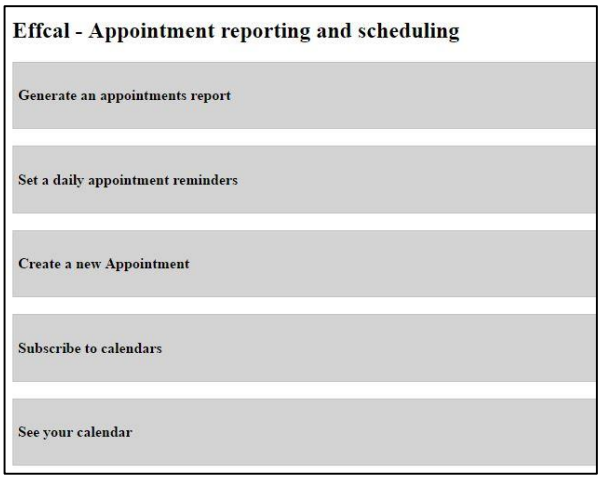


**Figure 1 Google Apps Script screen**

Figure 1 shows the home screen and all the features user can click and use further.

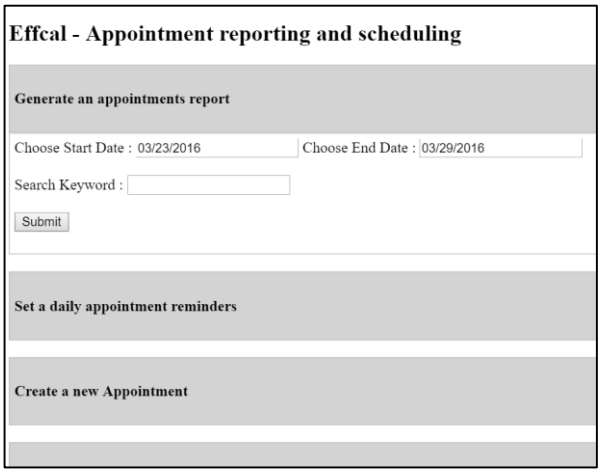


**Figure 2 Report creation**

Figure 2 shows a sample where user can enter a start date and an end date and create a report out of it which is emailed to his id.

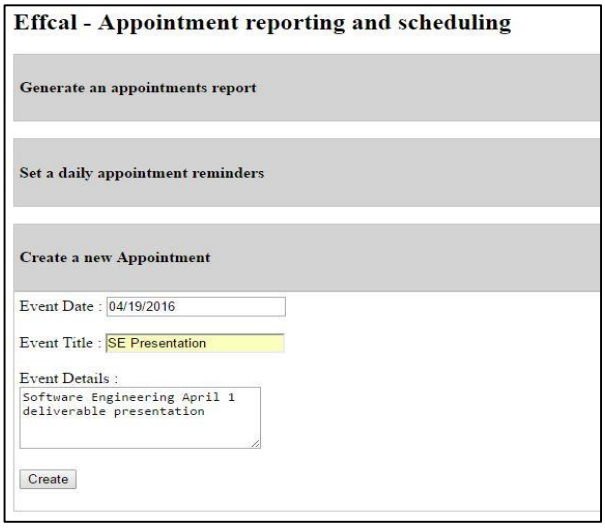

**Figure 3 Appointment Creation**

Figure 3 shows a scenario where user can create an appointment.

## 3.2 Web application

This solution is a JavaScript - based web interface that collaborates various scheduling and event platforms under one place. We worked on bringing different applications with calendar features such as Google Calendar, Facebook events and Outlook calendar on one place so that user can track their appointments effectively. User can simply type in the URL in the browser and get directed to the page which provides the option of selecting from various applications. This site can be accessed both from mobile and laptop hence making it more user friendly. The interface also records the session and stores the login information thus user need not login again and again. This application provides one-stop access to all the appointments and events of the user listed on different platforms which helps in better synchronization.

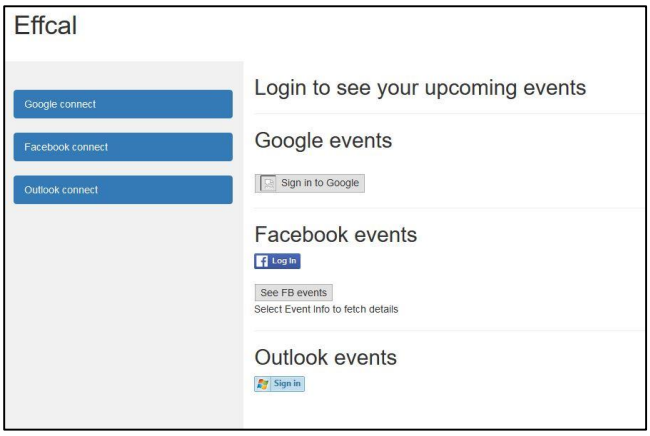


**Figure 4 JavaScript solution home**

Figure 4 shows the home page which shows up after user opens the link. Users can see the option to access Google, Facebook and Outlook events.

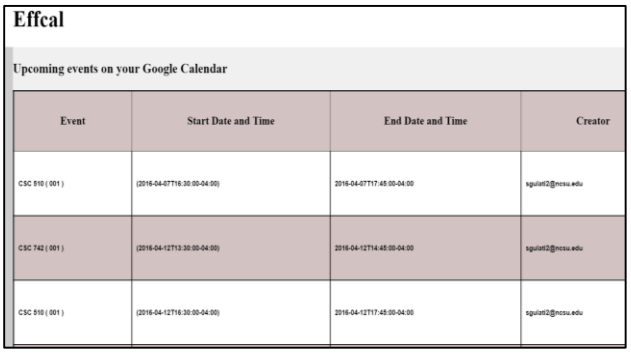


**Figure 5 Google Appointments**

Figure 5 shows a scenario when the after logging in with Google, gets the next set of scheduled appointments in the browser.

## 3.3 Android application

This solution is about realizing event calendar with multiple integrated accounts using the android platform. The application uses a design wherein the Software Development kit of various account types like Google, Facebook, etc are integrated within one solution. This helps user to see the personal, social as well as professional events all at same place.

The prototype includes the important functionalities of setting up several google accounts or logging in with different Facebook accounts to see the calendar events together when a particular date is selected from the calendar. The idea is to provide all the account information together and that too in a calendar layout.


**Figure 6 Android home**

Figure 6 shows the first screen of the app which shows the buttons to configure different account types. Google and Facebook APIs are integrated with the app which handles signing in several accounts at a time. Clicking on any of the button also shows if there are any events or not, and if there are it also tells if they were fetched successfully or not. Clicking on 'Show Events' button opens the following screen.


**Figure 7 Appointments view**

Figure 7 shows the calendar layout where selecting the date displays the events on that particular date. In case there are no events it shows text 'no events' in the Events section.

# 4. DATA COLLECTION METHODS

We collected data from multiple sources, with the focus being on the user groups study and also related analytics and logs. Our methods and details are as follows:

## 4.1 User Interviews and Feedback

We conducted personal interviews and survey with 20 users divided into 4 user-groups.

User groups were divided as below with 5 users each:

1. Google Apps Script group
2. Android group
3. Web group
4. Group using all 3 solutions

We asked users to work on our solutions and give their feedback on a set of questions we had prepared. Some of the users were asked to use all the three solutions so they can give us their personal preference and generic comments and an overall rating and preference of the type of solution. The questions were to see how they use the application and their overall experience. Few specific ones are listed below:

**Question 1: Did you find the application useful to track appointments?**

This question was primarily asked to see if a user would actually benefit from it to track his/her appointments.

**Question 2: On a scale of 1-5, how convenient was the interface to use (5 being the most convenient)?**

User convenience is really important while using an application. We asked this question for the same reason. We wanted to know which application was the most convenient amongst our solutions.

**Question 3: How would you rate the overall satisfaction of the application on the scale of 1-5(5 being the highest)?**

This question was asked to see the satisfaction level of the user the applications. A better satisfaction rating would give us a positive sign for a particular application.

**Question 4: Please provide any suggested features or inputs and generic comments you would like to share.**

This was helpful to know in general what users had to say about the applications. They also provided their comments on positives and negatives, and features they would like to see implemented in future.

Apart from the common questions above, we also asked some specific application based questions.

For Google Apps Script:

**Question 1: Which features did you find useful?**

We wanted to know the features of the applications users found useful out of Report Extraction, Reminder Emails, and Appointment Scheduling, Seeing their own calendar and subscribing to other calendars.

**Question 2: Did you find the email reporting feature useful?**

We asked users if they find the email reporting feature useful in this application.

For Web application:

**Question 1: Did you find the appointment view page helpful?**

We asked users if the appointment viewing for multiple sources from a single page was helpful.

**Question 2: Were you able to successfully login and see the next set of appointments?**

Since we had login functionalities of different sites on a single page, we wanted to know if the users were able to login successfully without any hassle.

For Android application:

**Question 1: Did you find the login access system easy to use?**

Our application detected the accounts already setup in the application. We wanted to know to know if users could login to the system easily.

**Question 2: Which account did you used the most with this application?**

We wanted to know which out of Google and Facebook in our application, users wanted to use more.

We also asked the user group using all the three applications, to provide us the order of the application they preferred the most and found useful to track appointments.

## 4.2 Google Analytics

The idea was to incorporate analytics in our applications to see how users interact with our application. This would give us the information of users accessing the application, the views and installs we have, the performance and the user clicks and interactions. This would help us analyses the features of the applications and how users are interacting with it. Our focus was to see the OS and the browsers users would use, especially for the Web and the Google Apps Script application, since Android one is bound for the same. Users being able to use an application from multiple devices gives a flexibility edge. The focus was to see the:

1. User clicks
2. General Demographics
3. OS and browser usages

## 4.3 Logs

We referred to the logs to see how users are interacting and spending time with our application. The parameter was to see the average time our users would take to use application for a session. We could also see the clicks users are doing to give an idea on the features users would use more.

# 5. EVALUATION OF SOLUTIONS

We analyzed the feedback, solution features and compared the results to see which was a better and the more preferred solution amongst the user groups.

## 5.1 Interface convenience

Firstly, our aim was to see the convenience of users using the interface of three solutions.

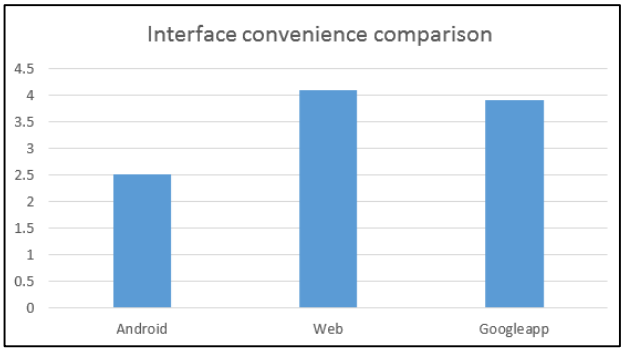


**Figure 8 Interface convenience comparison**

The users were asked to rate the application on a scale of one to five (five being the highest) on how did they find it easy to interact with the interface. Figure 8 shows the results. The Web application and the Google Script solution was a better choice here with the Web being rated as 4.1 and the Google Apps solution as 3.9. The Android solution averaged 2.5.

## 5.2 Useful for tracking appointments

Our main focus was to see how the applications would be useful to track the appointments. We asked the users if they found an application useful or not or if they were unsure of the same. On the results, we computed the average percentage of the results on what people had to say.

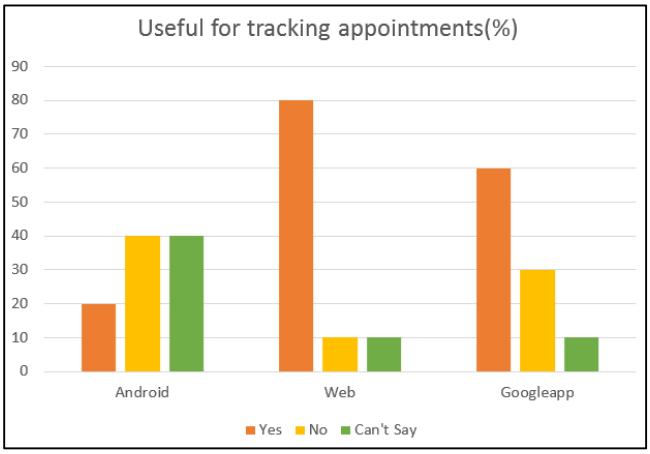


**Figure 9 Usefulness to solve the issue**

Figure 9 gives us a clear indication that most of the users had aligned on the web solution wherein they could access events from multiple sources. 80% of our users found the Web application useful, followed by 60% who supported the Google App solution and the Android version was the least useful here with only 20% users who supported it.

## 5.3 Average session/interaction time

We wanted to see how much time the users can work with our application to perform the operations they wish to. An average lesser time amongst all the three would be an indication of how it performs better and user doesn't need to spend much of the time with the app for doing operations.

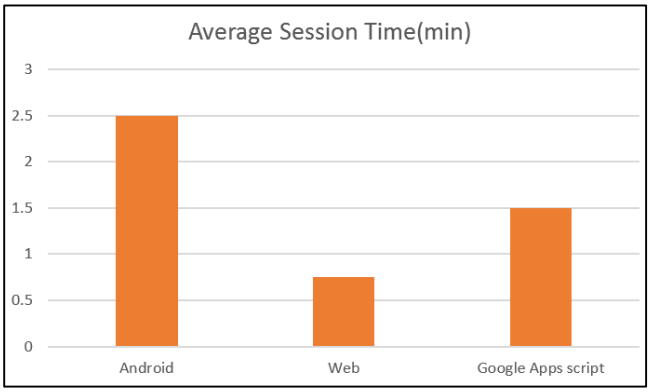


**Figure 10 Average interaction time**

Figure 10 shows the average interaction times. An average interaction with Android took roughly 2.5 minutes, which was much more than the other two applications. The Web was the best out of three taking roughly 3/4$^{th}$ of a minute followed by the Google solution.

## 5.4 Average application rating

This was a question we asked the users group for us to see the application they liked more. This was asked to all the users and not just a specific user group.

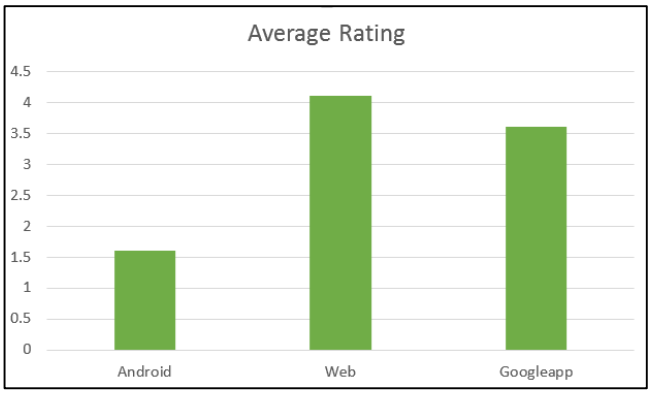


**Figure 11 Rating by users**

As per the figure 11, the web solution clearly was a better rated on with a rating of 4.1 out of 5. The next one was the Google App reporting solution with a rating of 3.6 and Android was the one, people didn't prefer in this case with a low rating of 1.6.

## 5.5 Application preference order

Since we had target user group using all the application, we asked them to provide us an order of their preference and liking depending upon how useful they found it. The order we followed was 1<2<3, 3 being the most preferred out of the three. The user group of 5 people rated the order shown in the below figure.

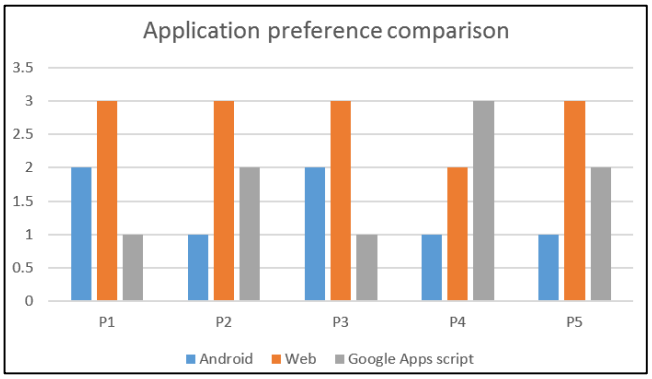


**Figure 12 Preference order**

From the preferences of 5 people (Figure 12), we saw that 4 out of those had a higher preference towards the Web solution which 1 of the user from that user group preferred the Google Apps Script solution more due to the reporting and e-mail scheduling functionalities.

## 5.6 Browser usage

We studied the Analytics on browser usage and found that people were using our Web and Google App solutions from multiple browsers on PCs or mobiles which was a strong point since the Android version was a standalone app.

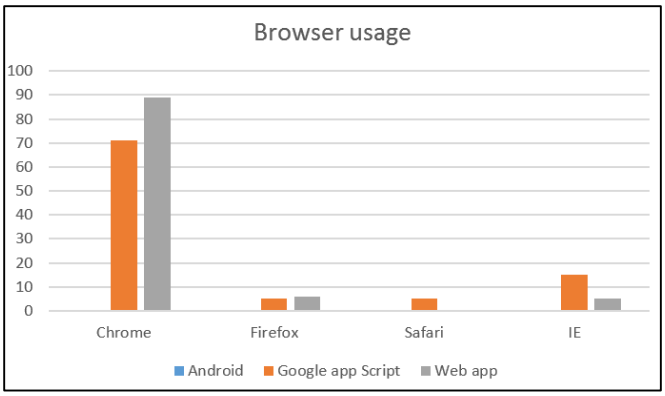


**Figure 13 Google Apps Script screen**

Figure 13 gives us an indication on how the different browsers were being used. Chrome was the most used amongst the two web-based solutions (more than 70% for both) with users also using Firefox, Safari and Internet Explorer.

## 5.7 Platform usage

Since the Android solution was a mobile based app, we wanted to see by which platform other apps were being used.

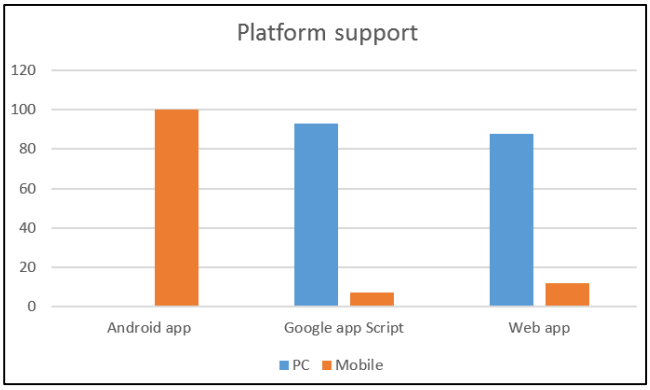


**Figure 14 Platform usage**

Our Google Apps script and Web solution was split between both PC and Mobile with PC usage being on the higher side (more than 85%) (Figure 14) in both cases. This was conclusive to see that a solution which works in both platforms would be of more benefit.

## 5.8 Google Apps Script feature comparison

Since our Google reporting solution had multiple options, we wanted to know from the users the ones they would use the most. We have users the option to let us know if they liked specific features from the solution.

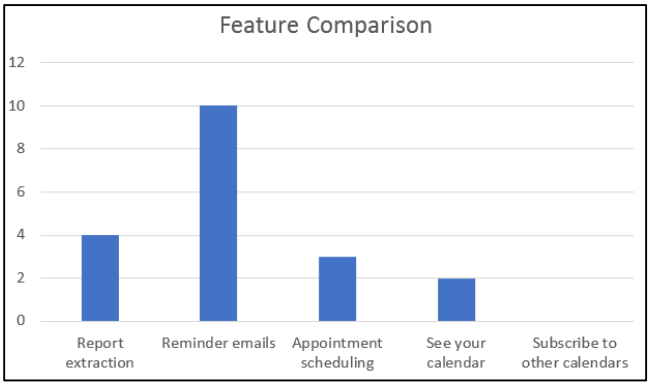


**Figure 15 Google Apps Script feature comparison**

All of our 10 users testing this application found the reporting emails feature useful (Figure 15) since it would auto deliver the set of appointments to their email to help them track the same. 4 users also liked the report extraction feature but it was manual since user could choose flexible dates. None of the users said that the subscribe feature would be of a lot of benefit to them.

# 6. THE BEST CHOICE

When we began experimentation, we came across situations which we wouldn't have thought of as to how a user would interact with the system. This indeed was helpful to know how and where the solutions were of benefit and where they had drawbacks. With all the data in hand and the infographics prepared, along with the comments from users, we decided to choose a best solution, and also considered features which users liked or disliked.

We concluded our Web based solution on JavaScript was the best one when compared with others.

Considering if any solutions would solve the problem of tracking multiple appointments which was a part of our earlier results from surveys, we deduced that most of the users found the web solution would be the one which would solve this issue more closely than the other two.

The interface convenience for the JavaScript based Web solution had a higher rating from our user group. Users found it handy wherein they could see the login options of multiple websites and access the same. Moreover, if the sessions were saved, they didn't need to re-login every time in the browser. We also found that it took users least time to interact with the web solution which was another strong point towards this. The Android application being sluggish took a lot more time and a good takeaway to improve. All the 10 users per application rated our solutions and it was also aligned towards the same with the JavaScript based web application being rated the highest. We received multiple comments regarding the fact that they could use both of our web based solutions from PCs and mobiles both which is an advantage. This was also well supported by the fact that users were able to open them on mobile phones and laptops both and with any browser. Our specific target group who tested all the three applications preferred the same solution as well over the others. However one user preferred the Google Apps Script reporting once since he was more interested in appointment email reminders.

The feature analysis also made us understand that users found the email reporting extremely useful, but not the overall solution. One of the users had to say this about the same "Can you add the email feature to the other web solution? Addition of that would be really great."

# 7. ACKNOWLEDGMENT

We would like to express our appreciation to Prof. Tim Menzies who has been helpful on how to go about the project process, scenarios and data collection. We thank our colleagues, business professionals and friends whom we interviewed initially and our study groups who tested our applications later provided us the feedback to better analyse our solutions and their features.

## 8. CONCLUSION

Our main aim was to provide an effective appointment tracking tool to the users. When we started surveying about appointment issues, we gathered data on what users had to say about the same and the related problems which we made a base for our solution idea thinking and development.

We then started building up our three independent solutions which could benefit the users and solve the problems.

While testing and analyzing the same with our user groups and seeing the interactions, we could clearly see that our JavaScript based web solution meets the maximum requirements closely to what users would have wanted.

The flexibility of this solution of being available on both laptop and mobile platform was really praised by the user groups. Availability of various application logins at one-stop was one of the essential requirements which made this solution our first preference.

On the other hand, the availability of appointments report reminder feature in Google Apps Script solution was appreciated by the user groups. Our third Android solution was also helpful as it provided a mobile wrapped application but it lacked availability of various application logins and also the sluggishness made it less popular amongst our users.

The overall studies really helped us to learn on how we could extend our work in future to make it even better.

## 9. FUTURE SCOPE

Through our findings from our user studies, we realized that a lot of work can be done to the existing web solution (the best solution so far). Also features such as appointment scheduling and generating reports of the Google Apps Script solution was appreciated by our user groups. For future scope, this could be one of the starting point to integrate these features into our Web solution to enhance it and make it more useful.

Many users said that they would like to get more events from platforms like Git and from where they would like to extract issue deadlines, milestones etc. Our next step in future work would be to integrate more and more platforms like Git, Evernote etc. Also as we have always wanted to provide a mobile app to the user we this could be extended to an iOS and Android solution. It can also be published as a Chrome plugin and a Firefox add-on. PC/Mobile graphic alerts will be another great feature to incorporate. For Example, if users give permission to the tool that if they are logged in, app can send them reminders then we can generate prompts or alerts on certain time intervals. Features like data range selection, generating and downloading appointment reports in various formats will also enhance our solution.

Furthermore, since application development is an ongoing process we would like to keep on testing our app with more user groups and make amendments accordingly. As the functionalities get more and more sophisticated, adapting agile methodology for further development will help us to make the process more streamlined.

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