NMA Drawing App Technology Research

Native App vs Progressive Web App

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# Introduction

This research report aims to give insight and better understanding into the advantages and disadvantages of using a PWA or a native android app for the drawing application for the National marine aquarium.

The report will acknowledge the hardware that the app will be running on, whether the benefits of a native app and the time to develop that alongside a web-based drawing app for use on the NMA’s website are viable. Ranking what is important from any benefits and disadvantages each path may take.

Also, the report will look aspects of the experience from the developers involved, what risks will also come from taking a single or multiple development path.

# Context and Background

The premise for this report is the argument on creating one PWA that can be written once and plugged into a website and installed as a PWA on the devices that the NMA use, or to develop a PWA for the website and a separate native app for the tablets that the NWA use.

The main things to consider are that the tablets used are extremely low spec, and they may need the battery to last all day. Further to this, the images stored may not be uploaded for some time.

Also, development time working on two apps needs to be considered. Either way, a web app will be built, but how much extra development time is needed to get it working as a PWA against building a native app.

# PWA

A PWA allows the ability to install a web site, or part of a website as an app, allowing for offline use. Adding this functionality though will require extra coding to have the PWA install as an app, as well as having some limitations. With no one on the team having experience with PWA’s, we cannot be sure exactly what limitations or issues may arise.

# Native App

Because native apps interact more directly with the hardware and the OS, they will be more responsive and use less power to run.

# The PWA on the tablets against online at home

Another thing to consider is that online, users will have much more time to do their drawings and may spend upwards of an hour on it. Because of this, it may be viable for there to be some extra features. Also, things that need to be considered are the HCI factors in drawing at home with a mouse and keyboard, on a much smaller screen, a much bigger screen, with an active or passive stylus. Any extra features like this will need to carefully be stripped for the installable PWA. Will this require as much development time both in production and progression of the application, also regarding testing that the app still works as intended on the tablets at the NMA.

Also, for consideration is that the PWA will only be installed on the tablets. For people visiting through the website, they will be using it in browse and only once. The NWA will not want visitors submitting lots of drawings each.

“Contrary to the authors’ assumption that PWAs are more lightweight than fully-fledged mobile apps and thus consume less energy, the Android Native development approach had a lower energy consumption than the PWAs. As this holds for sample apps as well as real-world apps, an inherent advantage of Android Native development could be attested with regard to UI energy-efficiency, compared to PWAs and to other examined MCPD approaches…

…In summary, PWAs can be considered as a viable alternative in terms of energy efficiency to other MCPD approaches. However, the Android Native development approach exhibited the lowest energy consumption in all the conducted experiments. That renders the native development approach still the most energy efficient.” (Huber et al., 2022)

# Development Time Considerations

Although designing this as one PWA may seem like there will be less development time, there is also the consideration that the tablets used by the NMA will have a different design to that of the one visited from the website. The table below shows the key differences between the two.

|  |  |
| --- | --- |
| NWA Tablets | Website Visitors |
| Location and event information to be entered by event leader prior to drawings and will encapsulate all drawings for session | Location information to be extracted from device or entered by drawer |
| Age information entered by drawer prior to drawing | Age information to be entered by drawer on submission of drawing |
| Drawing confined by time of 5-10 minutes | Unlimited drawing time |
| Drawings to be stored locally from bulk upload at a later time or date | Single drawing uploaded on submission |
| Drawn on same device | Drawn on numerous devices including phones, tablets, laptops, desktops, possibly consoles. |
| Drawn with fingers or passive stylus | Drawn with fingers, passive stylus, active stylus, mouse, trackpad, trackball, possibly controller. |
| Battery life will be an important consideration | Power consumption mainly irrelevant |
|  |  |

The main application will open, where the event leader will enter the information on the tablet about the event. The tablet will then be given to a visitor who will enter their age and then be taken to the canvas to complete their drawing and submit it. This will store the drawing on the device along with the relevant information. The tablet is passes on to the next visitor who will enter their age and the process repeats. For web visitors, although we could get the visitors location from their device, it may be simpler to ask them to input the first part of their postcode since they may not give the permission for location access of their device or may be using a VPN or other such complications.

Also due to the nature of the tablet input only being touch or possibly a passive stylus, the layout and any adaptation will be minimal compared to the website visitors, where they may use any number of different inputs, touch and passive stylus may be used, but it will also need to be compatible with using mouse, active stylus, trackpad, trackball and possibly a controller if they are visiting the site from a console.

Submission of the drawings is also very different, as with the tablet, all the drawings from an event will be stored on the device and may not be uploaded for hours or days. This will require an admin panel for uploading the pictures with their relevant data. Whereas on the website, drawings will be uploaded as soon as they are submitted.

Because of time restraints on events, the drawings will be done quickly, whereas on the site, visitors will have a lot more time to do their drawings. Because of this, it may be possible to have the website have more features when using a larger screen.

Another consideration for using a native app against a PWA is that PWA’s can consume a lot more battery, since they run in a browser. Native apps, as well as having a lot less restrictions, also are more power efficient as they run self-contained and more directly with the hardware.

Although the drawing element of the applications would be fundamentally the same, because of the different implementations regarding the user inputs and the way drawings are stored and submitted, it would probably be more beneficial to build a native android app for the NMA’s tablets and build a separate web app for the online visitors. There is also the option on the website to just upload scanned drawings or drawings from other applications. This would enable the users to draw with applications that they are already used to.

Also because of the fundamental differences to the applications, the amount of extra coding required to disparate a single PWA to fulfil both its requirements won’t be too different from building a separate native app for the tablets. Benefiting from this would also be increased battery life of the tablets. This also fits the ecological beliefs of NMA.

Another benefit to building two separate applications here would be that they can be independently modified. As mentioned before, the use cases for each application are different with both time interaction and input. It is likely that the tablet app will get much more use and develop further as time goes on, whereas the website viewers will be much less and having the option to upload their own drawings from either a scanned drawing or through an application of their choice will likely outweigh the use of the web app.

Another benefit to developing two applications is that the code will be cleaner as there will be no need to develop two types of application in one, and going forward, as we collectively have much more experience in building Native apps than PWA’s we are more aware of the limitations and features we can build in an app.

Also, a lot of the benefits to using a PWA are not required by the project. From looking around, they are more suited to social media websites, allowing the user to essentially cache a lot of the information either in the background while an internet connection is available, so that the website is viewable when offline or no connection is available. Also, things like SEO are irrelevant to this project.

Further to this, A lot of information can be found showing the decrease in development time for a PWA vs a Native application. However, these assume that you already have a fully-fledged website and show the development time of converting that to a PWA against building a native application, where you would essentially start from a blank canvas.

# Conclusion

Evaluating the risks, and the general software mantra that is build a piece of software that does one thing well. Going forward it is suggested that a Native Android app be built for the NMA Tablets. And a web app for the virtual drawings. Since the features of each have more differences than similarities. And the tablet app is the primary goal of the project,