Research document

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Contents

[1 Introduction 3](#_Toc150786335)

[2 Research questions 3](#_Toc150786336)

[3 Sub-questions result 4](#_Toc150786337)

[3.1 How should the video call facility work in the PRAS system? 4](#_Toc150786338)

[3.1.1 First Idea 5](#_Toc150786339)

[3.1.2 Second Idea 8](#_Toc150786340)

[3.2 What video call systems are there? 11](#_Toc150786341)

[3.2.2 The free version of a video call system is: 12](#_Toc150786342)

[3.2.3 The paid version of a video call system is: 24](#_Toc150786343)

[3.3 Which video call system can be implemented based on the requirements? 32](#_Toc150786344)

[3.3.1 Compliant 32](#_Toc150786345)

[3.3.2 Mostly Compliant 33](#_Toc150786346)

[3.3.3 Prototypes 33](#_Toc150786347)

[3.3.4 Initial start of all prototypes 34](#_Toc150786348)

[3.3.5 WhatsApp Messenger prototype 34](#_Toc150786349)

[3.4 Which video call system benefits a better user experience? 36](#_Toc150786350)

[4 Conclusion to the main questions 36](#_Toc150786351)

[5 References 36](#_Toc150786352)

# Introduction

The purpose of this document is to conduct research to address the problem within the project, specifically, finding a solution for the video call system. To tackle this problem, I will formulate a primary research question and several related sub-questions. These sub-questions will be explored through interviews, internet research, prototyping, and other methods.

The challenge in this project revolves around developing a video call system within the PRAS system. This document will provide a detailed account of the steps taken to address each sub-question and the overall problem-solving process.

# Research questions

**Main question:**

**What possible solutions are there, to create a video call facility to implement in the PRAS system?**

**Sub-questions:**

The strategy and methodology for the FHICT can be found at this link: <https://ictresearchmethods.nl/Methods> and <https://cmdmethods.nl/> .

1. **How should the video call facility work in the PRAS system?**

* **Strategy: Field**
* **Methods: Document analysis, interview**

1. **What video call systems are there?**

* **Strategy: Library**
* **Methods: Available product analysis, Literature study**

1. **Which video call system can be implemented based on the requirements?**

* **Strategy: Workshop, Stepping Stones**
* **Methods: IT architecture sketching, Prototyping, Requirements list**

1. **Which video call system benefits a better user experience?**

* **Strategy: Lab, Stepping Stones**
* **Methods: Usability test, Unit test, Persona**

# Sub-questions result

## How should the video call facility work in the PRAS system?

Currently the video call occurs on a tablet using WhatsApp. Normally the SVb employees would check the daily agenda to determine if there are any appointments scheduled. If there are, they have to look at what type of appointment it is and with whom. They have to first double click on the appointment box to see all the information of the appointment. See figure 2. Due to sensitive information, I have made a wireframe and dummy data of the user interface.



Figure 1: Overview of the agenda.

A screenshot of a video call

Description automatically generated

Figure 2: Information of the appointment.

After looking at the information the SVb employee would use the company tablet to contact the retirees on WhatsApp video call. They would need to have the retiree’s information saved in order to make a WhatsApp video call.

SVb now wants to eliminate the process of using a tablet to make video calls. They want video calls to be made through the PRAS application, which serves as the central hub for managing all pension client information. There are two concepts/ ideas to address this problem. The concepts can be found in the **Concept Document**. For the full, detailed process, please refer to the “**Wireframe**” document. Here is a summarized process for both ideas.

### First Idea

The first idea is to add a “Start Video Call” button to the appointment box. Clicking this button will initiate a video call with the retiree through WhatsApp. A video call interface will appear when the button is clicked, allowing the SVb employee to contact the retiree. After the video call, the SVb employee can end the call using the video call interface, and it will log the start and end times of the call, as well as the date. Figures 3 to 7 depict the process of initiating and ending the video call with the retiree.



Figure 3: “Start Video Call” button for the first idea.

A screen shot of a video call

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Figure 4: Connecting to retiree's phone.



Figure 5: Connected to the retiree.



Figure 6: In a video call with the retiree.

A screenshot of a computer

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Figure 7: End video call.

### Second Idea

The second idea, in the initial part, is the same as the first idea: adding a “Start Video Call” button to the appointment box. After clicking the “Start Video Call” button, the video call interface will display and place the SVb employee into a video call meeting. The SVb employee has to admit the retiree into the call when they join the meeting. The retiree can join the call through a link sent by email, SMS, or WhatsApp. After the meeting is finished, the SVb employee can end the call, and the system will log the start and end. times of the call. Figures 8 to 12 depict how the video call process should work.



Figure 8: "Start Video Call" button for the second idea.

A screenshot of a video call

Description automatically generated

Figure 9: Joining the meeting.

A person smiling with a video call

Description automatically generated

Figure 10: SVb employee joined the meeting.

A person with a ponytail

Description automatically generated with medium confidence

Figure 11: Retiree joined the meeting.

A screenshot of a computer

Description automatically generated

Figure 12: End video call meeting.

## What video call systems are there?

There are all sorts of video call systems, it depends on what type of video call system you want. There are free versions of the video call systems and there are paid versions of it. I won’t go through all of them, but I will mention some of them based on what I saw on the internet, or have tested out, or having used them before. I’ll also provide the type of features they offer. Please note that there might be some missing information that I couldn’t find, and these are relevant information from October 2023.

I will categorize the findings for each video call system into additional information, pros and cons. Additional information are some information of the video call system that doesn’t add any value to the pros and cons. Pros represent added benefits that we can use to enhance the current prototype, or for future prototypes. Cons represent challenges that would impact the concept of the prototype or the future prototype.

Additionally, I did some comparison to the video call systems, they can be found in the “Compare Video Call System” excel file.

#### Acronyms

In here we will give the full name of the acronyms/ abbreviations and describe what it is and what it does. This is mostly used as reference in case these acronyms have been used in the video call systems descriptions.

**SDK:**

SDK stands for software development kit. Also known as devkit, the SDK is a set of software-building tools for a specific platform, including complier, code samples, documentation, debuggers and, often a framework or group of code libraries such as set of routines specific to an operating system (OS).

**WebRTC:**

WebRTC is real-time communication for web. It supports video, voice, and generic data to be sent between peers, allowing developers to build powerful voice- and video-communication solutions.

**API:**

API stands for Application Programming Interface. It’s a way for two or more computer programs to communicate with each other. Application refers to any software with distinct functions. Interface is like a contract of service between two applications. This contract defines how the two communicate with each other through requests and responses.

**Encryption**:

Encryption is to convert string of items like message and etc. into special code so that no one can read it. You need special key or password to decipher it.

### The free version of a video call system is:

#### Zoom (Tested)

**Additional information**

* Here is the [link](https://zoom.us/) to test zoom.
* Break rooms are to separate people and put them into other calls.
* You can use some of the features of Zoom API for free. For more information about this you can find it [here](https://developers.zoom.us/docs/api/rest/rate-limits/).
* Zoom has a free and paid subscription. [Here](https://zoom.us/pricing) are all the subscription price.

**Pros**

* Host has to admit the guest to join.

*This is a good thing, so that no one can join the call randomly.*

* Zoom won’t let you join an old link.

*This is to prevent the retire from accidentally joining the old video call.*

**Cons**

* Zoom forces you to download the zoom executable on desktop when you try to open the zoom call on browser.
* You have to download Zoom on your mobile phone to join the call.

*This is less desirable because the retiree needs to download extra applications to join the call.*

* There is a bit of a learning curve to host the call or a participant of the call.

*It needs to be easy to understand and use.*

* For the free version, the call is capped at 40 minutes long.

*Maybe in the future SVb wants to make a longer call like 1 hour, then this won’t work.*

#### WhatsApp Messenger (Tested)

**Additional information**

* Here is the [link](https://web.whatsapp.com/) to the web browser version.
* You need to download the app on mobile, this isn’t a con because the client already has WhatsApp Messenger downloaded.
* You need to scan the QR-code on the web version and desktop app from the mobile.
* You need WhatsApp to use the web version or desktop app.
* You can send voice notes.
* You can send videos.
* You can make phone calls.

**Pros**

* It’s free to use.
* You need to have a phone number to use this.

*You can directly call the retiree by their number if they have WhatsApp, instead of sending a link for the retiree to join the call. Due to majority of the retiree has WhatsApp installed and connected to their mobile number it’s an advantage.*

* You can use the web version or desktop app.
* You can make a video call on the desktop app.
* “Everyone” has it.
* End-to-end encryption for messages, photos, videos, voice messages, documents, status updates and calls.

*See the acronyms section for the encryption definition.*

* You can make an invite link to join the video call or voice call.

*This can be done on the mobile and desktop.*

**Cons**

* You can’t make a video call on the web version.
* The web and desktop app version stay active as long as you keep using the mobile WhatsApp.

*After 14 days of inactivity on the mobile WhatsApp, it will log the user out of the web and desktop app. That’s for not using the WhatsApp on your mobile phone.*

* You have to log in with your mobile WhatsApp every time you are logged off from the web or desktop.
* WhatsApp account can be connected to max to 5 devices.

*Including the main mobile device, you have WhatsApp on.*

#### WhatsApp Business (Tested)

**Additional information**

* It is the same link as WhatsApp Messenger.
* There is a premium monthly subscription, which you can the information [here](https://faq.whatsapp.com/835833917556304/?cms_platform=android) and how to activate it [here](https://faq.whatsapp.com/5466418600110636/?cms_platform=android).

*One of the feature that the premium subscription offer is that you can logged up to 5 more devices, in total up to 10 device.*

* WhatsApp messenger and WhatsApp Business can’t share the same number, it’s either you use the number for WhatsApp Messenger or WhatsApp Business.

A screenshot of a social media post

Description automatically generated

Figure 13: WhatsApp Business on mobile with additional features.

* This is kind of the same as the WhatsApp messenger but for small businesses.

*It has the same features as WhatsApp messenger and additional features.*

* You can add opening hours to your profile.

*You can’t do this on the desktop app*.

* You can add your company website on your profile.
* You can add your company address on your profile.
* You can add your company email on your profile.
* You can do quick replies.

*They are customized messages that you create and use for frequently asked questions. You can create quick replies on mobile only. You can use them on all the other devices.*

* You can make automatic greeting messages.

*For clients initiating a conversation or after 14 days of inactivity.*

*You can only create them on mobile devices.*

* You can see message statistics.

*You will see how many messages were send out, read, and delivered.*

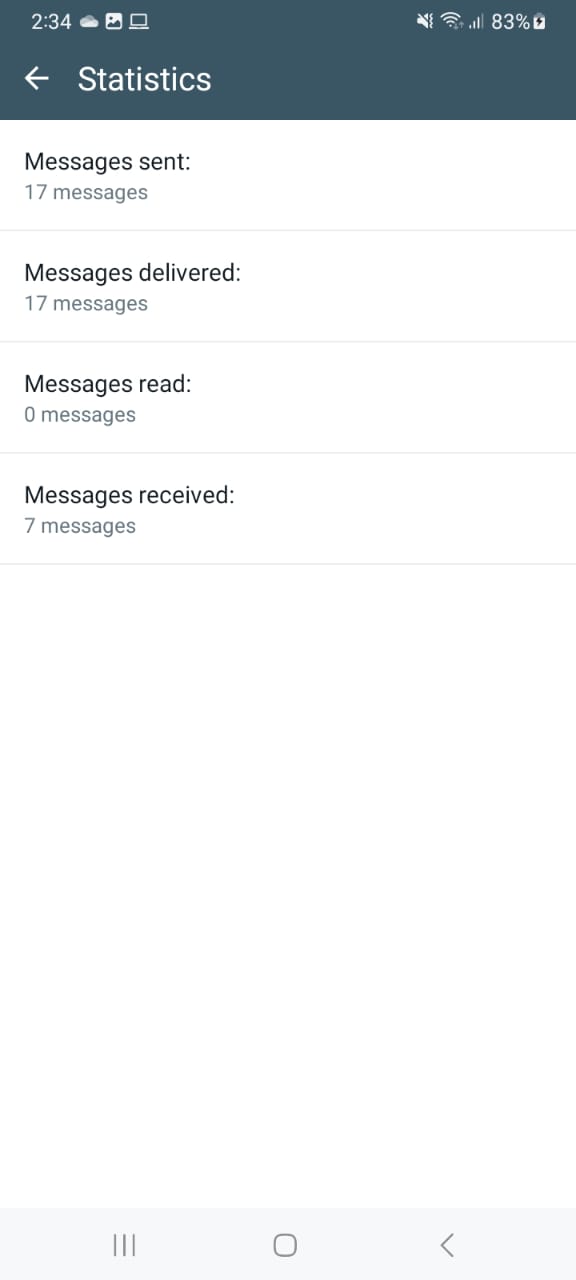


Figure 14: Statistics

* You can make labels.

*Label your customer to keep track of them. Additionally, you can label the messages between you and your customers. You can only create labels on mobile devices, but you can add labels on mobile and the web browser.*

* You can create catalogues.

*Show case your products. It needs to be approved first before showing it to the customer. You can find the policy of the catalogs* [*here*](https://www.whatsapp.com/legal/commerce-policy)*. Approval may take 5 to 10 min. You can’t create and you can’t see the catalogs on the desktop app.*

* You can link your WhatsApp business to your Facebook and Instagram.
* When sending a message to a WhatsApp messenger user, they will be notify that it’s a business account user.
* You can make advertisements about your catalogs.

*It will be advertised on Facebook. There is payment involved when making the ad. Pricing is based on the number of people you want to reach and the number of days you want to run the ad. This can only be done through mobile.*

* Customer can add the products in catalog to the cart and send them to the company chat/message.

*The company can see the cart items that the customer has send. You can’t see the cart items in the desktop app.*

A screenshot of a phone

Description automatically generated

Figure 15: Customer send cart items.

A screenshot of a computer

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Figure 16: See items in the cart.

**Pros**

* You can use the same web and desktop app as WhatsApp Messenger.
* You need to have a phone number to use this.
* You can easily change your WhatsApp Messenger to WhatsApp Business.

*All the information will be carried over to WhatsApp Business.*

* You can send unlimited messages to your customers.
* You can make “away massages”.

*To let the customer know when you’re away or unavailable. We can use this if the retiree messages the SVb employee at night or on the weekend.*

* Video call works from WhatsApp Business to WhatsApp messenger and the other way around on mobile.

**Cons**

* After 14 days of not using the mobile WhatsApp Business, the web and desktop app will log you out.
* You can only log onto 5 devices.

*Same as WhatsApp Messenger.*

* Can broadcasts messages up to 256 contacts.

*Customer must save you as contact to receive the broadcasts message.*

* The away massagescan only be created on mobile devices.

(Hess, 11 October 2023) (Carter, 25 August 2023)

#### Skype (Tested)

**Additional information**

* This is the [link](https://www.skype.com/en/free-conference-call/) for skype browser.
* You can use Skype without creating an account.

**Pros**

* On desktop you can use the browser or app.
* Invite participant to the call can be done through a link invite.
* Easy to use and understandable.
* You can call international phone number.

*You have to pay a flat fee per month.*

**Cons**

* You need to download the app on mobile to use Skype.
* You can join through an old invite link.

*The retiree may accidentally join an old call without knowing.*

* You can use Skype URI API.

*It provide a simple way to initiate Skype video calls directly from websites, desktop, and mobile apps. You must have a Skype client installed and have a Skype account, which is extra steps in using the API.*

#### Microsoft teams (Tested)

**Additional information**

* You have to have an account to receive video calls and to make video calls.
* You can join the call without an account, but you have to create a name.
* More for organizing company and educational meetings.
* You can create channels for groups.
* You can react to a message.

**Pros**

* On desktop you can use the browser or the app.
* The video call can be scheduled or directly called.
* You can invite people to a video call meeting with link.
* You can join the call through link or meeting ID.

A screenshot of a computer

Description automatically generated

Figure 17: Enter meeting ID

* The meeting organizer has to admit people to the video call.

**Cons**

* You have to download the app on mobile to use it.
* You have to schedule a date to create a meeting link.

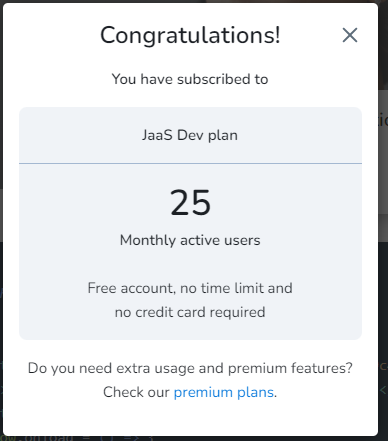
*Extra steps in creating an invite link.*

* You have to be an organizer to create a meeting link without making a schedule link.

*This is mostly to invite someone who doesn’t have an account.*

#### Jitsi Meet (Tested)

Here is the [link](https://meet.jit.si/) to Jitsi meet on browser.



<https://github.com/jitsi/jitsi-meet-react-sdk>

**Additional information**

* It can hold up to 100 participants but more than that can affect the video quality.

**Neutrals**

* Need to name the meeting room.
* Room name needs to be unique.

*To prevent anyone from joining.*

* Can join the call with or without inputting your name.
* API free to use, depending on active monthly users.
* You can lock the meeting with a password.
* You can share your audio.

*Share the music or audio you are listening to with others.*

* You can toggle push to talk with space button (not on mobile).

*Instead of muting yourself over and over again, you can make use of the push to talk. You have to push and hold the button, in this case, the space bar, to talk. When you are done speaking, release the button.*

* You can adjust screen view.

**Pros**

* It has open-source video conferencing API.
* Tracks how long the call is going.
* You can invite through link.
* On desktop you can use the browser or the app.
* On Mobile you can join the call via browser or app.
* No app required.

**Cons**

* Self-hosted server option can be complex.
* You need an account to start the video call.
* You can rejoin the video call through an old invite link.
* Not for large business.
* The meeting is not fully encrypted.
* Low audio and video quality.

(Panchal, 8 October 2020)

#### Talky.io (Tested)

Here is the [link](https://talky.io/) to Talky.io on browser.

**Additional information**

**Neutrals**

* You don’t have to have an account to make the video call.
* You need to choose a unique name for the video call meeting.
* You can lock the room.

*To prevent strangers from joining the room, they need a code to join.*

* You can play a mini game while waiting for people to join the call.

*If you are the only one in the call you can play the game, it’s similar to google web browser when you don’t have internet.*

* You can toggle push to talk (not on mobile).
* You can integrate their SimpleWebRTC to website.

*It’s their version of WebRTC (see the acronyms section for definition). There is a free trail period. After that you have to pay monthly depending on the plan and pricing you choose.*

**Pros**

* You can join through link with mobile phone on browser.
* You don’t have to download any apps.

**Cons**

* Interface of the browser version is a bit wonky on mobile.

*Everything on the interface is compact, on each component.*

* Everyone can kick each other from the video call.
* Can join old invite link.
* On the phone you have to manually set the audio and camera before entering the call.
* Can’t find any information on logging the video call for the API.

#### JumpChat (Tested)

Here is the [link](https://jump.chat/) to the web browser.

**Additional information**

* It has no limits on how many participants can join except for bandwidth. The more people in call the more bandwidth is used because your stream is sent to all the other people directly.

**Neutrals**

* You don’t have to create an account.
* It auto generates a room code for you.
* There is an app version on mobile.
* You can lock the room.
* JumpChat is built on top of WebRTC.

**Pros**

* It is browser based on desktop.
* All communications are encrypted in the video call.
* No limits to the number of people, except for bandwidth.
* You can admit the guest to join the call if the room is locked and the guest doesn’t know the code.
* You don’t have to download any apps.

**Cons**

* You can use the browser on the phone to video call, but it won’t work on iPhone.
* You have to click I’m ready to join the call.
* You can reuse the old invite link.
* Anyone that knows the room code can join.
* The video on the phone is wonky.

*Sometimes the video of the other person in the call is too big to fit the screen or it fits right at the top. If you rotate the phone horizontally, it will be exactly right.*

* Doesn’t seem to have call history.

#### WebRoom (Tested)

Here is the [link](https://webroom.net/) for the web.

**Additional information**

**Neutrals**

* The email address can be a fake address.
* You can keep trying the free session with the same email address.
* Tracks how many minutes you have left before the session ends.
* The guest can’t have the same email address as the host.
* It has notes that you can write on.
* You can switch screen view.
* You have to enter a name and an email address to start the video call.

**Pros**

* The email is just to get the log of the session.
* Can’t use the old invite links.
* No download required.

**Cons**

* The free session is only 20 minutes long.
* The guest also has to provide a name and an email address to join the call.
* You have to do a lot of checks before you join the call.

*Like microphone check etc.*

* Doesn’t seem to have call history.

#### Google meet (Tested)

This is the [link](https://meet.google.com/?pli=1) for the web.

**Additional information**

* You can only record the video call on the computer. For more information on how it works you can click [here](https://support.google.com/meet/answer/9308681?hl=en#:~:text=Recording%20is%20only%20available%20for,start%20presenting%2C%20and%20then%20record.).
* The guest needs to provide a name before entering the meeting.
* You can buy plans to extend the meeting duration and extend the maximum participant. The plans can be found [here](https://workspace.google.com/pricing.html).

**Pros**

* You can join through a link invite.
* You can join with the code provided by the host of the meeting.
* Android users have Google meet pre-installed.
* Before joining the host must admit the guest first, when joining the meeting.
* The guest can rejoin the call.

*They only have 60 seconds to rejoin.*

* Google API is free to use.
* You can remove user.

*You can use this for retiree, who doesn’t know how to end the call.*

* Easy to use.
* It has call history.

**Cons**

* You have to download the app on the phone to join the call.
* Meetings last up to 60 minutes for free.

### The paid version of a video call system is:

#### Vonage meeting API (Information online)

**Additional information**

If you are building web apps, your Vonage Video API app will also work with the following compatible browsers on Android and iOS:

A white grid with black text

Description automatically generated

Sign up to redeem $10 for free.

**Neutrals**

* It is hosted on the Vonage Video API cloud.
* Supports all video use-cases

*You can find the use-cases here.*

* It has messaging
* It’s built in WebRTC.
* You can share your screen.
* This is best suited for a company that is seeking to add SMS API.
* It offers a chat box.
* Didn’t find any information on creating a link for the video call.

**Pros**

* You can try a free trial version.
* Offers guide on building the API.
* You can integrate the API into your app.
* It offers virtual backgrounds filters.
* It can be created on the web, windows, android, macOS, iOS(Obj-C), iOS(Swift) and Linux.
* It has audio and video recording.
* You can retrieve information for a call.

**Cons**

* The pricing plans for the video API start at $9.99 per month (plus taxes & applicable fees) with 2000 minutes.

*The pricing can be found* [*here*](https://www.vonage.com/communications-apis/video/pricing/)

* Has a steep learning curve.
* Documentation is unclear and all over the place.

*It’s hard to find something and unclear writing.*

(Webb, 22 November 2022)

#### WhatsApp Business API (Information online)

**Additional information**

**Neutrals**

* Doesn’t have an interface and app.
* This is for medium to larger companies or large enterprises.
* It has the same features as WhatsApp Business but with additional features.
* There is an on-premises API and cloud API.

*On-premises API are hosted on your own server or WhatsApp solution providers. Cloud API are hosted on Meta’s cloud server. Cloud API is very new currently.*

* Can integrate various customer relationship management (CRM) systems.

*CRM system is a tool designed for efficiently managing relationships with your customers. It stores and organizes valuable information about customer interactions and helps enhance communication between your business and each customer.*

*One of its key features is automating communication messages, particularly in customer support scenarios. It's often impossible to respond to all the customers instantly, and this is where a CRM system comes into play. It enables you to be efficient and automate communication tasks, ensuring that no customer query or request falls through the cracks. With CRM, you can provide more personalized and timely responses, improving the overall customer experience.*

**Pros**

* You need to have a phone number.
* You can manage thousands of customer interactions with your team.
* You can send notification and promotional messages

*Notifications need to be approved by WhatsApp. Notifications are mostly alerts, no promotion of product.*

* You can add multiple devices.
* You can get a verified badge.

*Gives the account credibility that it is a real business and not a scam.*

**Cons**

* You need to follow certain business terms and conditions before applying for the API.
* You can sign up for Facebook Business Manager to get approved to use the API.

*Need to provide acceptable document to get approved on the business name and business address, you can look at the process* [*here*](https://yellow.ai/blog/whatsapp-business-api/#:~:text=1.%20Apply%20for%20WhatsApp%20Business%20API)*. After that you can start on the labor-intensive programming.*

* You can apply for WhatsApp solution providers or WhatsApp partners to get access to API.

*There are third-party companies that help you get access to WhatsApp API. They are approved by WhatsApp and can help and guide you in integrating the API or provide an already build application for you.*

* Customers need to initiate the conversation before you can start messaging them.
* Charge per conversation.

*Must pay a fee if you initiate a conversation***.** *Not per individual message. Conversations are 24-hour message threads between you and your customer. There are criteria to the conversation, and you can find them* [*here*](https://developers.facebook.com/docs/whatsapp/pricing#pricing-rules)*.*

* You have 24 hours to respond to your customers message.

*After 24 hours you must use a message template because you won’t be able to message them like the regular WhatsApp Messenger.*

* Not recommend for small business.

*Small business doesn’t receive more than 20 messages daily.*

(Gupta, 16 September 2023) (AiSensy, 08 August 2023)

#### MirrorFly Video Call API (Information online)

**Additional information**

Browser supported versions

Edge 13 or higher

Chrome 16 or higher

Firefox 11 or higher

Safari 7 or higher

No free trial.

**Neutrals**

* Can upload large file sharing.
* Can schedule a meeting.

**Pros**

* They have pre-built UI kit.
* Unlimited video calls.
* You can do video recording.
* You can add video calls on any platform or any device.
* It’s easy to integrate into a desktop app, web application and mobile app.
* You can do 1 on 1 video call or group call.
* Has real-time call logs.
* Has flexible hosting.

*You can host on your own server or MirrorFly’s private cloud.*

* You can join via link.
* Easy to follow documentation.
* End-to end support.

*You can easily get support from their experts anytime.*

* You can request a demo on it.
* You can choose your preferred SDK platform to build the video calls on Android, iOS, JavaScript, React, Angular, or Flutter.

*You can find the meaning for SDK in the* [*Acroyms*](#_Acronyms) *section.*

* It has call logs

**Cons**

* There are 2 plans you can buy.
* Essentials (for 5k monthly active users): $399 per month.
* Premium (for 5k monthly active users): $999 per month.

*The price also depends on the monthly active users. 5k is the lowest option.* *Each plan has different features. The pricing can be found* [*here*](https://www.mirrorfly.com/pricing.php)*.*

#### Cometchat Video Call API (Information online)

**Additional information**

A screenshot of a computer

Description automatically generated

A screenshot of a message

Description automatically generated

https://github.com/cometchat-pro/cometchat-chat-sample-app-react

The chat works.

**Neutrals**

* Has interactive whiteboard.
* You can share documentation.
* You can share your screen.

**Pros**

* There is a free trail option.
* Frameworks that they support: Android Java, Agular, Flutter, iOS, React, Android Kotlin, Laravel, PHP, React Native, Vue, and WordPress.
* You can invite or direct dial.
* You can record the call.
* Easly integration.
* Pre-built UI kits.
* It has active community support.
* You can fetch call logs.

**Cons**

* There are 3 plans that are priced as follows:
* Essentials (for 26 to 1000 monthly active users): $109 per month.
* Pro (for 26 to 1000 monthly active users): $509 per month.
* Custom: Need to contact them.

*The pricing depends on monthly active users and each plan has different features. You can find more information about the pricing* [*here*](https://www.cometchat.com/pricing)*.*

* Slow customer support.
* Limited support for back-end integration.

*There is no SDK for back-end languages such as java and .NET.*

(Ably, 21 Jul 2023)

#### Twilio Video Call API (Information online)

**Additional information**

A screenshot of a browser

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https://github.com/twilio/twilio-video-app-react#install-dependencies

**Neutrals**

* It’s built on top of WebRTC.
* Has group video interactions that support up to 50 participants.
* It offers interactive whiteboards.
* It offers chat box.
* It offers video animation.
* It offers customized and branded video layout.
* It offers video lobby.
* There are 4 plans that are priced as follows:
* For one-on-one: start for free.
* For peer-to-peer: $0.0015 per participant per minute.
* For group video call: $0.004 per participant per minute.
* High volume: custom, need to contact person.

*Each plan has different features. More information on the pricing can be found* [*here*](https://www.twilio.com/en-us/video/pricing)*.*

**Pros**

* It has a free trail option.
* It has a free version for one-on-one video call.
* It has documentation guide for developer tools, SDKs, sample code and video insights.
* It has one-on-one video interactions.
* It has peer-to-peer video interactions.
* It offers noise cancellation.
* It offers meeting recording.
* It offers screen filters, including virtual backgrounds and background blurring.
* It offers tutorials and guides.
* The applications it can be built on are: Node.js, Python, C#, Java, Apex PHP, Ruby and Twilio-CLI
* For the web-base, it can be built on JavaScript SDK, Android SDK, and iOS SDK.
* It has video call logs.

*The logs are available for 2 days for WebRTC Go Room (aka “Go Room”) and seven days for all other room types. WebRTC Go Room can be uses for one-on-one video calls.*

**Cons**

* Required advance coding knowledge

*Developers without experience will have a difficult time incorporating Twilio’s APIs.*

* It has bad customer service.
* Video call logs only last for 2 day for one-on-one video calls.

(Webb, 22 November 2022)

#### QuickBlox Video Call API (Information online)

**Additional information**

A screenshot of a computer

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A screenshot of a computer

Description automatically generated

<https://github.com/QuickBlox/quickblox-javascript-sdk/tree/gh-pages/samples/webrtc>

**Neutrals**

* Built on WebRTC.
* You can build a chat box.
* You can make use of voice calling.
* You can make use of file sharing.
* You can share your screen.
* Don’t know if you can get call history.

**Pros**

* There is a free trail period.
* There is a push notification.
* It supports both peer-to-peer and multi-party use.
* It has flexible data storage.
* Dedicated.
* On-premise.
* Own virtual cloud.
* You get customer support to help you if you have any problem.
* Easy and quick integration.
* Customizable UI Kits.
* It has a documentation guide.
* It can be built on website, iOS, Android, and desktop app.

**Cons**

* There are 5 plans that are priced as follows:
* Basic: for free for 500 users that is registered in your app database.
* Starter: for $99 per month for 10,000 users.
* Growth: for $249 per month for 25,000 users.
* HIPAA Cloud: for $399 per month for 20.000 users.
* Enterprise: for $599 per month. Custom need to contact them.

*Each plans has different features. For more information on the pricing can be found* [*here*](https://quickblox.com/pricing/)*.*

#### Agora Video Call API (Information online)

**Additional information**

A close-up of a text

Description automatically generated

https://github.com/AgoraIO/Basic-Video-Call

You have to download it on mobile.

Sample doesn’t work.

**Neutrals**

* Offers voice calling.
* Offers chat box.
* Offers Interactive whiteboard.
* You can share your screen.
* Don’t know if you can get call history.

**Pros**

* You can record the call.
* There is UI kit
* It is offered in Android, iOS/macOS, Windows, Web, Electron, Flutter, React Native and Unity.
* You can add extensions.
* There is a documentation guide.
* It offers an app builder.
* Every month you get 10,000 minutes free.

**Cons**

* Steep learning curve for developers that are new to Agora’s SDK.
* It takes significantly more time to integrate.
* There is a concern about privacy, security, and data.

*Because Agora is based in China and follows* [*local data privacy laws*](https://www.cooley.com/news/insight/2021/2021-11-30-china-new-national-privacy-law)*.*

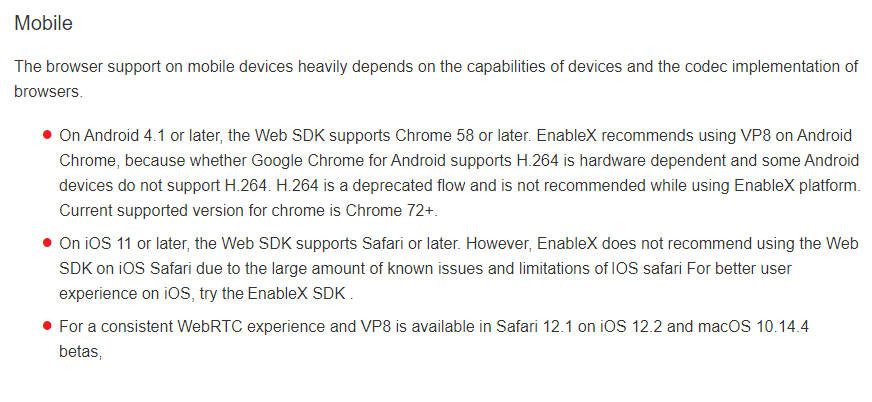
* Price for video call starts at $3.99/1,000 minutes for HD video.
* Price for video call starts at $8.99/1,000 minutes for FULL HD Video.

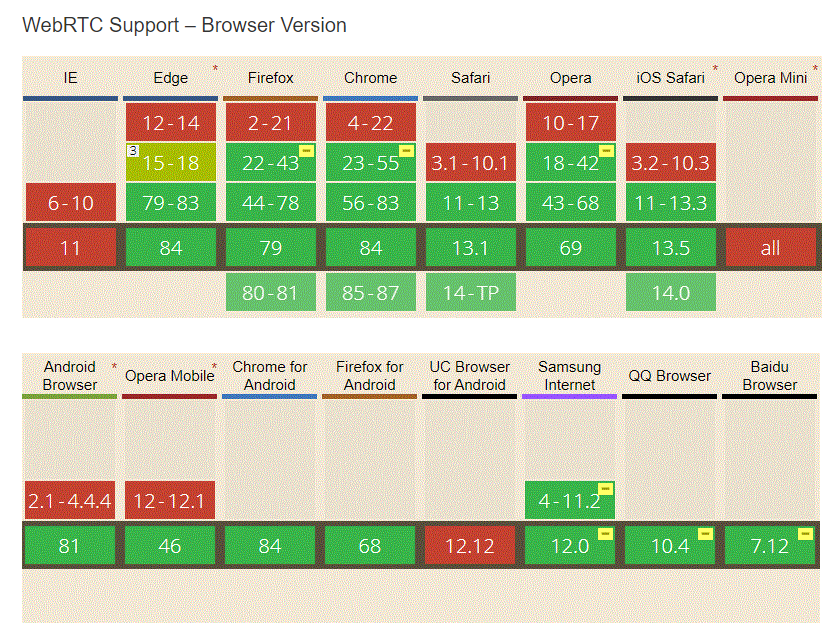
*The pricing for both can be found* [*here*](https://www.agora.io/en/pricing/video-calling/)*.*

(S, 4 Oct 2023)

#### EnableX Video Call API (Information online)

**Additional information**





<https://try.enablex.io/> it works for mobile phones

<https://github.com/EnableX/One-to-One-Video-Calling-Open-Source-ReactJS-Application>

<https://www.enablex.io/insights/how-to-build-video-conferencing-app-using-react-js/>

video server API: <https://www.enablex.io/developer/video-api/server-api/rooms-route/>

Create room Rest: <https://www.enablex.io/developer/video/low-code-video-embed/create-meeting-room-using-rest-api/>

A screenshot of a computer

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**Neutrals**

* You can add screen share.
* You can have 100 participants.
* Don’t know if there is a call history.
* $5 credit when you sign up for the first time.
* You can do low code.
* You can lock room as the moderator.
* There is an interactive white board.
* You can share screen.
* You can put the call on hold as the moderator.
* You can add breakout room as the moderator.
* You can kick participant out of the video call as the moderator.
* As the moderator you can end the video call session for all participants.
* You can add name is you want.
* You can file share.
* You can do emojis reaction during the video call.
* You can mute participants as the moderator.

**Pros**

* You can try it for free.
* You can build on any platform, browser, and coding language.
* There is UI kit.
* You can integrate into a 3rd party application.
* You can add virtual background.
* You can have live recording.
* You can monitor video calls.

**Cons**

* It has less features compared to other video call API’s.
* There is not enough UI customization for video call API.
* Documentation may take you a while to understand.
* May have compatibility issues with older or less common web browsers.
* The pricing is $0.004 per participant per minute (max 50 participants in a room).

[*Here*](https://www.enablex.io/cpaas/pricing/our-pricing) *you can find more information on the pricing.*

#### Sendbird Video Call API (Information online)

**Additional information**

???

A screenshot of a computer screen

Description automatically generated

https://github.com/sendbird/quickstart-calls-reactjs

Sample doesn’t work, I get an error when I try to do “npm run start”

**Neutrals**

* It has a shared screen capability.
* It can share file and multimedia.

**Pros**

* Direct video call.
* Group video call.
* It has a call history.
* It has call muting.
* It can be built on iOS, Android, JavaScript, React native and Unity.
* It has call recording.
* There is a free trail option.
* It has a UI kit.
* You can retrieve call history.

**Cons**

* It may take a while to implement for new developers.
* The customization options are limited.
* Does not provide professional services support.
* This is the 4 plan pricing overview:
* Developer: is free for max 100 monthly active users.
* Starter 5K: $399 per month for 5K monthly active users.
* Pro 5K: $599 per month for 5K monthly active users.
* Enterprise: custom pricing with millions of monthly active users.

*Each plan has different features.* [*Here*](https://sendbird.com/pricing) *you’ll find all the information about the pricing.*

(Cemazar, 15 June 2023)

## Which video call system can be implemented based on the requirements?

The requirements that must be met to are:

* Eliminate the use of tablet.
* Integrate the video call on the PRAS desktop.
* No special equipment or software required at the recipient’s end of the call.
* Log the start and end time of the call.

The video call system must adhere to these requirements. I have categorize the video call systems into two sections based on the information that I have gathered and tested. After that I will make at least 2 protypes for each category to display how they would work. In reality, I can’t test all of them due to the complexity of implementation, and I have limited experience as I only have around 3 month left (this is written at the end of October).

The first section is for systems that fulfill all the necessary requirements and will be labeled as “Compliant.” The second section is for systems that align with most of the criteria and will be labeled “Mostly Compliant.” I will also provide explanations for the reason why they are placed in the “Mostly Compliant” section.

### Compliant

These video call APIs are information I found online and have not been tested.

**Jitsi meet API (Jitsi as a Service) (react) For web React SDK and IFrame API. For mobile android SDK, iOS SDK, Flutter SDK and React Native SDK.**

**Vonage meeting API (react)** [**https://tokbox.com/developer/embeds/**](https://tokbox.com/developer/embeds/)[**https://developer.vonage.com/en/tools**](https://developer.vonage.com/en/tools)

**MirrorFly Video Call API (react) https://www.mirrorfly.com/docs/audio-video/overview/**

**Cometchat Video Call API (react) https://www.cometchat.com/docs/javascript-chat-sdk/overview**

**Twilio Video Call API (react) REST API Reference for node.js, java, python, C# (console), Go, PHP, Ruby, Twilio-CLI, Curl https://www.twilio.com/docs/video/api/rooms-resource**

**QuickBlox Video Call API (react)**

**Agora Video Call API (react)** [**https://docs.agora.io/en/video-calling/get-started/get-started-uikit?platform=web**](https://docs.agora.io/en/video-calling/get-started/get-started-uikit?platform=web)

**EnableX Video Call API (react) https://www.enablex.io/developer/video-api/client-api/web-toolkit/ https://github.com/EnableX/One-to-One-Video-Calling-Open-Source-ReactJS-Application**

**SendBird Video Call API (react)** [**https://sendbird.com/docs/calls**](https://sendbird.com/docs/calls)

### Mostly Compliant

**WhatsApp Messenger:**

It adheres to most of the requirements. The thing is that it can’t be integrated in the PRAS app, and you can’t implement the call history in the PRAS app but it’s ideal choice to use. SVb employees can have WhatsApp on their desktop, and retirees don't need any special software or application. Since WhatsApp is their current video call platform.

**WhatsApp Business:**

This is the same idea as WhatsApp Messenger but with additional features. These features can be used for future implementation if needed.

### Prototypes

This section represents the prototypes that I'll be creating and explains the reasons behind choosing these prototypes. Additionally, I’ll provide detailed information on how I developed the prototypes, potential problems that may arise, and the advantages they offer.

**WhatsApp Messenger**

This is the ideal choice because they are already using it on a tablet to make video calls. There is a way to open a retiree’s WhatsApp messenger directly without having to search for their name. The idea is that when they click “Video call retiree's mobile phone number” (for detailed reference, see section 3.2.1 of the wireframe document), WhatsApp will open, and they'll be directed to the retiree's messenger page, where they can initiate the video call from the top right corner.

### Initial start of all prototypes

This feature is implemented in all the prototypes, allowing SVb employees to initiate the video call. To use it, we simply need to add a button on the “Edit Appointment” screen. For a detailed description of how it should look and function, please refer to Section 3.1 in the Wireframe document.

### WhatsApp Messenger prototype

After adding the “Start Video Call” on the “Edit appointment” form, we made a form where the SVb employees can choose which mobile phone number to call.

A computer screen with text and images

Description automatically generated with medium confidence

A screen shot of a computer program

Description automatically generated

A screenshot of a computer program

Description automatically generated

### EnableX Video API prototype

Application part for mail: SMTP is a standard protocol used for the transmission of emails over internet.

Right click project and go to “Manage NuGet Packages...”, type cefsharp and select CefSharp.winForms and install it.

<https://github.com/cefsharp/CefSharp/>

problem with email.

Fix with the help of co-worker.

Adhoc room is delete after you join the room, and it will be deleted depending on room duration.

Participant can join the room without the moderator, and it will initiate the room duration.

The room will initiate even when the participant wait in the lobby.

Schedule room: participant can only join the room on scheduled time or 15 minutes before the scheduled time.

A red sign with white text

Description automatically generated

{

    "result": 0,

    "room": {

        "name": "Test Room 8",

        "service\_id": "655bb8c6f271ccdc0f82cd26",

        "owner\_ref": "tony.itp.test@gmail.com",

        "settings": {

            "description": "Test room meeting 8",

            "mode": "group",

            "scheduled": **false**,

            "adhoc": **false**,

            "duration": "10",

            "participants": "1",

            "auto\_recording": **false**,

            "screen\_share": **true**,

            "canvas": **false**,

            "media\_configuration": "default",

            "quality": "HD",

            "moderators": "1",

            "viewers": 0,

            "active\_talker": **true**,

            "encryption": **false**,

            "watermark": **false**,

            "single\_file\_recording": **false**,

            "max\_active\_talkers": 2,

            "media\_zone": "XX"

        },

        "sip": {

            "enabled": **false**

        },

        "created": "2023-11-30T12:45:46.659Z",

        "room\_id": "656883fad577914722959184"

    }

}

When “knock” is true and “wait\_for\_moderator” is false. The participant needs to wait in a lobby until moderator gives permission to join the room.

When “wait\_for\_moderator” is true, and “knock” is false. The participant has to wait until the moderator to join the room then the participant can join the room.

Email may take up to 1 min to receive.

Participant can stay in the permanent room without the moderator, and it will drain the payment.

The duration need to be higher than 9 min.

It will kick participant out for the adhoc after 5 min of the end time. Can’t join after the duration time. For example, after time duration 10.

The time is in UTC (Coordinated Universal Time), time 4 hours difference.

## Which video call system benefits a better user experience?

# Conclusion to the main questions

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