**Key Terms:**

**Period Key (PK)**: key used to protect users’ privacy, which is updated daily.

**Dynamic Sharing Code (DSC)**: code derived from PK and used to protect users’ privacy. This code is broadcast as a payload and is updated about every 15 minutes to prevent an endpoint from being tracked.

**User**

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| **# of User Story ID** | **Title** | **Scenario Solution** |
| E01.01 | The user has Bluetooth turned off on their phone upon entering the App. | 1. User opens the App with Bluetooth turned off 2. Error message pops up on device to prompt user to enable Bluetooth to continue 3. Pause broadcast and Scan features until Bluetooth enabled |
| E01.02 | Broadcasting and Scanning - Not discovered | 1. User A passes by User B on the streets quickly 2. User A and User B are within 6 feet distance 3. User A and User B’s device did not discover each other due to latency or other reasons |
| E01.03 | Broadcasting and Scanning - Exposure | 1. User A passes by User B on the streets 2. User A and User B are within 6 feet distance 3. User A and User B’s devices both broadcast and scan and discovers each other 4. User A and User B collects each other’s DSC and saves it as an encounter token |
| E01.04 | Broadcasting and Scanning - Prolonged Exposure | 1. User A sits next to User B within 6 feet distance 2. User A’s device sends out Bluetooth signal and discovers User B 3. User A and User B collects each other’s DSC and saves it as an encounter token 4. Both User A’s device and User B’s device continue to scan and broadcast their DSCs 5. After a certain number of duty cycles (need to be determined through testing), they will be marked as prolonged exposure |
| E01.05 | Receiving test result | 1. User goes to test center and gets a Covid-19 test 2. Test center returns test result back to user and the user is tested positive 3. The user receives the verification QR code which could be scanned through the app to verify their positive result |
| E01.06 | Verification through QR code | 1. User clicks on the report positive button 2. User is taken to a page that gives the options of verification methods 3. User selects Scan QR code method 4. User scans the QR code on the test result report with phone camera 5. The server automatically fetches the user’s test results and verifies the user |
| E01.07 | Verification through teleTAN | 1. User clicks on report positive button 2. User is taken to a page that gives the options of verification methods 3. User selects request teleTAN method 4. User will be taken to a page with the hotline number and they will be able to call this number to get the teleTAN 5. User can type the teleTAN in the input field to verify their results |
| E01.08 | Successfully Verification | 1. If the methods of verification succeeds through any of the above methods (QR code or teleTAN), the periodic keys of the patient will be uploaded to server |
| E01.09 | Alerting the user of an encounter with a Covid patient | 1. User’s device downloads the list of patient PKs from server daily 2. The device then compares the user DSCs and the patient DSCs 3. If there is a match, the device will alert the user |
| E01.10 | Alerting others for a possible exposure | 1. The user receives an alert for a possible exposure to a Covid-patient 2. This user can choose to notify others who have been in contact with him and are possibly exposed to Covid-19   The user is taken to a confirmation page to give consent and upload his PK to the server |
| E01.11 | Disabling the App | 1. The user wants to disable all the features in the app 2. The user goes to settings and turns on Disable App 3. App engine will be disabled until the user turns “Disable App” off |
| E01.12 | Disabling Alerts and Notifications | 1. The user does not want to receive notifications or alerts from the app 2. The user goes to settings and turns on Disable Notifications 3. Alerts and notifications will be disabled until the user turns “Disable Notifications” off |
| E01.13 | Disable PK from uploading to the server | 1. The user does not want to upload his/her PK to the server, but wants continue all the other features (such as alerts, exchanging encounter tokens, etc) 2. The user goes to settings and turns on “Disable Uploading PKs” 3. PK uploading will be disabled until user turns “Disable Uploading PKs” off |
| E01.14 | Clear all data from device | 1. The user wants to clear all data from his/her device 2. The user goes to settings and clicks on the “clear data” button 3. All the PKs of the device, patient PKs downloaded from the server, and DSC will be erased |
| E01.15 | User enter the App with Bluetooth turn off or no internet connection | 1. Send error message to user to enable Bluetooth and internet connection to use the app |
| E01.16 | Status update disabled for 7 days after report positive | 1. The user reports positive and returns to the home page 2. The radio button for status update is disabled since the user have just reported positive 3. When the user tries to click it, an error message pops up detailing the reason of the disabled function 4. During these 7 days, the PK’s of the user will be automatically uploaded by the device |
| E01.17 | Automatically upload PK from the device | 1. After the user reports positive, the device will automatically upload the user’s PK to the server daily for 7 days 2. The timestamp is stored with the registration key in the device, so the device will use a counter that counts the days 3. When it reaches 7 days, the process will be terminated and the registration key will be deleted from the device |

**Server**

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| **# of User Story ID** | **Title** | **Scenario Solution** |
| E02.01 | Generate teleTAN Verification Code | 1. Receives request from testing center 2. Generate a unique 6 digit verification code with the GUID for this specific patient    1. This verification code is ephemeral and is only of use one time 3. Return code to testing center |
| E02.02 | Generate QR code | 1. Receives request from testing center 2. Creates a unique QR code with specific GUID for this positive test 3. Return QR code to testing center |
| E02.03 | Verifying the patient | 1. User self-report positive and submits a verification to the server 2. The server will confirm the GUID matches the record and verify the covid status of the user 3. Return valid/invalid message |

**Testing Center**

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| **# of User Story ID** | **Title** | **Scenario Solution** |
| E03.01 | Request verification Code | 1. The user’s test results are positive 2. The testing center request a verification code for the server 3. The testing center shares the test result and this verification code with the patient through phone/text message |
| E03.02 | Request QR code | 1. The user’s test results are positive 2. The testing center request the generation of a QR code 3. The testing center prints this QR code on the test result documents and gives it to the user |

**Dashboard**

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| **# of User Story ID** | **Title** | **Scenario Solution** |
| E04.01 | Keep track of how many users are download/install/using the app | 1. Create a standard line chart that documents the number of users |
| E04.02 | Keep track of the number of positive users | 1. On the chart from E04.01, add a line in a different color that represents the number of positive users |
| E04.03 | Collect information on the patient location | 1. Create a bar chart that display the number of patient from each other area    1. This information can be obtained from the users area code or the test center location |
| E04.04 | Compare the timestamp of the actual test date, the submission of the verification form and the exposure alerts after the submission | Issue: patients may not submit the verification form immediately after receiving their test results, so some users in contact will not receive the exposure notification   1. Create a line chart that contains two lines, one represents the times a user submitted their verification form and the other represents the date they got tested for comparison |
| E04.05 | Compare the users who prefers to submit verification through QR code and those who prefer to submit through teleTAN | 1. Create a bar graph chart where one bar represents the number of patients who submits their verification through QR code and the other those who submit manually |
| E04.06 | Record of real-time errors that occur | 1. Set up error reporting in Google Cloud |
| E04.07 | Compare the risk level of the users | 1. Create a bar graph chart where one bar representing the number of high risk users, another representing the number of medium risk users and the third representing the number of low risk users |

**Exceptions and Errors**

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| **# of User Story ID** | **Title** | **Scenario Solution** |
| E05.01 | CS engine disabled when the user is trying to report a positive test | 1. The user is trying to report a positive test by changing his/her status in the home page while he/she disabled the app 2. Error message appears asking the user to enable the app in order to use this function |
| E05.02 | QR code invalid during the scanning process | 1. The user is going through the verification process with an invalid QR code 2. Error message appears telling the user QR code is invalid |
| E05.03 | App cannot access camera when trying to scan QR code | 1. The user is going through the verification process with the “scan QR code” method 2. The user did not enable the access for camera on the device 3. Error message appears asking the user to provide access to the camera |
| E05.04 | No internet connection while reporting a positive test | 1. The user does not have internet connection while reporting a positive test 2. Error message appears telling the user the process cannot be completed without internet connection |
| E05.05 | Server error when uploading a positive test | 1. Server encounters a problem during the process 2. Error message appears telling the user to try again |
| E05.06 | User does not have a positive test but tries to report positive | 1. The user reports positive and goes through the verification process 2. The verification server does not find this user’s positive test 3. Error message appears telling the user that he/she is not positive and therefore cannot submit a positive test report |
| E05.07 | The user enters an invalid teleTAN | 1. The user entered the wrong 6 digit teleTAN verification code 2. Error message appears telling the user to check the teleTAN again and retry |
| E05.08 | teleTAN expired | 1. The user enters a teleTAN after it has expired 2. Error message appears telling the user that he/she has entered an invalid teleTAN |
| E05.09 | teleTAN is not the correct format | 1. The user enters a teleTAN that is not 6 digits or is not all numbers 2. Error message appears telling the user that he/she has entered an invalid teleTAN |
| E05.10 | Registration key null/invalid | \*\*\* This use case is for testing purposes only   1. The registration key is invalid and thus the reporting process cannot be complete 2. Check for any exception that has occurred and fix it |