Online Visitor Log System
System Overview Document

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INTRODUCTION.

This document presents an overview of the Online Visitor Log (OVL) system that is deployed at Maker Nexus. The Online Visitor Log substitutes for a paper visitor log that was used previously. The paper visitor log remains as a backup to the OVL.

The OVL is a fully functional stand alone system using a single database table.

The OVL implementation at Maker Nexus is “lightly” integrated with the Maker Nexus RFID Access Control System (see: https://github.com/makernexus/RFID_System). Both systems share the “facility display”, a web client that displays both members and staff who are present in the facility (via RFID check in) and visitors who are present in the facility (via the OVL check in). Therefore, the facility display shows all people who are in the Maker Nexus facility at any given time. In order to do this, the OVL database (one table) is incorporated into the RFID system “facility database” and one php script combines queries to RFID system tables and the OVL table in the database in order to produce this combined display.

BACKGROUND.

Maker Nexus is a 501(c)3 educational non-profit makerspace located in Sunnyvale CA. Maker Nexus staff and members regularly use the facility. In addition, non-member people visit the facility for a number of reasons:

- *Take A Tour*: People who are interested in learning more about Maker Nexus can schedule a guided tour of the facility.
- *Attend an Open House*: Maker Nexus periodically schedules open house events for the general public to learn more about Maker Nexus and making in general.
- *Participate in a Meetup Group*: Maker Nexus hosts various maker-related meetup groups as part of its educational mission.
- *Take a class:* Maker Nexus classes and workshops are open to the general public as well as to members.
- *Be part of a camp:* Maker Nexus hosts various summer, holiday and after-school maker related youth camps as part of its educational mission.
- *Volunteer:* Maker Nexus is a non-profit organization. Non-members sometimes volunteer their expertise and services to help improve the facility and participate in open houses and other public events.
- *Forgot badge*: Members who forget their membership badge are treated as visitors for a

session at the facility.

Maker Nexus staff and members are issued an RFID badge. An RFID system uses the badges, along with the Maker Nexus CRM system, to facilitate access control to the facility and to locations within the facility. Maker Nexus staff and members do not need to be escorted within the facility, as their RFID badge provides the necessary access control functions. The RFID system is documented at: https://github.com/makernexus/RFID_System.

Maker Nexus has a regulatory and operational requirement to know who is in the facility at any given time. The RFID system fulfills this requirement for staff and members. A "facility display" shows who is currently in the facility and where within the facility they have badged in. In order to meet this requirement for non-members, a physical sign-in/out sheet has traditionally been used. Visitors to Maker Nexus must sign in and out of the facility using this sheet.

The hardcopy sign-in sheet minimally fulfills the requirement to document non-member visits to Maker Nexus. However, the hard copy sign-in sheet has a number of significant limitations:

- It creates a bottleneck at the front desk, particularly when visitors come in for group events.
- Entry and exit times on the sheet are unreliable.
- Visitors to Maker Nexus must have signed an on-line liability waiver form. This action cannot be linked to a hardcopy sign-in sheet.
- Maker Nexus staff needs to use visitor sign-in information for follow-up outreach and marketing activities. The hard copy forms are very difficult to use for this purpose. For example, it is very tedious to manually make a list of people who visited in order to attend some specific event.

These limitations have motivated the development of an on-line visitor log that replaces the hardcopy sign-in sheet with an electronic system that:

- Eases the flow of visitors into and out of the facility by allowing visitors to use their cell phones to fill out an on-line visitor form.
- Identifies visitors within the facility via stick-on visitor badges.
- Provides an electronic linkage to the on-line liability waiver system for visitors who have not previously signed the waiver form.
- Automatically and accurately timestamps visitor entry and exit times.
- Provides a real-time display of all visitors in the facility; ideally integrated with the RFID system *facility display* (to show all people who are in the facility at any given time).
- Provides an electronic report generation capability that can be used by Maker Nexus staff to generate electronic reports related to attendance at various outreach events.

PROJECT REQUIREMENTS.

The following are summary (not comprehensive) requirements for the on-line visitor log system.

Electronic Visitor Form Requirements:

- The Online Visitor Log system shall allow visitors to check in to Maker Nexus by filling out an electronic visitor form.
- The electronic visitor form shall be web based; that is: it shall be presented and filled out on any device with Internet connection and a web browser.
- A simple system shall be provided for visitors to obtain the electronic visitor form on their cell phone. A QR code on one or more signs is the preferred implementation.
- The electronic visitor form shall be presentable and usable on typical cell phone screens as well as on large format tablets and computer screens.
- The electronic visitor form shall contain the following fields for the user to fill out:
    - Visitor First Name (required).
    - Visitor Last Name (required).
    - Visitor Email (optional).
    - Reason for visit: a series of checkboxes.
    - Has the visitor signed an online liability waiver: yes/no checkbox (mandatory). Note: checking “no” shall automatically load the online waiver page onto the visitor’s browser after the form is submitted.
    - A text field wherein the visitor can fill out “how did you hear about us” (optional)
    - Submit button.
- The electronic visitor form shall allow the visitor to add people to their form (multiple people in their party). Adding a person shall present fields for that person’s first name and last name.
- Clicking the submit button on the electronic visitor form shall submit the form data to the Online Visitor Log database. If the form contains multiple people, each person shall have a separate visit record in the Online Visitor Log database.

Online Visitor Log Database Requirements:

- The Online Visitor Log system shall have a central database wherein all visits are logged.
- The Online Visitor Log database shall be hosted on a reliable, professionally maintained server, such as a web hosting cloud service.
- A log entry (record) in the Online Visitor Log database shall consist of all of the data from the electronic visitor form.
- Each person named on an electronic visitor form submission shall have their own record in the database.
- Each record in the Online Visitor Log database shall automatically be time stamped with the date and time that the record was stored in the database (UTC), as well as the check-in time (local time).
- Each record in the Online Visitor Log database shall automatically be provided with a unique visit ID.

Visitor Badge Requirements.

- The Online Visitor Log system shall have at least one printer that prints out a stick-on visit badge for each visitor checked into the facility.
- Each visit badge shall contain the first and last name of the visitor and a QR code containing a link that can be used to checkout the visitor.
- Visit badges shall be printed out automatically whenever a new visitor is entered in the database.
- Maker Nexus staff shall be provided with tools to manage the visitor badge printing process; specifically, the ability to reprint visitor badges in the case of printer jam or other corruption.

Check-in/Check-out Requirements.

- Filling out the electronic visitor form and storing corresponding records in the database shall constitute checking in to Maker Nexus as a visitor.
- The Online Visitor Log system shall permit a visitor to check out of Maker Mexus by scanning the QR code on their visitor badge using their cell phone.
- The Online Visitor Log system shall be provided with a tablet that allows visitors to scan their badge for checkout in lieu of using their cell phone.

- The Online Visitor Log system shall check a visitor out of Maker Nexus when the QR code on their badge is scanned and the visitor is currently checked in.
- The Online Visitor Log system shall check-in a visitor into Maker Nexus when the QR code on their badge is scanned and the visitor is currently checked out. This is intended to provide a quick way for repeat visitors to enter and exit the facility. Note: when a visitor checks in to Maker Nexus using the QR code on a previous visit badge, the information from the previous visit shall be used to create the new visit record.
- Maker Nexus staff shall be provided with a tool to check visitors out of the facility if the visitor loses their badge or is otherwise unable to use the badge QR to check out.

Facility Occupancy Display Requirements.

- The Online Visitor Log system shall be provided with one or more electronic displays that show the names of each visitor that is currently checked-in to Maker Nexus.
- This display may be incorporated into the RFID system *facility display* or it may be a standalone display.

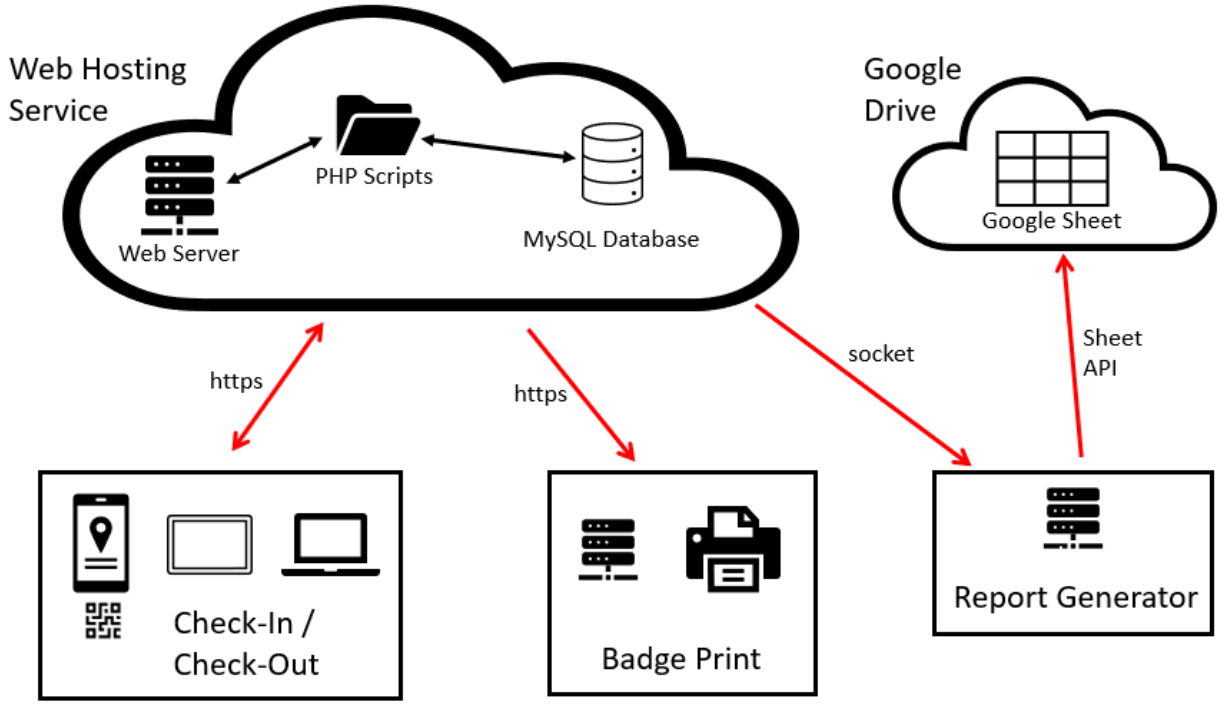
Report Generation Requirements.

- The information stored by the Online Visitor Log is sensitive as it contains email addresses. The database shall use strong passwords to control access. Any reports that contain information that can identify an individual shall be created and stored in a secure manner.
- The Online Visitor Log system shall be provided with a means to mine the database for information about visitors and visits. Examples of such reports are:
    - Names of all visitors attending an open house event.
    - The total number of visitors who attended an open house event.
    - The names and/or numbers of visitors participating in a workshop or class event.
    - The names and/or numbers of visitors participating in a Meetup group meeting hosted at Maker Nexus.
    - Contact information for visitors listed in the aforementioned reports.
- Export of the database to a *Google sheet* spreadsheet shall be an acceptable way to provide this reporting capability. Maker Nexus staff have the skills necessary to generate the desired reports from such a spreadsheet. If the report is generated into a folder with strong access controls and limited access, then this meets our security requirements.

IMPLEMENTATION.

Implementation Overview.

The figure below presents an overview of the Online Visitor Log system. The core of the system is a centralized database that stores timestamped visit events. A description of each of the system components follows.



Hardware/Software Component Description.

The following sections describe the hardware and software for each component of the Online Visitor Log shown in the above figure.

Central Database/Web Hosting Component.

The central database is a MySQL database that is part of a commercial web hosting package. The Maker Nexus implementation uses an existing web hosting package that supports the RFID system and the Maker Nexus Wiki; however, any web hosting package that provides a MySQL database, PHP, and a web server will work.

The Online Visitor Log consists of a single table in the database. The table is fully described in the GitHub repository:

https://github.com/makernexus/Online_Visitor_Log/tree/main/Software/Database-Server_Software

Most of the database access is web based via a REST API that is implemented with PHP scripts. The single exception is the Report Generator which directly connects to the database and executes its own SQL to copy the contents of the database into a *Google spreadsheet*. The PHP scripts, along with supporting html, javascript, and css files are in this repository:

https://github.com/makernexus/Online_Visitor_Log/tree/main/Software/Database-Server_Software

Check-in/Check-out Component.

The PHP script that is the url endpoint for checkin and checkout is:

https://github.com/makernexus/Online_Visitor_Log/blob/main/Software/Database-Server_Software/www/v1/OVLcheckinout.php

This script is supported by corresponding html and javascript files in this same folder, as well as the following files in this same folder: OVLcommonfunctions.php, OVLstyle.css, and OVLconfig.ini.

Note that the endpoint OVLcheckincheckout.php supports both checking in and checking out via the QR code, based upon whether the visitor is currently checked in or not.

Web form check in.

The “usual” way to check in is for the visitor to fill out a web form. Anyone completing the form is considered a “new” visitor. The web form is presented via a url to the script:

https://github.com/makernexus/Online_Visitor_Log/blob/main/Software/Database-Server_Software/www/v1/OVLcheckinout.php

Visitors can fill out the web form on their own smartphone by scanning a QR code that is part of the visitor signage in the front lobby of Maker Nexus. In addition, a PC is provided in the front alcove area where visitors can fill out the form in a web browser running on the PC. When a visitor checks in, a name badge is printed for them.

Repeat visitor.

The second way the check in is available to a repeat visitor. They can check in to Maker Nexus by scanning the QR code on their visitor badge that was printed on a previous visit. This QR code contains the url of this same OVLcheckincheckout.php script along with the visit ID that is the key into the database record of the previous visit. This automatically creates a new visit record in the Online Visitor Log database, with the same information as the previous visit.

Check out.

When visitors leave Maker Nexus, they can check out by scanning the QR code on their visitor badge using their smartphone, or by presenting the QR code on their badge to a Tablet near the front desk. This Tablet is an Android device that runs a custom app that is continuously looking for QR codes and will check the visitor out when the code on their badge is presented to the tablet's camera. The app is written in MIT App Inventor 2 and the source code and Android install file are in this repository at:

https://github.com/makernexus/Online_Visitor_Log/tree/main/Software/Check_In-Out_App

Visitor Display Component.

A list of names of all visitors currently in Maker Nexus can be obtained by https GET to a url that runs the following script:

https://github.com/makernexus/Online_Visitor_Log/blob/main/Software/Database-Server_Software/www/v1/OVLcurrentvisitors.php

Any web browser running on any host computer can continuously query for visitor information and display it on the computer's monitor.

Maker Nexus already has several computer/monitor setups that are part of the RFID system for staff and member tracking and access control. These monitors (called "facility display" in the RFID system) display photos, names, and locations of members who are currently in the facility. Maker Nexus has elected to add the current visitor query to the relevant web page that is part of the RFID system so that the *facility displays* show everyone who is currently in the facility – both members and visitors. See the following repository for details:

https://github.com/makernexus/RFID_System

Badge Print Component.

If a new visitor checks in to Maker Nexus, a stick-on label visitor badge is automatically printed. A label printer is connected to a Raspberry Pi via usb. The Raspberry Pi acts as a print server. It periodically performs an https: GET on a url that returns up to 5 unprinted visitor badges.

The following PHP script queries the database for unprinted badges, marks the records as printed, and returns the badge information to the print server:

https://github.com/makernexus/Online_Visitor_Log/blob/main/Software/Database-Server_Software/www/v1/OVLvisitorbadges.php

The script returns 0 - 5 badges with each query.

The print server software residing on the Raspberry Pi print server is written in the Go programming language (Golang) and can be found in this repository at:

https://github.com/makernexus/Online_Visitor_Log/tree/main/Software/Print_Server_Software

The following script is provided to reprint a visitor badge in the event of a jam or other failure of the printer:

https://github.com/makernexus/Online_Visitor_Log/blob/main/Software/Database-Server_Software/www/v1/OVLreprintbadge.php

A link to this script is provided on the page produced by another script; one that displays all of the current visitors in the facility:

https://github.com/makernexus/Online_Visitor_Log/blob/main/Software/Database-Server_Software/www/v1/OVLcurrentvisitors.php

Report Generator Component.

This component consists of a Raspberry Pi computer running the report generating software. The program is written in the Go programming language (Golang) and can be found in this repository at:

https://github.com/makernexus/Online_Visitor_Log/blob/main/Software/Report_Creator_Software/visitor_report/visitor_report.go

This report creator software directly logs into the cloud database and retrieves all records from it. It creates a new *Google sheet* on a Maker Nexus Google Drive with limited access rights, and it writes the data from each record onto this spreadsheet. This program can be run manually, but is usually run from a crontab once per day, overnight. This ensures that there is an up to date spreadsheet available any time that an authorized Maker Nexus staffer wishes to obtain information about past visits.

The spreadsheet form of reporting was chosen because Maker Nexus staff personnel are familiar with manipulating data on spreadsheets. Hence, they do not need to engage the

developers to write new SQL and PHP scripts when they need to mine the Online Visitor Log for management or marketing support information.

Online Visitor Log System Workflow,

The following sections describe the individual workflows that implement the requirements for the Online Visitor Log system. These workflows describe how the components described in the previous chapter interact to meet these requirements.

Visitor Check-in; First time.

The first time (and possibly subsequent times) that a visitor comes into Maker Nexus, they must register their visit on an online web form. Visitors can access this form in one of two ways:

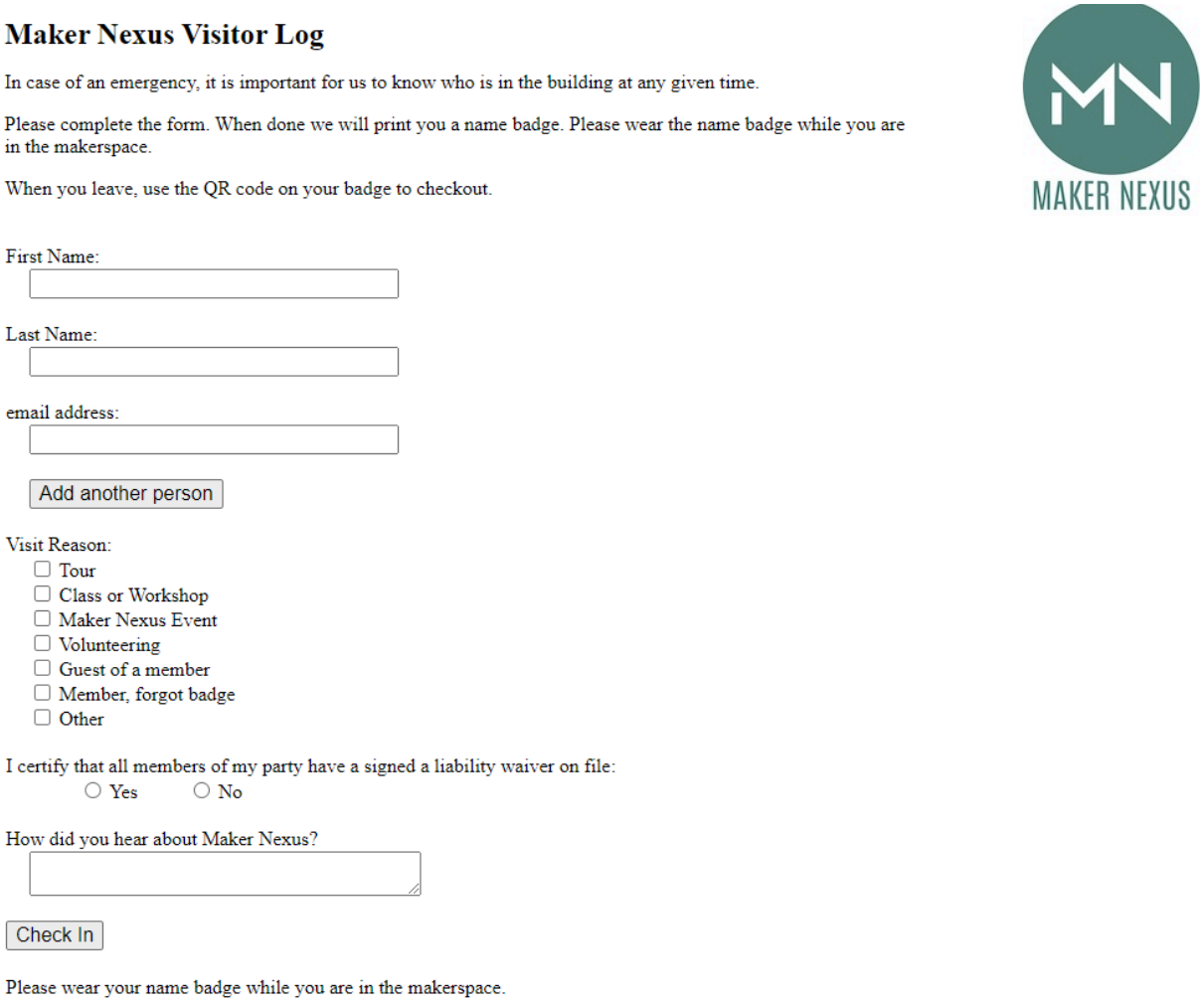
- The visitor can scan a QR code that is printed on signage by the front entrance using their personal cell phone. This QR code contains the url that returns the web form to the visitor.
- The visitor can use a PC that is provisioned by the front entrance alcove to fill out the web form on the browser that is installed on the PC.

The figure below depicts the web form, whichever way the visitor obtains it. The following fields are mandatory and the form will not be processed unless they are filled out:

- First Name
- Last Name
- Visit Reason (at least one box checked).
- Yes or No checked on the liability waiver certification

The following fields are optional and the user may leave them blank:

- email address
- How did you hear about Maker Nexus



Maker Nexus Visitor Log

In case of an emergency, it is important for us to know who is in the building at any given time.

Please complete the form. When done we will print you a name badge. Please wear the name badge while you are in the makerspace.

When you leave, use the QR code on your badge to checkout.

MAKER NEXUS

First Name:

Last Name:

email address:

Add another person

Visit Reason:

- Tour
- Class or Workshop
- Maker Nexus Event
- Volunteering
- Guest of a member
- Member, forgot badge
- Other

I certify that all members of my party have a signed a liability waiver on file:

Yes No

How did you hear about Maker Nexus?

Check In

Please wear your name badge while you are in the makerspace.

Accompanied visitors may sign in their whole party. The primary visitor clicks “Add another person” which adds a new set of first name and last name fields to the form. Note that each person checked in gets their own checkin record in the database. Each person’s name is unique; however, the rest of the visit related data on the form is applied to each record so created. Database entries for any additional persons do not contain an email address.

If the visitor checked “No” to the liability waiver question, they will automatically be redirected to the Online Liability Waiver page when they submit the form. The Online Liability Waiver system is a commercial, web based system that is completely independent of the Online Visitor Log system. It is the visitor's responsibility to make sure that all eligible members of their party have a signed liability waiver form.

Whenever the online visit form is filled out, a new badge is printed for each person named on the form.

Visitor Check-in; Repeat Visit.

A repeat visitor may check in one of two ways:

- By filling out the visit form, per the above description; or
- By scanning the QR code on their old badge (from their original visit). The QR code on their old badge can be scanned on their cell phone or using the Tablet with the checkin/checkout app.

The intent of re-entering using a visitors' previous QR code is to ease the bottleneck at the front entrance when non-members come in for some repeated event, such as a Meetup group meeting. Whenever the online visit form is filled out, a new badge is printed for each person named on the form. Visitors who check in using their old badge do not trigger printing of a new badge, but their new visit is logged in the database.

Visitor Check-out.

The usual way in which a visitor checks out is to scan the QR code on their visitor badge. The visitor can scan the QR code using their cell phone or using the Tablet with the QR app. Note that a scan of the badge QR code is always a "toggle" – if the visitor is currently checked in, the scan will check them out. If the visitor is currently checked out, the scan will check them back in (see Repeat Visit, above).

Visitors who cannot check out using their badge (because it is lost or mutilated) must present themselves to a staff member manning the front desk. The staff member can use the front desk PC to query OVLcurrentvisitors.php on their web browser and then click on the checkout link by the visitor's name to check them out.

Reprint a Badge

It is possible for the badge printer to jam or fail in some way. On the web page of currently checked in members, each person's name is a link to reset the badge print history so that the badge printing system will print another badge.

If a returning visitor has lost their badge they must fill in the OVL check in form again. There is no other way to reprint a badge for a returning visitor.

Determining Who is Visiting the Facility.

The url endpoint for OVLcurrentvisitors.php will cause the web server to return a list of visitors who are currently checked in and not checked out. A computer running a web browser can provide a continuously updated list of current visitors in the facility.

Maker Nexus does not use this capability because we desire a comprehensive list of all people (staff, members and visitors) who are currently in the facility. The RFID system (https://github.com/makernexus/RFID_System) already provides *facility display* capability that is

deployed in several locations within the facility. This *facility display* function has been integrated with the Online Visitor Log so that the legacy *facility display* shows both RFID checkins and Online Visitor Log checkins, with no new hardware required to be deployed.

Mining the Database.

One of the motivators behind the Online Visitor Log project is to provide support for Maker Nexus staff to understand the cost-benefits of various community outreach programs, such as open houses, community workshops, youth camps, Meetups, etc. Staff members desire the ability to produce their own reports mined from the database. The most acceptable way to do this is to produce an up to date *Google spreadsheet* that is a dump of the database – a spreadsheet row for each person-visit with all of the information captured about the event that drew them in and the time that they spent visiting. The Low code/No code capabilities of *Google sheets* allow non-technical staff personnel to produce their own reports as the need arises. Using a *Google sheet* within a protected *Google drive* folder provides sufficient security so that only designated staff personnel have access to the Online Visitor Log data.

The Report Generator at Maker Nexus refreshes the spreadsheet once per day, in an overnight database dump.