# MOHS TURNAROUND TIME TRACKING

**BME 300/200 Team:** Adeline Drier (Team Leader), Kevin Tan (Communicator), Madison Bugel (BSAC), Thomas Turinske (BWIG), Christopher Pudzisz (BPAG)
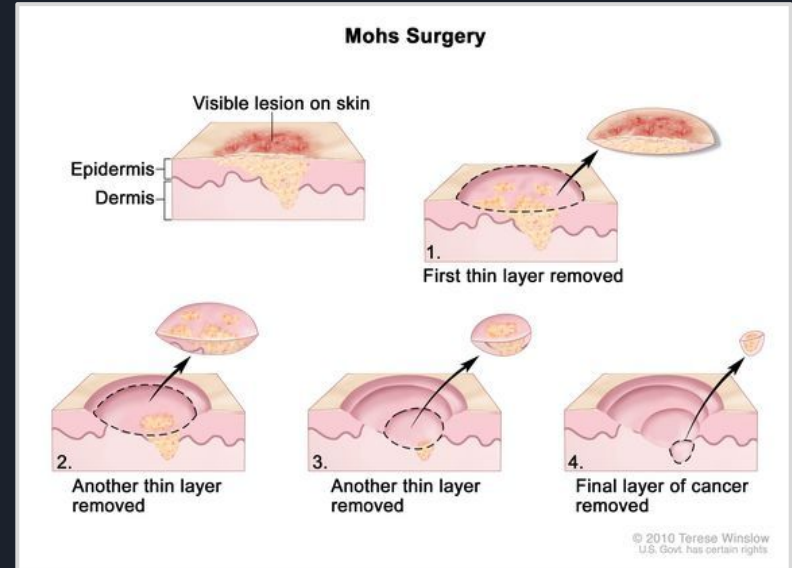**Client:** Mr. Ryan Dauman, UW Health Supervisor
**Advisor:** Dr. Melissa Kinney
**Date:** 10/02/2020

# Overview- Client Description

- Mohs surgery involves the removal of possible cancerous skin lesions
- These layers are analyzed by a laboratory in the UW Hospital
- To improve efficiency and accuracy, the laboratory has adopted a time tracking system to monitor this process.



**Mohs Surgery**

Visible lesion on skin

Epidermis
Dermis

1. First thin layer removed

2. Another thin layer removed

3. Another thin layer removed

4. Final layer of cancer removed

© 2010 Terese Winslow
U.S. Govt has certain rights

[Fig. 1] Basic Image of Mohs Micrographic Surgery Procedure

# Problem Statement

- Lab technicians are tasked with marking paper time cards at each step in the lab process.

- Physical time cards are inefficient and may lead to misplaced or incomplete data.

- A more automated system utilizing the existing barcodes on each tissue specimen is ideal.

- The timestamps that must be recorded at these various steps:

    - Arrival                    (Barcode)

    - Begin processing           (QR code)

    - Finish processing          (QR code)

    - Microscope analysis        (QR code)

# Background Material - Lab Diagram
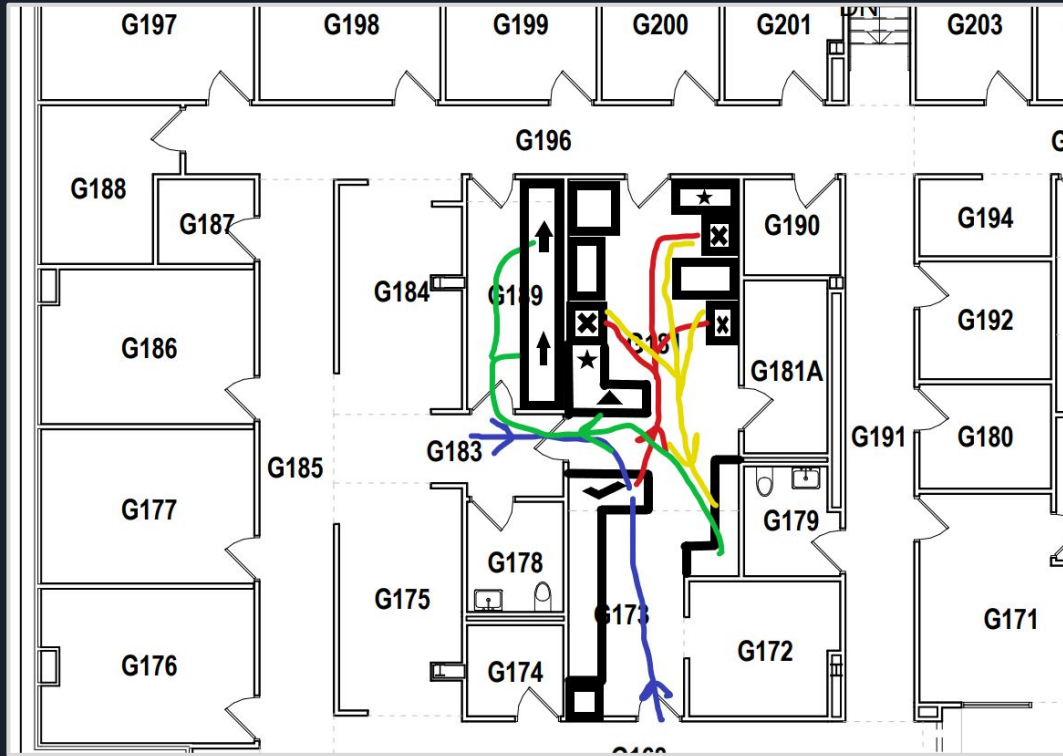


Areas of Focus:

☑ - Table for specimen drop off/pick up (Busy!)

★ - Lab computers

⊠ - Specimen prep

↑ - Microscopes

Colored lines represent the flow of specimen throughout the lab

[Figure 2]  Mohs Laboratory Diagram

# Competing Designs

Current design: Use of Physical time cards



[Fig. 3] Partially filled paper timecard



[Fig. 4] Time stamp device. Times are stamped at the red arrow

# PDS Summary

- Create a time tracking system that:
  - Be used Monday through Friday even on busy days
  - Costs less than $200 and use of old equipment
  - No breach of private patient information (HIPPA)
  - Shelf life of at least one week without charging batteries  or offloading data
  - Differentiate between at least 5 different test sites at one time
  - Cause minimal disruption to the workplace

# Preliminary Designs - Mixed

Use the existing laboratory barcode scanner to scan barcodes and obtain two smart devices to scan QR codes.



Timestamp 1
(✅ - Table)

Timestamps 2, 3
(✅ - Table)

Timestamp 4
(Microscope room)

[Fig. 5] Mixed Design Flow

# Preliminary Designs - Smart

Obtain two smart devices to scan barcodes and QR codes.



Timestamp 1, 2, 3
(✔️ - Table)

Timestamp 4
(Microscope room)

[Fig. 6] Smart Design Flow

# Preliminary Designs - Scanner

Obtain two handheld scanners to scan barcodes and QR codes.



Timestamp 1, 2, 3
(✔️ - Table)

Timestamp 4
(Microscope room)

[Fig. 7] Scanner Design Flow

# Design Criteria Definitions

Efficiency: Minimize time to use

Accuracy: Reduce error and dependably reports needed information such as timestamps

Ease of Use: Evaluates the simplicity of the system

System Integration: Ease to implement in their current setup

Maintenance Requirements: How often device needs repair

Safety: Minimized contact for disease transmission and maximized confidentiality

Cost: Price for implementation

# Design Matrix

| Criteria | Weighted Factor | Mixed | Smart | Scanner |
|---|---|---|---|---|
| Efficiency | 20.0 | 4.0 | 4.0 | 5.0 |
| Accuracy | 20.0 | 3.0 | 3.0 | 4.0 |
| Ease of use | 15.0 | 3.0 | 4.0 | 4.0 |
| System Integration | 15.0 | 3.0 | 4.0 | 4.0 |
| Maintenance Requirements | 12.0 | 4.0 | 5.0 | 2.0 |
| Safety | 10.0 | 4.0 | 3.0 | 5.0 |
| Cost | 8.0 | 4.0 | 5.0 | 2.0 |
| Total | 100.0 | 63.6 | 70.0 | 74.8 |

[Fig. 8] Design Matrix

# Future Work

- Based on the matrix we will begin working on the scanner design

Potential obstacles:

- Scanner doesn't communicate well with the computer
- Unable to test software in person
- Doesn't integrate well with laboratory flow
- Development time is too long to allow for testing

Backup plan: Go back and reevaluate other design choices

# References and Acknowledgements

Figure 1: https://www.cancer.gov/publications/dictionaries/cancer-terms/def/mohs-micrographic-surgery

Figures 2-4: Provided by client

Figure 5:
https://i5.walmartimages.com/asr/4b7c74e3-003b-4607-babb-49f845b33d4a_1.221dffcff7e3e293424855989d395a92.jpeg

Figure 6:
https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcRQxM6PzdO_6pi2pd3dKFoian43n9G0cmwTim2z5jKxki7TOkfJBDYaSTubs8UFtXUMwiezv36bsvO8icidZ8nI_rSsEqjxTE_zyw&usqp=CAU&ec=45707744

Figure 5,6:
https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcQb8yzY20eiixWVlhfxjYTPAWl9C5irT1SjWijVXQjXjE1_ic572o_3DuisqurOVkZ1QIz1uNOsvlyKmQQEA2A6nvgVa0FishoIAA&usqp=CAU&ec=45707744

Figure 7:
https://i5.walmartimages.com/asr/c5e6ef54-63e0-42fd-bb58-7ce594275b8a_1.2e0032825a3a7224e1be3e9a4e862477.jpeg