Needs Identification and Problem Statement

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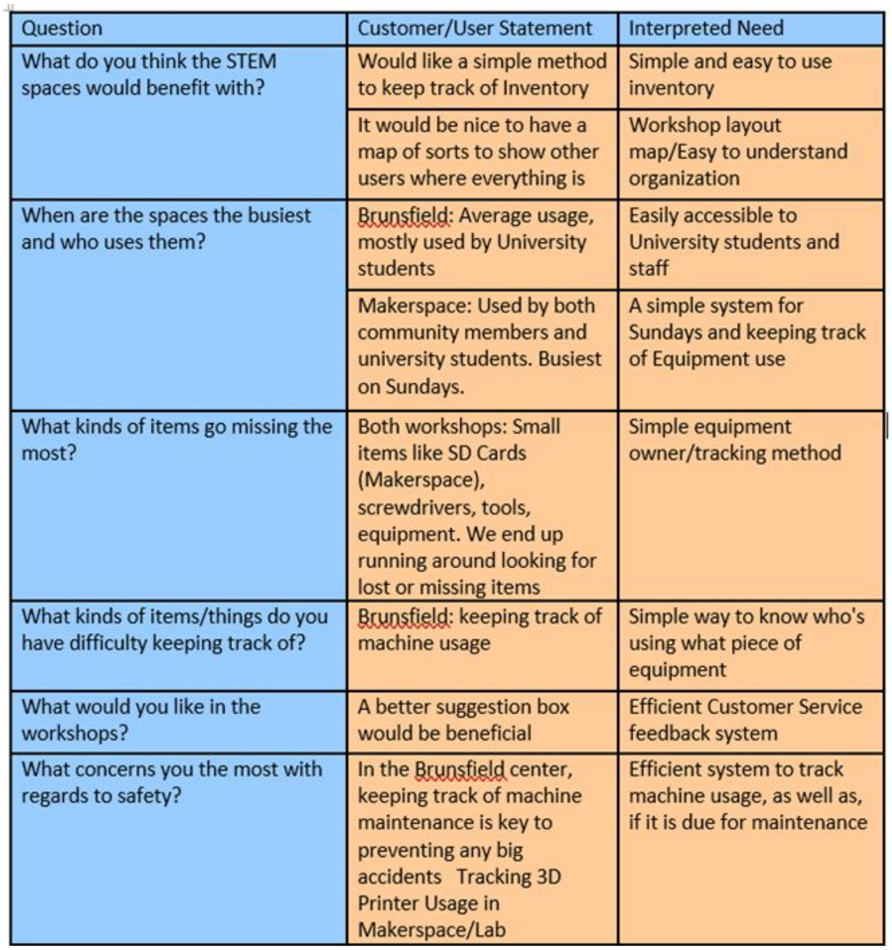
Introduction:

The CEED management and Ross Dashboard approached the GNG1103 class requesting a device or system that will automate the STEM workspaces. After an extensive interview with the CEED management, Team 7 has created a list of needs within the STEM workspaces. Table 1 below illustrates the needs of the STEM workshops as interpreted by members of the team.

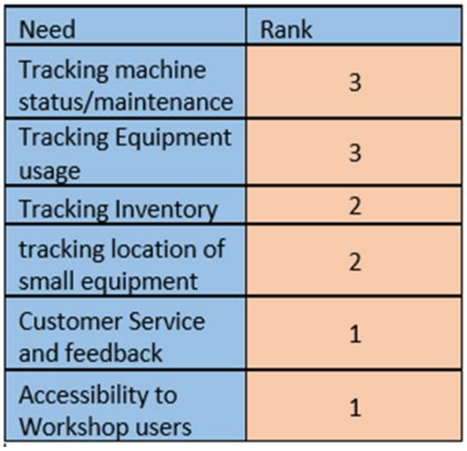


Question	Customer/User Statement	Interpreted Need
What do you think the STEM spaces would benefit with?	Would like a simple method to keep track of Inventory	Simple and easy to use inventory
	It would be nice to have a map of sorts to show other users where everything is	Workshop layout map/Easy to understand organization
When are the spaces the busiest and who uses them?	Brunsfield: Average usage, mostly used by University students	Easily accessible to University students and staff
	Makerspace: Used by both community members and university students. Busiest on Sundays.	A simple system for Sundays and keeping track of Equipment use
What kinds of items go missing the most?	Both workshops: Small items like SD Cards (Makerspace), screwdrivers, tools, equipment. We end up running around looking for lost or missing items	Simple equipment owner/tracking method
What kinds of items/things do you have difficulty keeping track of?	Brunsfield: keeping track of machine usage	Simple way to know who's using what piece of equipment
What would you like in the workshops?	A better suggestion box would be beneficial	Efficient Customer Service feedback system
What concerns you the most with regards to safety?	In the Brunsfield center, keeping track of machine maintenance is key to preventing any big accidents Tracking 3D Printer Usage in Makerspace/Lab	Efficient system to track machine usage, as well as, if it is due for maintenance

Table 1: Needs Identification

Needs Identification and Prioritization:

Table 2 provides the needs organized by importance. The higher the number assigned, the more important the need. It was determined that tracking the machine usage and maintenance of all machinery was of utmost importance for maintaining a safe environment within the STEM (specifically Brunsfield) workshops. The CEED management is currently unaware of precisely which machines are being used and for how long; that makes it difficult for them to schedule maintenance for various machines. Through maintaining the machines and their performance, CEED will be able to prevent most major injuries. Keeping an inventory of the equipment and materials within the space was found difficult to manage, and small tools regularly go missing from the space. The staff have difficulty locating lost equipment and ensuring that it is returned. Unfortunately, this comes at a great financial cost to the management, thus spending their budget efficiently is far more difficult. Ensuring that suggestions made by users of the space reach management is difficult since the current method involves the employees remembering the suggestion and personally telling the management. The Makerspace management would like a simple method to collect and process customer feedback, however, it is not a necessity at this time. During the rush hour periods, the various workshops would like to provide its customers with a pleasant and efficient experience.



Need	Rank
Tracking machine status/maintenance	3
Tracking Equipment usage	3
Tracking Inventory	2
tracking location of small equipment	2
Customer Service and feedback	1
Accessibility to Workshop users	1

Table 2: Needs Prioritization

Benchmarking:

In order to get a better grasp of the issue, Team 7 benchmarked various solutions and products. Table 3 benchmarks various companies and focuses on the general design criteria that these companies paid attention to.

Need	Company	Product	Design Criteria
Machine Monitoring	Monnit	Wireless sensors	- Real-Time feedback - Moveable Sensors - Custom Alerts - Large Wireless Range - Affordable (starts at 49$) - Can monitor: Run Time, Voltage Fluctuations, Motor or mechanical Failure,etc.
Network Monitoring	PRTG	Monitoring Software	-Emergency Alerts -Easy Interface -Affordable -Automatic discovery of network
Tracking inventory	Wasp Barcode tech.	Inventory software & scanner	-Accurate inventory management -Define storage locations -Set minimum & maximum stock -Easily order stock when supply is low
Machine Monitoring	Casco Development	Overall Equipment Effectiveness (OEE) Software	-Runs automatically -Electronic interface -Collects data as a byproduct -Tracks availability, activity, performance -Calculates OEE
Machine Monitoring and Performance	Free Point Technologies Inc.	Machine Monitoring and System OEE. Non-invasive connecting sensor	- Universal Integration - Secure Data Storage and Transfer - Live Data - Historical Data Analysis - Human-Machine Interaction - Targeted Product Improvements - Equipment Effectiveness

Table 3: Benchmark Data

As described in Table 3, there are multiple companies that manufacture machine monitoring systems. Companies such as Monnit valued live feedback, cost, data collection and a well designed user interface. It has also been found when designing inventory tracking systems criteria, the criteria focused on are efficiency, accuracy, increasing profitability, and creating peace of mind. While network monitoring systems valued characteristics like a simple but well designed and effective system. It was found that the company focused on delivering great service by still being affordable.The software provides features that allow you to monitor servers, datasets and local networks.The aspect of the software that gives you detailed account of every application that runs on a network is exciting and seems to be of great use. Based on the research found, Team 7 has come to the conclusion that, CEED would benefit from a cost effective, efficient, automated system which accurately monitors machine data and usage while having a simple user interface is important, if not necessary.

Problem Statement:

CEED management needs an accessible, and cost effective visual interface. The system should easily inform users and staff at each workshop about the machine usage, availability, and provide technical data to aid in scheduling maintenance.

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