Building Strategic Partnerships with Non-Maker Entities to Foster a Maker Culture

ISAM 2017 Paper No.: XX

Michael R. Buchman[1] and Daniel S. Dorsch[2]
[1]Michael R. Buchman; Department of Mechanical Engineering MIT; e-mail: mbuchman@mit.edu
[2]Daniel S. Dorsch; Department of Mechanical Engineering MIT; e-mail: dorsch@mit.edu

ABSTRACT

In order to expand maker culture it is important to consider methods to involve the entire community and increase access to equipment. To achieve these goals, partnering with groups not traditionally involved with making can result in a mutually beneficial arrangement advantageous to the larger community. In this paper, the benefits of involving non maker groups in making is discussed, and an example of a successful collaboration between the MIT Library system and MIT MakerWorkshop is presented.

In February 2017, "Equipment to Go" was launched. This program allows students at MIT to check out tools and equipment from MIT Libraries. This program is a partnership between the MIT Libraries & MIT MakerWorkshop, a student run makerspace. The goal of this program is to allow MIT faculty, staff, and students to make things at their own convenience. Sometimes it is logistically simpler to take the tool to the project, a strategy not currently well supported by the MIT maker infrastructure. Our partnership leverages the current MIT Library system and skilled MakerWorkshop mentors to provide a convenient means for tool checkout.

Between February and May of 2017 this program underwent a soft roll out. The pilot consisted of 25 unique kits (53 total). During the first ten weeks of the pilot the program the kits were checked out 196 times. In January of 2018 the program will undergo an assessment evaluating usage, increasing the number and variety of kits, and expanding to new libraries at MIT.

INTRODUCTION

The goal of this paper is to provide a case study on how to identify organizations to partner with that are not traditionally involved in making and detail how to work with them in a mutually beneficial way.

Leveraging existing strengths on campus is critical to the success of any organization [1, 2]. The MIT MakerWorkshop, a student run makerspace at MIT, is skilled at training, mentoring, and providing on site maker resources. We regularly partner with other organizations on campus to create safety standards, provide resources, fundraise, and advertise. In all of these cases we partnered with internal organizations that are prepared and excited to work with us. The MIT Environmental Health and Safety (EHS) department was a critical partner during development of our safety standards. The MIT Mechanical Engineering Department and the Martin Trust Center partnered with us from the beginning, supporting us financially, and supporting the initiative to MIT administration. These organizations were excited to help us and had interests that lined up with ours.

When we sought to expand our services to better serve the needs of the MIT community we realized operating from a single room on campus was a limiting mindset. Enabling students to work on projects anywhere empowers them to be more efficient, and more likely to work on new types of projects. Upon further thought, we realized that MakerWorkshop is not equipped to do inventory tracking, holding users accountable for missing parts or kits, and our hours do not match when students might need to check out tools. We contacted the MIT Libraries realizing they are well equipped in all of these areas [3, 4].

Before beginning our partnership, four main things needed to be discussed and resolved. The first was setting financial & ownership expectations. If these expectations are not set partners can have a difficult time setting budgets or agreeing to purchases. The second was defining rolls and responsibilities. This is key to making all of the stakeholders comfortable in the implementation of the program. The third was setting metrics for success. This is important so that at the end of the pilot program all partners can agree if the program was successful, and have metrics to determine success, which can aid in building further support. The fourth was setting a vision on how the program would function long term. This vision is key to having all the involved groups working towards a common goal.

IMPLEMENTATION

When implementing a new program with a partner it is important to consider every detail. This was especially important for Equipment to Go, where we were not comfortable with tracking inventory, and the library was not comfortable with maker kits. In order to ensure the success of the program all of these details were worked out in a comprehensive implementation plan, ensuring understanding and agreement between both parties.

For the initial implementation, MakerWorkshop constructed a series of kits including handheld and power tools, photography gear, electronics, and sensors. An initial pilot study consisted of 53 kits of varied types located in Rotch Library. The initial implementation was broken down and detailed in nine parts. This was to make sure that all of the details were resolved leading to smooth implementation. All of these parts were discussed and agreed on by both the library and MakerWorkshop.

1. Implementation Overview: Kits are available for 1 week

and can be checkout by any MIT affiliate. The kits are cataloged and checked out the same way that library books are checked out. MakerWorkshop mentors procured, organized, and labeled the kits for easy use. The kits were transferred to the library staff for cataloging. Library staff were trained on how to use the equipment and check that it is in working order. MakerWorkshop staff maintain the kits through weekly inspections of the kits.

2. MakerWorkshop Responsibilities: MakerWorkshop was responsible for procuring the tools and assembling the kits. The kits consist of hard cases which contain a laminated contents list and training guides. Each case is labeled with the MIT Libraries logo, the MIT MakerWorkshop logo, and a label describing what it contains.

MakerWorkshop staff maintain the kits, checking in on the kits on a weekly basis to make sure the tools are in functioning order, replacing broken kits, and responding to any needs the librarians may have. MakerWorkshop staff work with the library to determine which tool kits are in the highest demand and order additional kits accordingly.

3. Library responsibilities: MIT Libraries are an optimal partner for this initiative due to their inventory tracking system, operating hours, and accessibility. The library is responsible for cataloging the kits (to be checked out as if they were books), allocating shelf space for them, and having staff undergo training on how to use the kits. The library staff ensures kits are returned complete and in working condition.

4. Storage, Checkout, and Return: All kits will be housed in hard shell cases stored on a single shelving unit (approximately 40 linear feet). Each spot on the shelves, and sides of each case are clearly labeled for easy locating. A laminated menu detailing kits and their contents is available on the library desk, and each case includes an inventory sheet. Upon student checkout, the librarian retrieves the kit and confirms with the student that it is complete. The librarian may also give advice on how to use the tool. The kits can be checked out for a week at a time (with online renewal available if no one has the kit waitlisted). When the user returns the kit the librarian checks that it is complete and functional.

5. Budgeting & Fundraising: $6,000 was provided by the Graduate Student Council to start the program. $6,000 was allocated to tool purchasing and the materials needed to package the kits. An additional $1,000 of MakerWorkshop funds was set aside for overhead, unexpected expenses, replacing broken kits, and creating new kits for in demand tools. Upon program evaluation, additional fundraising efforts will take place.

6. Wear, Tear, and Charging: Tools wear out over time. This is expected, and users do not get charged for normal wear and tear. On an annual basis, MakerWorkshop staff will evaluate every kit and will replace worn and damaged tools. MakerWorkshop staff also perform weekly evaluations of kits that are in stock. The librarians can remove worn or damaged kits from circulation. MakerWorkshop staff take care of replacing those kits. The library charges users for incomplete, or obviously broken, or unreturned kits. Users who fail to return the kits on time are charged a late fee.

7. Metrics for Success: At six months, the tool checkout rates will be evaluated and additional high demand tools will be ordered. After a one year initial study the tool checkout program will be evaluated. It will be deemed a success if the checkout rate of the tools matches or exceeds the checkout rate for the average book (less than three times per year). If the program is deemed a success it will be expanded to include more tools and to more locations. If the program does not meet the performance metrics set, the library can choose whether or not to proceed with the program. User feedback will also be collected in order to constantly improve and adapt the program.

8. Safety: All of the tools and instruments selected are considered class 1 by EHS (the safest class). Clear instructions on proper use are provided in every kit along with the appropriate personal protective equipment (safety glasses, gloves, earplugs, etc.).

9. Kit Design: The kits are designed to be as user friendly as possible. They each come in cases with instructions, list of contents, and instructions on how to contact MakerWorkshop with any issues. The equipment selected was chosen for ease of use.

Fig.1 Interior of NI DAQ kit

Fig.2 Arrangement of kits in the library

DATA

Periodic review of the checkout data is key to demonstrating program success. This data is then compared to the metrics set during implementation [5]. For this program we analyzed the checkout data after 10 weeks of operation. We found that the kits were used 196 times. This beat our goal of at least three checkouts per kit per year, achieving this benchmark in only 10 weeks. This data also allowed us to determine which kits to add based on demand. With limited resources it is important to focus future effort in the highest value areas.

The first piece of data examined was the total number of checkouts per tool type (as some tools are duplicated and are available in 2 or 3 identical kits). The results of this examination is presented in Figure 3. It was found that the most popular kits were checked out upwards of twenty times during this 10 week period. We also found that some of the instrumentation was significantly less popular and rarely checked out. Note that due to library confidentiality policies we had limited data (a lack of specific checkout/check-in dates and specific info on who checked out what or if someone checked out an item more than once).

In order to figure out where future resources could best be spent we looked at number of checkouts per kit (Figure 4). This tells us which kits are likely unavailable at any given time. A number of kits were checked out more than six times; there is a good chance they were unavailable to the users who needed them. In order to address this we will add more of those kits.

The most popular kit is not a tool, it is a DSLR camera. As a result our next round of expansion will focus on audio/video equipment such as projectors cameras and microphones.

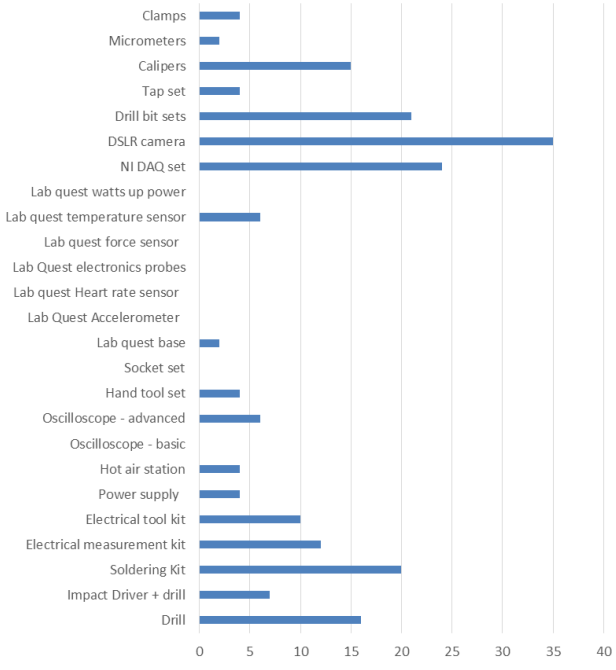

Fig.3 Total kit checkouts by piece of equipment.

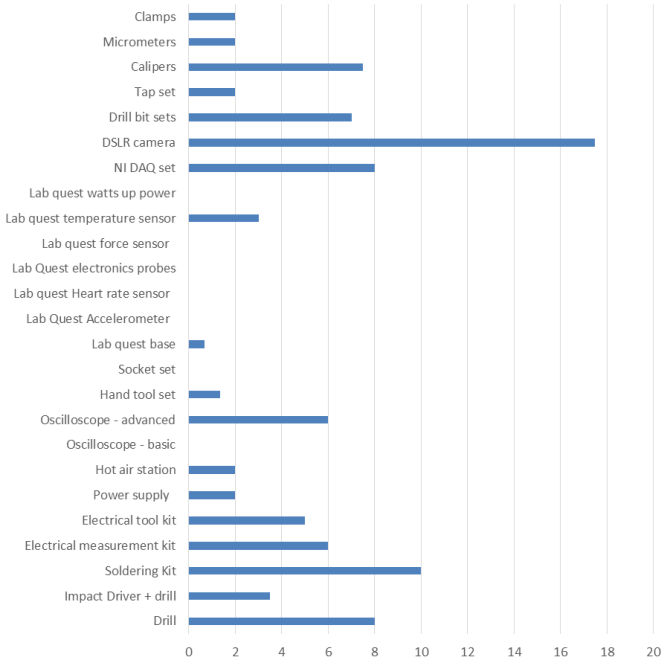

Fig. 4 Checkouts per available kit (some kits are available in quantities of 2 or 3).

Table 1 displays checkout data divided based on user group. We found that the program was primarily used by undergraduate students. This is to be expected since graduate students, faculty, and staff often have access to this equipment through their labs. Also note that this program is was rolled out quietly with limited advertising so this data might be skewed by the fact that students are more likely to use the library system and learn about the program.

Table 1 Status of Borrower

Student - Undergraduate	116
Student - Graduate	52
Staff - Administrative/Medical	12
Staff - Support/Service	14
Staff - Academic/Research	2

The final data set depicts borrower department (Table 2). Users of this program came from a large variety of departments. However most of the checkouts came from the mechanical engineering department and the MIT Library staff. This was expected since this program was not highly advertised and MakerWorkshop is a mechanical engineering space. However, this program was utilized by 15 different departments and groups, showing that it can be a valuable resource to a variety of students, faculty, and staff.

Table 2 Borrower Department

Aeronautics and Astronautics	4
Center for Transportation & Logistics	2
Earth, Atmospheric & Planetary Sciences	2

Electrical Engineering-Computer Science	18
Freshmen	6
Libraries	26
Management Program	16
Materials Science and Engineering	6
Mathematics	2
Mechanical Engineering	91
Nuclear Science and Engineering	9
Physics	2
Undefined Department	10
Urban Studies & Planning	2

CONCLUSION

Creating strategic partnerships with entities not traditionally involved in making can significantly improve making culture in a community. In order to make these partnerships a success, it is important to set rolls, responsibilities, and metrics for success. These partnerships can have a large impact on the maker community, creating new avenues for individuals to get involved.

An example of a strategic partnership is the Equipment to Go program. A detailed implementation plan was created that clearly outlined all parties' responsibilities and metrics for success. In a ten-week pilot program we were able to achieve utilization equivalent five times our desired checkout rate. The data collected also allows us to strategically expand this program based on user demand.

ACKNOWLEDGEMENTS

We would like to thank the MIT Libraries for all of their support, willingness to try something new, and being open to this program. We would also like to thank the MIT graduate student council for providing the funds to successfully implement this program.

REFERENCES

[1] P.Z. Ali, "The Power of Investing in Building Relationships, Collaboration and Ownership," in Proceedings of the First International Symposium on Academic Makerspaces, 2016, 202-214.

[2] P.Z. Ali, M Cooke, M.L. Culpepper, C.R. Forest, B. Hartmann, M. Kohn, V. Wilczynski, "The Value of Campus Collaboration for Higher Education Makerspaces," in Proceedings of the First International Symposium on Academic Makerspaces, 2016, 124-127.

[3] John H. Burke, Makerspaces: A Practical Guide for Librarians, Rowman & Littlefield Publishers, Lanham: 2014, 1-56.

[4] A. S. Rogers, "The Librarian's Role in Academic Makerspaces," in Proceedings of the First International Symposium on Academic Makerspaces, 2016, 124-127.

[5] M. N. Cooke, I.C. Charnas, "The Value of Data, Metrics, and Impact for Higher Education Makerspaces," in Proceedings of the First International Symposium on Academic Makerspaces, 2016, 180-183.