

## UT Arlington FabLab Project | A description of FabLab user analysis

### Introduction

In October 2014, UT Arlington Libraries became the first in the Dallas-Fort Worth metropolitan area to have a fully functional Fabrication Lab, FabLab for short. The lab is intended to provide access to technologies, opportunities for interdisciplinary collaboration, training, industry mentorship, and spaces for inspiration to engender invention and entrepreneurship in the student and larger DFW community. After its inauguration in the fall of 2014, the lab exposed library patrons and student users to tools that ignite Creativity, support eXploration, and generate Innovation (CXI)—the key elements of UT Arlington Libraries strategic plan. The lab gained popularity among technically-minded patrons and within the student community mainly from STEM majors. But on-ground experiences in the FabLab foretold of a broader audience base than had been anticipated.

This white paper provides a detailed overview of the user analysis conducted at the end of spring semester in 2015, as a run-up to the anticipated summer expansion of the FabLab beyond its initial layout and equipment. In the following pages, based on principles drawn from user or consumer studies in literature, we outline the data assessment approach to collect information on ethnography, equipment use, and user preferences. We present the survey design principles and discuss other data gathering tools utilized over the course of two weeks to produce meaningful insights valuable for making decisions on additional services and equipment offered at the FabLab.

### Literature Review

The study of users and the choices they make in reference to using goods and services offered to them is part of well documented scholarship in consumer studies. Everett Rogers 'diffusion of innovation' theory proposed in 1995 provided a great deal of insight into the factors responsible for user engagement and encouragement of use. The diffusion theory lays the groundwork for explaining the pattern of uptake of innovation, which can be either goods or services, by the target audience. The stages of adoption - knowledge, persuasion, decision, implementation, and confirmation - develop at different rates for different users. The rate users go through the initial three stages can be classified into user groups, described as follows:

- **Innovators:** the first among the user community to adopt. In context of the FabLab, these are anticipated to be the users from STEM majors and loyal patrons with previous technical experience.
- **Early Adopters:** the group that reacts based on social value of the offering as awareness of its products and services rises. In our case, these are users who may not be necessarily from the STEM majors but are curious patrons who wish to take advantage of the services and equipment in the FabLab.
- **Early Majority:** the group of users that takes slightly longer to become adopters. They are more cautious than innovators and belong to a group of majors that may not be directly influenced by the FabLab marketing strategies.

- **Laggards**: the group that typically falls outside the purview of efforts by marketers because of the time and tools required to elicit their interest. This smaller group is usually found to adopt eventually.

Using this theoretical basis, the FabLab survey and focus group assessment was implicitly designed to investigate: ethnography of users, i.e., what majors and colleges use the FabLab the most; frequency of use, i.e., how often do users return and how many; equipment in use, i.e., what equipment and services find the most use or popularity among users. Although the theory has undergone significant changes, with further user categories being added after “Laggards”, the premise of adoption remains the same. The main aspect of publicity and improvement of services to encourage adoption is the focus on the so-called ‘chasm’ that exists between innovators and the early majority. This captures most of the user community, and, by extension, promotes word-of-mouth publicity. The goals and design of data collection are provided in the following sections.

### Data Assessment Goals

The popularity of the FabLab was immediate among STEM users. Equipment like 3D printers, 3D scanners, the vinyl cutter, the electronics bay, the laser cutter and the sewing machine offered a range of tools for creative work. Therefore, the goals of the assessment were to understand the ways in which the equipment and services were beneficial to users. The survey and focus groups were targeted to answer the following questions:

- Within the student community, what majors and/or colleges use the FabLab the most?
- What are the dynamics of FabLab use by patrons, including frequency of use and purposes that drive up their visitation?
- How has the user community reacted to the FabLab marketing, via newsletters, word-of-mouth and staff/faculty encouragement?
- What equipment is most used or most popular among the user community?
- What do the users desire or wish to see in the FabLab?

Before beginning this assessment process, we needed to first validate questions in order to generate meaningful responses. A preliminary survey was distributed via Qualtrics on an iPad to finalize survey questions. Once finalized, the survey was administered via Qualtrics on iPads within and outside of the FabLab. The data assessment would not be effective without the ability to communicate the outcomes; through visualization software like Tableau, this assessment project was rendered accessible to a wider audience.

### Outcomes and Insights

The questions asked in the previous section guide the structure of this section, allowing valuable exploratory information to be relayed for drawing insights and inspiration in the planned extension work taking place in summer.

1. Within the student community, what majors and/or colleges use the FabLab the most?

**Outcome:** As hypothesized, STEM colleges formed the majority users and hence the innovators in reference to their adoption of FabLab as a service. Among the users visiting the

FabLab the most, College of Engineering students made about 34.48% of the total visits. Trailing behind and falling closely in proximity of visits from each other are students from College of Liberal Arts and College of Architecture with 18.97% and 17.24% respectively.

Furthermore, in comparing the use per STEM majors, it was found that undergraduate students from Architecture and Mechanical Engineering visited more than graduate students in these fields, while the reverse was true in the case of Computer Science majors.

**Insight:** While the prediction that the FabLab would be most utilized by technical majors like Engineering was accurately verified, the higher use by Liberal Arts student body than Architecture students was positively surprising. The insights that can be drawn from this outcome apply towards maintaining the patronage of Liberal Arts majors as the FabLab expands, especially for services they use. Also, through a cross-cutting measurement across graduate and undergraduate use, the study indicated the areas where staff liaisons could support building further faculty relationships.

2. What are the dynamics of FabLab use by patrons, including frequency of use and purposes that drive up their visitation?

**Outcome:** Under this question, a number of sub-questions were asked. These included:

- ✓ *Sources of awareness* - answers indicated the higher impact of peer influence, followed by supervisor encouragement. Other options were social media, campus marketing, and in-library marketing.
- ✓ *Visitation frequency by marketing influence*- which showed higher first time visitors and visitors who had been in the FabLab three or more times. The fall in visitation after the first, for second visit, was indicative of the early majority group among the patron community.
- ✓ *Visitation frequency by visit purpose*- those visiting for the first time were curious, while those visiting more regularly were either loyal patrons from STEM fields or were visiting to complete a class project.

**Insight:** The fall in visitation after the user's first visit indicated a need to further engage their curiosity. Although, class projects and extra-curricular activities were reason enough for students to revisit the FabLab; avenues for encouraging their visits are worth investigating based on the dynamics portrayed by the data.

3. How has the user community reacted to the FabLab marketing: via newsletters, word-of-mouth, and staff/faculty encouragement?

**Outcome:** Not only were undergraduate students from almost all majors found to be more curious than graduate students, they made frequent visits based on this curiosity. Comparing the two, an undergraduate student from a non-STEM field was more likely to visit the FabLab than a STEM graduate student, barring of course Computer Science majors.

**Insight:** Not only does there appear to be a gap between innovators and early majority, indicating the existence of ‘chasm’ between these groups, but the disparity of use across undergraduate and graduate students is an aspect worth investigating further.

4. What equipment is most used / most popular among the user community?

**Outcome:** In terms of student status, FabLab equipment was used mostly by undergraduates as explained earlier. 3D scanners, followed by the laser cutter, were extensively used by College of Engineering majors in comparison to other colleges. Laser cutter found popularity across Engineering, Architecture, and Liberal Arts.

**Insight:** The main insight that can be drawn from the outcome is the need for an additional, preferably larger laser cutter.

5. What do the users desire or wish to see in the FabLab?

**Outcome:** Through a focus group of FabLab users, questions were created to know the preferences students had and what they wanted for the FabLab to offer; several responses were obtained. Three focus group meetings were conducted with at least three participants in each, and questions ranging from equipment and space needs, services preferred and timings required were posed for the an informal discussion to occur.

**Insight:** The students found the existence of the FabLab to be an additional advantage to the labs and studio workshops available within their own departments. Suggestions for more space included cubicles or enclosures for public interaction and private work. Additional and larger - laser cutters, 3D printers, and soldering equipment topped the list of desired equipment; students also wanted the ability to purchase low-cost pieces like integrated circuits and filament. Furthermore, the students wanted to see the FabLab extend its operating hours, including 24 hour schedules at the end of the semester to prepare for final projects f. Financial and inspirational support for project ideas was reported as a potential method to generate interest.

## Recommendations

The data assessment of FabLab services, equipment and space led to the following set of recommendations for consideration as its expansion takes place over summer semester:

1. Ethnographically, the range of disciplines and colleges that use the FabLab has been wider than what was initially anticipated. This indicates a potential to expand the user base across different departments. Liaisons can play a crucial role by extending this invitation to faculty in their respective departments and by encouraging coursework that integrates the use of FabLab in curriculum creatively.
2. Because pre-defined course work has proved to be a motivator for frequent visits, it's likely that the lack of an idea is where many lose interest. The FabLab can provide avenues of idea-capitalization among curious visitors by offering an outlet for spontaneous and, meaningful projects, interactive spaces for discussion, possibly a book or wall of projects undertaken,

and ideas for students to tackle, each of which builds upon the other in providing an increasing range of challenges and subsequent skills to the user.

3. Finally, a membership structure for non-campus members of the community and local businesses can provide a revenue model as well as increased public interest and interaction between industry professionals and students in practice. This is justified as a feasible and potentially fruitful option to increase awareness as word-of-mouth is the most prominent factor in reported FabLab visit frequency.