# Group 15, Deliverable B - Needs Identification and Problem Statement

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**Introduction:**

After meeting with the client, it is important to identify the needs that they are looking to address. The needs of the customers must be correctly identified early on, to ensure that the design process is followed correctly and that the final design helps the customer with their problems. In this case, the customer is looking for a way to track the usage of bat boxes to determine their effectiveness specific to Canada's climate where there currently exists a lack of data.

**Identifying Users:**

There are three users of that will be each interacting with different aspects of the product.

- The Big Brown and Little Brown Bats are the residents of the bat house.
- The maintenance workers will be installing and maintaining the bat house as well as recharging and repairing the sensor.
- The analysts are solely using the sensor as they will be accessing and interpreting the data.

**Identifying Customers:**

Tiree and organizations or governments are the customers as they are purchasing this product to fulfill their goals.

**Organized Interpreted Needs and Ranking by Relative Importance:**

| Group | Interpreted Needs | Importance [See Definitions Table below] |
|---|---|---|
| Bats | Box is a suitable temperature, dry, dark, and safe roost site under the conditions of southern Ontario between April and October. | 4 |
| | Device cannot interfere with bat roosting or structural stability of bat house. | 4 |
| | Box has an open space below with grippy panel for bat access. | 5 |
| Analysts | Device can estimate bat house usage accurately and robustly. | 5 |
| | Device can also check other data (time, temperature, etc.) | 2 |
| | Data collected is organized in a way that can easily be analyzed. | 2 |
| | Clear identification of what is being tracked. | 4 |
| Maintenance | Requires minimal maintenance at most once per month. | 3 |
| | Is easily installable and has its data accessible by non-engineers (users). | 3 |

| | | |
|---|---|---|
| | Device can be installable onto existing bat boxes of varying sizes. | 3 |
| | Has a way to inspect whether bats are present in box. | 2 |
| Customer | Is affordable to scale. | 3 |
| | Can survive the conditions of being near bats and being in southern Ontario between April and October without needing to be replaced or repaired. | 3 |
| | Box is scalable for larger and smaller designs. | 1 |
| | Box and device have a long lifespan (10+ years). | 2 |

**Defining Importance Numbers:**

| Importance | Definition |
|---|---|
| 5 | Critical |
| 4 | Highly necessary |
| 3 | Nice, but not necessary |
| 2 | Nice, but even more unnecessary |
| 1 | Not important |

### Unknown Information (requires clarification from the client):

- How have other similar projects succeeded and failed? How are the studies in the USA done versus the studies in Canada?
- Who is specifically our client? Is it Frederick Conn asking on behalf of Tiree?

### User Benchmarking:

These positive and negative attributes are based on a variety of user perceptions on existing similar products.

The following products were looked at:

Japanese Cedar Bat House
Kingsyard Recycled Plastic Bat Houses for Outdoors
Outer Trails Bat House
TRAFx Trail Counters

Positive Attributes:

- Easy to mount/simple to install bat box
- Holds many bats
- Is sturdy, is of good quality, and is of suitable longevity
- Includes all hardware for mounting (For example, screws and brackets)
- Aesthetically pleasing
- Counter sensors are inexpensive to charge, and the batteries can last for a decade
- These sensor packages can survive in extremely harsh weather conditions

Negative Attributes:

- Bat boxes experience wood and seams splitting
- Grooves in bat climbing chamber leave pinholes on side of bat box that lets light in
- Bat boxes need to be reinforced to not collapse during heavy weather
- Paint chips off
- Lack of seam sealant for waterproofing
- Lacks certain wood treatment that some users desire for preventing mold and providing water repellence while remaining chemically safe for the wildlife
- Metal roofing is sharp and could rust since it is not galvanized
- Lack of instructions for installation and placement
- Too wide of an opening
- Lacking ventilation for the case of bat boxes in warmer climates. In those cases, there is a risk of overheating. (Likely not applicable to Southern Ontario)
- Similar sensor packages are very expensive, over ~$3000 CAD

### Problem statement:

A need exists for researchers to analyze the effectiveness of bat boxes using a device that can collect data on total visits and is easily mountable, all while maintaining the safe and accessible roosting site a bat box provides. Additionally, both the device and the box need to be low maintenance and cost-effective for research.

### Conclusion:

As previously mentioned, it is important to clearly identify the needs of the client that the product must address so that a proper and suitable solution can be provided. In this specific case, fulfilling these needs will provide the client with a means to track the effectiveness of bat boxes currently in place, thus satisfying their short-term goals. Furthermore, it will allow for improvements to be made to these shelters in the long run and can lead to large-scale production. Overall, this solution will address the lack of data around the effectiveness of bat boxes in compensating for their habitat loss in Canada, thus it is critical that the product provides usable and reliable results.