

HP

Project Scope

Client: HP

Timeframe: Three Months

Role: UX Data Scientist

Team: 3D Printing as a Service

Methods: Observational Studies, Interviews, Diary Studies, Metadata Analysis

Tools: SQL, R, Excel

Project Overview

Backstory

HP launched 3D Printing as a Service (3DaaS), giving customers the advantage of not needing to pay for the entire machine upfront (~\$250k), instead paying per print job. The pricing for each print job was based on a cost plus formula created from the initial engineering specifications.

Project Kick-off

Profitability of the 3DaaS program hinged on users going through materials at a reasonable rate. In particular, customers were replacing \$800 printheads far faster than initial engineering guides said, sometimes 10x faster!

Additional insight was needed into what the customer was doing and why. However, the majority of our clients were international -- we could not easily see how they were using the machines, instead needing to rely mainly on device metadata interpretation.

Objectives

Understand why customers were using materials at a much higher rate than we expected.

- Are customers using the machines correctly?
- Do our error messages correctly display when a print job fails due to the printhead?
- What remediative steps can we take to solve this problem?

Methodology

The richest form of research was a metadata analysis very similar to a diary study. Extensive data was logged by each printer, down to the individual layer of the 3D print. This was my main data source to find what was happening, particularly as the clients with the most issues were located across Europe and South America.

We also had access to the HP Print Lab, a testing space for printers with technician SMEs we could ask questions, and I was able to have an on-site interview with U.S.-based one client.

Diary Study and Metadata Analysis

The printer metadata was sent to a central data lake as sparse data, then was processed into programmatically generated tables. To say the data was a little rough would be an understatement, and I got to work closely with the data engineering team to find ways to clean and compress the data into something I could look at in R.

Once I did, I was able to confirm the mean usage time for printheads varied widely across companies, from over 12L to under 2L. Surprisingly, within the same company the usage often did *not* vary as much, leading me to believe users may not understand how long a printhead could be used.

I looked closer at the lifespan of a printhead in a couple of our worst offenders, to see if specific kinds of print jobs would cause failure. Instead, what I found was something much stranger: printheads were being removed from the machine, then reinstalled at a later date.

Interviews

I asked our customer service team to follow up with our customers, asking why they were removing and reinserting printheads, as well as asking about their troubleshooting methods.

Around this time, I was also able to get into the HP Lab to ask our on-site technicians how they dealt with printheads.

Internal technicians knew to use the Printhead Maintenance feature, buried in the UI. External clients did *not* see this function, and were often unaware it existed. Logs confirmed that customers did not know to use the built-in function!

Instead, they tried things and stuck with those that seemed to work. We found out one technician was blowing in the printheads as if they were Nintendo cartridges, while another put printheads in "time out" if they failed a print job, to be used later.

Outcomes

First, we sent out an email blast to our customers to let them know about the printhead cleaning function, and to use it regularly, particularly after a bad print.

The second was to create a check report to see if anyone was reinstalling printheads after they had been shelved, so we could catch this practice and check in on our clients on an ongoing basis.

Most importantly, we started assembling a drip campaign of Best Practices to send out to our users, so we could follow-up on the initial training. While the one-time training was helpful, we found that because there was a gap between the initial training and when the machine was fully installed and ready for use, technicians often forgot the basics.

Reflection

I love interviews, but this was a fantastic test of the limits of interviews. Language barriers prevented the natural repore which is normally a big part of interviews; instead, we needed to do a good deal of legwork before the interview started so we could steer the conversation.

As well, this reinforced the value of being able to swap between data science and UX research: we needed both on a small team to be able to find the solution quickly.

Finally, customers do weird things when expensive things break! This was nearly a superstitious pigeon situation, with the number of odd practices which would happen in their labs. Helping customers come together and get reinforcement for how to use a product, particularly a very technical one, can help a ton to correct the weirdest excesses of behavior.