**Human Software in a Thingiverse**

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Following Kyle’s analysis of 3D printing hardware, I’d like now to probe into the examination of 3D printing software. I am interested in software programs because they work in tangent with the physical printer, and they profoundly shape the surrounding maker communities. Software programs are also where community and commercial interests converge and—every so often—collapse. As such, my take on the “critical unmaking” refers to the moment of tension—the moment when makers find themselves being reduced to a cog of late capitalism or an edge in the object-oriented world of 3D printing.

**[IMG]**

**Unaccountable Software [IMG]**

123D Design is one of the many free programs provided by Autodesk, and it has been a popular choice among makers. Or, it *was,* until Autodesk recently announced their plan to withdraw the program on March 31st, 2017. Autodesk now recommends 123D users to shift to Fusion 360 with the annual $300 licensing fee (unless you are using the software for educational purposes, in which case you must sign up with the .edu email address).[[1]](#footnote-1)

Autodesk’s online Q&A forum bears witness of the user outcries, particularly from those who developed their entire curricula based on the 123D program **[IMG]**: “I spent two and a half years teaching people how to use 123D Design, and making tutorial videos that have received tens of thousands of views. [...] Whelp.”[[2]](#footnote-2) Similar sentiment is also noted on Reddit under a thread with the self-explanatory title **[IMG]**: “123D Designs GONE tonight at midnight. Not an April Fools joke.”[[3]](#footnote-3)

Autodesk seemed to have assumed that this transition would have little impact on the users and suggested, in what I think is a patronizing tone, that users better get on board with new trainings. In anticipating inquiries from the users, Autodesk provided a list of recommendations. **[IMG]**: “Don’t worry; we have great products for you to transition to. [...] Here are links to some product information and training if you want to start exploring today.”[[4]](#footnote-4) Autodesk shows no hint of regrets for users needing to forgo their conditioned skill set. This kind of indifference strikes me as most defeating since it unveils the inherent power structure between the users and the software companies. The sense of betrayal is looming especially when the celebratory, if not liberatory, rhetoric surrounding maker communities assures that you can **[IMG]** “make (almost) anything.”[[5]](#footnote-5) One of the Reddit’s (since-deleted) comments bitterly articulates the woes of makers. In response to a comment, suggesting makers shift to Fusion 360 à la Autodesk’s suggestion **[IMG]**:

“Your solution to Autodesk yanking support for a proprietary CAD tool is to tell people to use a different proprietary CAD tool from Autodesk? What’s that bit about the definition of insanity again? Folks, no. They did it before. They’ll do it again. If you bet on the eternal generosity of corporate America for your tool choices, you’ll be burned every time. Either pay for it or use free software. This junkie-ware (i.e. Autodesk is the pusher) nonsense will only lead to tears.”[[6]](#footnote-6)

**[IMG]**

**The Ephemera**

Though the Autodesk incident appears as an archivist’s worst nightmare, Alex Ball in his 2013 Technology Watch Report notes a commonly short life cycle of proprietary CAD programs. According to Ball, a typical CAD program would be updated every six months, and the entire system usually gets withdrawn after every ten years.[[7]](#footnote-7) It sounds like Reddit is right. It will happen again. Given that most of the models created by 123D Design can be opened with other compatible programs, the ephemerality that I am concerned about here is not necessarily that of the software program per se. Rather, I am worried that a community of makers who were connected through their shared expertise of the program might eventually be dissolved.

Taking up on the Autodesk incident as a wakeup call, I wonder how to keep *at least* the record of social networks intact so that we would have something to remember by this distinct community that we now come to recognize as makers. **[IMG]**

**Accountable CAD Software**

My proposal is simple: let’s make CAD software program accountable. Not in terms of expecting it to have an eternal life span, but in terms of having it ensure the documentation of makers’ creative process. At the moment, Autodesk seems to care little about how makers interact with each other. Can the interface of CAD program tackle this issue so that we can keep the record of maker movement for the future prosperity as well as encouraging collaboration along the way? In thinking about a possible CAD program design, I follow Richard Rinehart and Jon Ippolito’s suggestion in their *Re-Collection: Art, New Media, and Social Memory.* They say, when hoping to preserve certain cultural phenomena and artifacts, archives and other cultural institutions ought to listen to the community’s needs rather than imposing the institutional standards upon them.[[8]](#footnote-8) As such, I would like to take what appears to be some of the best practices among the makers’ existing programs and platforms in thinking what an accountable CAD program may look like. **[IMG]**

**Thingiverse**

First of all, Thingiverse managed by Makerbot stands out as one of the most popular platforms to share 3D models. In addition to their popularity, it adapts a fine documentation protocol. When uploading a model, Thingiverse prompts you to fill in the basic descriptions about the model. Licensing terms is among the many required fields, and Thingiverse makes you choose from a range of open licensing.

For example, this model for MacBook Pro cable saver is created by Tonio Schneider in Berlin and shared on the Thingiverse under the CC BY 3.0 license. **[IMG]** That means, as long as we give credits, we are free to use it, remix it, and even make profits out of it. What is great about Thingiverse’s interface is how it showcases the social network surrounding the object. For Tonio, we can see there are at least three other makers who have printed this model. Tonio’s design is a part of 96 collections other makers curate on the Thingiverse, and the model is downloaded 723 times.

Naturally, Thingiverse offers API, and a scholar such as Spiros Papadimitriou has worked on a project to visualize how makers remix the model.[[9]](#footnote-9) **[IMG]** With Papadimitriou’s “Thingiverse Remix Graph,” we can see how objects like **[IMG]** the head of Stephen Colbert, an octopus, rocket models, and a rabbit get linked through fantastic mash-up projects.[[10]](#footnote-10) **[IMG]** Though I speculate the platform is too big to fail the community, there is nothing guaranteed as we have learned from the 123D Design incident.

If we are to circumvent any reliance on the for-profit entities, that might as well be a great opportunity to ameliorate some of the design issues of a platform like Thingiverse. Currently, all the interesting information about the edges—that is, traces of human activities involving the exchange and the remix of object nodes—are highly dependent on the Thingiverse interface. Which means, once the individual CAD files get divorced from the Thingiverse, it retains little information about the licensing terms let alone the name of the author or how the 3D model came to be.

 As I speculate CAD files to remain indispensable for file sharing, I’d like to see how the pieces of information collected through Thingiverse interface might instead be embedded into the CAD file itself. As a consequence of my busted maker social bubble of 123D Design, I come to learn open-source CAD programs that have little to do with Autodesk. For the purpose of this presentation, I think the interface design of Onshape warrants our attention. **[IMG]**

**Onshape**

Onshape is a cloud-based 3D CAD platform that is designed to facilitate collaboration. While the need of constant access to the Internet can be a potential obstacle, its automatic saving function ensures every tweak and version to be recorded. If you are familiar with the GitHub repository, Onshape adapts a similar design, indicating collaborative efforts though the versioning history. That means you can actually see how an octopus branch and a rabbit branch stem out of the main branch, the head of Stephen Colbert. **[IMG]**

Of course, Onshape adapts a linear representation, and the tree form visualization fails to capture the dynamic mash-ups that occur among makers. On the other hand, one of the advantages of keeping the versioning history is to record the exact steps of tinkering—which I found to be more complex than simply putting together two object files, as my failed attempt suggests. **[IMG]** Onshape also allows documentation of each parts, so, in theory, such feature can be used to give credit to every maker involved in the creation. Lastly, Onshape keeps separate files in a bundle, and thus avoids the need of extra documentation indicating how each part of the object relates to one other. **[IMG]**

**Thingiverse + Onshape = Thingiape?**

To reiterate, a software program that combines Thingiverse’s encouragement for remixing and Onshape’s versioning control—just as how makers remix existing models—appears to me as a good candidate platform both for nurturing the existing maker communities and for keeping the records of how makers collectively do the making. It might be a matter of time that Makerbot purchases a CAD software company to launch such an all-in-one-place service in conjunction with the Thingiverse; but I would like to see a non-profit organization tackle the challenge of documenting the ephemeral, the maker communities and their makings.

1. Based on [the comment](http://blog.123dapp.com/2016/12/important-news-about-the-next-chapter?utm_swu=1316) made to the AUTODESK’s public announcement, the company is not providing free license to public libraries where they host 3D printers and accompanying programs to provide access among the local communities for free. [↑](#footnote-ref-1)
2. Perez, Daniel. “[Comments](http://blog.123dapp.com/2016/12/important-news-about-the-next-chapter?utm_swu=1316)” to “Important News About The Next Chapter” posted by SarahOrourke76, 16 December 2016, AUTODESK 123D Blog. [↑](#footnote-ref-2)
3. Here is [the link](https://www.reddit.com/r/3Dprinting/comments/62nm01/123d_designs_gone_tonight_at_midnight_not_an/) to the entire thread, “123D Designs Gone tonight at midnight. Not an April Fools joke. ” [↑](#footnote-ref-3)
4. ["Are there other Autodesk apps I should look at?"](https://support.tinkercad.com/hc/en-us/articles/115000144927-Are-there-other-Autodesk-apps-I-should-look-at-) [↑](#footnote-ref-4)
5. Gershenfeld, Neil. “How to Make Almost Anything: The Digital Fabrication Revolution,” *Foreign Affairs*, Vol.91, No. 6, p.46. Neil Gershenfeld is a Professor at the massachusetts Institute of Technology and the head of MIT’s Center for Bits and Atoms. He is also the founder of FabLab. Learn more about FabLab in the consequent section of the essay and in [Gershenfeld’s TED talk](https://www.ted.com/talks/neil_gershenfeld_on_fab_labs#t-31664) delivered in 2006. [↑](#footnote-ref-5)
6. [BugFix](https://www.reddit.com/r/3Dprinting/comments/62nm01/123d_designs_gone_tonight_at_midnight_not_an/), 31 March 2017, “123D Designs GONE tonight at midnight. Not an April Fools joke,” /*R/3D PRINTING: The Largest 3D Printing Community on Reddit.* [↑](#footnote-ref-6)
7. Ball, Alex. “Preserving Computer-Aided Design (CAD),” DPC TEchnology Watch Report 13, 2 April 2013, DIgital Preservation Coalition, p.10. [↑](#footnote-ref-7)
8. Ippolito, Jon, and Richard Rinehart. *Re-Collection: Art, New Media, and Social Memory*. The MIT Press, 2014. [↑](#footnote-ref-8)
9. Papadimitriou, Spiros. “[Thingiverse Remix Graph: Visualizing the Net of Physical Things](http://bitquill.net/blog/thingiverse-remix-graph-visualizing-the-net-of-physical-things/),” *bitquill*, 21 June 2013. [↑](#footnote-ref-9)
10. Papadimitriou, Spiros. “[Thingiverse Remix Graph](http://bitquill.net/make/remix/?cc=0),” 2013. [↑](#footnote-ref-10)