

Problem	Our Solution	Tech Enablers		
<p>Circuit prototyping is the <u>rate limiting step</u> in fast-moving engineering teams.</p> <p>Almost all board prototypes are outsourced, requiring:</p> <ul style="list-style-type: none"> • Intl. shipping (CO₂ + time) • Import costs/tariffs 	<p>3D print prototype circuits on your own 3D printer.</p> <ul style="list-style-type: none"> • 50 times faster – reduce engineering team costs • 50% less expensive per board • Integrated mechatronics • Economic one-off boards 	<p>Our three novel tech advances:</p> <ul style="list-style-type: none"> • Patent pending metal 3D printing filament • Circuit to 3D printable model converter • Online, open source, circuit board repository 		
Target Markets		Near Term Goals	Revenue Streams	
<ul style="list-style-type: none"> • Academic (initial focus): 3D circuits, RF electronics, materials research • Commercial: faster product prototyping, less team down-time, lower failure rates • Individuals: distributed manufacturing, millions with 3D printers can make their own electronics • Federal Labs: low volume complex boards expensive, hard to outsource sensitive designs 		<p><u>Customer pilot program</u></p> <p>Send material to partners for feedback</p> <p><u>Software Infrastructure</u></p> <p>Finalize circuit conversion tools needed to print</p>	<ul style="list-style-type: none"> • Material Sale • Conversion software licensing (free web-based program available, but requires cloud upload) • Commission on designs sold in repository 	



Stacked Circuits

3D Print Circuits
in Minutes

Circuit board prototyping
is the rate limiting step
in fast moving engineering teams

Proper circuit prototyping slows development,
but rushing untested products can be just as dangerous.

Galaxy Note 7

Recall

\$17B

Income Loss

[reuters.com](https://www.reuters.com)

GM Ignition

Recall

124

Deaths

[justice.gov](https://www.justice.gov)

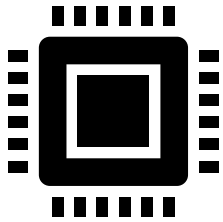
PCB prototyping is largely unchanged since the 1930s

We need a circuit prototyping method
that keeps up with modern product development

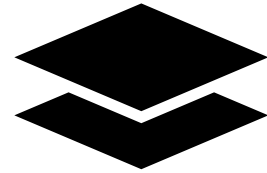
Stacked Circuits turns
off the shelf filament-based 3D printers
into circuit board factories

Traditional PCB Prototyping

Digital Design

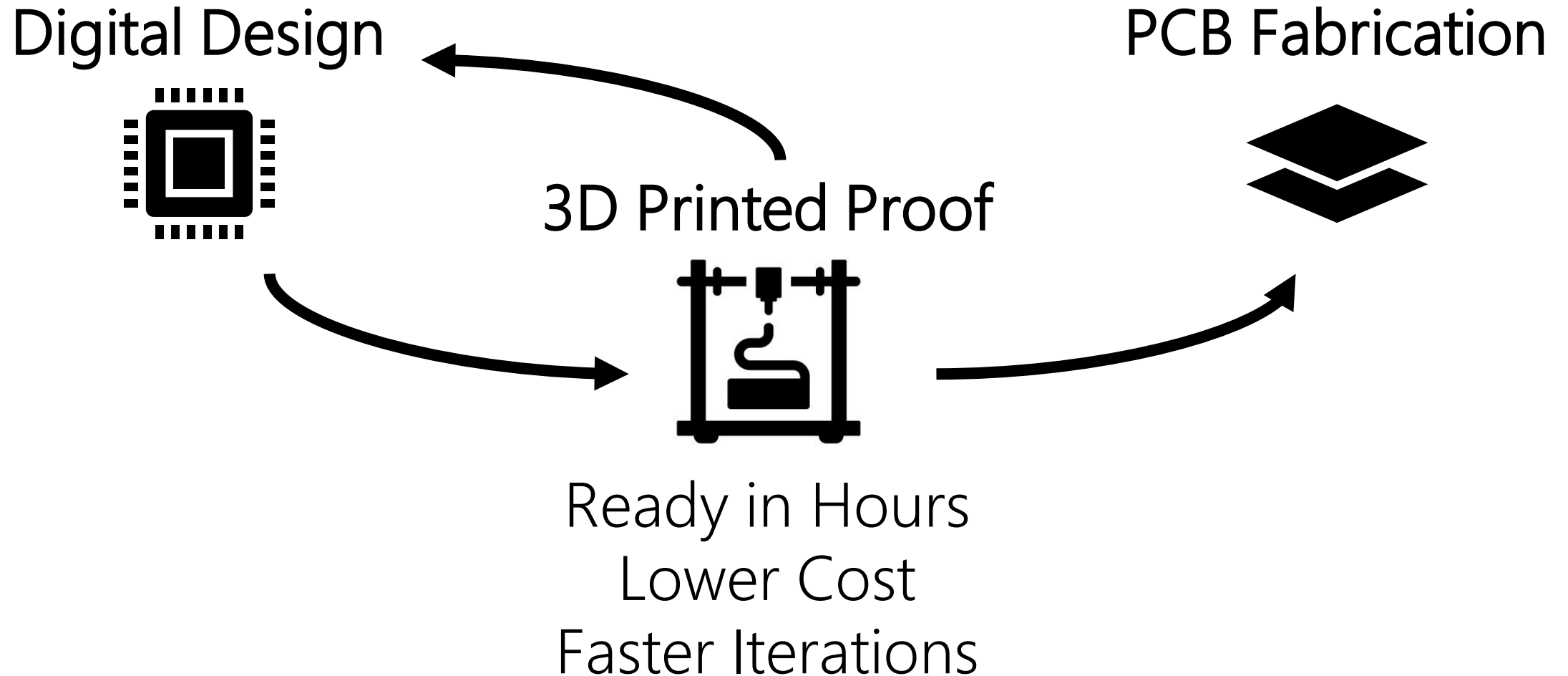


PCB Fabrication



Slow
Usually Made Overseas
Carbon Intensive

PCB Prototyping With Stacked Circuits



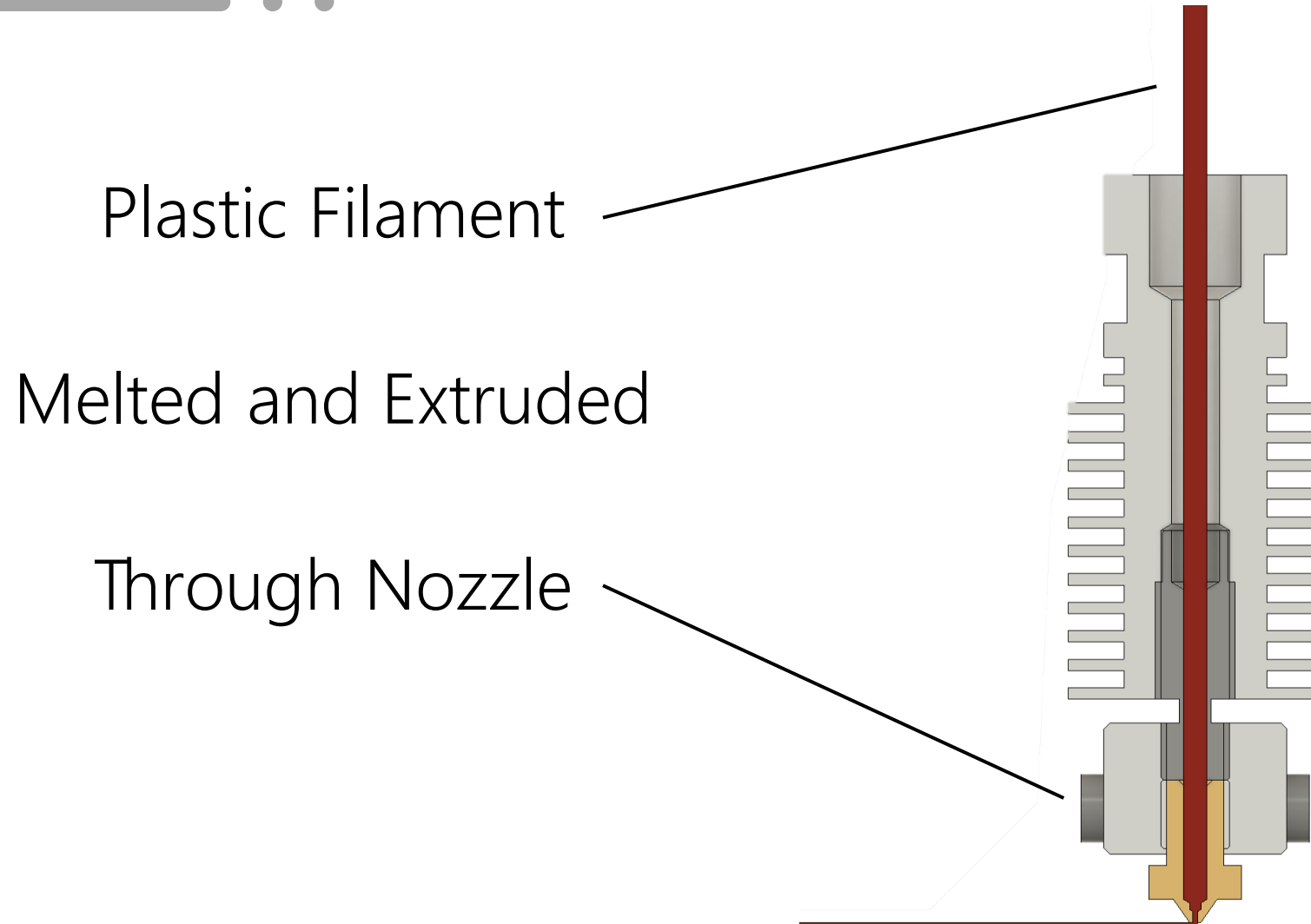
With Stacked Circuits, you can prototype

**>100 Times
Faster**

**50% Lower
Cost**

when compared to traditional PCB prototyping

How Does FDM 3D Printing Work?





Our Innovation?

Replace Plastic Filament with Metal

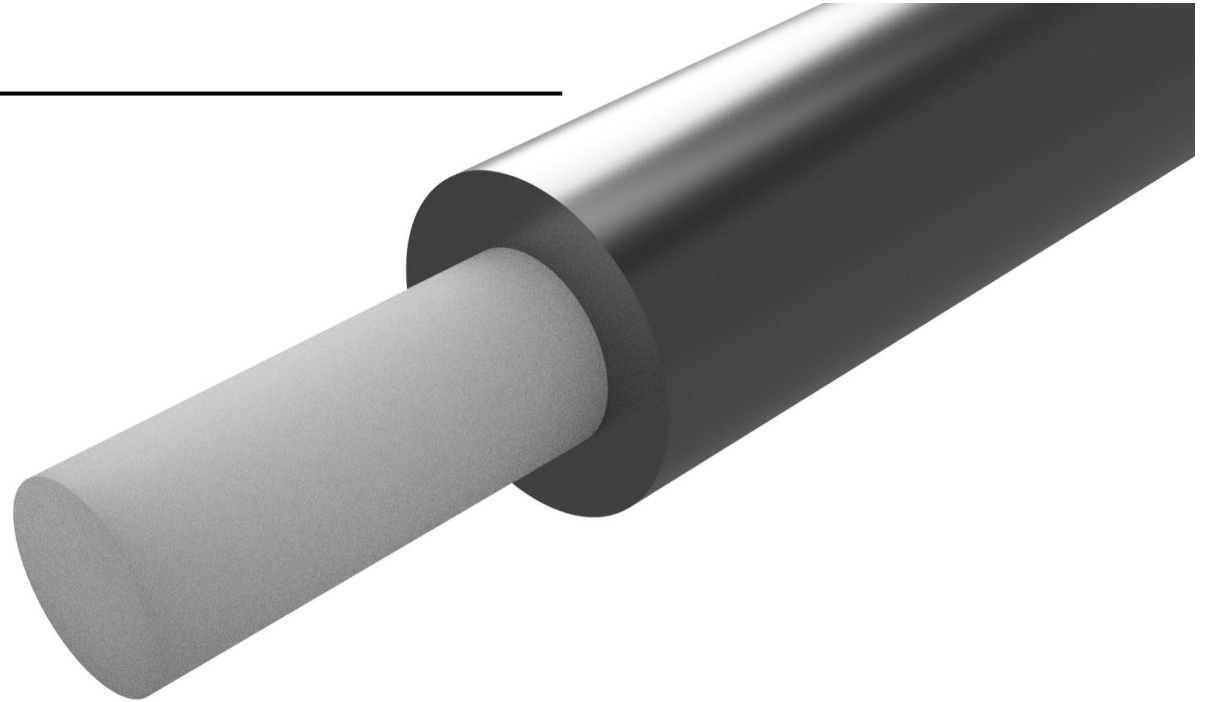
Our Patent-Pending 100% Metal Filament

Outer Shell

makes our filament compatible with
standard extrusion systems

Engineered Alloy Core

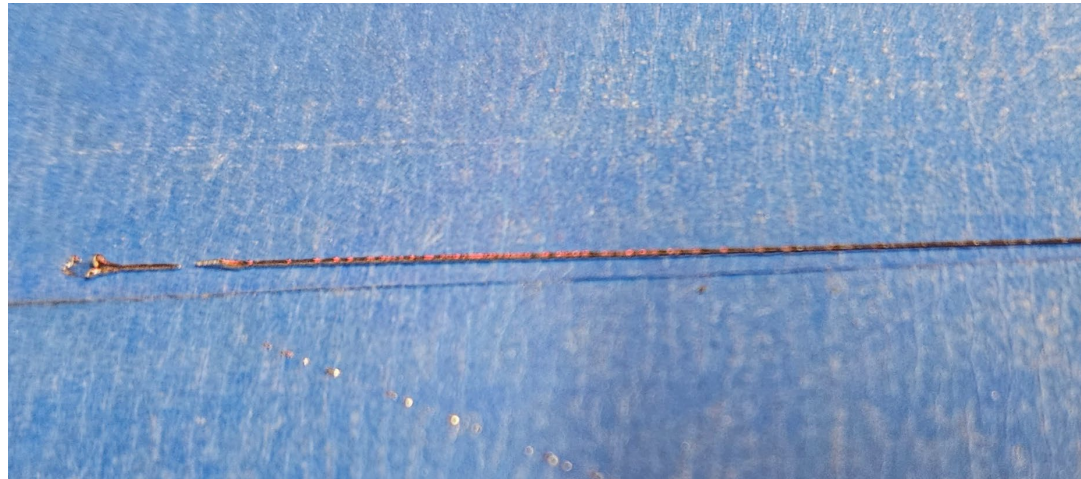
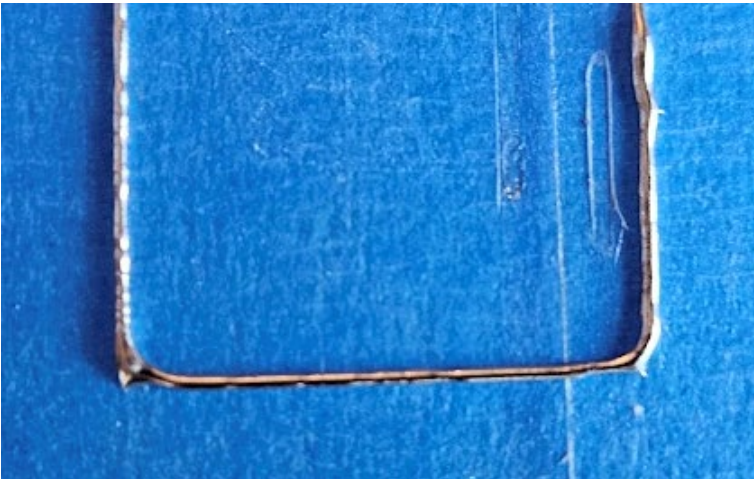
provides melt stability and increases
mechanical strength



Normal Metal – *Discontinuous*



Stacked Circuits – *Complete Wires*



Our unique design means
Stacked Circuits is compatible with any of the

>8M FDM 3D Printers

sold in the last 5 years, the most common 3D
printing technology¹

Circuit Prototyping Is Not a Niche Market

One of our competitors makes

>9M PCBs

and services

>6M Customers

each year

<https://jlcpcb.com/aboutUs>

The electronics prototyping industry is
projected to expand by

4x

from

3.3B to 12.1B

Between 2021 and 2031

<https://www.futuremarketinsights.com/reports/electronic-prototyping-market>

Multiple Market Segments

Smallest

Largest

Federal R&D Laboratories

Sending classified materials outside the lab incentivizes local circuit board production

Individuals & Makers

Lower cost and faster alternative, perfect for one-off non-production boards

Academia & Research

Unconventional uses of the material for research in materials, RF electronics, etc.

Commercial Electronics

Save engineering labor time by producing prototypes in house, reduces errors

Initial Focus

Near Term Goals

Customer Pilot Program

Inform product launch with customer experiences

Confirmed Partners

- MIT Lincoln Laboratory
- Ohio State University

Develop Software Infrastructure

Circuit-to-print conversion

Circuit Repository



Laura Lerebours
Software Development



Brian Minnick
Founder



Vineet Sharma
Web Design
Business Development





Additional Information

Revenue Channels

Direct Material Sale

Sale of metal 3D printing filament for circuits or structural products

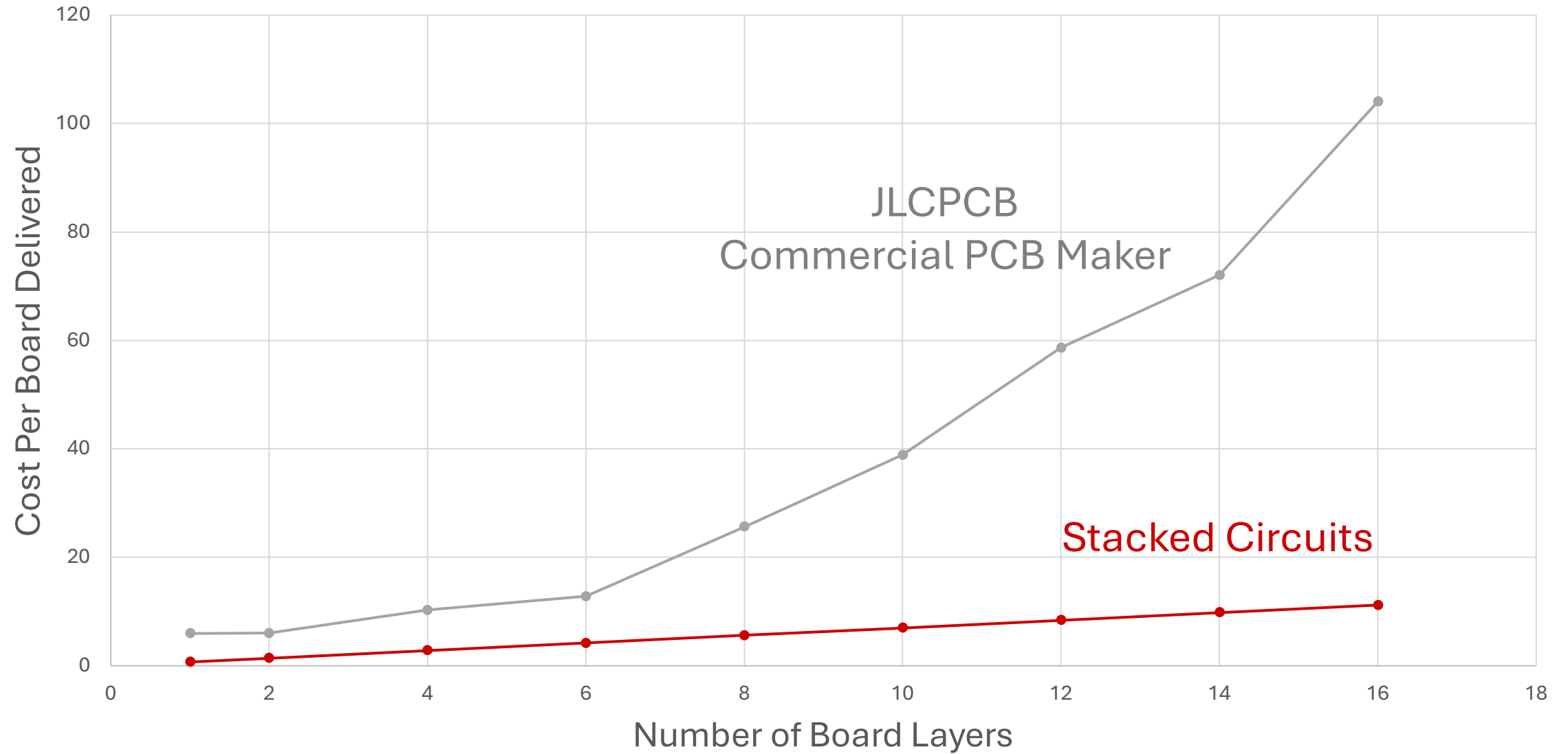
Software Licensing

Local PCB conversion cuts out need for cloud upload, required for some customers.


Model Hosting

Users opt to sell models to other users; take a percentage of this transition.

Cost Comparison Between Stacked Circuits and JLCPCB



For a Standard 2-Layer Board

 Stacked Circuits		Direct to PCB Fabricator	
\$1.40*	1 hour	\$5.99**	4-6 days

All prices quoted for a small 145mm x 70mm board, prices increase for larger boards with additional options

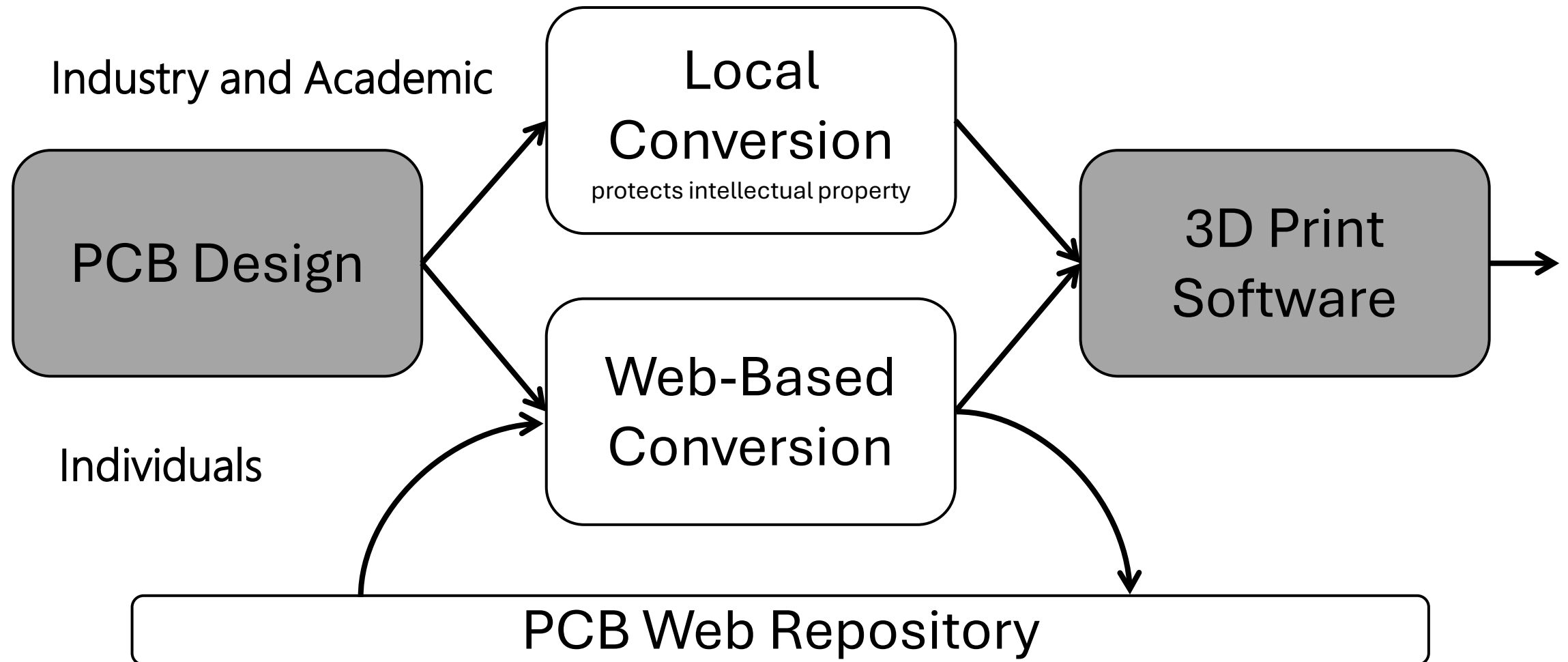
* Estimated cost of Stacked Circuits material at suggested retail price including delivery

** Cost for single board from JLCPCB online quote tool including delivery, taxes, and fees

Software Ecosystem

Existing Software

Our Software



Key Insights From Customer Interactions

Current Problems

- Quality concerns on PCB routers
- Organizing components
- Assembly time

New Material Applications

- RF protection
- Thermal management
- Antennas
- Power connections

Key PCB Properties

- Size, Weight, and Power
- Compatible with existing layout tools
- True facsimile

Great interest in printing metal for structural components