Objects as Software

The coming age of digital fabrication.

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- Creator of Sanguino, an Arduino derivative
- Founder, Thingiverse.com
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Disclaimer

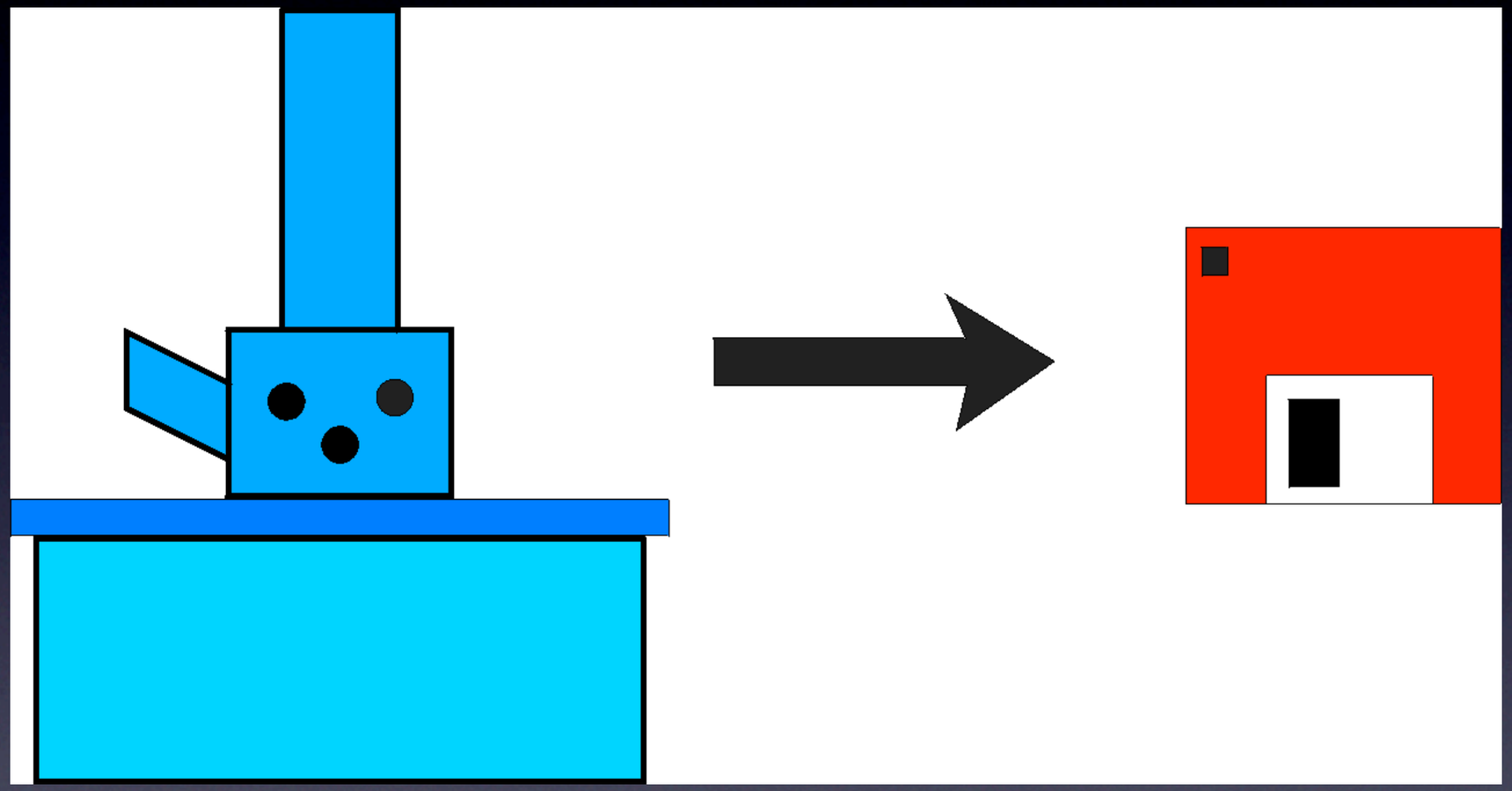
- I'm probably completely wrong.

Digital Fabrication?

- Digital Design -> Physical Object
- Automated Processes
- Repeatable, reliable, really awesome

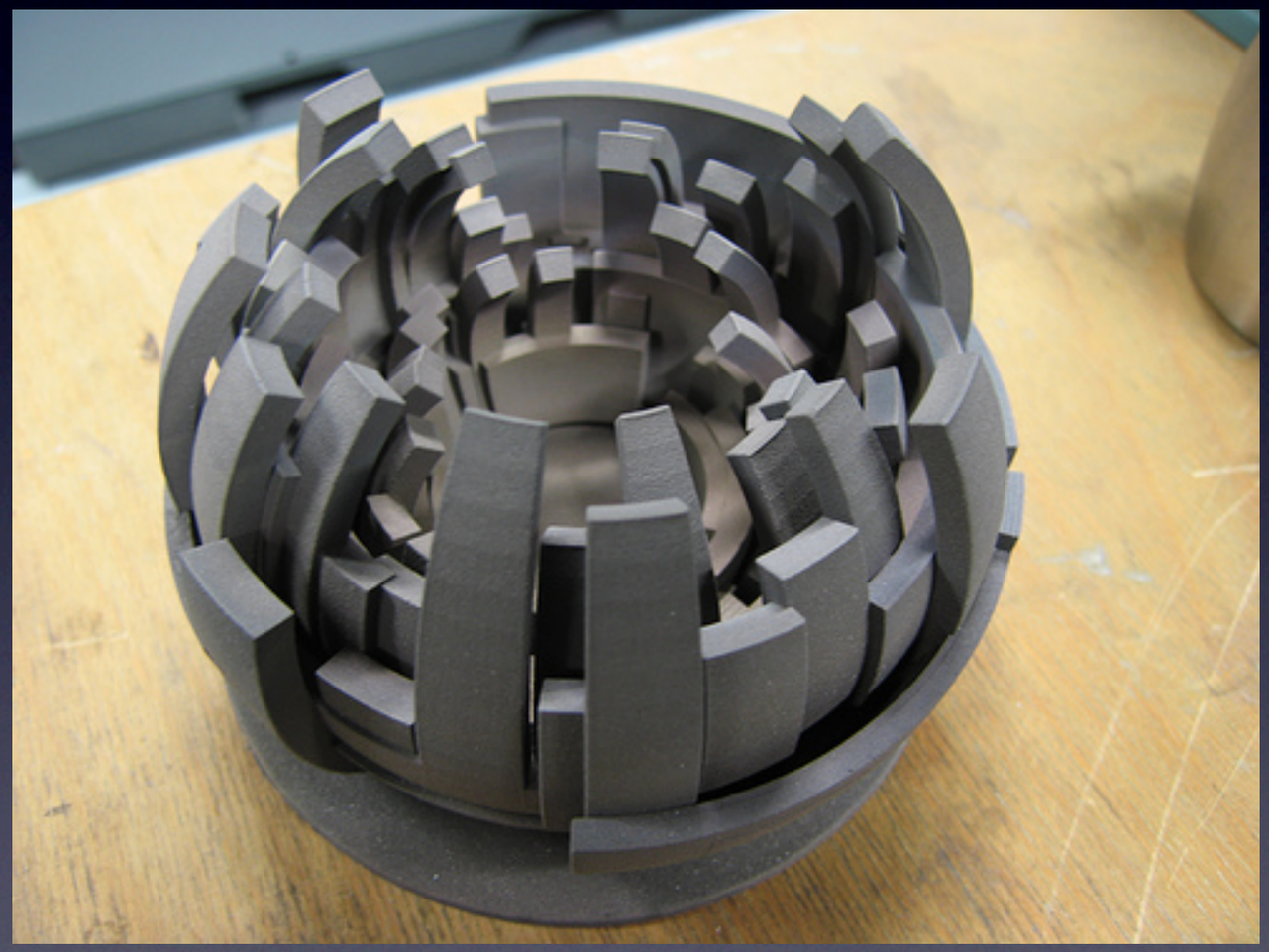
The Revolution

It will be downloaded.



Someday you'll have a machine that will make you anything you want.

I call this the ‘Automation Age’



I lied. It's already here.

- cds / dvds
- computers
- consumer goods
- books
- clothing

But it's not really here.

- How many people have regular access to:
- a CNC machine
- a Laser Cutter
- a 3D printer
- a normal inkjet / laserjet printer
- a computer

Perspective

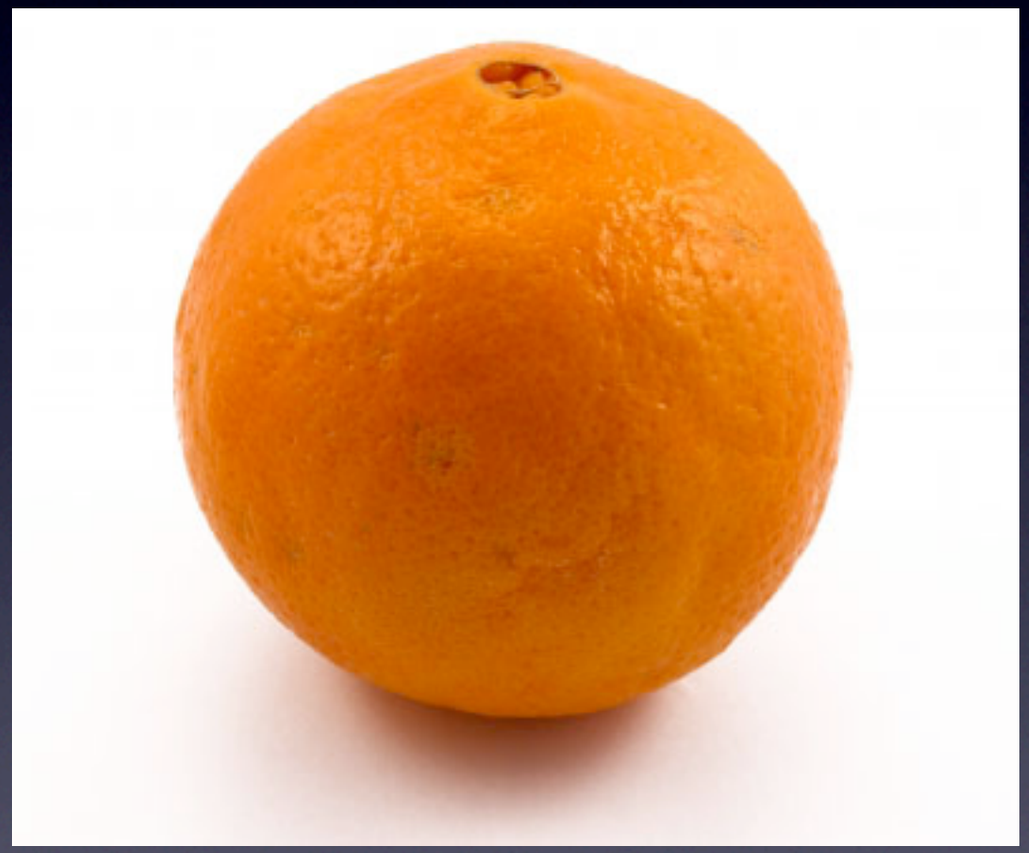
- 2 GHZ Dual Core ~= 4 billion calculations / second
- I can do 2 calculations / second max.
- A computer does it 2 billion times faster and with zero mistakes.

Perspective v2

- CNC Machine w/ feedrate of 1000mm/min
- Human w/ feedrate of 100mm/min
- CNC is 10x faster, can run 24/7, zero errors.
- Digital Fabrication = better, faster, stronger.

Helpful Metaphors

vs.



Designs as Source

- Source code to your physical object.
- Change the source, change the object.
- Possible to dynamically generate objects.
- Sharing the source is free / cheap.

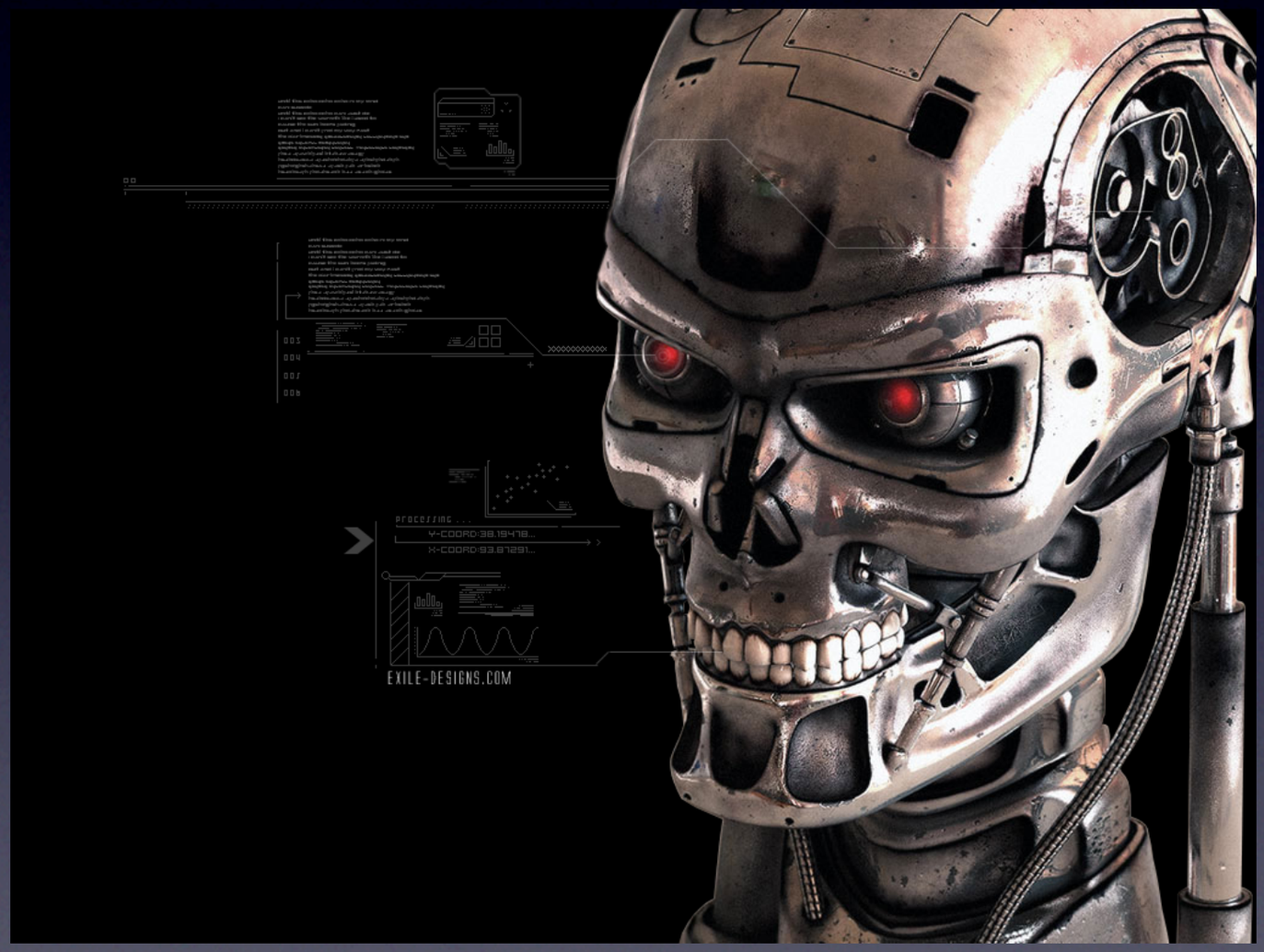
Fabricator as Compiler

- Takes your source (design)
- Turns it into binary (finished object)
- Its essential that this portion is open source.
- Absolutely must be hackable.
- Ideally, it can ‘compile’ itself. (RepRap)

Things as Binaries

- Finished product contains no information on how to make it.
- Can only share it the old fashioned way.
- Runs anywhere! ;)
- Do you have the source to your CD player?

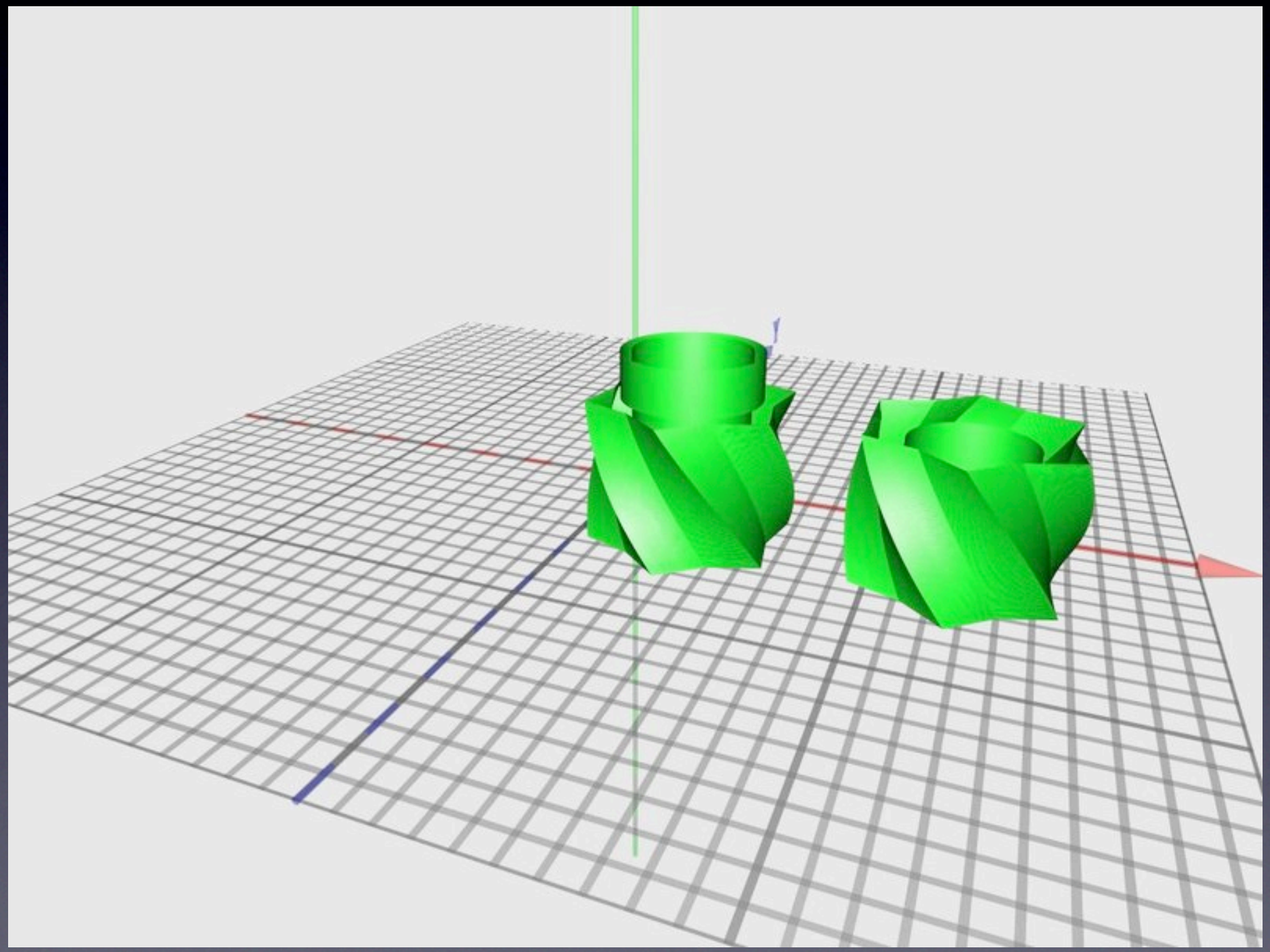
Implications?



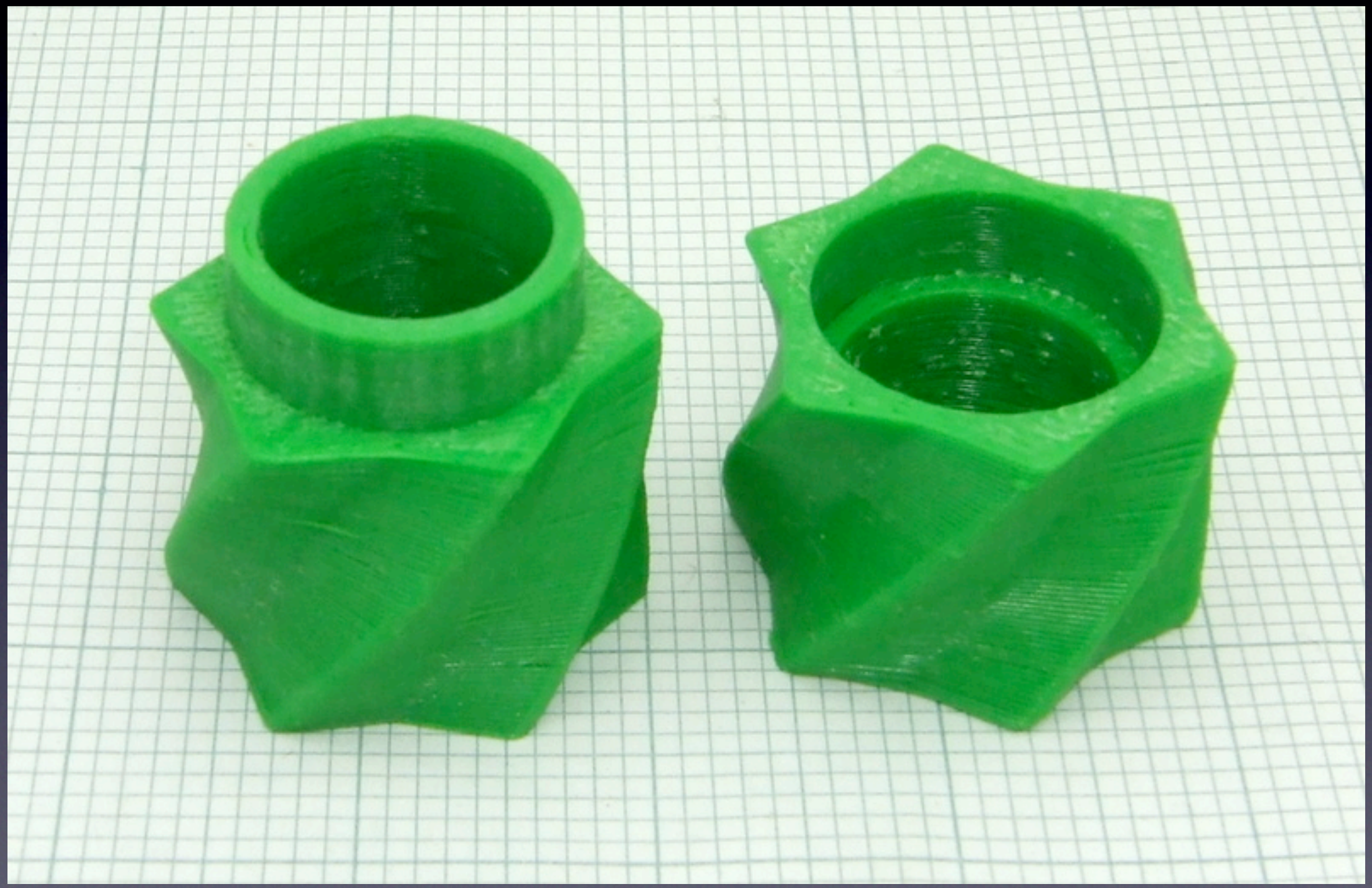
When Things Go Digital

- Design in Austria, fabricate in UK
- Version control for objects? yes please!
- Easy, worldwide collaboration.
- Make as many copies as you want.

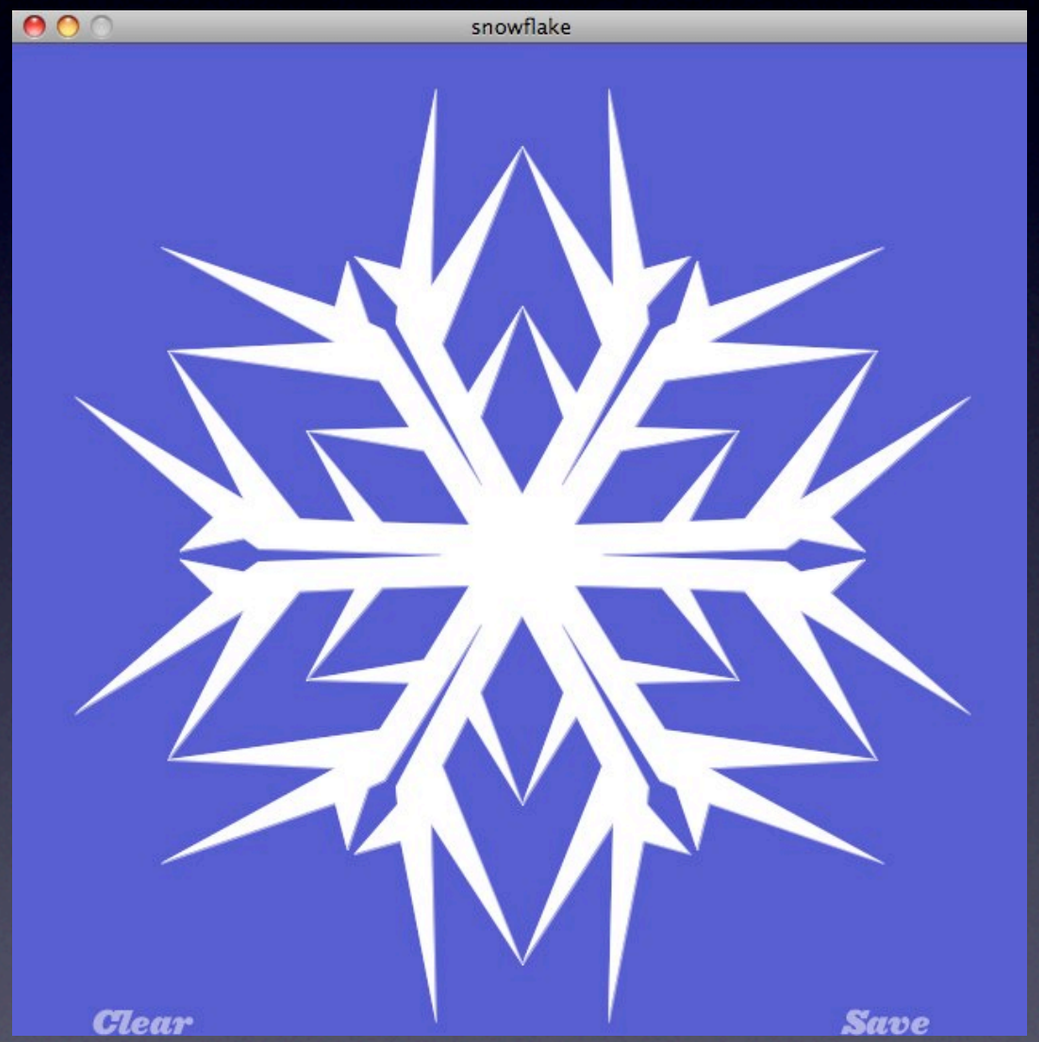
Designed In Austria



Made in the UK



Infinite Customization



Consumer to Producer

- Need a laptop stand? Make one yourself.
- Make a copy for a friend, or sell one.
- Bingo: you're no longer a mindless drone.

Open Source It All!

- Open source robots.
- Open source machines (pumps, tools, etc.)
- Open source toys.
- Open source anything you can make.

Who's Working on it?

- RepRap - open source, self-copying fabber.
- Fab@Home - open source fabber.
- Lumenlab - open source CNC.
- FabLab - Digital Fabrication lab in a box.

Obstacles

- Technology is not widespread.
- No shared platform.
- Really Repeatable Results.
- Costs are still relatively high.
- Large learning curve on software, hardware, electronics, everything.

How do we get there?

- Get yourself a machine. Any machine.
- Contribute to Thingiverse.com
- Adopt a RepRap machine. Let it breed.
- Tell your friends at your hacker space.
- Learn as much as you can.

Summary

- Digital Fabrication is a real technology.
- It's coming to a house near you.
- Work smarter, not harder.

Thank You!

- For listening to my crazy ideas.

Places to Go

Thingiverse.com - design sharing website

RepRap.org - open source self-replicating fabricator

RRRF.org - RepRap Research Foundation

Digital Design Community:
http://groups.google.com/group/digital-designers
or
http://groups.google.com/group/thingiverse