

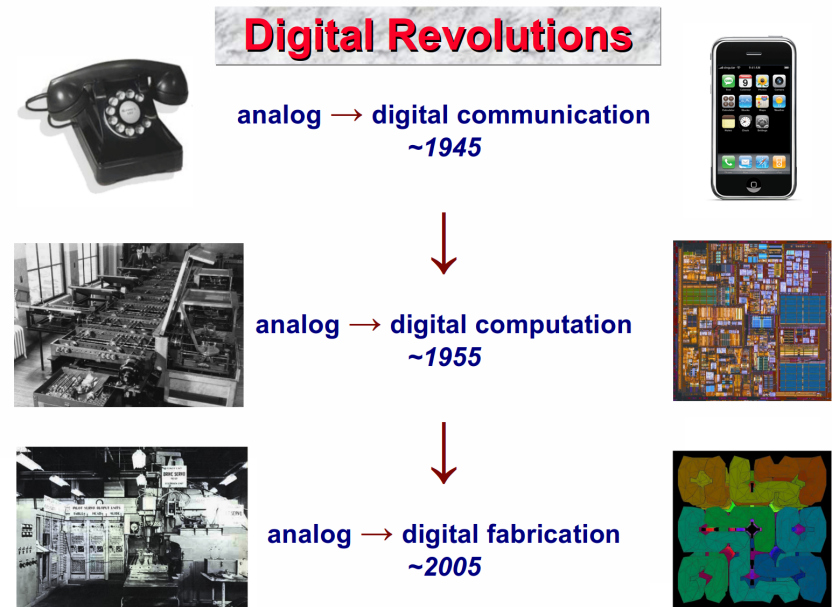
Today

From 3D Printing and Personal Fabrication to Personal Design

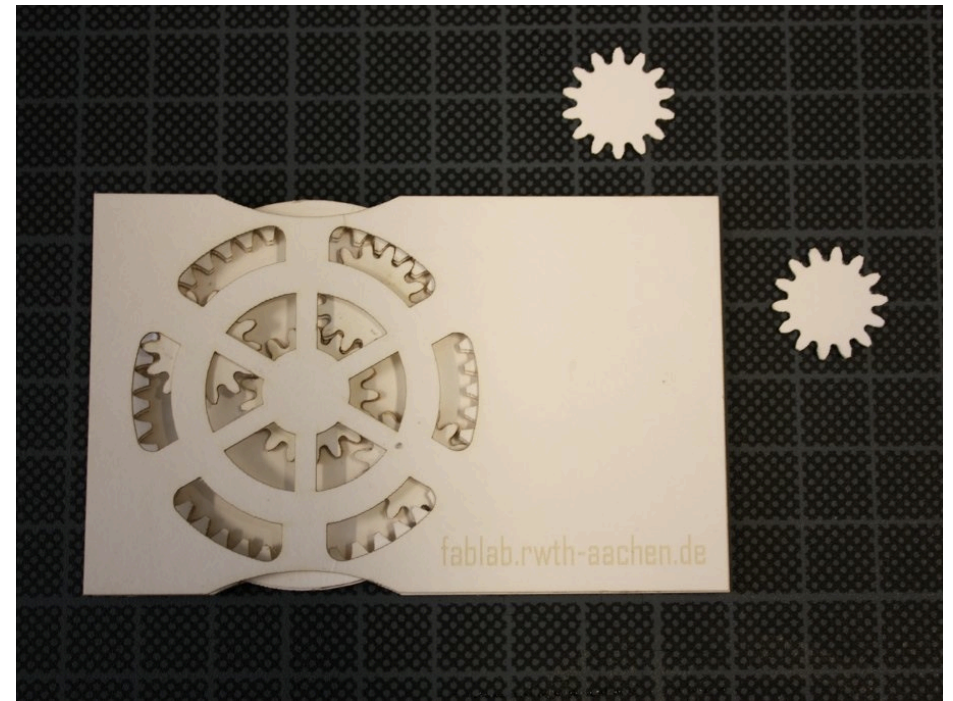
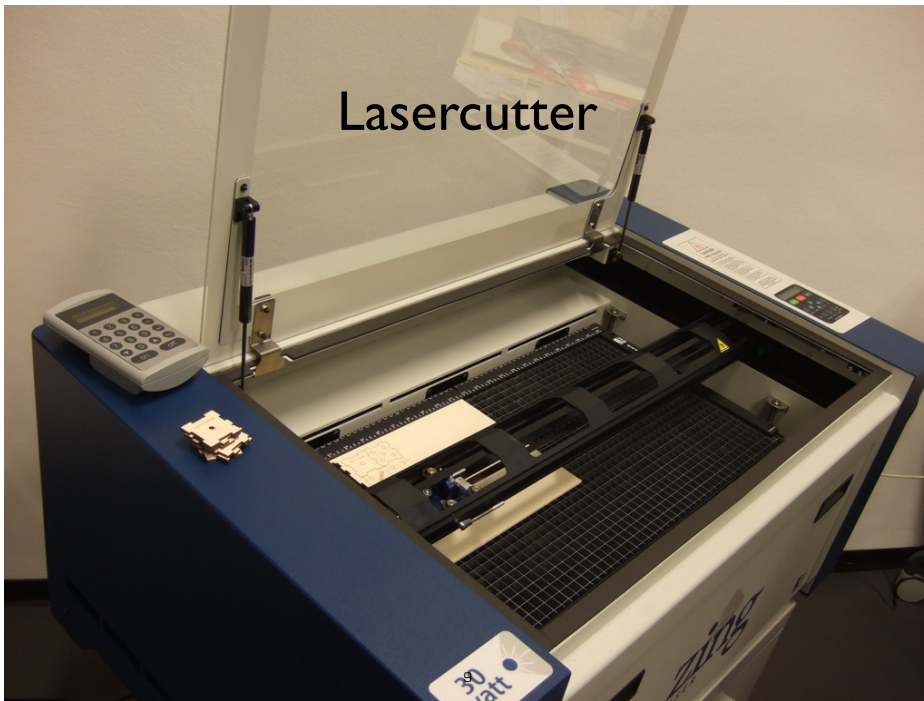
- Personal Fabrication: Concepts and tools
- Fab Labs
- Personal Design and HCI



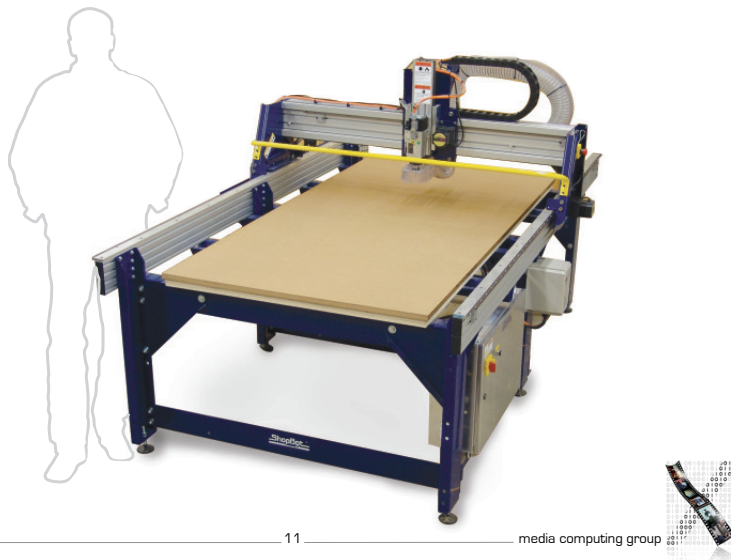
The 3rd Digital Revolution?

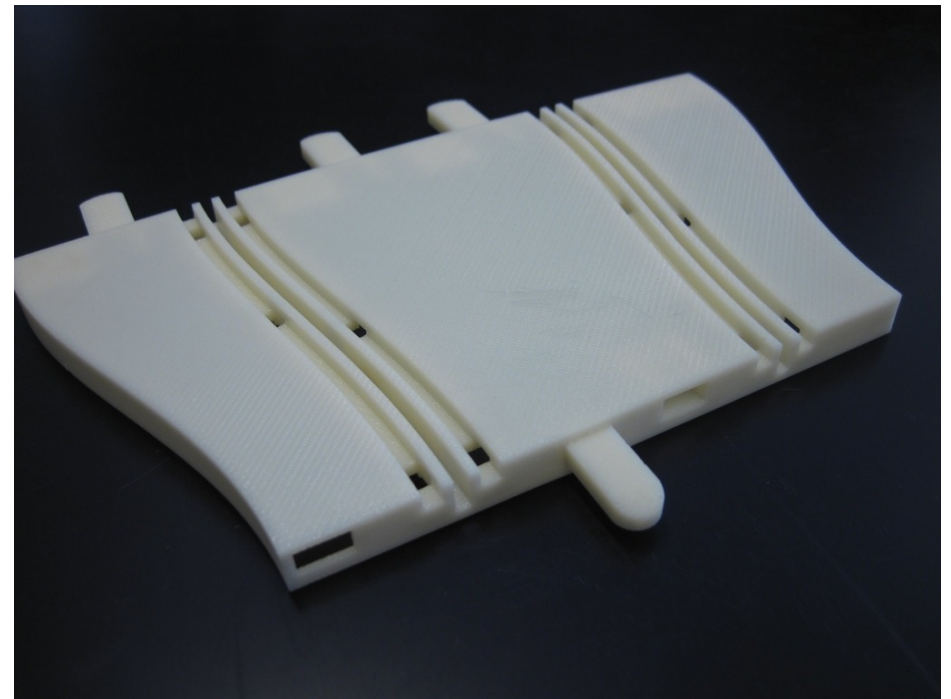
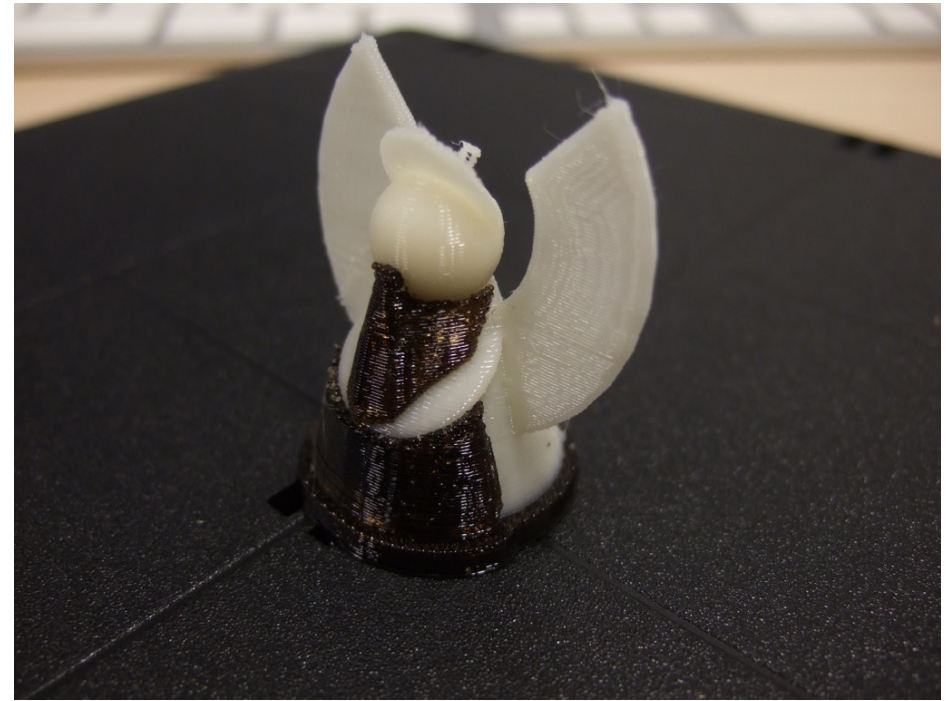
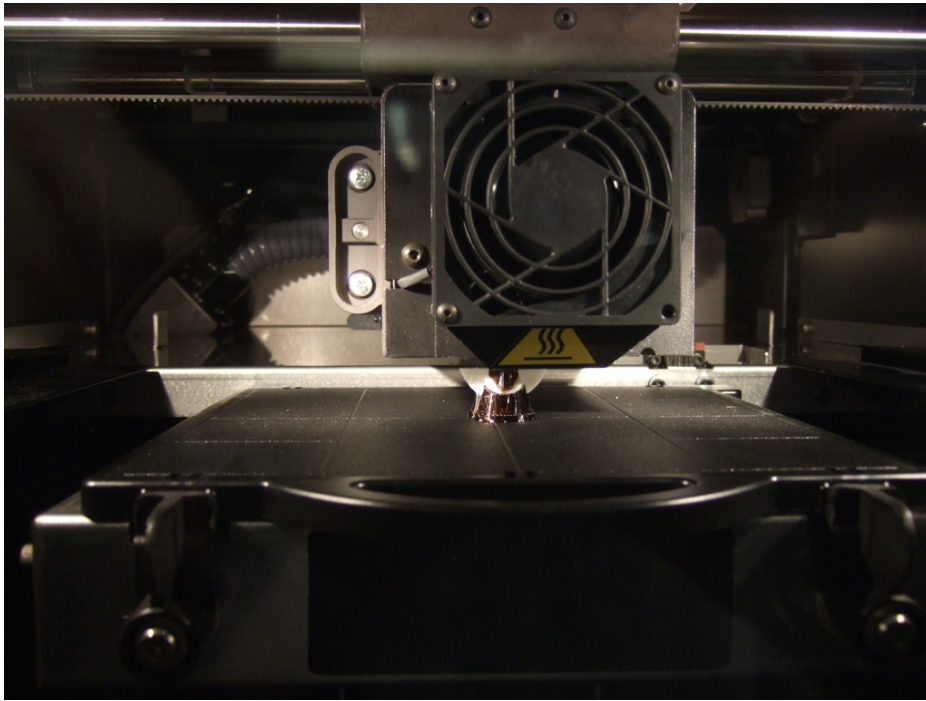


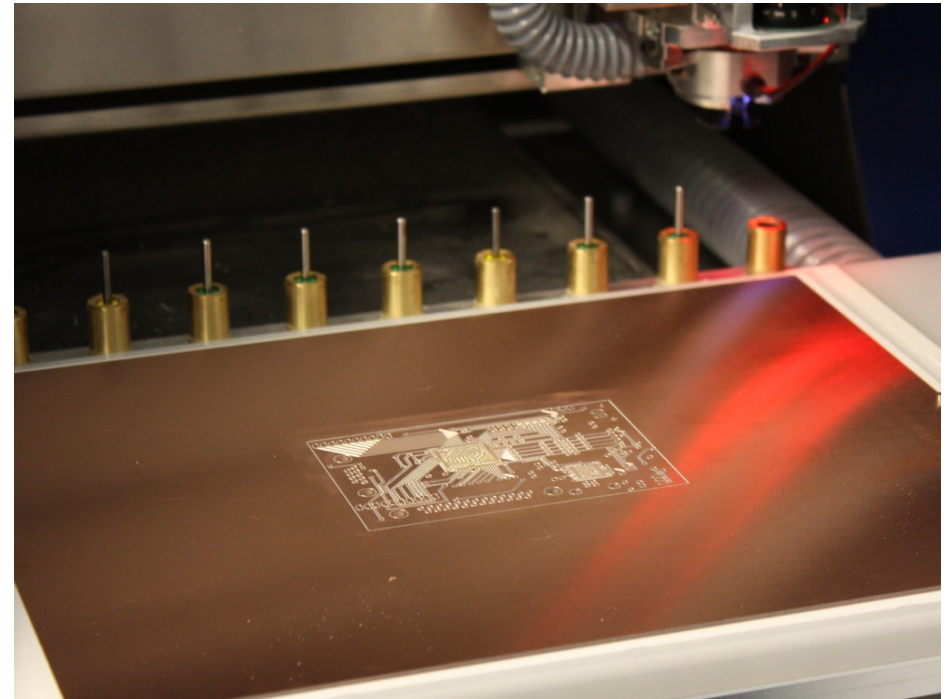
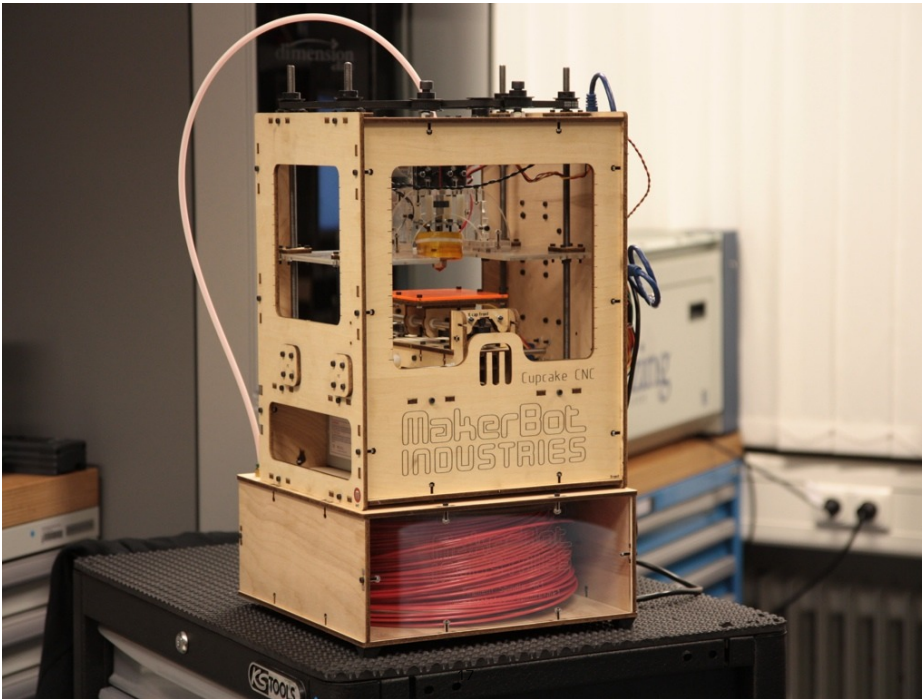
Lasercutter



CNC Router

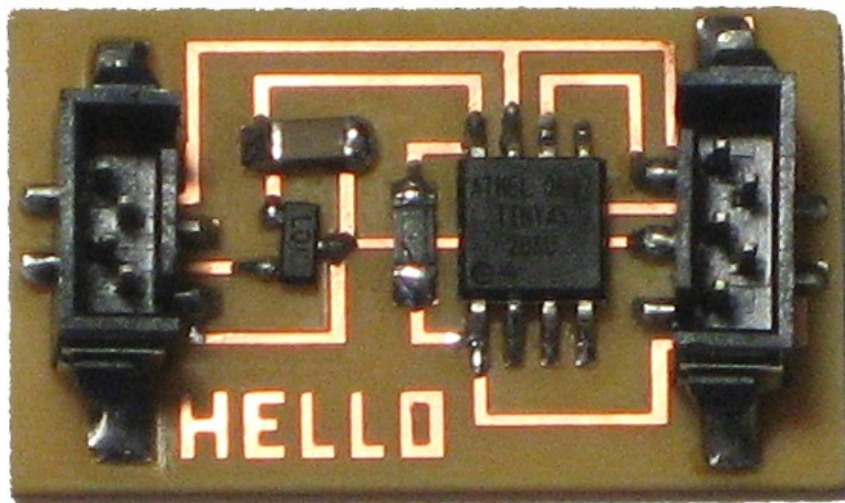


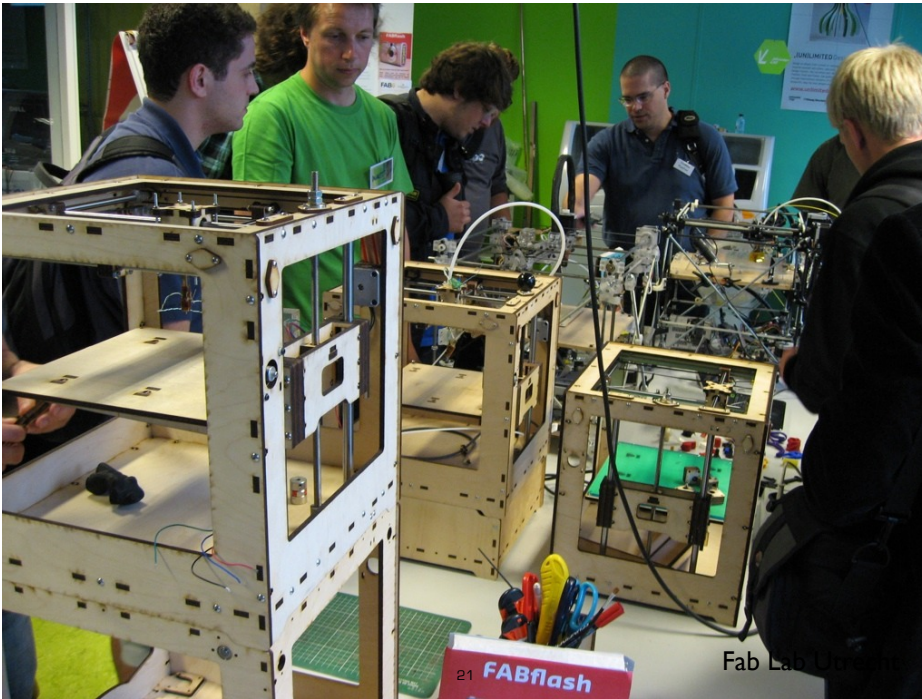




Four Stages

- Fab 1.0: Expensive digital machines on dumb materials
- Fab 2.0: Easily replicated machines that make (MTM)
- Fab 3.0; 4.0: Smart, self-arranging (replicating?) materials





Physical Literacy

- Correcting historical error (“liberal arts” excluded making stuff)
- Reunite arts and artisans, creator and consumer

Impact on Society



<http://www.bbc.co.uk/news/technology-22423883>



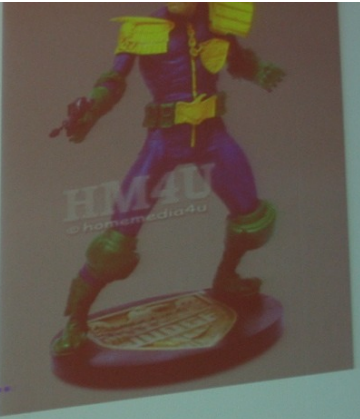
The Law

- 1 You can't infringe trademarks
- 2 You can't forge (pass off)
- 3 You can't make copyright figurines
- 4 You can't include copyright artwork
- 5 You can't **sell** patented items
- 6 You can pretty much do anything else...

S Bradshaw, A Bowyer and P Haufe, "The Intellectual Property Implications of Low-Cost 3D Printing", (2010) 7:1 SCRIPTed 5, <http://www.law.ed.ac.uk/ahrc/script-ed/vol7-1/bradshaw.asp>

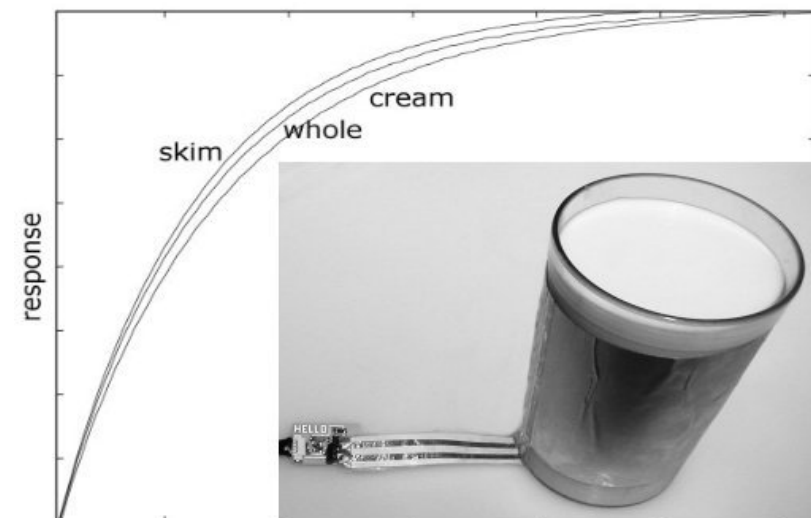
RepRap

Adrian Bowyer (Bath)



Fab Labs

- Free, open access
- Teach “revolutionary” skills
- Community based
- 60 around the world
- Fab Lab Aachen: Germany's first
- <http://fablab.rwth-aachen.de>



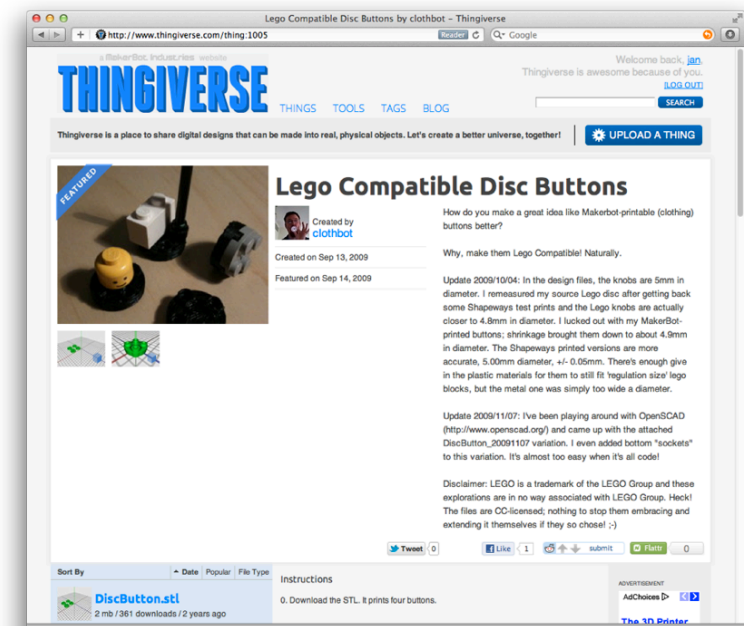
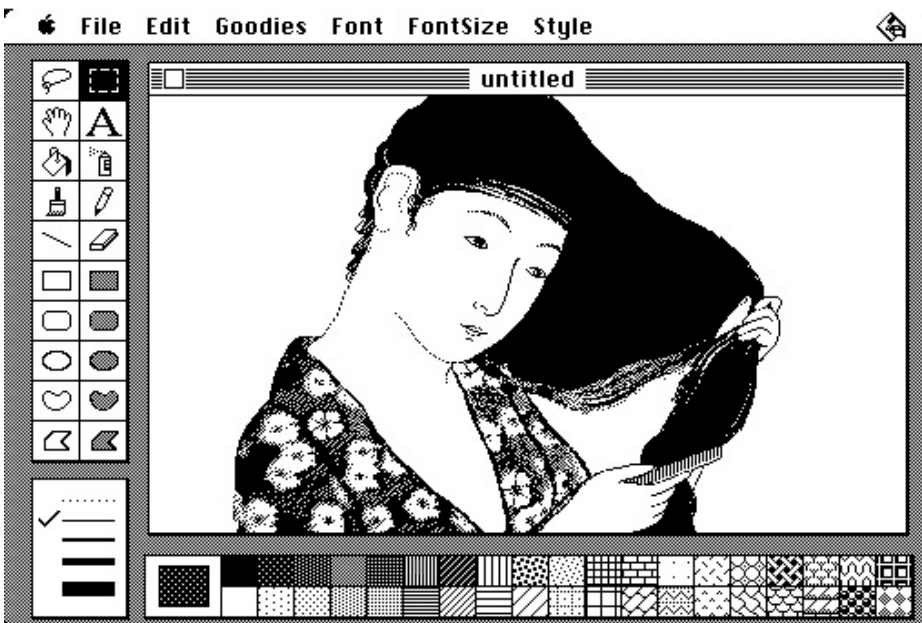
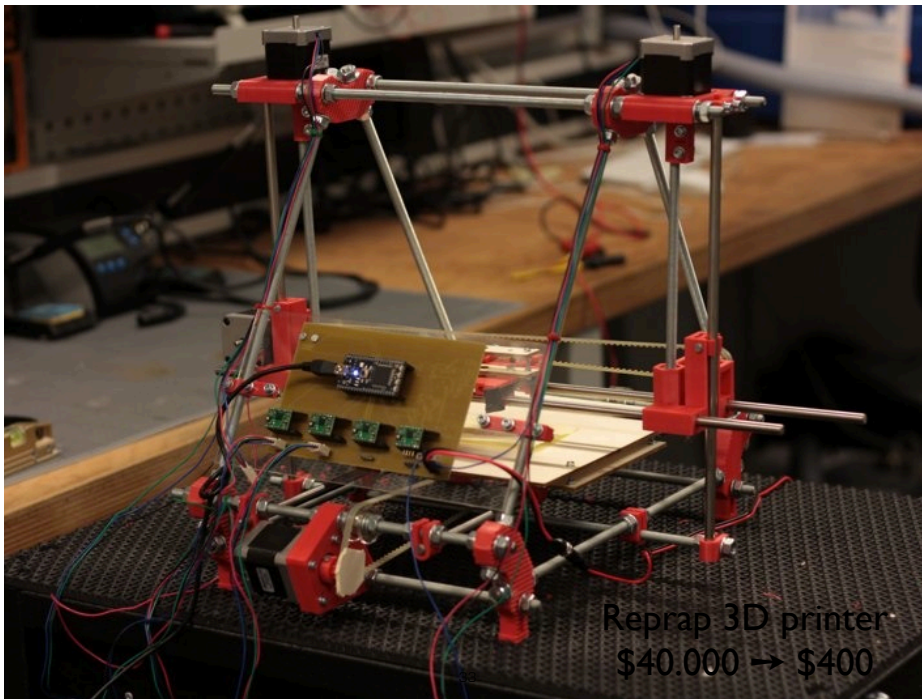


Personal Fabrication *Enables* New HCI Design/Research/Teaching Practices



Personal Fabrication *Requires* New User Interfaces





Make awesome stuff.

Flat is boring. Capture your world in 3D with free Autodesk 123D apps.

→ Meet the 123D Apps



123D

Design stuff you really want to make, send it straight to a 3D printer.

123D Catch

Automatically convert ordinary photos into extraordinary 3D models.

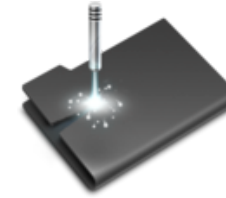
123D Sculpt

Shape and paint digital clay into amazing 3D sculptures on your iPad.

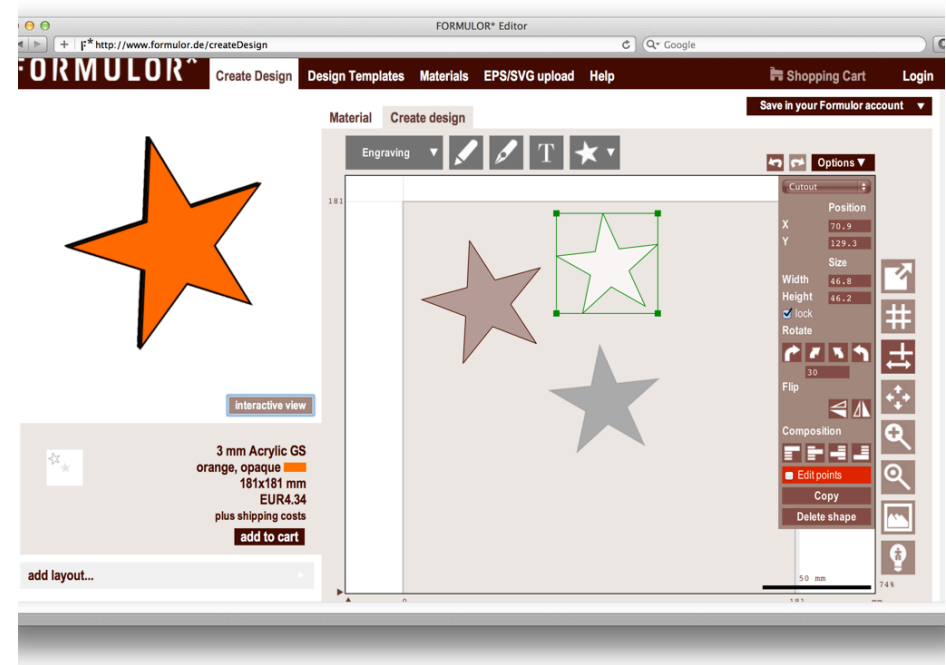
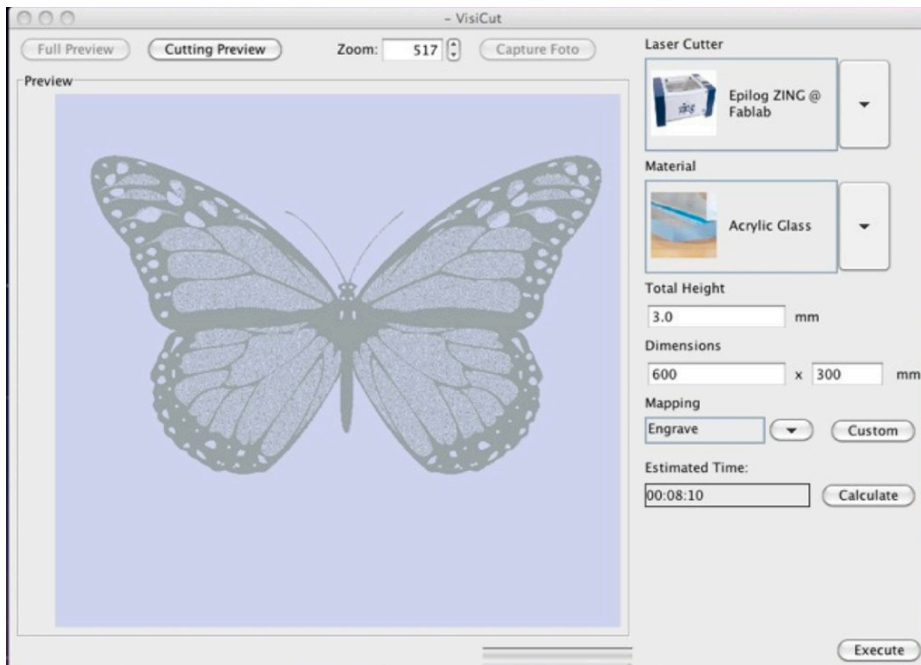
123D Make

Transform 3D models into a pattern for assembling real artful creations.

VisiCut



- The VisiCalc of LaserCutting
- Open-source, free
- <http://hci.rwth-aachen.de/visicut>



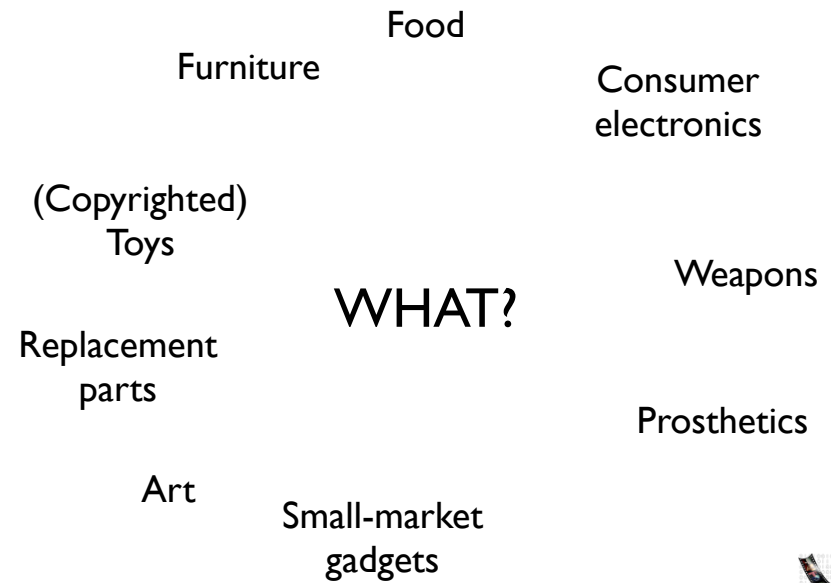


Cassius Lamp
(AEC '09)



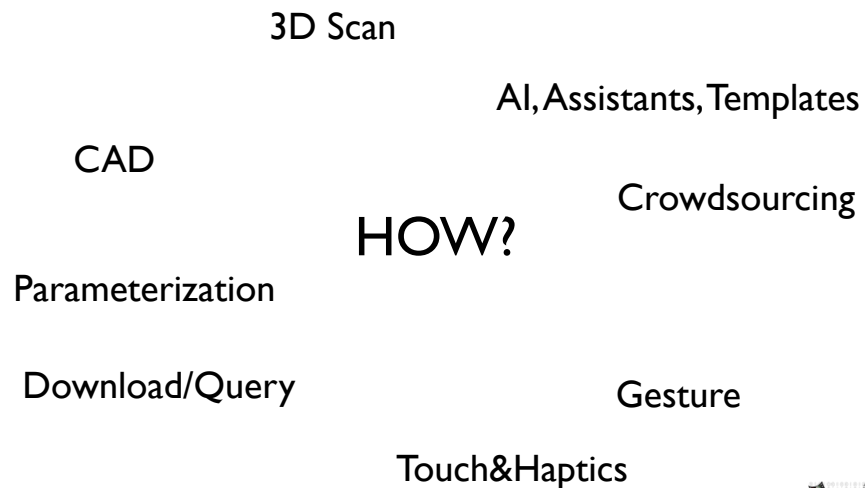


Sketch Chair
(Greg Saul, 2010)



Personal Design vs. Personal Fabrication

	Local Design	Outsourced Design
Local Fabrication	AutoCAD + RepRap	Thingiverse
Outsourced Fabrication	Shapeways	Traditional



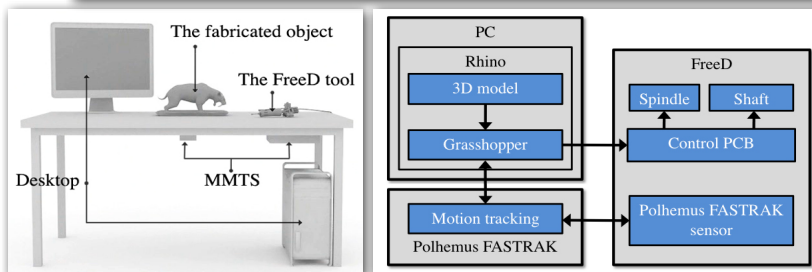
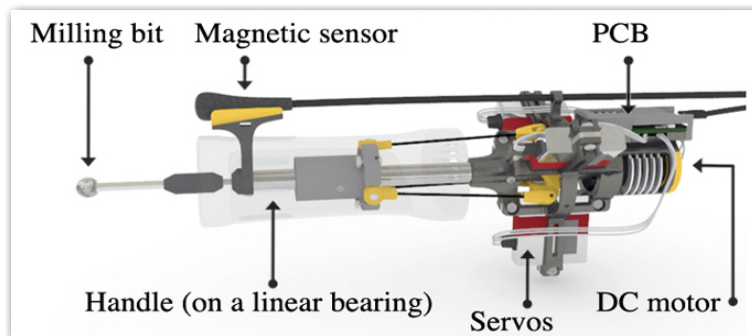
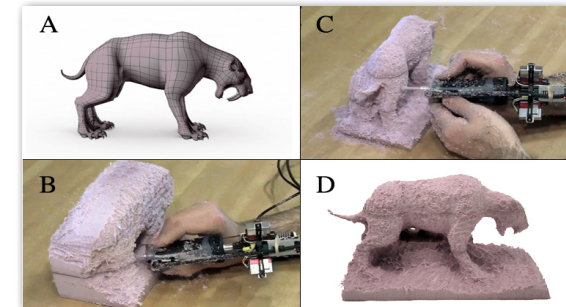
HCI Research Topics

- Tools for HCI Research
 - Examples: SLAP, Madgets, Pneumatic Displays (CHI 2009)
- Software for Fabrication
 - 123D Make (Autodesk)
 - SketchChair.cc (Igarashi)
- New Interactions for Fabrication (beyond CAD)
 - FreeD
 - Constructables



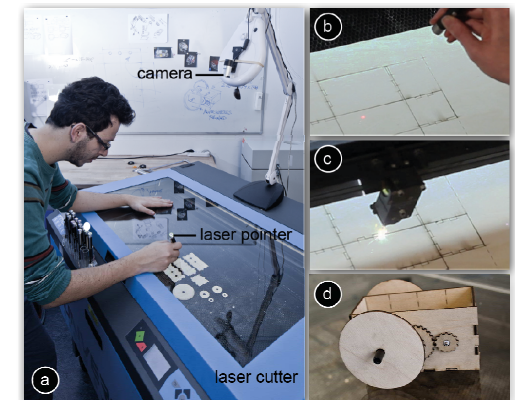
FreeD: A Freehand Digital Sculpting Tool

- Amit Zoran, Joe Paradiso (MIT), CHI 2013 (vimeo.com/59826043)
- Handheld milling device knows 3D model, constrains sculptor to avoid, e.g., carving too deeply



Interactive Construction

- Stefanie Mueller et al. (HPI), UIST 2012 (youtu.be/8g3LaF9oVFY)
- Use laser pointers to draw on material, lasercutter cuts interactively





- “People doing strange things with electricity”
- International network of people doing interactive art and electronic hacks
- We launched the Aachen dorkbot chapter in 2009
- Meetings every 3rd Wed of the month, here (room 2222)
- dorkbot.de

