



Aalto University
Media Factory

Digital_Fabrication_Studio.01

Fabbing and Fab Labs - history, concepts, fields of application

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<http://www.slideshare.net/openp2pdesign>





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This morning:

- * Digital Fabrication
- * FabLabs
- * Other spaces



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01.

Digital Fabrication: interactions between bits and atoms

A craft project



“This exact material (atoms) and my perception
and experience (bits)”

Source: <http://www.flickr.com/photos/kellycdb/6168020183/>
<http://commons.wikimedia.org/wiki/Category:Wood>

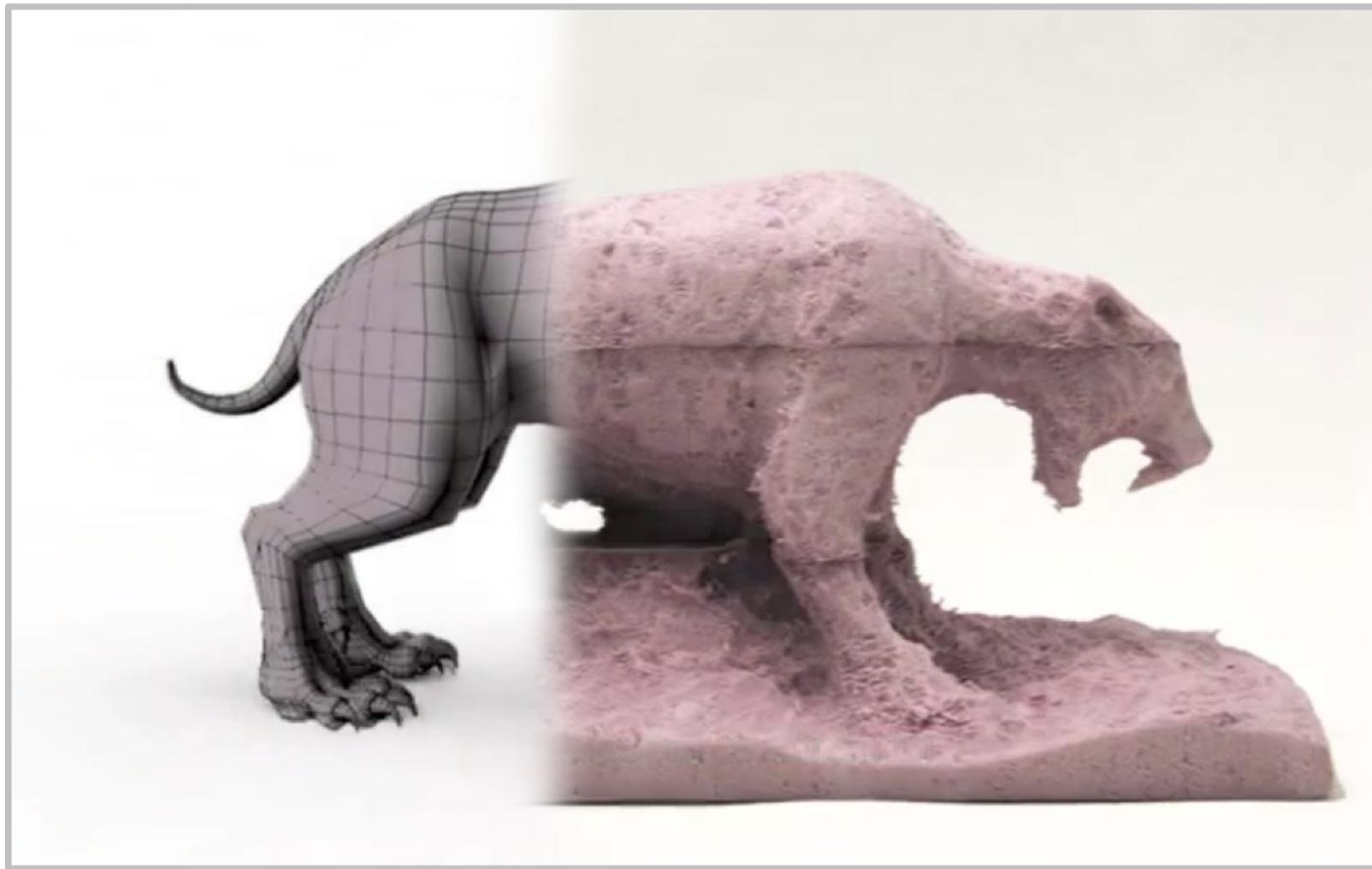
An industrial project



“A standardized material (atoms) described only
by numerical values (bits)”

Source: <http://commons.wikimedia.org/wiki/Category:KUKA>
<http://commons.wikimedia.org/wiki/Category:Polyethylene>

A digital fabrication (fabbing) project



“My experience, perception and digital information (bits)
shape this exact material and its values (atoms)”

A digital fabrication (fabbing) project



“... and I will probably design and make my own tools” [metadesign]

A digital fabrication (fabbing) project



“... and I will probably design and make my own tools” [metadesign]

Bits + atoms = information + materials

 fablab
waag society

what you can do in fablab amsterdam ▾ projects ▶ equipment ▶

embroidered speaker tryout



Fab Prosthetics
AbstractThe major objective of prosthetics is to restore the functional capacity formerly held by a limb deficient person as closely as...



Fab Foos
Fab Foos is a open source Table Soccer Game, featuring 2 web cams, audio response, electronic counter system and vga out. The goal was to built the...



Comm. Design
During my three months at



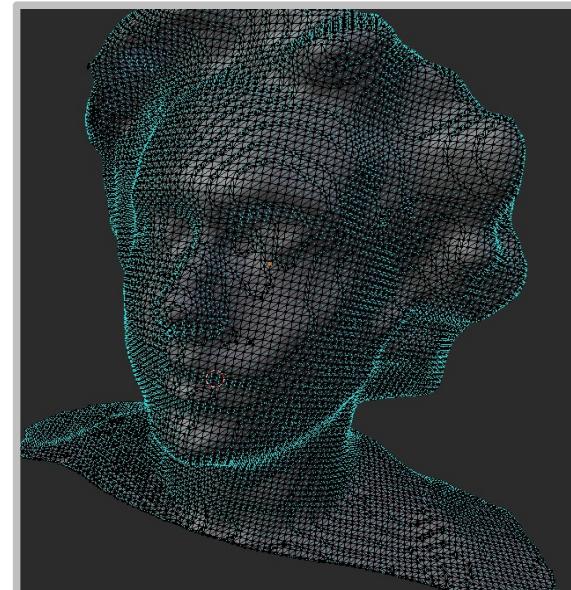
Developing projects at the intersections between bits and atoms

Source: <http://fablab.waag.org/node/3847>

Bits and atoms – two directions



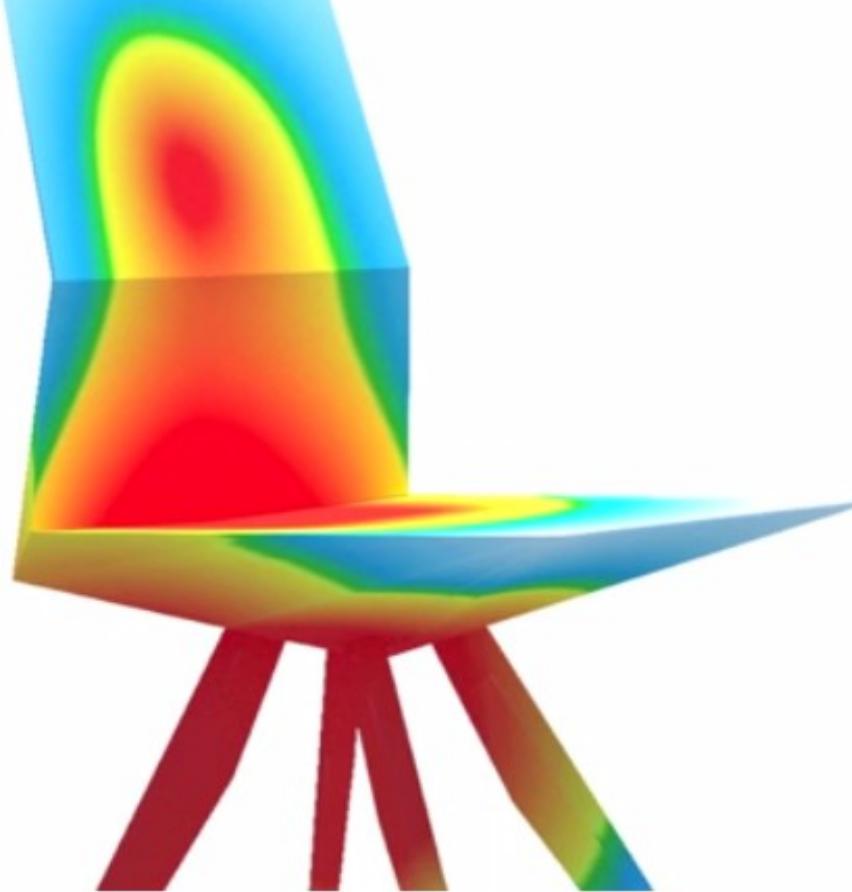
From atoms to bits
(getting data -
representation)



From bits to atoms
(build the data -
representation)



Bits and atoms: an application



As an individual sits in the chair, information about the flow of forces from his or her weight is depicted on visualization screens throughout the space.

Source: <http://www.designboom.com/weblog/cat/16/view/20419/audi-r18-ultra-chair.html>

<http://vimeo.com/40877183>

Digital Fabrication and bits+atoms: CBA @ MIT



THE CENTER FOR
BITS AND ATOMS

Massachusetts Institute of Technology



... not the center for rapid prototyping: “investigating the interface between computer science and physical science”

Source: <http://cba.mit.edu/>
http://en.wikipedia.org/wiki/Neil_Gershenfeld

Fab.01: Machines attached to a computer

Google patents

Search Patents Advanced Patent Search

MOTOR CONTROLLED APPARATUS FOR POSITIONING MACHINE TOOL Frank L. Stulen et al

Overview Abstract Drawing Description Claims +1 0

Search in this patent Go

Patent number: 2820187
Filing date: May 5, 1952
Issue date: Jan 14, 1958

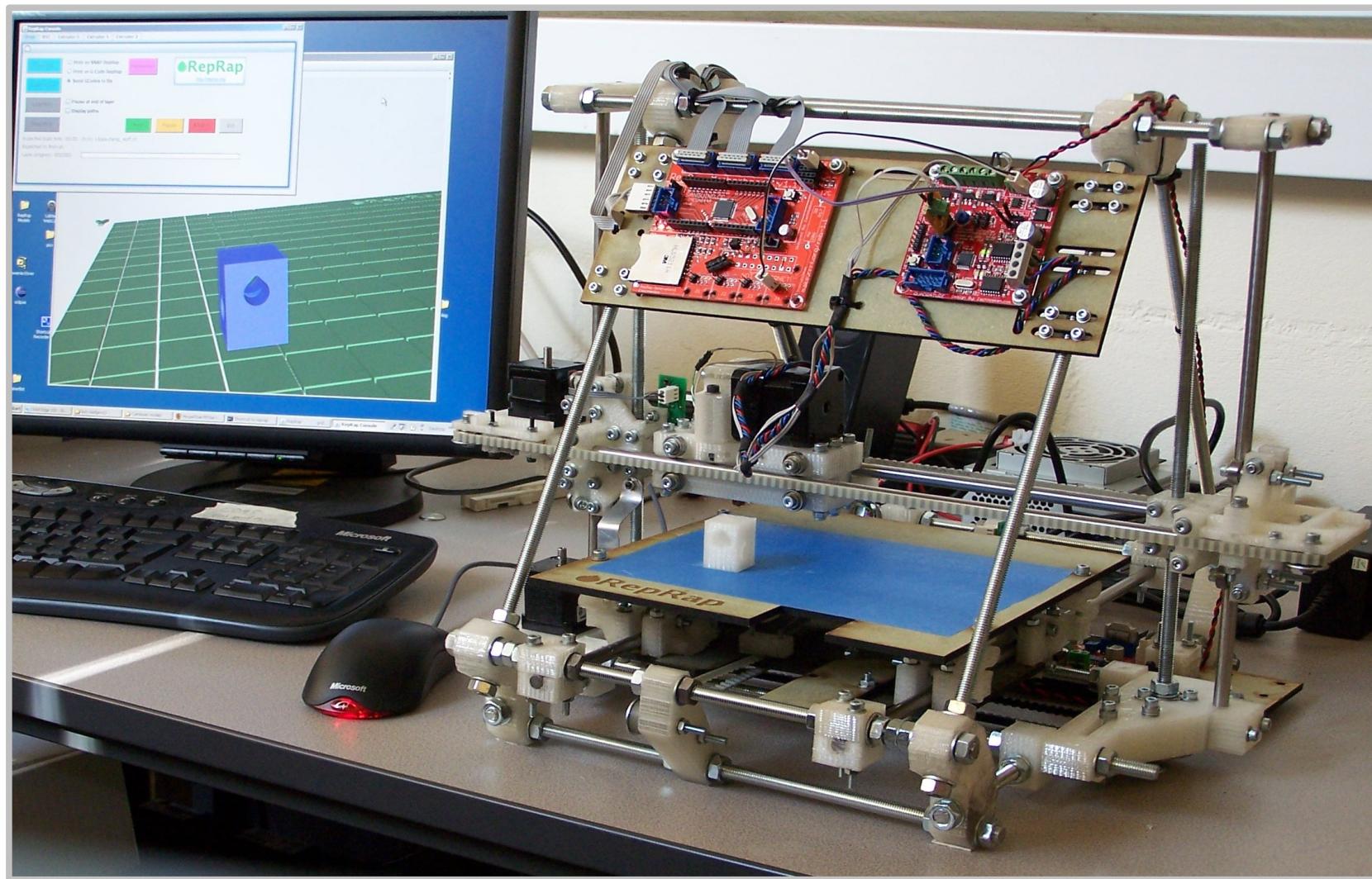
Filed May 5, 1952 7 Sheets-Sheet 1

The diagram illustrates a complex mechanical system designed for precise positioning. It features a vertical frame with a motor (32) and associated drive components (34, 36). A horizontal worktable (14) is supported by a base (10) and includes a track system (24) for movement. A control unit (52) is connected to the main assembly.

1950s: first computer numerical control (CNC) machines, attached to computers

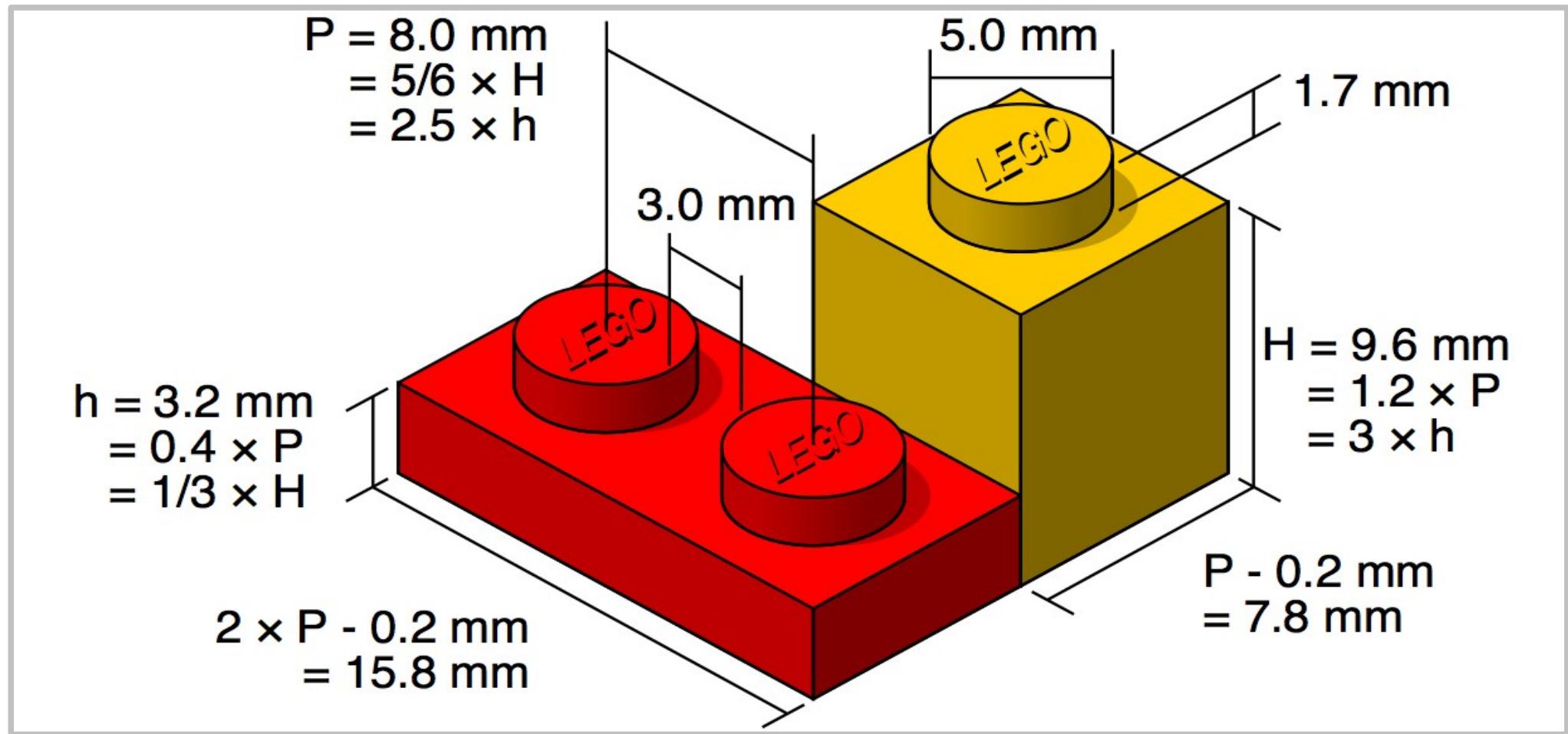
Source: <http://www.google.com/patents?id=rRpqAAAAEBAJ&printsec=drawing&zoom=4#v=onepage&q&f=false>

Fab.02: Machines that make machines



2005: RepRap (open source) 3D printer that replicates itself
(and that generated an ecosystem of 3D printers)

Fab.03: Materials with embedded code



Materials with an embedded code that help
shaping them.

Source: <http://en.wikipedia.org/wiki/Lego>

Fab.03: Materials with embedded code

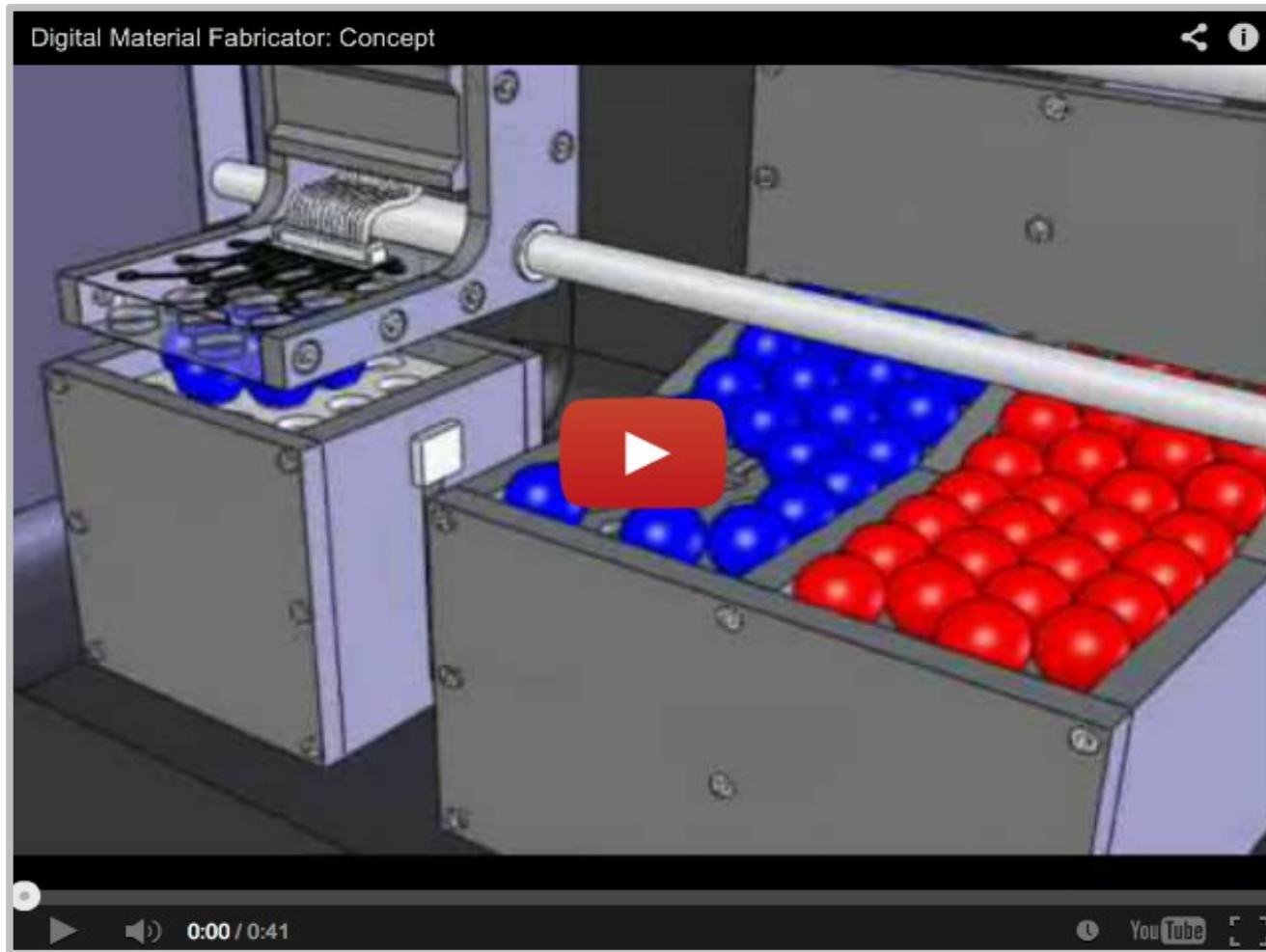


North Carolina State University: a simple way to convert two-dimensional patterns into three-dimensional (3-D) objects using only light.

Source: <http://news.ncsu.edu/releases/wmsdickeyfolding/>

<http://www.youtube.com/watch?v=NKRWZG67dtQ>

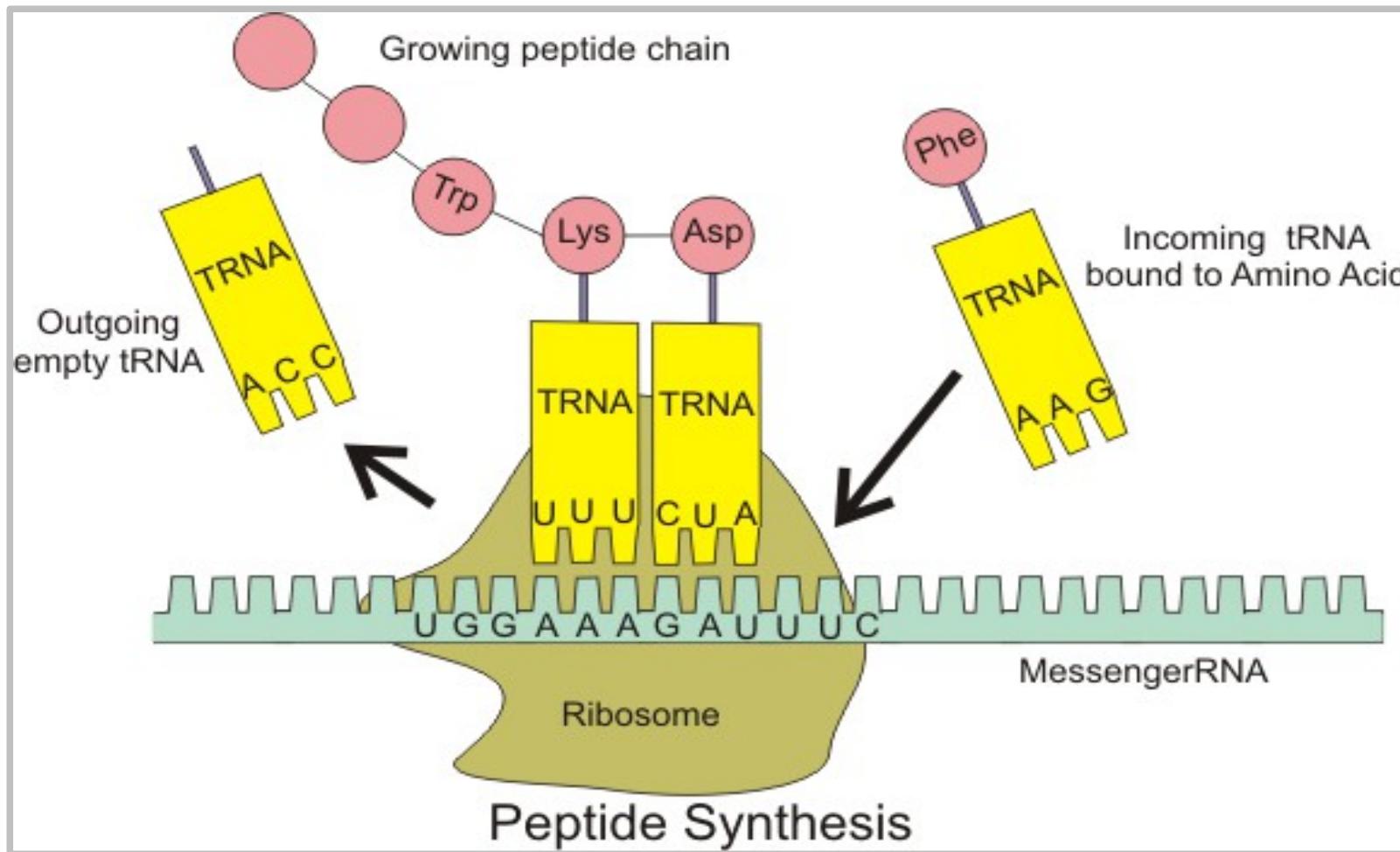
Fab.03: Voxels + Digital Material Fabricator



In the digital domain, a 3D object is composed voxels. Each voxel location is occupied (1) or not (0), so 3D space is digital (discrete) not analog (continuous).

Source: http://creativemachines.cornell.edu/Rapid_Assembler
<http://youtu.be/-szjlhVMGh4>

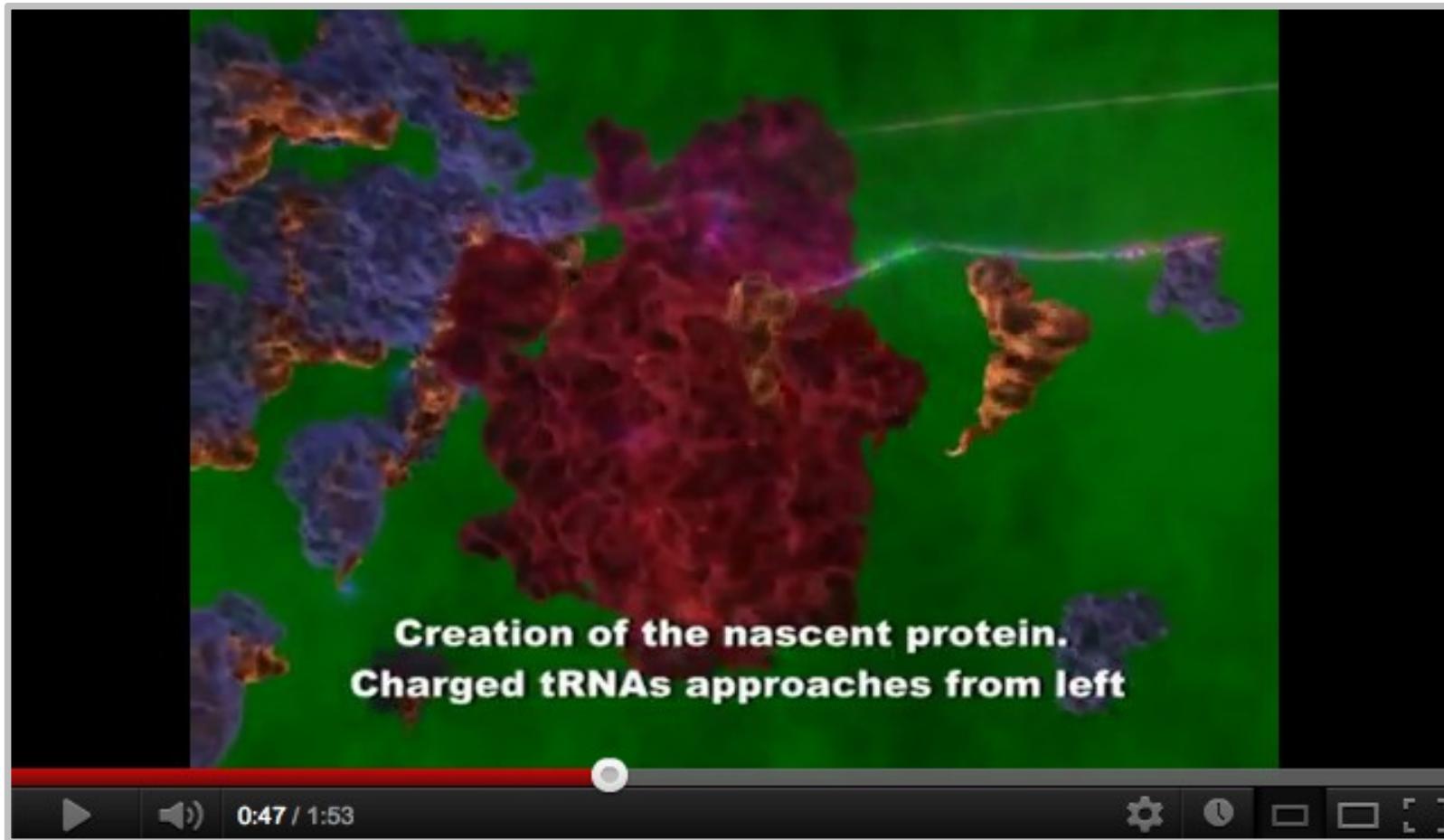
Fab.04: Materials with embedded program



Materials that have code, data and programs for self-manufacturing / auto-assembly.

Source: <http://en.wikipedia.org/wiki/Ribosome>

Fab.04: Materials with embedded program



Materials that have code, data and programs for self-manufacturing / auto-assembly.

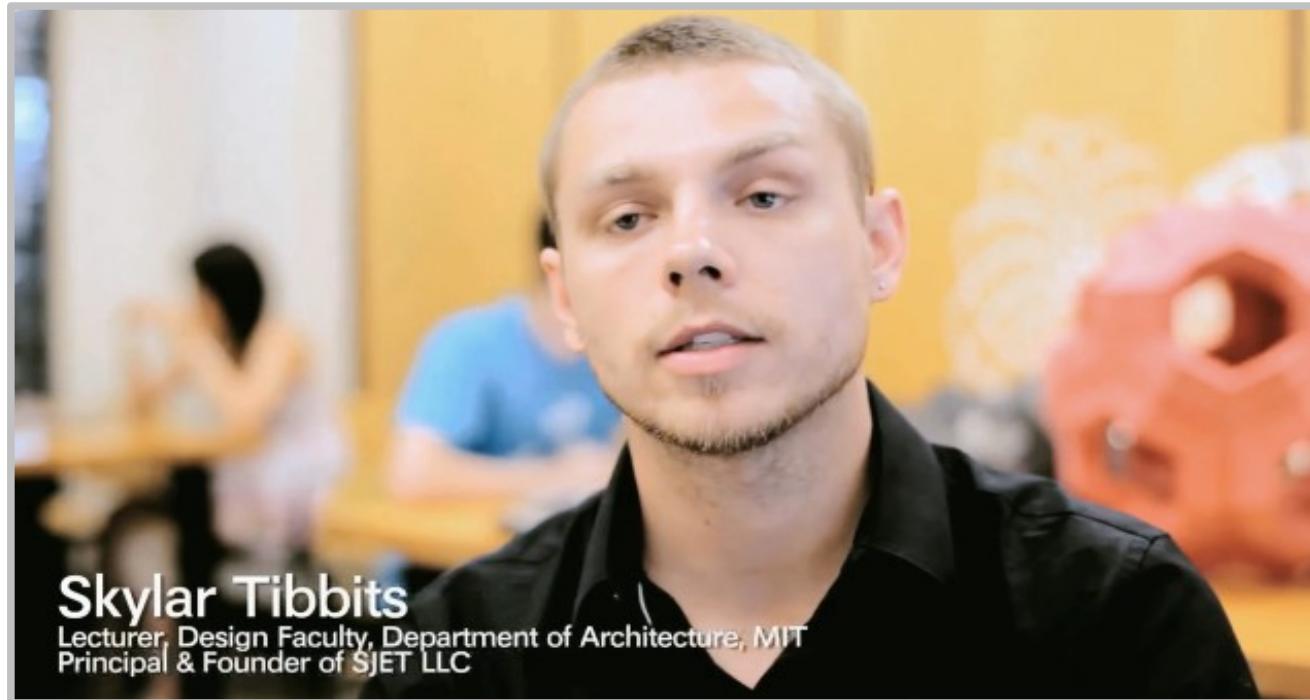
Fab.04: Materials with embedded program



Materials that have code, data and programs for self-manufacturing / auto-assembly.

Source: http://www.ted.com/talks/skylar_tibbits_can_we_make_things_that_make_themselves.html
<http://youtu.be/emW1TQ290ec?t=2m10s> <http://www.sjet.us/SJET-MIT.html>

Fab.04: Materials with embedded program



Skylar Tibbits

Lecturer Design Faculty, Department of Architecture, MIT
Principal & Founder of SJET LLC

Materials that have code, data and programs for self-manufacturing / auto-assembly.

Fab.04: coming to the Design world, soon

Training Bacteria To Grow Consumer Goods

By Christopher Mims

Thinkers at IDEO are working with scientists to find a way to have E. coli bacteria form objects--like a coffee cup--when exposed to light. It's nature's version of 3-D printing.



Even IDEO is already researching how to manufacture products starting from bacteria that create shapes through self-organization.

Source: <http://www.fastcompany.com/biomimicry/training-bacteria-to-grow-consumer-goods>

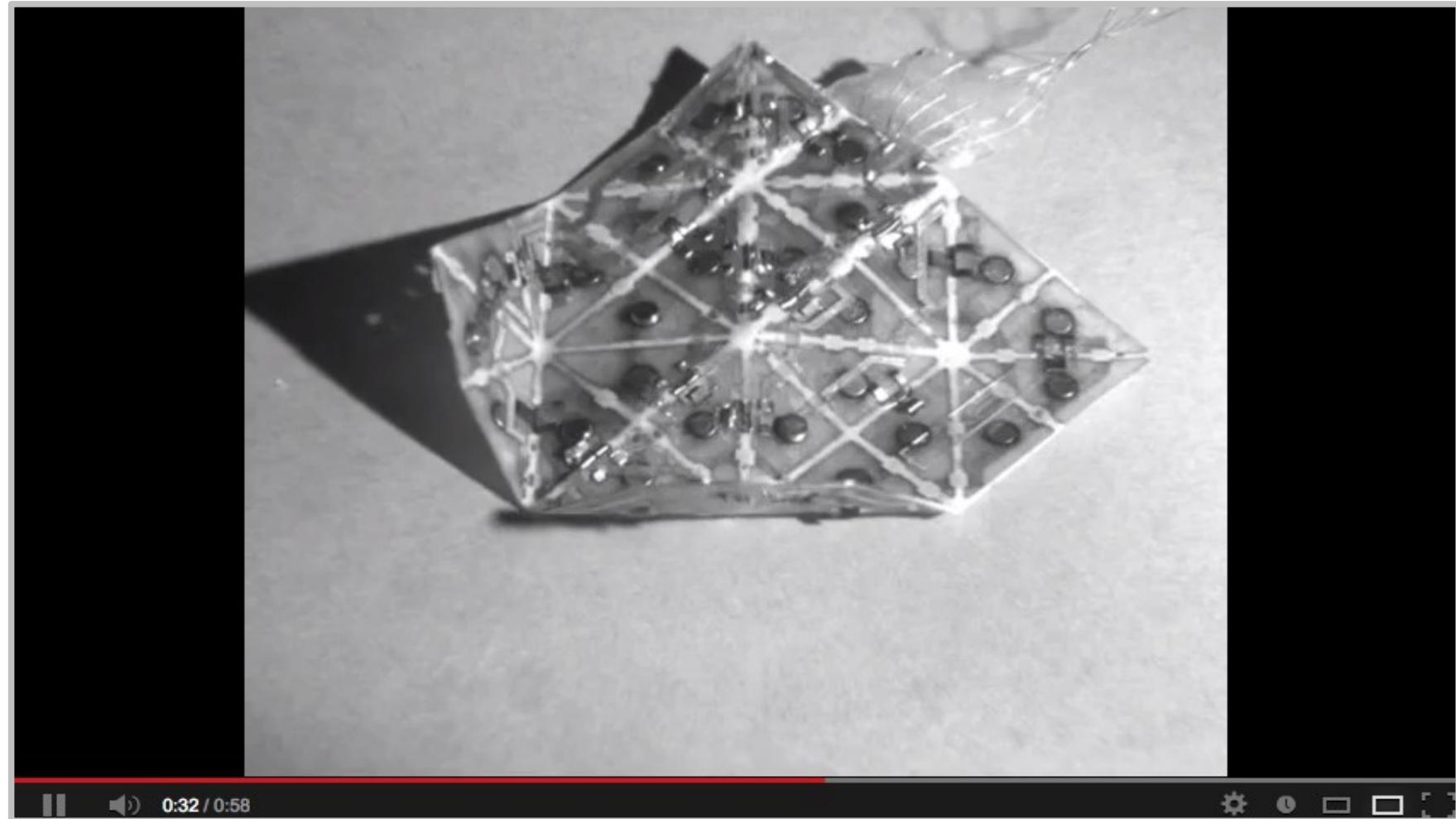
Fab.04: coming to the Design world, soon



[...] spreading a pattern on a responsive material to control how it deforms when exposed to a stimulus [...]

Source: <http://www.newscientist.com/blogs/nstv/2012/03/plant-mimicking-gel-could-morph-into-any-3d-shape.html>
<http://www.youtube.com/watch?v=j7MyjOTynK0>

Fab.04: Programmable Matter



Researchers at Harvard and MIT have reshaped the landscape of programmable matter by devising self-folding sheets that rely on the ancient art of origami.

Source: <http://news.harvard.edu/gazette/story/2010/06/shape-shifting-sheets-automatically-fold-into-multiple-shapes/>
<http://youtu.be/Pg8VAVWkz3k>

Fab.04: DNA bricks



Complex 3D structures by using short synthetic DNA strands (“DNA bricks”). Bricks with hundreds of distinct sequences self-assemble into prescribed 3D shapes.

Source: <http://m.sciencemag.org/content/338/6111/1177.abstract>

<http://wyss.harvard.edu/viewpressrelease/101/> <http://wyss.harvard.edu/viewpage/408/>

Fabbing: not just learning from biology...



A new bioprinter developed at a hackerspace can print living cells for less than the cost of an iPod touch.

Source: <http://www.instructables.com/id/DIY-BioPrinter/>
<http://www.wired.com/design/2013/01/diy-bio-printer/>

But coming back to Fab 1.0 / 2.0 in 2012



Laser cutting



CNC milling



Vinyl cutter



3D Scanner



3D printing



Digital sewing /
embroidery machine



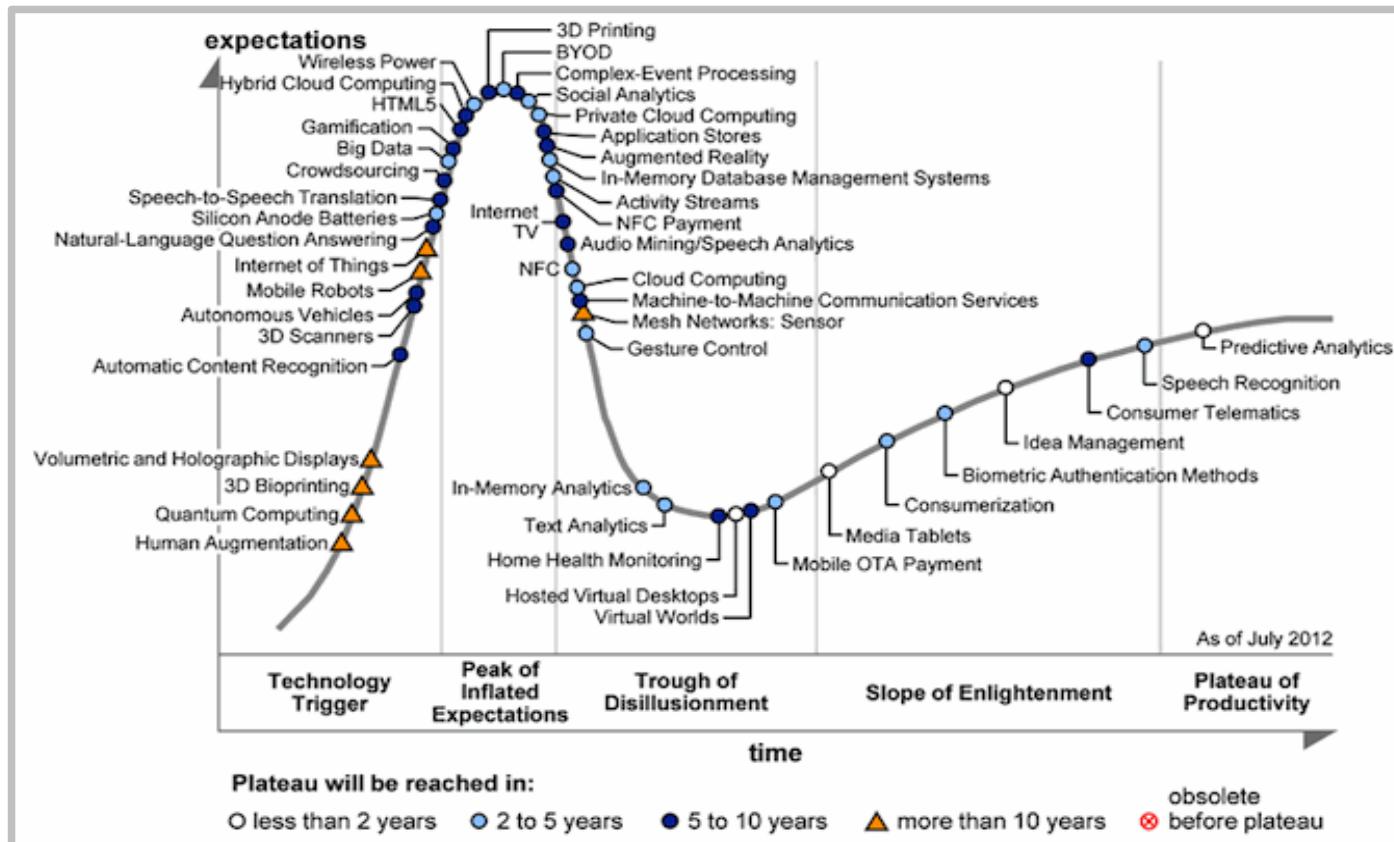
CNC milling



Electronics

This is what you usually can find in a FabLab, at the moment.

At the peak of enthusiasm, far from productivity



3D Printing has been steadily climbing to the peak of 'Inflated Expectations' over the past few years and now sits on top, poised for the drop.

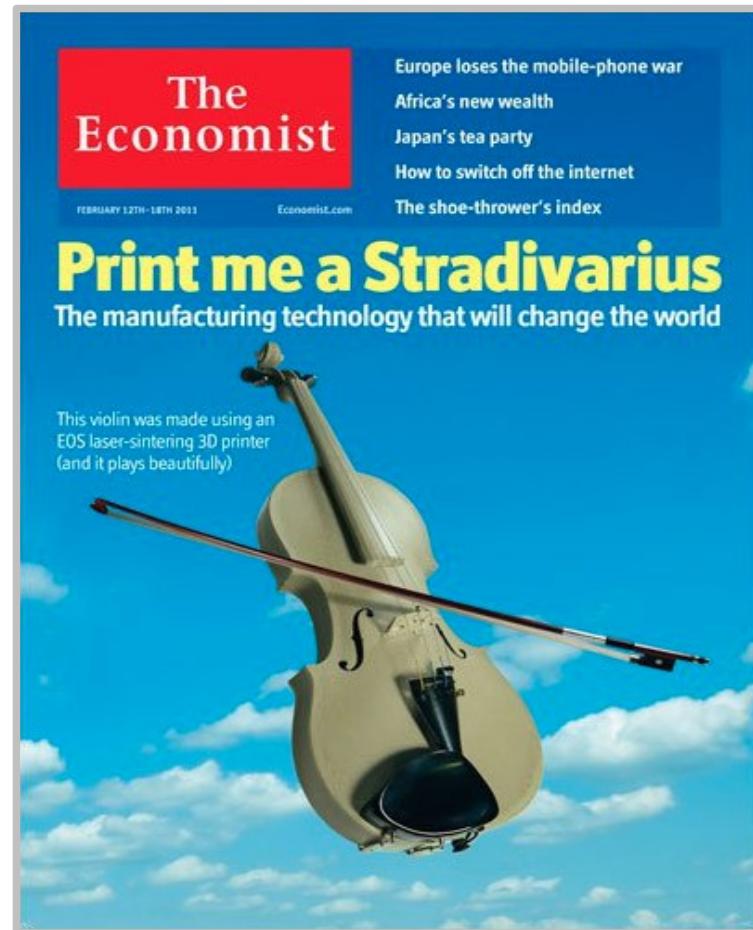
Democratization of Digital Fabrication

The image shows a screenshot of the Origo website. At the top left is the 'origo' logo. To the right are four menu items: 'Home' (highlighted with a light gray background), 'What is Origo?', 'The making of Origo', and 'About Us'. Below the menu is a large photograph of two young boys, approximately 5 to 7 years old, looking at a purple 3D printer. The printer's door is open, showing its internal mechanism. In front of the printer are two small, white, 3D-printed objects. Navigation arrows ('<' and '>') are positioned on the left and right sides of the photo, respectively. At the bottom center of the photo are two small circular dots.

“Hello, I am Origo. I am a 3D printer for ten year olds.”

Source: <http://www.origo3dprinting.com/>

... and Digital Fabrication became famous



Digital Fabrication / distributed manufacturing as a viable
tool / strategy for business.

Source: http://www.wired.com/magazine/2010/01/ff_newrevolution/
<http://econ.st/tnr97E>

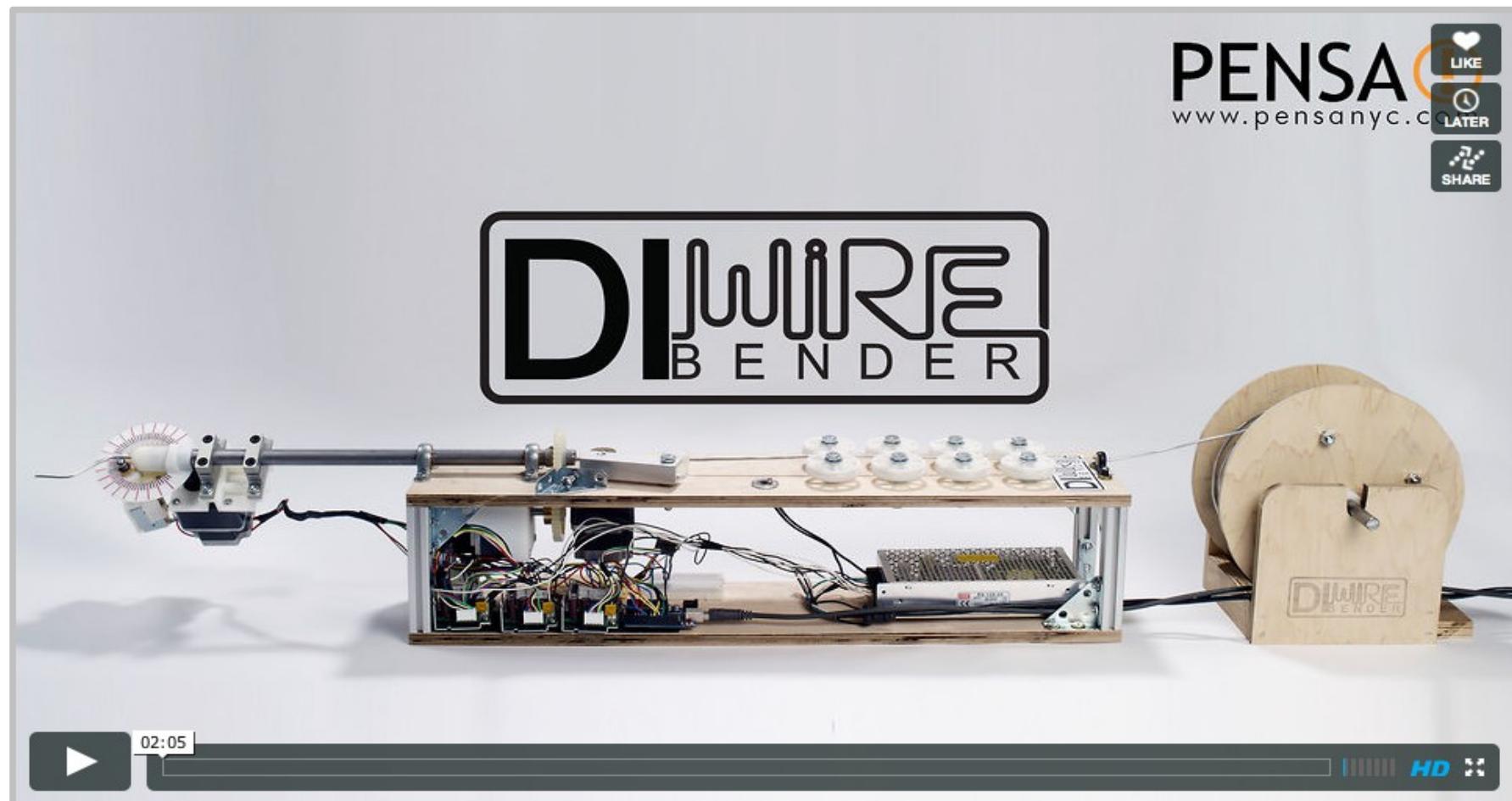
And build your own machine...



Not only cutting and printing, also weaving...

Source: <http://www.fastcodesign.com/1669627/holy-crap-this-mit-robot-might-one-day-weave-a-building>
<http://youtu.be/JgeFLGfvEM>

And build your own machine...



Not only cutting and printing, also bending...

Source: http://www.core77.com/blog/digital_fabrication/add_pensas_diwire_bender_to_your_diyer_arsenal_22383.asp
<http://vimeo.com/41425580>

... between digital and hand work...

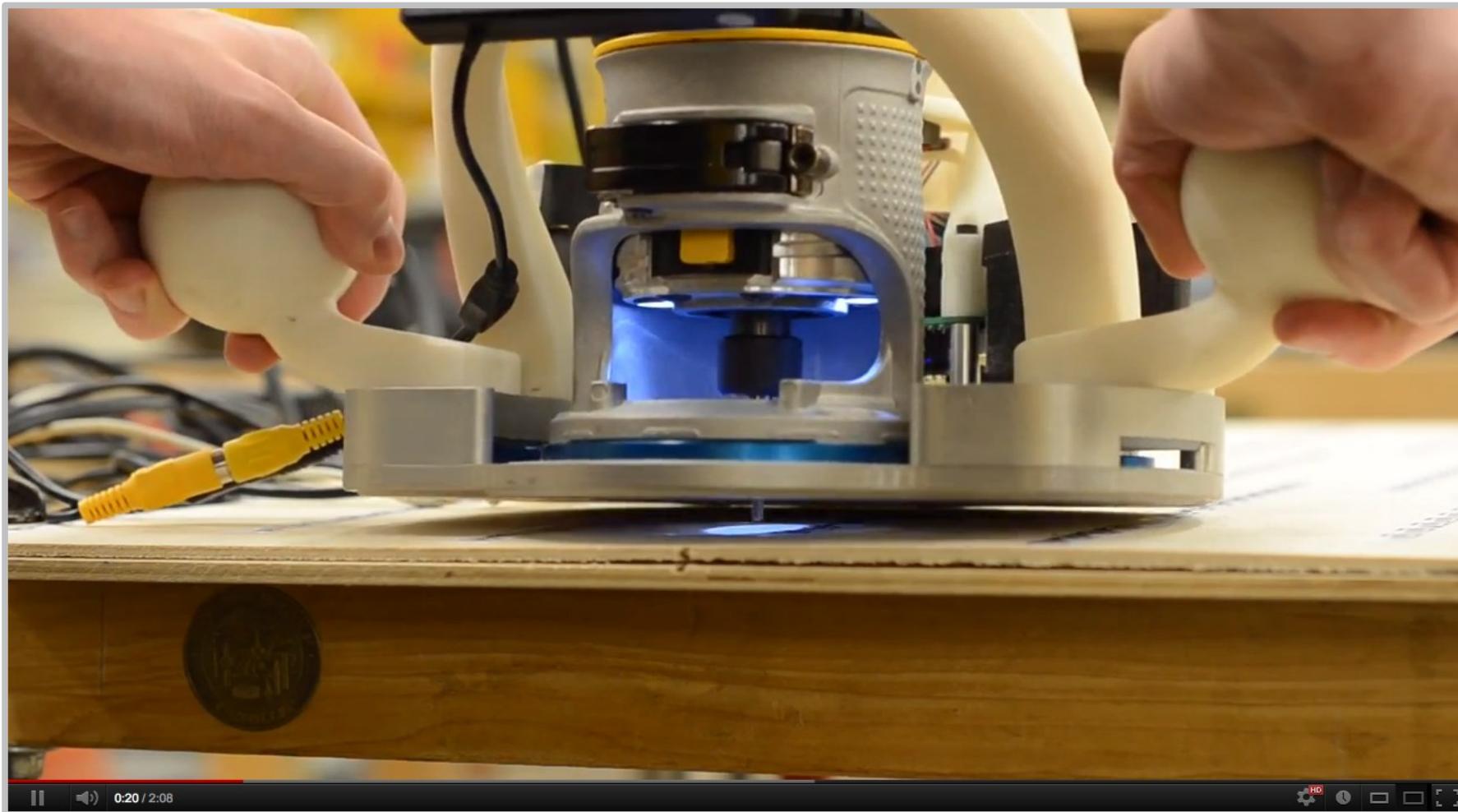


HAPTIC INTELLIGENTSIA is a human 3D printing machine that allows the user to tactually perceive the virtual object and to directly transform it into the physical.

Source: <http://www.fastcodesign.com/1665529/a-hybrid-machine-joins-3-d-printing-and-human-handicraft-video#3>

<http://vimeo.com/32538081>

... between digital and hand work...



A frame and a tool: the frame is positioned manually by the user and can adjust the position of the tool to correct for error in the user's coarse positioning.

Source: <http://www.alecrivers.com/positioncorrectingtools/>
<http://youtu.be/-UmL7xZZSUK>



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02.

FabLabs: spaces for collaborative use of digital fabrication technologies

A space that democratizes digital fabrication



Exploring collaboratively the interactions between bits and atoms, rather than making (almost) anything...

Source: <http://www.flickr.com/photos/protospace/5199454304/>

Conditions for being a FabLab

Conditions:

- * **public access** to the fab lab
- * **support and subscribe** to the fab lab charter
- * **share a common set** of tools and processes
- * **participate** in the global fab lab network (no isolation)

The **Fab Lab conformity rating** is a code that describes how closely a lab meets the conditions for use of the Fab Lab label. It is a quick summary of the lab "now", can change over time. The conformity rating is self-assessed or community-assessed.

Fab Charter

- * **Mission:** fab labs are a global network of local labs, enabling invention by providing access for individuals to tools for digital fabrication.
- * **Access:** you can use the fab lab to make almost anything (that doesn't hurt anyone); you must learn to do it yourself, and you must share use of the lab with other users and users
- * **Education:** training in the fab lab is based on doing projects and learning from peers; you're expected to contribute to documentation and instruction
- * **Responsibility:** you're responsible for:
 - * safety: knowing how to work without hurting people or machines
 - * cleaning up: leaving the lab cleaner than you found it
 - * operations: assisting with maintaining, repairing, and reporting on tools, supplies, and incidents
- * **Secrecy:** designs and processes developed in fab labs must remain available for individual use although intellectual property can be protected however you choose
- * **Business:** commercial activities can be incubated in fab labs but they must not conflict with open access, they should grow beyond rather than within the lab, and they are expected to benefit the inventors, labs, and networks that contribute to their success.

August 30, 2007

Fab Charter

What is a fab lab?

Fab labs are a global network of local labs, enabling invention by providing access to tools for digital fabrication

What's in a fab lab?

Fab labs share an evolving inventory of core capabilities to make (almost) anything, allowing people and projects to be shared

What does the fab lab network provide?

Operational, educational, technical, financial, and logistical assistance beyond what's available within one lab

Who can use a fab lab?

Fab labs are available as a community resource, offering open access for individuals as well as scheduled access for programs

What are your responsibilities?

- safety: not hurting people or machines
- operations: assisting with cleaning, maintaining, and improving the lab
- knowledge: contributing to documentation and instruction

Who owns fab lab inventions?

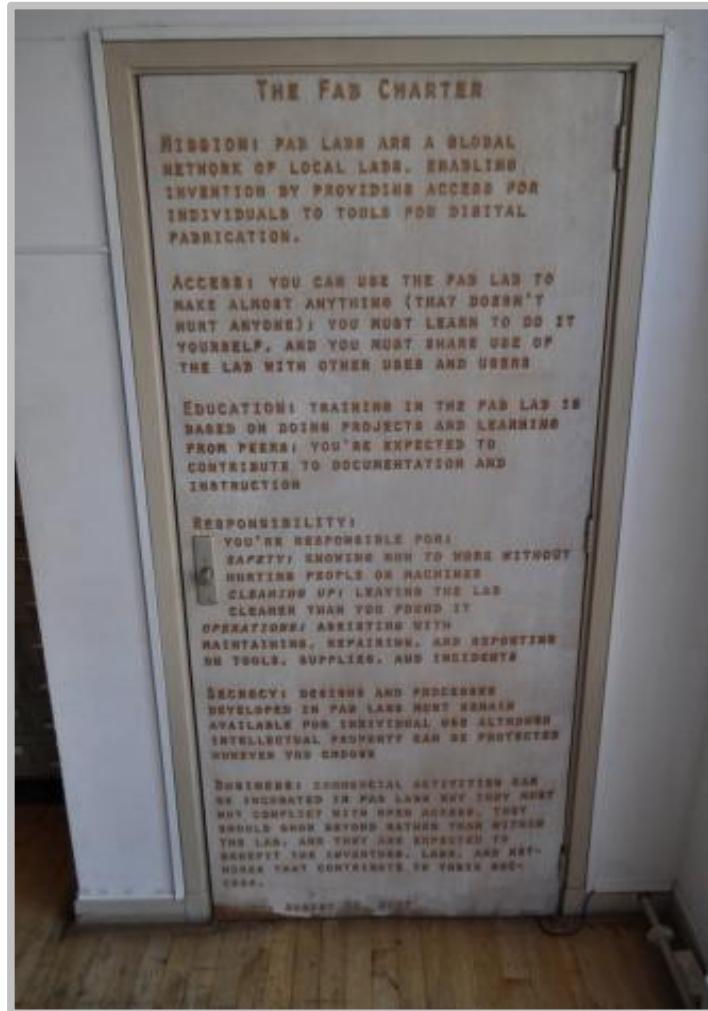
Designs and processes developed in fab labs can be protected and sold however an inventor chooses, but should remain available for individuals to use and learn from

How can businesses use a fab lab?

Commercial activities can be prototyped and incubated in a fab lab, but they must not conflict with other uses, they should grow beyond rather than within the lab, and they are expected to benefit the inventors, labs, and networks that contribute to their success

draft: October 20, 2012

Fab Charter (Amsterdam, Netherlands)



The Fab Charter is always visible in a FabLab

FabN : the yearly meeting



Every year in August in a different continent.

Fab Academy

APPLICATION FORM CONTACT FACULTY METHODOLOGY SCHOLARSHIPS VIDEOGALLERY WHAT IT IS?



FAB ACADEMY

PRINCIPLES, APPLICATIONS AND IMPLICATIONS OF DIGITAL FABRICATION



The Fab Academy began as an outreach project from the CBA, and has since spread to Fab Labs around the world.

Source: <http://fabacademy.org/>

Fab Academy: my experience

Massimo Menichinelli

Exercises

Final project

Digital Fabrication Studio course

About

Back to FabAcademy 2012

Massimo @ FabAcademy 2012

Here you can find all the notes, exercises, documents of the final projects done by Massimo Menichinelli for the FabAcademy 2012 from Aalto FabLab (Helsinki) and mentored by FabLab Amsterdam.



Final project: FABMoney

FABMoney is an open source digital currency for enabling collaboration in a FabLab. The project is completely open source software, data,

Digital Fabrication Studio

About Massimo...

My background is in Industrial and Service Design since I have a Master of Science in Industrial Design from the Politecnico di Milano (Italy).

Aalto FabLab

I attended the FabAcademy from the Aalto FabLab in Helsinki, a lab I've helped building with Anu Maatta at the Aalto Media Factory. We

An example of documentation...

Source: <http://academy.cba.mit.edu/2012/students/menichinelli.massimo/index.html>

Fab Foundation

info@fabfoundation.org



FAB FOUNDATION

[About](#)[News](#)[Fab Labs](#)[Fab Exchange](#)[Mobile Fab Lab](#)[FAQ](#)[Contact us](#)

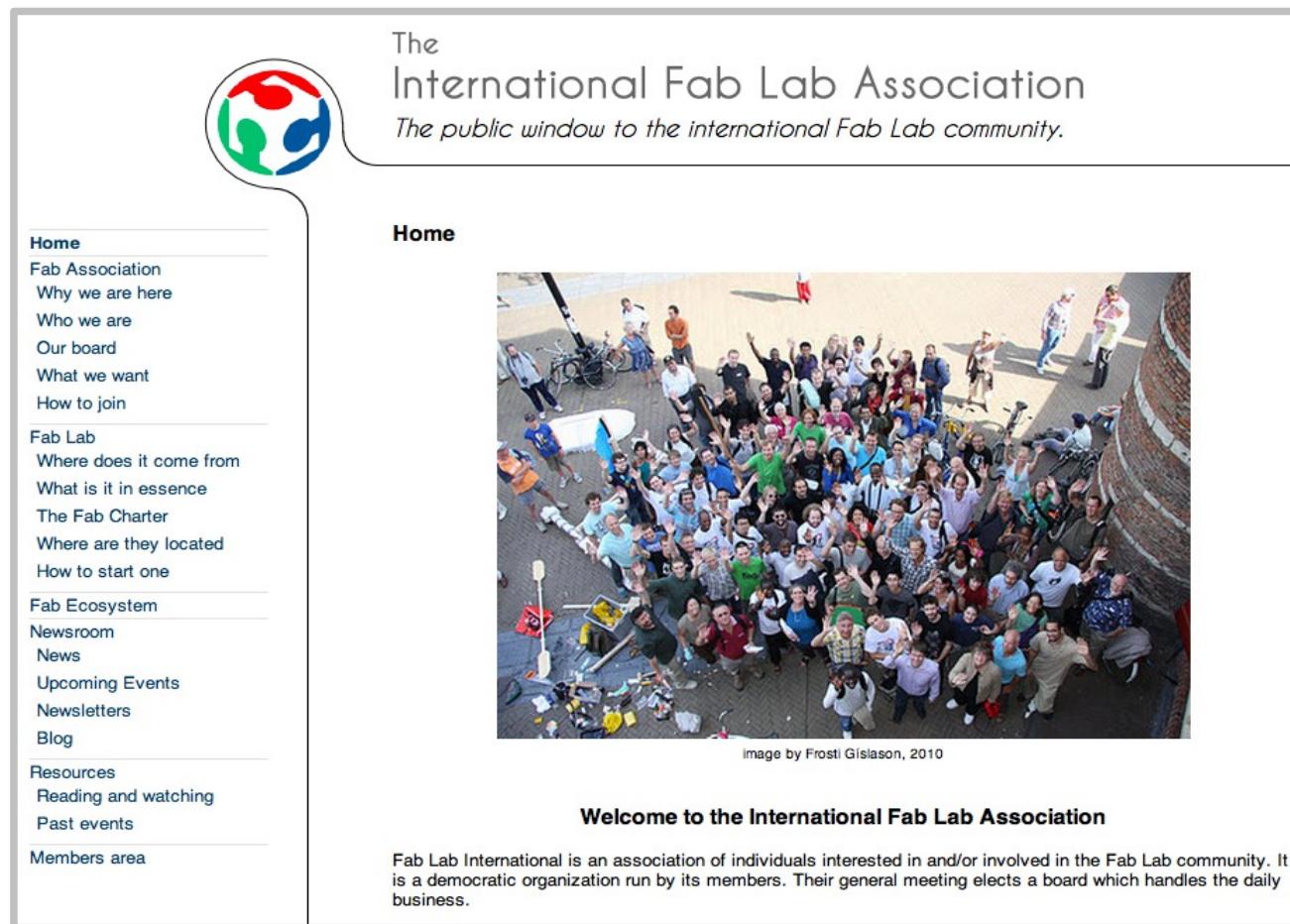
Digital Fabrication



The Fab Foundation was formed February 9, 2009 to facilitate and support the growth of the international fab lab network.

Source: <http://www.fabfoundation.org/>

The International Fab Lab Association



The screenshot shows the homepage of the International Fab Lab Association. At the top right, the logo consists of three stylized human figures in red, green, and blue. To the right of the logo, the text reads "The International Fab Lab Association" and "The public window to the international Fab Lab community." Below this, a large photograph shows a large group of people gathered outdoors, waving at the camera. A caption below the photo reads "Image by Frosti Gislason, 2010". The main content area is titled "Home" and includes the following text:
Welcome to the International Fab Lab Association
Fab Lab International is an association of individuals interested in and/or involved in the Fab Lab community. It is a democratic organization run by its members. Their general meeting elects a board which handles the daily business.

Home

- Home
- Fab Association
 - Why we are here
 - Who we are
 - Our board
 - What we want
 - How to join
- Fab Lab
 - Where does it come from
 - What is it in essence
 - The Fab Charter
 - Where are they located
 - How to start one
- Fab Ecosystem
 - Newsroom
 - News
 - Upcoming Events
 - Newsletters
 - Blog
- Resources
 - Reading and watching
 - Past events
- Members area

On the 4th of July 2011, the International Fab Lab Association was established. It is an association with members, a Board and an Academic Council, etc.

Source: <http://fablabinternational.org/>
<http://fablabinternational.blogspot.com/>

From Fab Foundation: fablabs.io

The screenshot shows the fablabs.io website interface. At the top, there is a navigation bar with a globe icon, a search bar containing "Search Labs...", and links for "Labs" and "Machines". On the right side of the top bar is a user profile icon labeled "Me". Below the navigation bar, the page title is "Labs / All Countries". There are two buttons: "LIST" (which is highlighted in blue) and "MAP". The main content area displays five FabLab entries in cards:

- 3dlab-fabcafe**
Buenos Aires, Argentina | cotizaciones@3dlab-fabcafe.com | 1131220461
We have 3d scanning service. More than 10 different 3d printers.
Wide format inkjet vinil cutterm tools
- 7elektron**
Belo Horizonte, Minas Gerais, Brazil | fablab@7elektron.com.br | +55 31 99825166
- 8 FabLab Drôme**
Crest, Drôme, France | contact@fablab-drome.fr
- Aalto Fab Lab**
Helsinki, Suomi, Finland
- ACoLab**
Clermont-Ferrand, France | contact@acolab.fr | +33(0)651800518

To the right of the cards is a sidebar titled "Filter by Country" which lists countries and their counts:

Country	Count
All Countries	313
Afghanistan	1
Argentina	4
Australia	2
Austria	1
Belgium	7
Brazil	7
Bulgaria	1
Canada	6
Chile	4
Colombia	2
Costa Rica	1
Czech Republic	1
Denmark	3
Egypt	2
Ethiopia	1
Finland	1

The official platform for mapping the international network of FabLabs.

Fab Lab Amsterdam (Netherlands)



Fablab Amsterdam is hosted by Waag Society, a non profit organisation active in the field of social innovation through creative technology.

Source: <http://fablab.waag.org/>

<http://www.flickr.com/photos/37873897@N06/4973326149/>

Mini Fab Lab (Utrecht, Netherlands)



A FabLab in your room for 3500 €.

Mini Fab Lab / 10k: the community



The screenshot shows the homepage of the "Small Fab Lab Network" Facebook group. At the top, there is a horizontal navigation bar with links for "Small Fab Lab Network", "Members", "Events", "Photos", and "Files". To the right of these are buttons for "Notifications" (with a checkmark), "+ Create Group", a gear icon, and a search icon.

Below the navigation bar, there is a grid of small profile pictures of group members. On the left side of the main content area, there is a sidebar with a dropdown menu set to "All", a "+ Create Doc" button, and a "+ Upload File" button. Below these are three file attachments:

- FS5gen settings.xlsx** - Downloaded on November 4, 2013 at 9:43am by Bart Bakker.
- Small FabLab Suite.xlsx** - Downloaded on October 3, 2013 at 1:05am by Anna Waldman-Brown.
- 10k labs presentation.ppt** - Downloaded on October 3, 2013 at 12:53am by Anna Waldman-Brown.

On the right side of the page, there is a summary section for the group:

- ABOUT**: 174 members
- Open Group**
- Welcome to the burgeoning Small Fab Lab Network. If the startup cost for a regular fab lab is about US\$100k, can we start a small fab lab for about US\$10k? Such a suite must – like the MIT standard suite – comply to conditions like stable product, worldwide shipping, open source where possible and ease of use. We're developing a comprehensive bill of materials for small fab labs and facilitating their growth worldwide.
- This network was inspired by Bart Bakker's miniFabLab: <http://www.minifablab.nl/>
- 174 members (5 new) · Invite by Email**
- + Add People to Group**
- Tags:** Fab lab · Education

Welcome to the burgeoning Small Fab Lab Network. If the startup cost for a regular fab lab is about US\$100k, can we start a small fab lab for about US\$10k?

Source: <https://www.facebook.com/groups/smallfablab/>

Mobile Fab Lab



In USA, Europe, South Africa...

Fab Lab Afghanistan (Jalalabad, Afghanistan)



Not only in USA or Europe ...

Fab Lab Afghanistan: FabFi, a project



An open-source, FabLab-grown system using common building materials and off-the-shelf electronics to transmit wireless ethernet signals.

Source: <http://fabfi.fabfolk.com/>

FabLab Barcelona (Spain)



FAB LAB BARCELONA

HOME EL FAB LAB EQUIPAMIENTO SERVICIOS VIDEOS GALERIA CONTACTO MACHINE RESERVATION WIKI

THURSDAY SEPTEMBER 22ND 2011

Search ...



Thursday, August 25, 2011

Muestra Fab Products en el Fab7 > Concurso de innovacion en el Fab Lab Bcn

Iaac
Institute for advanced architecture of Catalonia

Featured

Fab 7 – Lima (Peru). Séptima conferencia mundial de Fab Labs.
Cada verano, la red mundial de Fab Labs se reúne de manera "física" en un lugar del mundo para discutir [Read More]



UNIBE workshop > Fabricacion Digital en el Caribe
El taller UNIBE workshop tuvo lugar en el Fab Lab Barcelona del 26 al 30 de Abril. 14 estudiantes de primer año de [Read More]



GREEN FAB LAB Project presentation at Valldaura
Last Friday the IAAC community launched the new project for the upcoming years. The GREEN FAB LAB will be a research, [Read More]



From the Institute for Advanced Architecture of Catalonia (IAAC).

Source: <http://fablabbcn.org/>

FabLab Barcelona: FabLab House, a project



FabLab House

info@fablabhouse.com

IAAC | MIT's CBA | Fab Lab



"Una casa solar debe fabricarse con un material solar, como la madera."

Salvador Rueda, ecólogo Director de

The Fab Lab House is a self-sufficient dwelling produced to take part in the Solar Decathlon Europe 2010.

Source: <http://www.fablabhouse.com/>

A FabLab and its local context



A city with a long tradition of organic / generative architecture and experimental building technologies.

Source: http://en.wikipedia.org/wiki/Casa_Batllo

Green FabLab Barcelona

The screenshot shows the homepage of the Green FabLab website. At the top left is the logo 'GREENFAB LAB' with a stylized globe icon. The main title 'Naturaleza, Tecnología y Energía.' is displayed above a photograph of a landscape with a building on a hill. Below the photo is a map of a road network. On the right side, there are logos for 'GOBIERNO DE ESPAÑA', 'MINISTERIO DE INDUSTRIA, TURISMO Y COMERCIO', 'plan avanza...', 'Iaac Instituto de arquitectura avanzada de Cataluña', 'Con el apoyo de THE CENTER FOR BITS AND ATOMS Massachusetts Institute of Technology', and 'BECOLOGIA'.

Naturaleza, Tecnología y Energía.

March 24, 2010

Parc de Collserola, Barcelona

canalladauratotal_800x6001

PLAN AVANZA...

Un proyecto de

Iaac

Instituto de arquitectura avanzada de Cataluña

Con el apoyo de

THE CENTER FOR BITS AND ATOMS
Massachusetts Institute of Technology

BECOLOGIA

A fablab that researches sustainable technologies with and for digital fabrication.

Source: <http://greenfablab.org/>

The future: Barcelona FabCity



"Toni Vives [...], Head of the Department the Urban Habitat in the Office of the Mayor of Barcelona and member of the IAAC Board of Directors, presented the city's plan to become a "Fab City" with multiple Fab Labs in neighborhoods around Barcelona."

Source: <http://www.iaacblog.com/blog/2011/iaac-at-fab-7-in-lima-peru/>

Fab Lab Brand: no trademark (until recently)



So far, and except some countries (Netherlands) where it
is managed by the local association.

Source: <http://fab.cba.mit.edu/about/logos/index.html>

Fab Lab and Brand: a possible strategy?



Do you recognize this brand? It tried to open a FabLab in Madrid
to show how it cares about creativity.

Source: <http://www.flickr.com/photos/journal-du-design/3895643669/>

Absolut Lab (Madrid, Spain)



A huge FabLab sponsored by Absolut Vodka, that was closed few months after its opening...

Source:<http://www.franciscosegarra.com/absolut-lab-proyecto-interiorismo/>



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03.

FabLabs and FABBING: applications and examples

A space for DIY projects



The first value offer is a space for people to develop
(and learn) their own projects.

Source: Scott Beale / Laughing Squid <http://laughingsquid.com>
<http://www.flickr.com/photos/laughingsquid/133324021/>

No idea for a project? Hack one!

The screenshot shows the homepage of the IKEA Hackers website. At the top, the "IKEA HACKERS" logo is displayed, featuring the word "IKEA" in yellow and "HACKERS" in blue, accompanied by a cartoon illustration of a person holding a book and a lightbulb. Below the logo is a navigation bar with four tabs: "Home" (which is active), "About", "Start here", and "Post a hack". The main content area contains three images of hacked IKEA furniture: a mirrored cabinet labeled "Mirrored luxe", a flexible lamp arm labeled "Extendable bedside lamp", and a repainted Aneboda chest labeled "Aneboda chest makeover".

IKEA HACKERS

Home About Start here Post a hack

Mirrored luxe Extendable bedside lamp Aneboda chest makeover

IKEA products are cheap enough, there are many options and components that can be reused.

Source: <http://www.ikeahackers.net/>

Generative Design

nervous system SHOP BLOG ABOUT US TOOLS STOCKISTS JOBS CONTACT login cart: 0 Items

JEWELRY HOUSEWARES CONCEPTS

vessel pendant and spiral bracelet model photography by Natalia Borecka

featured products

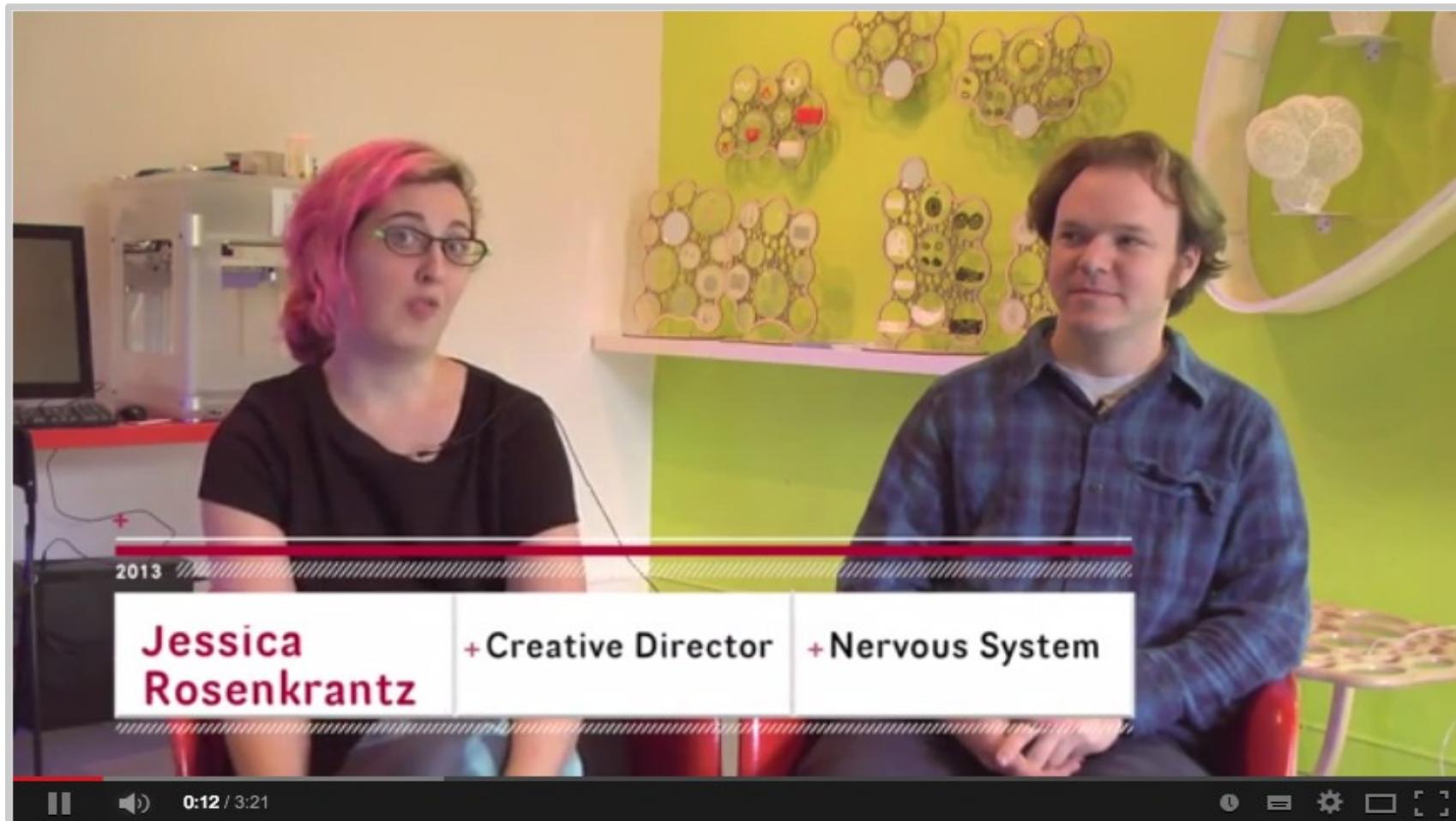
SILVER VESSEL PENDANT \$275.00

HIVE TRIVET \$12.00

Generative Design projects need digital fabrication technologies for being manufactured.

Source: <http://www.n-e-r-v-o-u-s.com/>

Generative Design



Generative Design projects need digital fabrication technologies for being manufactured.

Source: <https://www.youtube.com/watch?v=aWWkB31QXck>

Physical Data Visualization

// MICROSONIC LANDSCAPES

An algorithmic exploration of the music we love. Each album's soundwave proposes a new spatial and unique journey by transforming sound into matter/space: the hidden into something visible.



// ARVO PÄRT
Für Alina



// THIRD
PortisHead



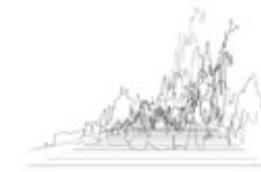
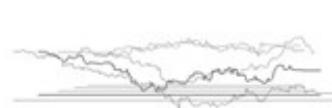
// ANOTHER WORLD
Antony & the Johnsons



// PINK MOON
Nick Drake



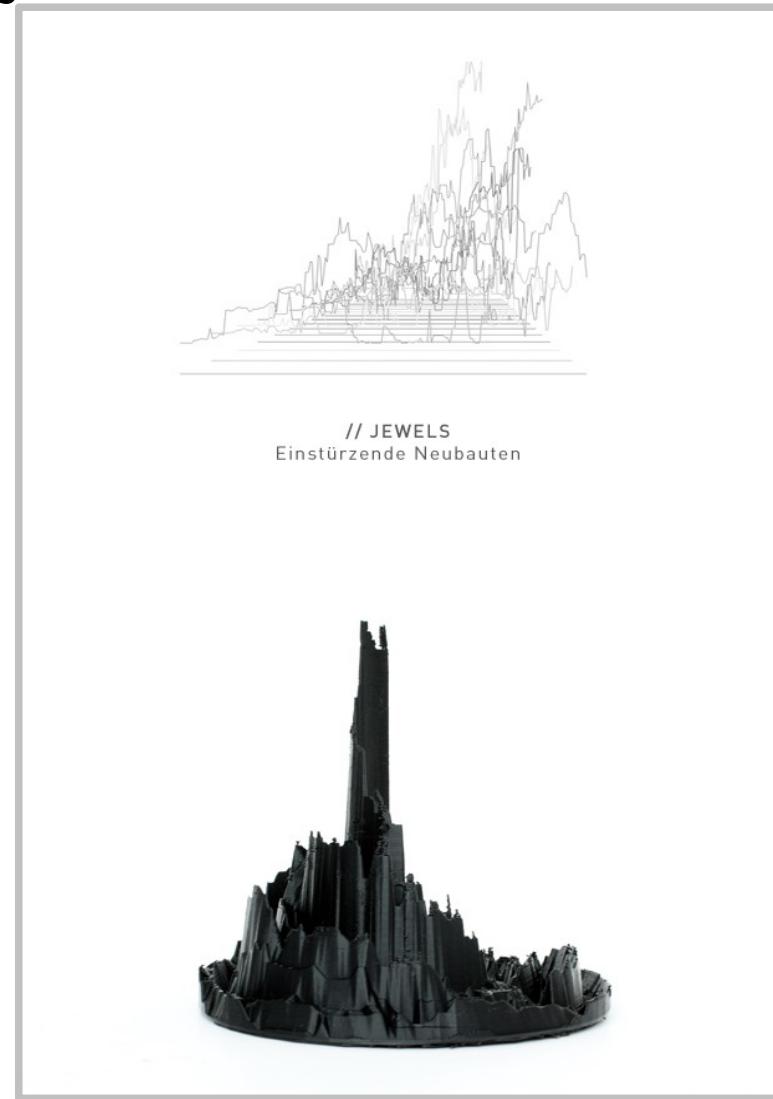
// JEWELS
Einstürzende Neubauten



Digital Fabrication can be used for rendering visible and physical intangible data and concepts.

Source: <http://www.realitat.com/microsonic/>

Physical Data Visualization



Digital Fabrication can be used for rendering visible and physical intangible data and concepts.

Source: <http://www.realitat.com/microsonic/>

Mass Customization



Mass customization can be enabled in an easier way with digital fabrication technologies (and places for interacting with customers).

Source: <http://nikeid.nike.com/nikeid/>

Custom Prosthetics



Building customized prosthetics, at home!

Source: <http://youtu.be/WoZ2BgPVtAO>

http://www.core77.com/blog/digital_fabrication/wrex_3d_printed_magic_arms_and_the_future_of_pediatric_prosthetics_23101.asp

Custom Low-cost Prosthetics

The
Low Cost
Prosthesis

Contact FAQ

[home](#) [the need](#) [what we do](#) [partners](#) [blog](#)



Elements of the Low Cost Prosthesis

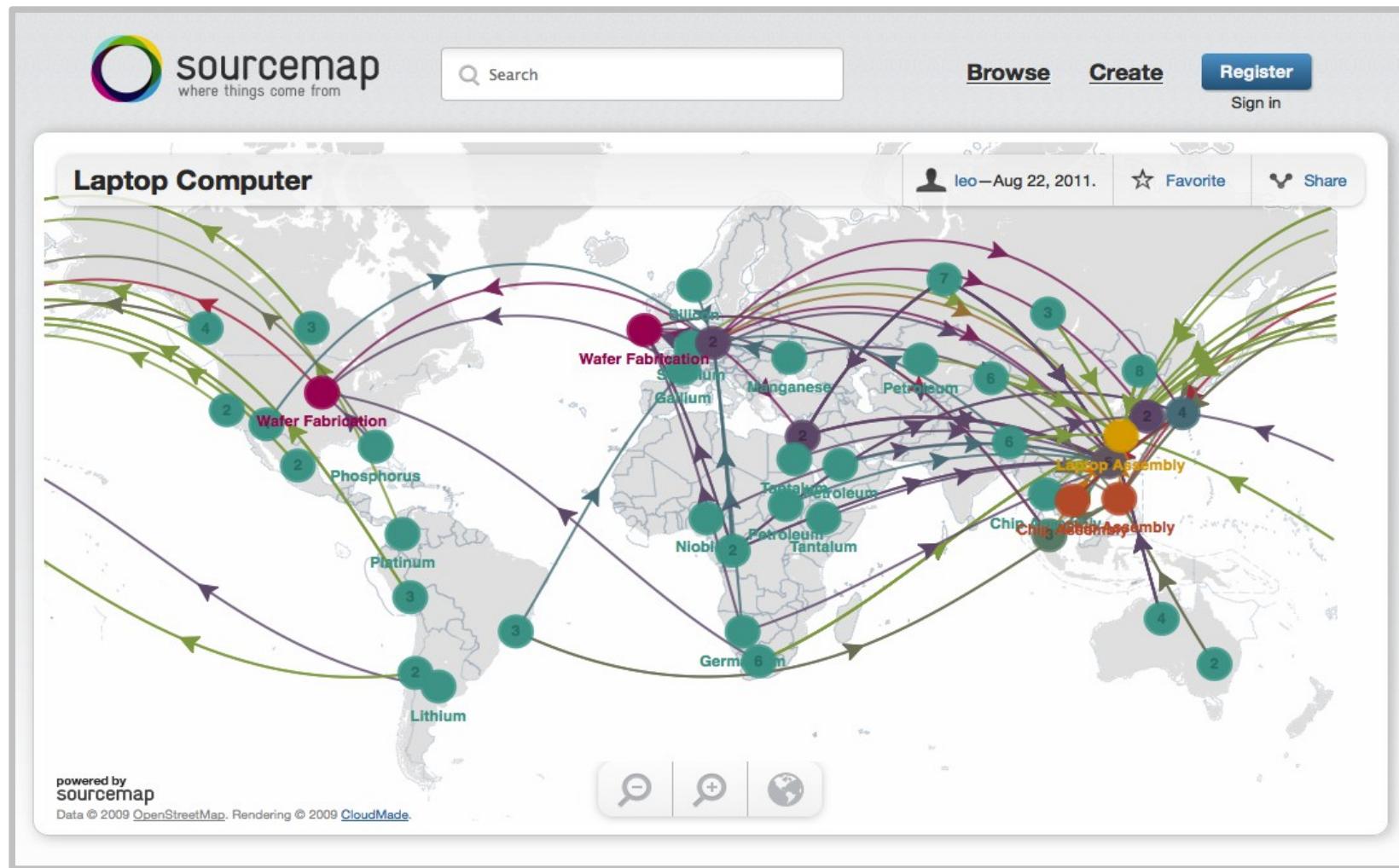


The Low Cost Prosthesis project aims at developing a lower leg prosthetic with production costs below \$50. An important cause, because the need for prostheses is growing and the costs are often high. Due to the increasing rate of amputations, there is an ever-growing demand for prosthetic limbs.

Building low-cost customized prosthetics, at home, from
FabLab Amsterdam.

Source: <http://www.lowcostprosthesis.org/>

Shorter and more sustainable supply chains



Visualizing and redesigning supply chains, through open source and open data software.

Source: <http://www.sourcemap.com>

Instead, what cannot we do?

The screenshot shows the homepage of Defense Distributed. At the top, the site's name "DEFENSE DIST." is displayed in a large, stylized font. To its right are two small colored squares (brown and tan) and a "NEWSLETTER SUBSCRIPTION" button. Below the main title is a banner with the text "HOME OF THE WIKI WEAPON". Underneath this banner is a navigation menu with links: OUR PLAN, FAQ, ABOUT US, THE GUNS, EVENTS, MEDIA, BLOG, WIKI, and CONTEST. A "DONATE" button is located below the navigation menu. On the left side of the page, there are two sections: "WATCH VIDEO" and "SPREAD THE WORD". The "WATCH VIDEO" section features a video thumbnail showing a 3D printer printing a gun part, with a play button overlaid. The "SPREAD THE WORD" section contains the text "HOME OF THE WIKI WEAPON. A COLLABORATIVE PROJECT TO CREATE FREELY AVAILABLE PLANS FOR 3D PRINTABLE GUNS." Below this text is another "DONATE" button. On the right side of the page, there is a "NEWSLETTER SUBSCRIPTION" button, a "bitcoin ACCEPTED HERE" logo, and social media icons for Facebook, Twitter, and RSS. At the bottom of the page, there is a footer with the text "The Wiki Weapon" and "printablegun.com".

The rise of 3D printed weapons, but you cannot build them in a FabLab (it's against the Fab Charter).

Source: <http://defensedistributed.com/>

Instead, what cannot we do?

DESIGN | product design | miscellaneous | apocalypse prep

Looks Could Kill: Using 3-D Printers to Design Guns

BY JOSEPH FLAHERTY | 08.10.12 7:45 AM

Facebook Like 55 | Twitter Tweet 66 | Google +1 7

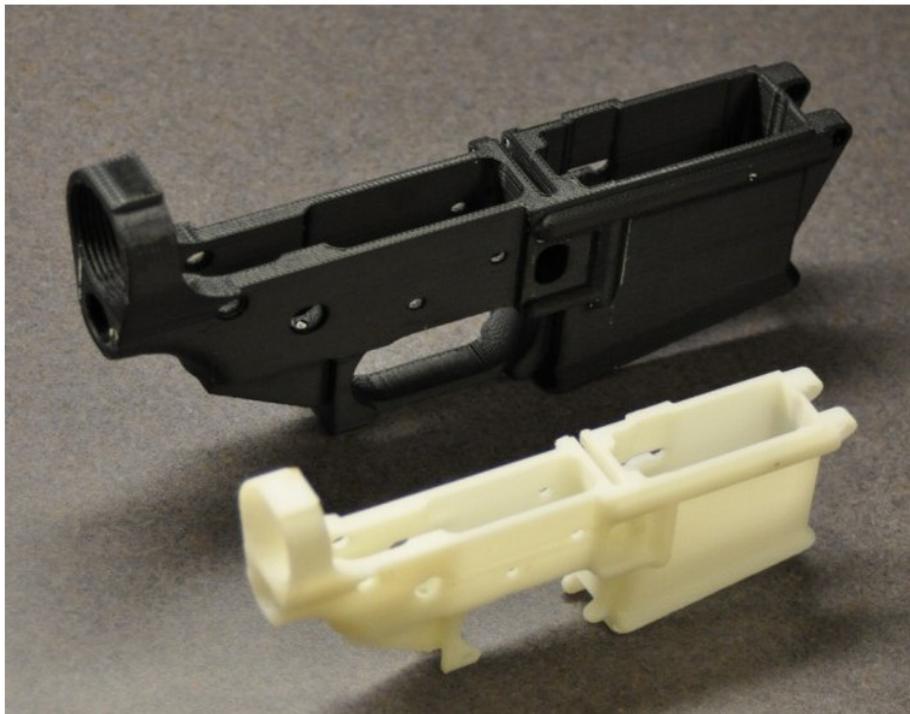


Photo: Courtesy Michael Guslick/Haveblue.org

The rise of 3D printed weapons, but you cannot build them in a FabLab (it's against the Fab Charter).

Source: <http://www.wired.com/dangerroom/2012/08/3d-weapons/>
<http://www.wired.com/design/2012/08/rapid-fire-rapid-prototypes/>

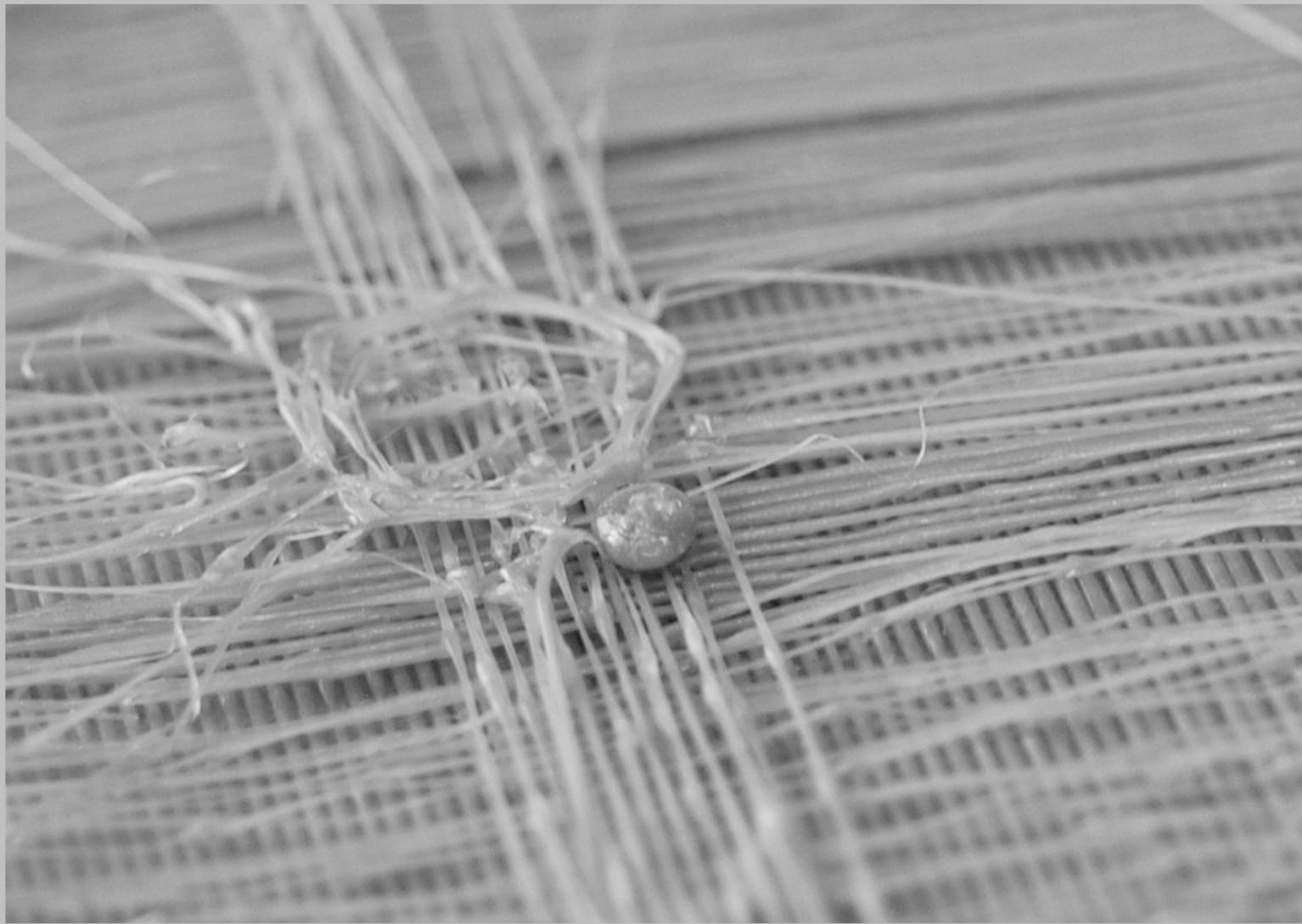
Instead, what cannot we do?



The rise of 3D printed weapons, but you cannot build them in a FabLab (it's against the Fab Charter).

Source: https://www.youtube.com/watch?v=Spm_zrjedzk

Fabbing and Media



Digital Fabrication can be used in different media:
photography of failed 3D prints.

Source: <http://cunicode.com/beautiful-failures/>

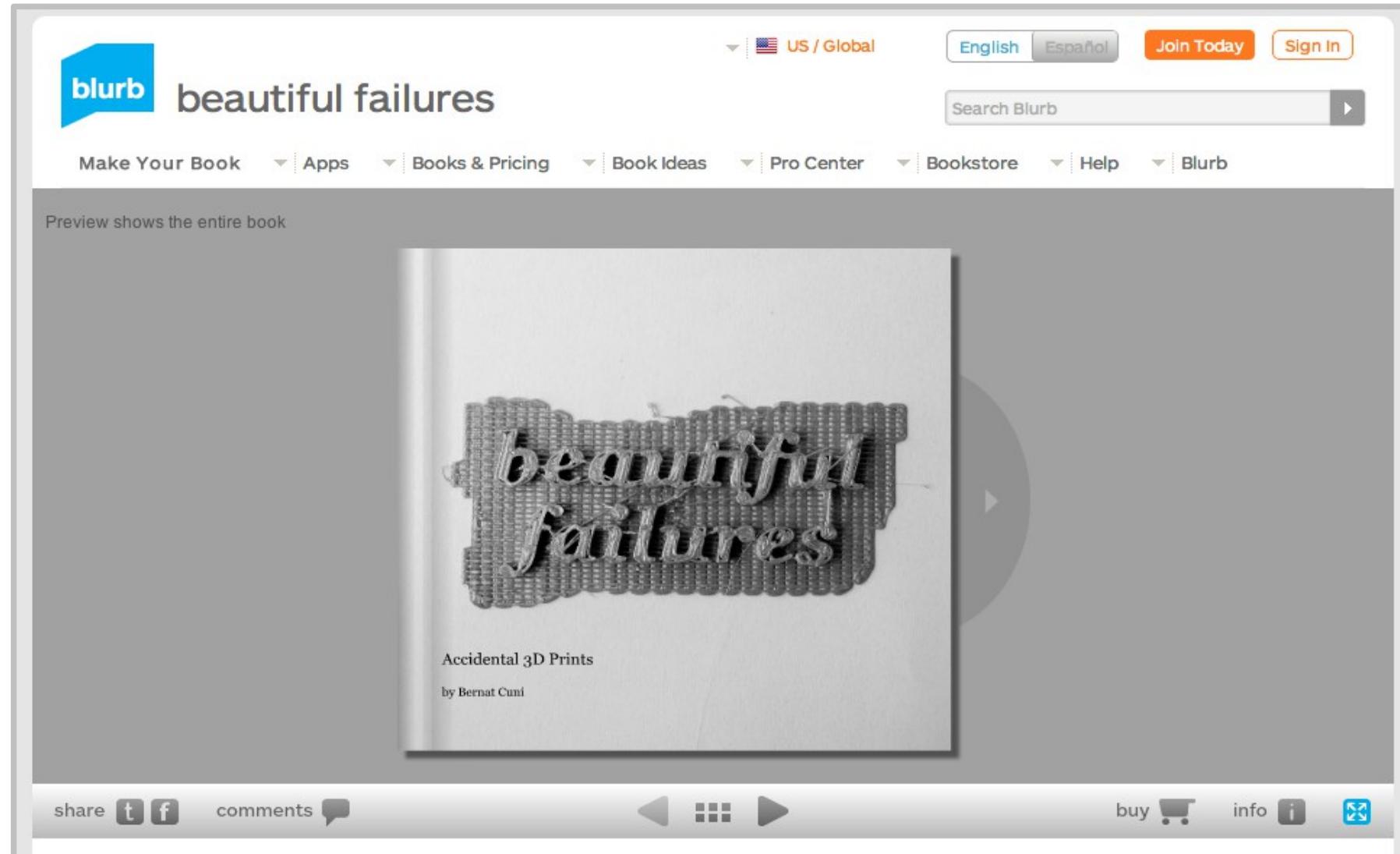
Fabbing and Media



Digital Fabrication can be used in different media:
video of failed 3D prints.

Source: <http://cunicode.com/beautiful-failures/> <http://vimeo.com/42537804>

Fabbing and Media



Digital Fabrication can be used in different media:
book of failed 3D prints.

Source: <http://cunicode.com/beautiful-failures/> <http://www.blurb.com/books/3248225>

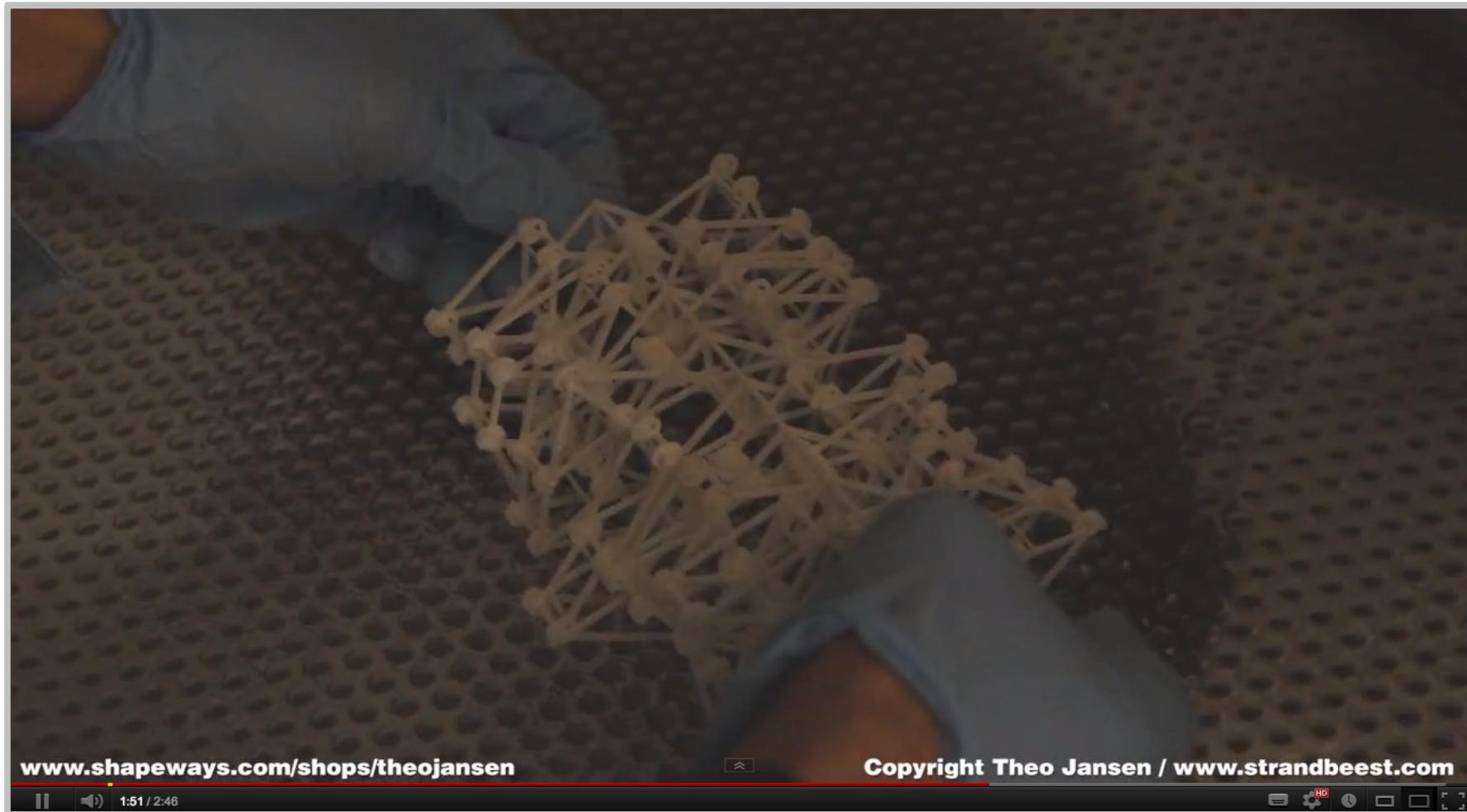
Same project, different media



Digital Fabrication can be also thought as a medium for converting one project to a different format.

Source: <http://www.3ders.org/articles/20120820-theo-jansen-3d-printed-strandbeests-here-are-the-lego-and-bamboo-version.html>
<http://youtu.be/HSKyHmjyrkA>

Same project, different media



Digital Fabrication can be also thought as a medium for converting one project to a different format.

Source: <http://www.3ders.org/articles/20120820-theo-jansen-3d-printed-strandbeests-here-are-the-lego-and-bamboo-version.html>
<http://youtu.be/pZr-zyHRBn4>

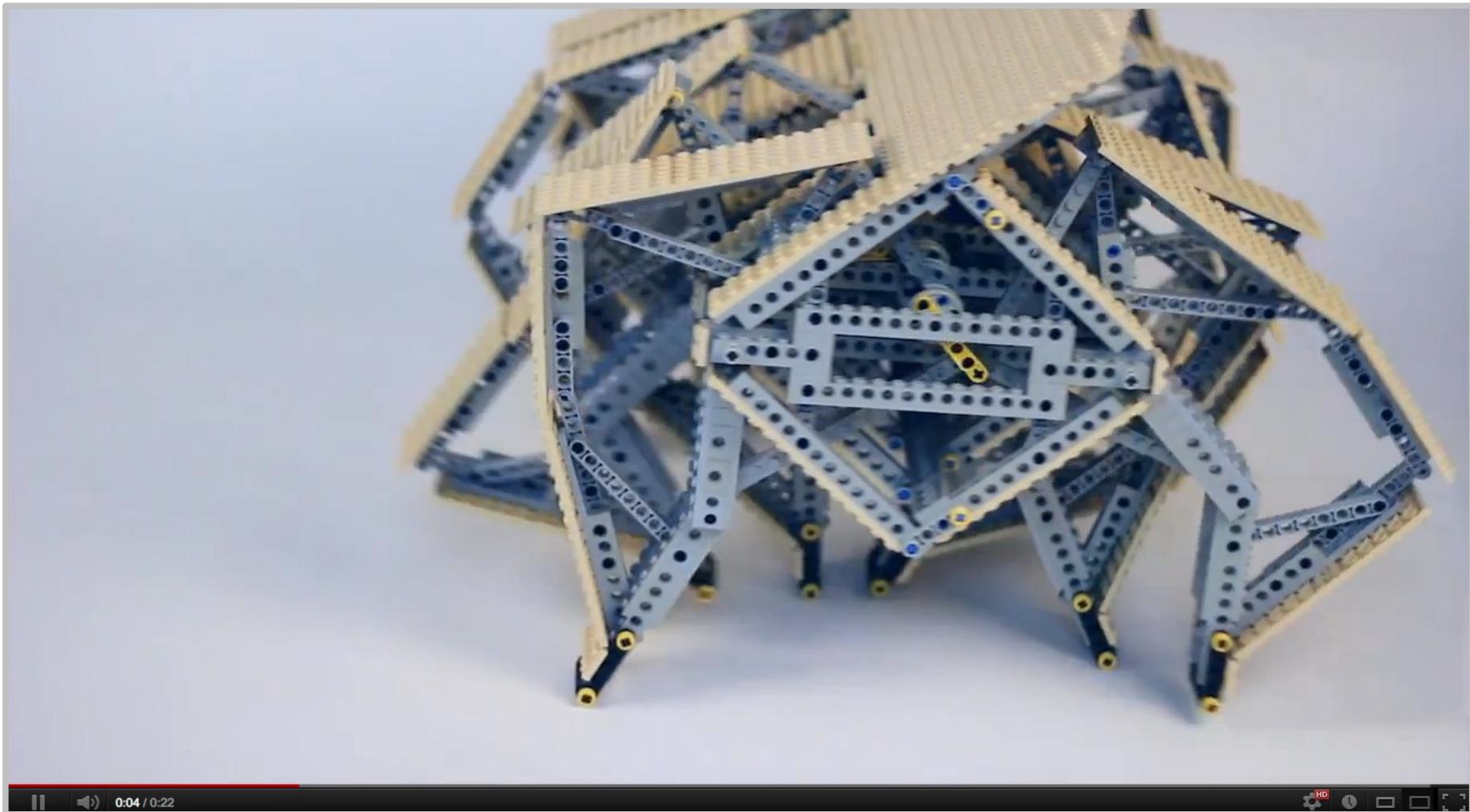
Same project, different media



Digital Fabrication can be also thought as a medium for converting one project to a different format.

Source: <http://www.3ders.org/articles/20120820-theo-jansen-3d-printed-strandbeests-here-are-the-lego-and-bamboo-version.html>

Same project, different media



Digital Fabrication can be also thought as a medium for converting one project to a different format.

Source: <http://www.3ders.org/articles/20120820-theo-jansen-3d-printed-strandbeests-here-are-the-lego-and-bamboo-version.html>
<http://youtu.be/NfutNEauniE>



Aalto University
Media Factory

04.

Other spaces and services: making digital fabrication even more accessible

Hackerspaces / Makerspaces

hackerspaces

Page Discussion View source History

Hackerspaces

Communication

Active hackerspaces

All hackerspaces

> add a hackerspace

List of events

> add an event

List of projects

> add a project

Recent changes

Go Search

What links here

Related changes

Special pages

Printable version

Permanent link

Browse properties

List of Hacker Spaces

This is a comprehensive, user-maintained list of all active hackerspaces throughout the world.

We have also a [list of planned Hacker Spaces](#), as well as a [list of ALL hackerspaces](#) around the globe - including those still in bu



Map Satellite Hybrid Terrain Overlays

POWERED BY Google 2000 mi 2000 km

Map data ©2011 Geocentre Consulting, MapLink, Tele Atlas - [Terms of Use](#)

If we're missing your space, or you want and/or are about to create a new one, please [add yourself](#) to the list.

hackerspace	Country	State	City	Website
BAH	Argentina	Buenos Aires	Capital Federal	http://www.hackerspace.com.ar
Toylab	Argentina	Buenos Aires	Capital Federal	http://toylab.wordpress.com/
MatesLab	Argentina	Buenos Aires	Mar del Plata	http://www.mateslab.com.ar

Hackerspaces are open community labs with machine shops, workshops and/or studios where hackers can share resources and knowledge.

Source: http://hackerspaces.org/wiki/List_of_Hacker_Spaces

Helsinki Hacklab

Helsinki Hacklab

Yhteisöllinen työpaja Helsingissä

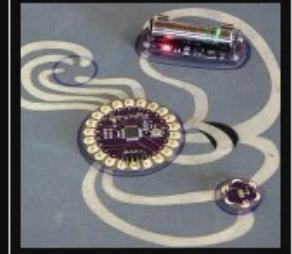
[Home](#) [Helsinki Hacklab](#) [Tilan esittely](#) [Liity Jäseneksi](#) [Tapahtumat](#) [Yhteystiedot](#)

Sunnuntaina 6.5. Ommeltavan elektroniikan työpaja

Posted on **30.4.2012** by **anacron**

Sunnuntaina 6.5. pidetään Helsinki Hacklabilla ommeltavan elektroniikan työpaja. Alkaen klo 12 osoitteessa: Nilsänkatu 10 B.

Ohjelmassa on luvassa elektroniikan alkeita ja tarkoituksena on myös ommella jotakin johtavaa, joka sitten vilkkuu tai vaikka piipittää. Mukana menossa myös Arduino (+ Lilypad) sekä kooste kiintoisista e-textile projekteista, joita voidaan yhdessä ihmetellä ja ideoida joitain vielä hienompaa...



IN ENGLISH

- [English summary](#)
- [In English](#)

LINKS

- [!\[\]\(675a6a3c7948bdd6f6388475f04d5404_img.jpg\) Facebook](#)
- [!\[\]\(4cc395580df72e6c8154c1b8963a8b5a_img.jpg\) GitHub](#)
- [!\[\]\(e7e75f6aab50bb53de46628522d0ffc5_img.jpg\) IRC](#)
- [!\[\]\(8a872ae181783ac2d97079324a3aea52_img.jpg\) Kalenteri](#)
- [!\[\]\(e77bd277116deda516f2af2eb842e87e_img.jpg\) Kirjoitusalusta](#)
- [!\[\]\(4ecb1eac7c7ba5af4c027fbf3f8d7573_img.jpg\) Muita hackerspaceja](#)
- [!\[\]\(bb12fc21c658beb75dc75ee6ff2034af_img.jpg\) Twitter](#)
- [!\[\]\(19e75b61ff8b4955c80c21dcfeef33bd_img.jpg\) Wiki](#)

RECENT POSTS

- [Sunnuntaina 6.5. Ommeltavan](#)
- [...](#)
- [...](#)
- [...](#)
- [...](#)

The local hackerspace...

Source: <http://helsinki.hacklab.fi/>

Sewing Café

The screenshot shows the homepage of The Sewing Café website. At the top left is the logo featuring a sewing machine icon and the text 'THE SEWING CAFE' with 'the social sewing emporium' underneath. To the right are contact details: 'E: hello@thesewingcafe.co.uk' and 'T: 01455 698034'. Below the logo is a navigation bar with links: Home, Sew by the Hour, Workshops, Sew help me!, Shop at the Sewing Café, About Us, How to get in Touch, and Register. To the left of the main content area is a vertical sidebar with a brown tag that reads 'THE SEWING CAFE' with a sewing machine icon, 'thesewingcafe.co.uk', and 'No. 116'. It lists 'VISIT US FOR...' followed by 'Sewing Workshops', 'Sew by the hour', 'Social Sewing', 'Sewing Parties', 'Inspiration & Advice', and 'Plus a shop full of beautiful fabrics and haberdashery'. The main content area features a large image of colorful spools of thread in a wooden tray, with a teal circular overlay containing the text 'WELCOME to THE SEWING CAFE'. To the right of the main image are two smaller images: one showing a sewing machine on a floral fabric and another showing rolls of patterned fabric. At the bottom right are social media icons for Flickr, Facebook, and Twitter.

A coworking space with sewing and embroidery
machine (usually pay per hour)

Source: <http://www.thesewingcafe.co.uk/>

Techshop (USA)

The screenshot shows the TechShop website homepage. At the top left is the TechShop logo with the tagline "BUILD YOUR DREAMS HERE". To the right is a banner with the text "WHAT DO YOU WANT TO MAKE?™". On the far right is a "CAREERS" section with a "Click here for more information" link. The main menu on the left includes: Welcome, Membership, Classes, Events, Facilities & Amenities, TechShop Locations (selected), Equipment Reservation Calendars, Services, Member Project Gallery, FAQs, TechShop News, Contact Us, and Forum. The "TechShop Locations" section lists several stores: Menlo Park (Open Now), Raleigh NC (Open Now), San Francisco CA (Open Now), San Jose CA (GRAND OPENING SATURDAY SEPT 24, 10 AM - 6 PM), Detroit MI (Under Construction Fall 2011), Portland OR (In Planning), New York NY (In Planning), and Los Angeles CA (In Planning). The "TechShop Locations" section also contains a "UPCOMING EVENTS @ San Jose" block for the September 24 Grand Opening, featuring a small illustration of a robot and the text "Click for More Details". Below this is a large advertisement for learning Autodesk Inventor for free.

TechShop Locations

There are several TechShop locations currently open or opening soon to serve you. Please click on the name of the store you are interested in for more information including address, contact information, and hours of operation:

- [TechShop Menlo Park](#) (Menlo Park CA)
Open Now
- [TechShop RDU](#) (Raleigh NC)
Open Now
- [TechShop San Francisco](#) (San Francisco CA)
Open Now
- [TechShop San Jose](#) (San Jose CA)
GRAND OPENING SATURDAY SEPT 24, 10 AM - 6 PM
- [TechShop Detroit](#) (Detroit, MI)
Under Construction Fall 2011
- TechShop Portland (Portland OR)
In Planning
- TechShop New York (Brooklyn, NY)
In Planning
- TechShop Los Angeles (Los Angeles, CA)
In Planning

UPCOMING EVENTS @ San Jose

September 24:
TechShop San Jose
Grand Opening!

Click for More Details

Learn how to use Autodesk Inventor FOR FREE

A network of commercial spaces with many tools and technologies and paid support services (only in USA).

Source: <http://techshop.ws/>

Techshop (USA)

Ford + TechShop: Getting Employees to Tinker

BY JOSEPH FLAHERTY 

05.14.12 3:20 PM



CNC router carving the Ford logo at TechShop.

Before he invented the assembly line, Henry Ford built his first prototype on a workbench in a shed. More than a century later, his [company](#) has partnered with [TechShop](#), Detroit, the 21st-century equivalent of that shed, with a bold program to ignite innovation in the company.

Ford employees who invent something that the company ends up patenting receive a free three-month membership to TechShop.

Source: <http://www.wired.com/design/2012/05/ford-techshop/>

100k Garages (USA)

The screenshot shows the homepage of 100kGarages.com. At the top left is a logo featuring a small garage icon with a person inside, next to the text "100kGarages.com" and "connect. collaborate. create.". To the right is a horizontal navigation bar with links: "Home", "About", "Participate", "Create/Design", "Inspiration", and "Connect". On the far right of the bar are "Find Designers", "Find Fabbers", and "Request Project Bids". Below the navigation is a search bar with a "Google Custom Search" button and a "Search" button. A yellow banner across the middle features a camera icon. To the left, there's a large image of four colorful wooden chairs (orange, green, blue, red) in a room with large windows. Below this image is a caption: "Be inspired. Take a look at these cool creations from 100kGarages users. And sample the work of designers who make their plans available for use. It's all at our [Inspiration gallery](#)." To the right of the image, the text "Got an idea? Get it made." is displayed above a section about connecting with fabbers. Further down, there's a "How it Works" graphic showing a person working on a project with a heart and a table, and a "ShopBot" logo. The bottom right corner features the word "Make:".

sign up or log-in

100kGarages.com

connect. collaborate. create.

Home About Participate Create/Design Inspiration Connect

Find Designers Find Fabbers Request Project Bids

Google Custom Search Search

100kGarages.com

How it Works

learn more

created by

ShopBot®

our sponsors

Make:

Got an idea? Get it made.

100kGarages connects you with Fabbers who can turn your thoughts into things.

100kGarages.com is a place for people who have designs, or just ideas for things they want to make, to connect with digital fabricators ("Fabbers") who can help make these ideas become real.

Our participating Fabbers work with 2-D or 3-D digital fabrication tools to cut, machine, drill, sculpt, or "print" in 3-D. Our "matchmaking" service can help you find a Fabber near you, and it's free. [Learn more and get started.](#)

I have an idea. [What's Next?](#)
I need an idea. [Show me cool stuff.](#)

Be inspired. Take a look at these cool creations from 100kGarages users. And sample the work of designers who make their plans available for use. It's all at our [Inspiration gallery](#).

100kGarages is a place for people who have designs (or just ideas) to connect with digital fabricators ("Fabbers") who can help make these ideas.

Source: <http://100kgarages.com/>

Maker Factory



The same service as 100kgarages, but open source ...

3D Hubs

The screenshot shows the 3D Hubs website interface. At the top, there's a navigation bar with the 3D HUBS logo, a dropdown menu set to HELSINKI, and links for LIST PRINTER, 3D PRINT, BLOG, and ACCOUNT.

The main feature is a map of the Helsinki region, with red circles marking various 3D printing hubs. Labels for towns like Lieto, Paimio, Somero, Riihimaki, Hyvinkää, Mäntsälä, Vihti, Nurmijärvi, Tuusula, Vantaa, Sipoo, Porvoo, Kotka, Hamina, and Lohja are visible. A legend indicates there are 6 Print Hubs in Helsinki.

Below the map, a green button says "3D print in Helsinki".

A section titled "Browse Local 3D Printers in Helsinki" lists five hubs with their names, logos, and ratings:

- LTronic's Hub (Kossel, MendelMax) - 5 stars
- Versoteq's Hub (Leapfrog Creatr) - 5 stars
- Ali's Hub (Replicator, Thing-O...) - 5 stars
- Anssi's Hub (miniFactory) - 5 stars
- Markku's Hub (Solidoodle) - 5 stars

To the right, a sidebar titled "Wanted: Mayor" shows statistics: 17 Makers and 6 Print Hubs. It also has a "Learn more" link and an "INVITE FRIENDS" button.

The same service as 100kgarages, but for 3D printers...

Seoul (South Korea)



No FabLabs or similar places, but many small manufacturers that will produce you small-scale series very quickly.

Living Labs (USA, Europa)

The screenshot shows the homepage of the European Network of Living Labs (ENoLL). At the top, there's a yellow circular logo on the left with the text "European Network of Living Labs". To the right, a banner features a group of diverse people and the text "The European Network of Living Labs - the first step towards a new Innovation System!". Below the banner, there's a "Login or Sign up!" button. The main content area has two sections: "news" on the left and "on the map" on the right. The "news" section contains a recent post about the 6th Wave opening, with details about the submission date and a brief description of the invitation to apply for membership. The "on the map" section displays a map of Europe with colored dots representing different waves of living labs: First Wave (light gray), Second Wave (dark gray), Third Wave (red), and Fourth Wave (yellow). There are also small arrows pointing to specific locations on the map.

European Network of Living Labs

The European Network of Living Labs
- the first step towards a new Innovation System!

Login or Sign up!

news

ENoLL 6th Wave is open – Join our growing community!

SUBMITTED BY ENOLL ON MON, 2011-10-24 17:53

All organisations public and private from all countries in the world, actively committed to engage and empower users and citizens to take part in sustainable innovation processes, are once again invited to apply for membership in the European Network of Living Labs (ENoLL) as of October 24th, 2011. The announcement was made at the Future Internet Conference in Poznan (Poland).

You can see the session 'User Driven Innovation – Shaping the Future Internet for a Better Society' including the announcement of the 6th Wave here.

[Read more](#)

on the map

- First Wave Living Labs
- Second Wave Living Labs
- Third Wave Living Labs
- Fourth Wave Living Labs

Spaces for co-designing products and services with users... not necessarily with digital fabrication.

Source: <http://www.openlivinglabs.eu/>

National Additive Manufacturing Innovation Institute (USA)

the WHITE HOUSE PRESIDENT BARACK OBAMA

★★★★★ ★★★★★



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BLOG PHOTOS & VIDEO BRIEFING ROOM ISSUES the ADMINISTRATION the WHITE HOUSE our GOVERNMENT

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Office of the Press Secretary

E-Mail Tweet Share +

For Immediate Release August 16, 2012

We Can't Wait: Obama Administration Announces New Public-Private Partnership to Support

Consortium of Businesses, Universities, and Community Colleges from Ohio, West Virginia and Pennsylvania Co-Invest with Federal Government in a Manufacturing Innovation Institute

WASHINGTON, DC – Following through on our *We Can't Wait* efforts, the Obama Administration today announced the launch of a new public-private institute for manufacturing innovation in Youngstown, Ohio as part of its ongoing efforts to help revitalize American manufacturing and encourage companies to invest in the United States. This new partnership, the National Additive Manufacturing Innovation Institute (NAMII), was selected through a competitive process, led by the Department of Defense, to award an initial \$30 million in federal funding, matched by \$40 million from the winning consortium, which includes manufacturing firms, universities, community colleges, and non-profit organizations from the Ohio-Pennsylvania-West Virginia 'Tech Belt.'

EXTENDING MIDDLE-CLASS TAX CUTS IT'S THE RIGHT THING TO DO



VIEW THE INFOGRAPHIC

BLOG POSTS ON THIS ISSUE

September 08, 2012 5:30 AM EDT

Weekly Address: Coming Together to Remember September 11th

The institute will ensure that the U.S. manufacturing sector is a key pillar in an enduring and thriving economy.

Source: <http://www.whitehouse.gov/the-press-office/2012/08/16/we-can-t-wait-obama-administration-announces-new-public-private-partners>

Anywhere...



A vending machine with 2 3D printers at Virginia Tech's
College of Engineering.

Source: <http://youtu.be/c1MhNLGi-5I>



Aalto University
Media Factory

Thank you!!

Massimo Menichinelli
Aalto Media Factory
massimo.menichinelli@aalto.fi
[@openp2pdesign](https://openp2pdesign.net)

