

# Making the web of things

EURO OSCON

Sept. 2006

Kent





Winston  
Churchill

Charles Dickens





Pond

Ducks



A word cloud on a dark chalkboard background. The word 'Ducks' is the largest and most prominent. Other words are scattered around it in various sizes and orientations. The words include: Politics, Inkjets, Worth Based, Electronics, Genetics, Commoditisation, Maths, Programming, Patents, Football, People, Fotango, Printing, Open Source, Freedom, Archery, Javascript, and XP.

Politics  
Inkjets Worth Based Electronics  
Genetics Commoditisation  
Maths Programming  
Patents Ducks  
Football  
People Fotango Printing  
Open Source Freedom  
Archery Javascript XP

Politics

Inkjets

Worth Based

Electronics

Genetics

Commoditisation

Maths

Ducks

Programming

Patents

Football

People

Fotango

Printing

Open Source

Freedom

Archery

Javascript

XP



courtesy of Katrien Janin, Creative Commons License.

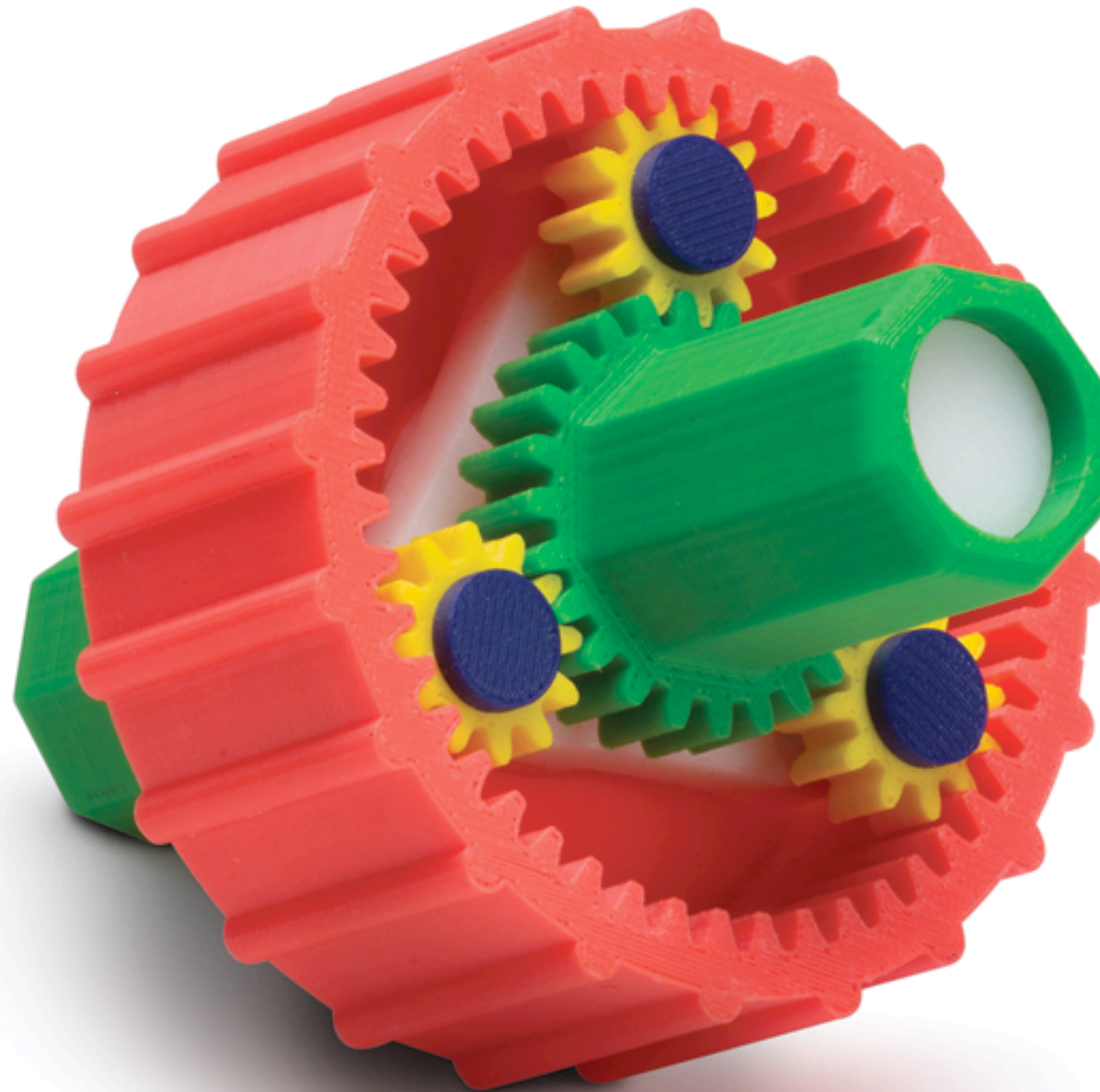


Image courtesy of Rob Wilson, LaserLines

3dmodelprinting.com



*InVision SR*  
*Robot Design*



*Simon Robinson*  
*simonrobinsonsculptor@hotmail.com*

Image courtesy of Inition



6' Kouros Statue, Image courtesy of Materialise

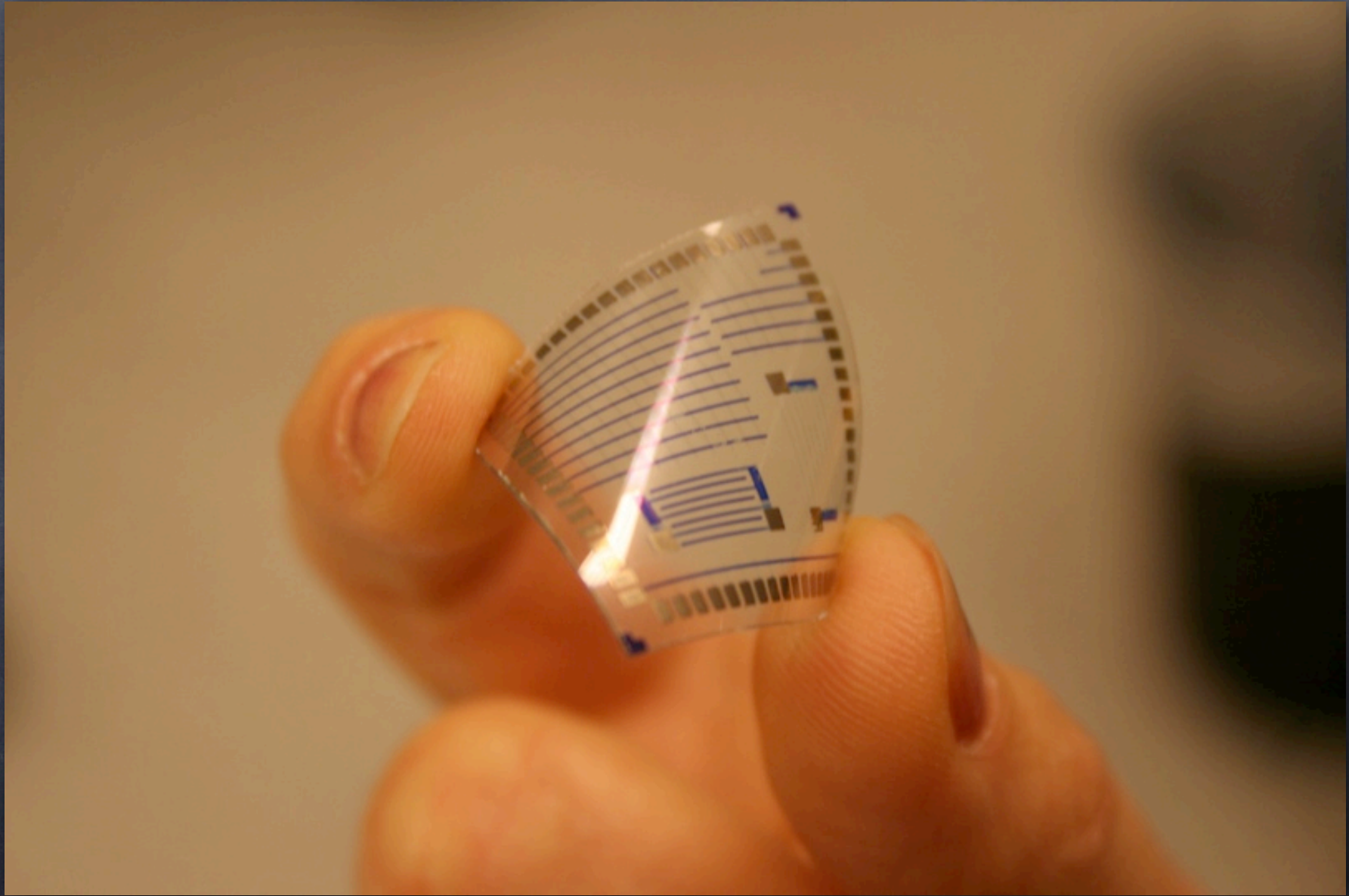


Image courtesy of Thin Film Electronics

56 TTFT's



B.J. Norris et al, J. Phys. D. 36, L105 (2003) .

$$e = mc^2$$

$$3dp = mc^{0.0002}$$

$$3dp = mc^{0.0002}$$

$$3dp = mc^{0.0002}$$

$$3dp = mc^{0.0002}$$

$$3dp = mc^{0.0002}$$

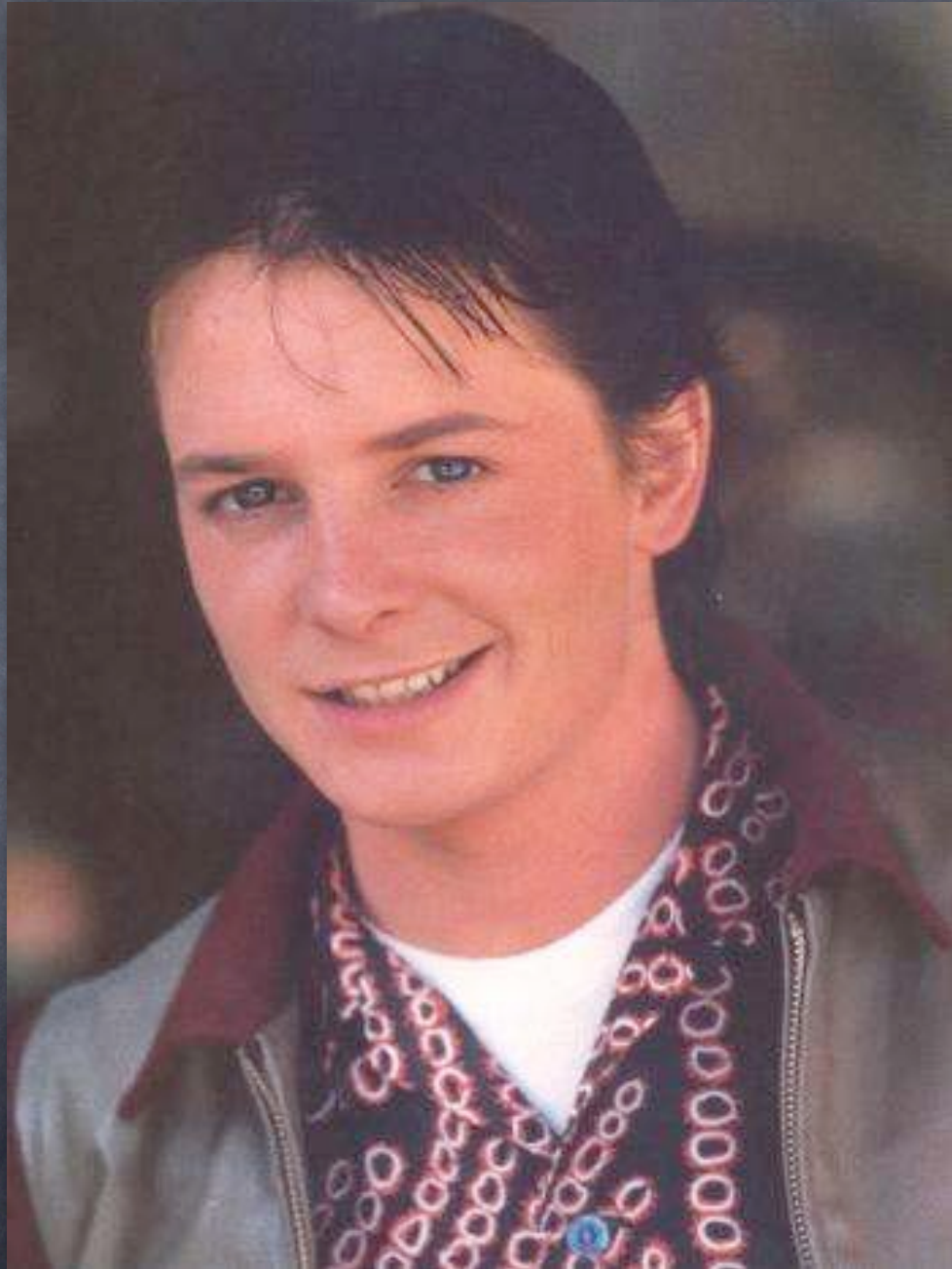




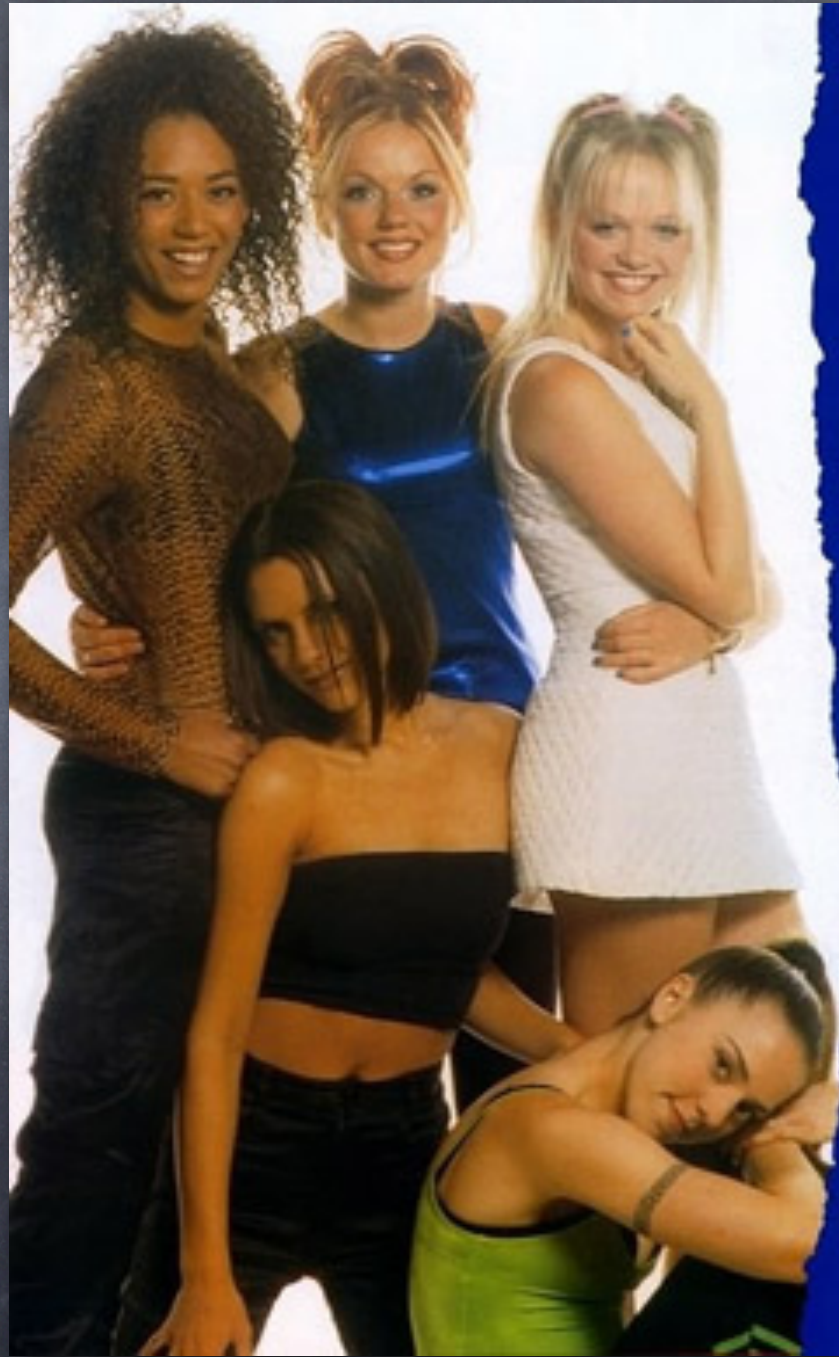
“The empires of  
the future are the  
empires of the  
mind.”



"Bah! Humbug!"









Politics

Pepsi

Snowboarding

Electronics

Genetics

Commoditisation

Maths

Databases

Microsoft

Programming

Patents

Business theory

Acting

Football

People

Security

Judo

Trading

Bridge

Freedom

Archery

Cars

C++

XP

No Pond

Politics

Pepsi

Snowboarding

Electronics

Genetics

# Commoditisation

Maths

Databases

Microsoft

Programming

Patents

Business theory

Acting

Football

People

Security

Judo

Trading

Bridge

Freedom

Archery

Cars

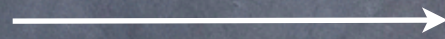
C++

XP

Wikipedia : change from  
monopolistic to perfect  
competition



today's  
hot stuff



tomorrow's  
boredom

1890's

1930's

Electricity

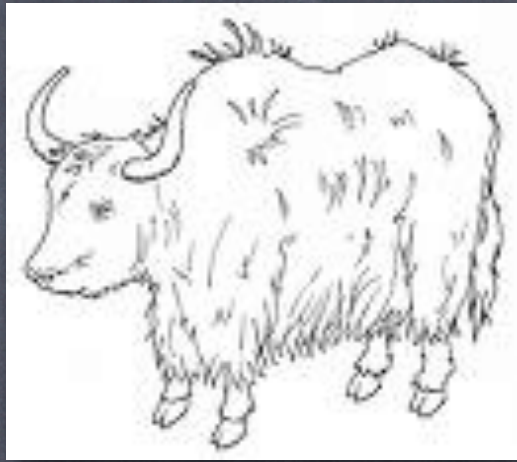


National  
Grid

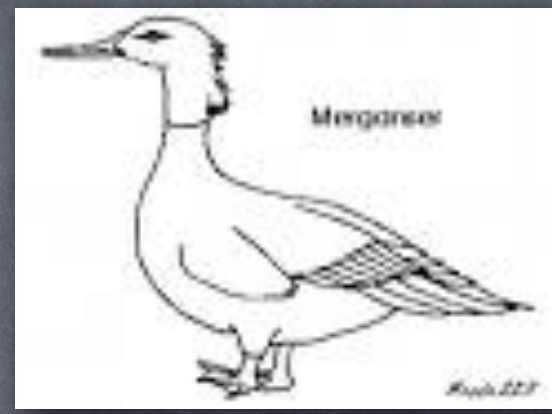


Rare thing

Ubiquitous  
Distributed



= 6 x



# DOES **IT** MATTER?

**INFORMATION TECHNOLOGY**  
AND THE CORROSION OF COMPETITIVE ADVANTAGE

NICHOLAS G. CARR



New thing

Leading  
Edge

Standard  
Products

Utility  
Service

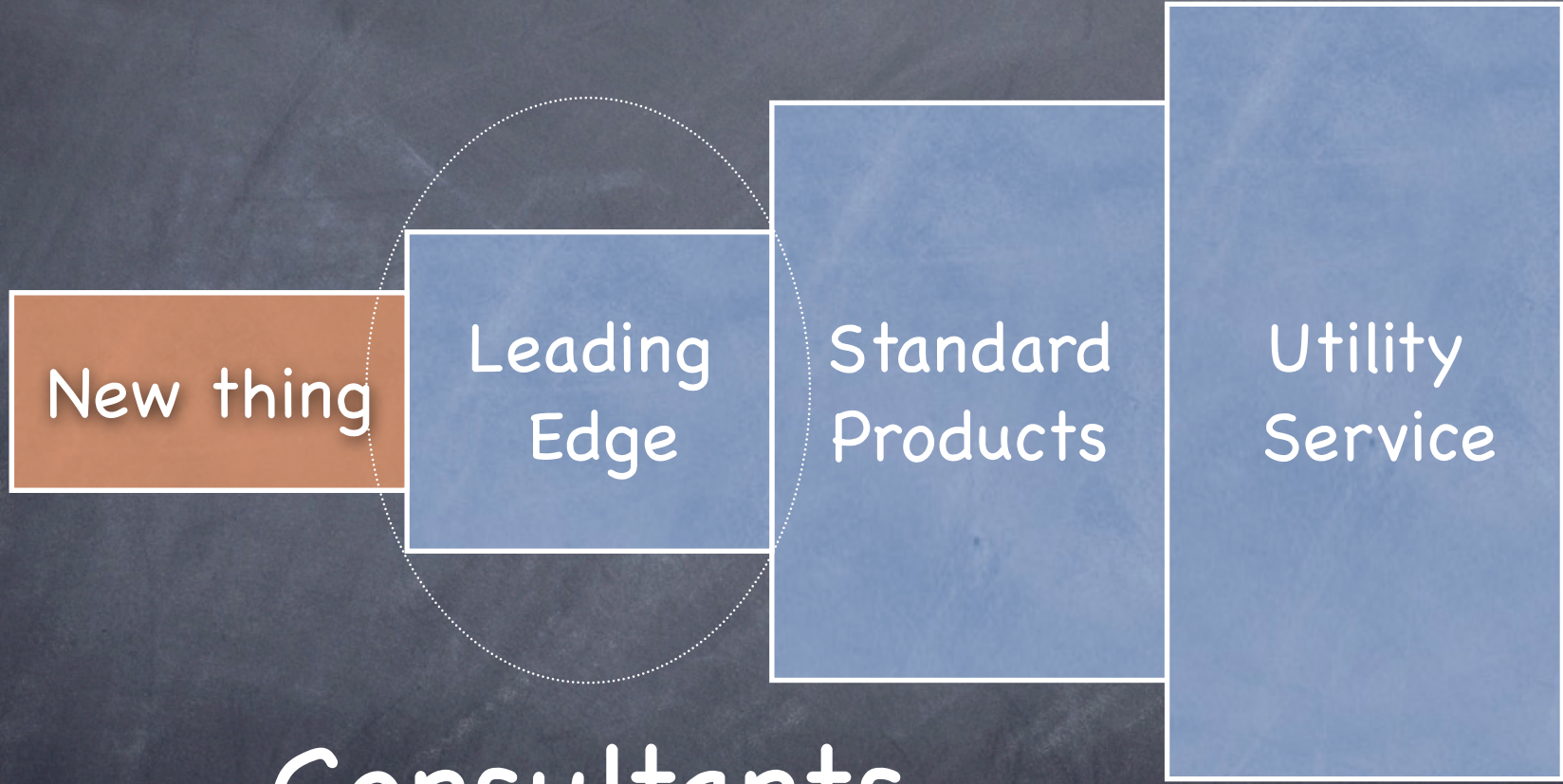
New thing

Leading  
Edge

Standard  
Products

Utility  
Service

CRM



Consultants

New thing

Leading  
Edge

Standard  
Products

Utility  
Service

ABC System

New thing

Leading  
Edge

Standard  
Products

Utility  
Service

Salesforce

New thing

Leading  
Edge

Standard  
Products

Utility  
Service

# ABC System

New thing

Leading  
Edge

Standard  
Products

Utility  
Service

Consultants

New thing

Leading  
Edge

Standard  
Products

Utility  
Service

CRM

New thing

Leading  
Edge

Standard  
Products

Utility  
Service

Competitive  
Advantage



New thing

Leading  
Edge

Standard  
Products

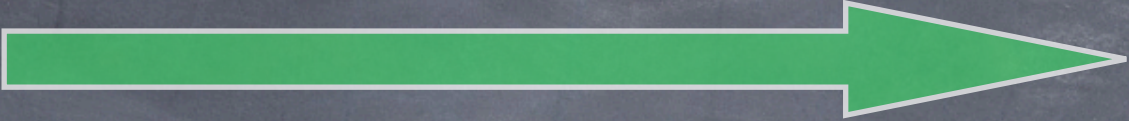
Utility  
Service

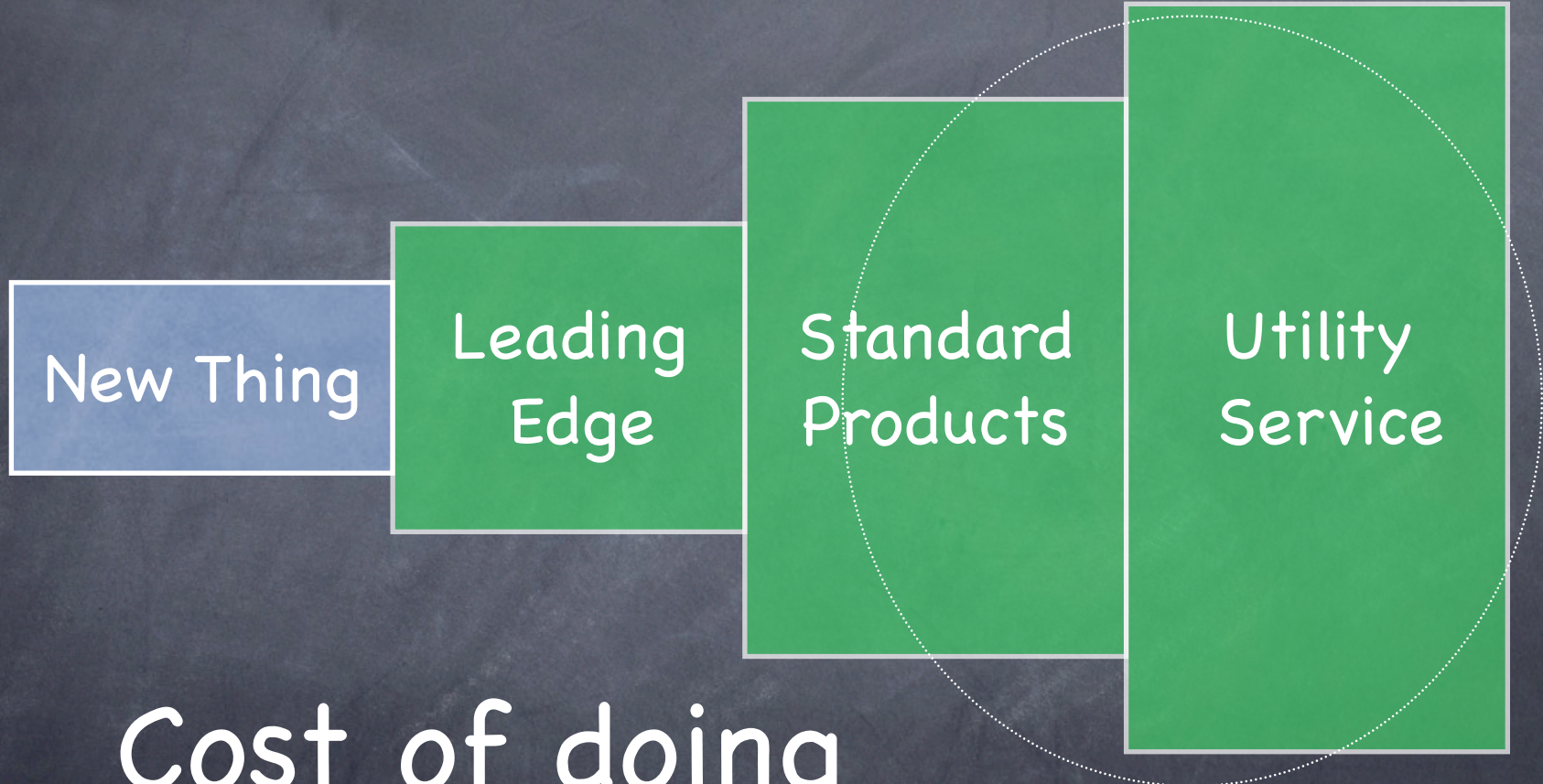
New Thing

Leading  
Edge

Standard  
Products

Utility  
Service





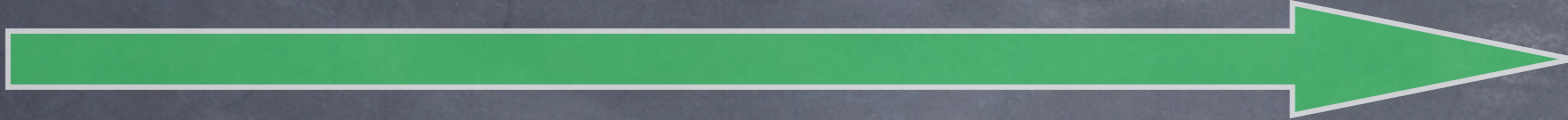
New Thing

Leading  
Edge

Standard  
Products

Utility  
Service

Cost of doing  
business

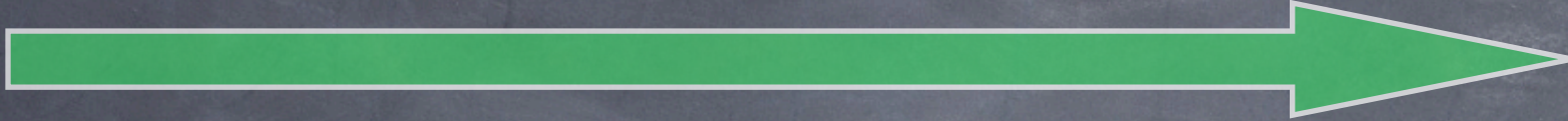


New Thing

Leading  
Edge

Standard  
Products

Utility  
Service



New Thing

Leading  
Edge

Standard  
Products

Utility  
Service

open source

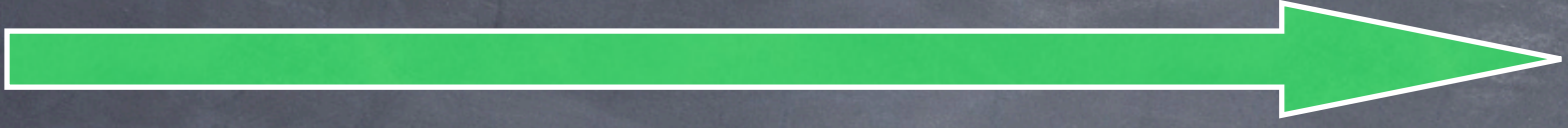


Factory

Factory  $\equiv$  One thing

Digital → Physical

Factory  $\equiv$  Many things



Factory



Ubiquitous  
Distributed  
Manufacture

Central Lab

Local  
Labs

Retail  
Printing

Home  
Printers

# DOES IT MATTER?

**INFORMATION TECHNOLOGY**  
AND THE CORROSION OF COMPETITIVE ADVANTAGE

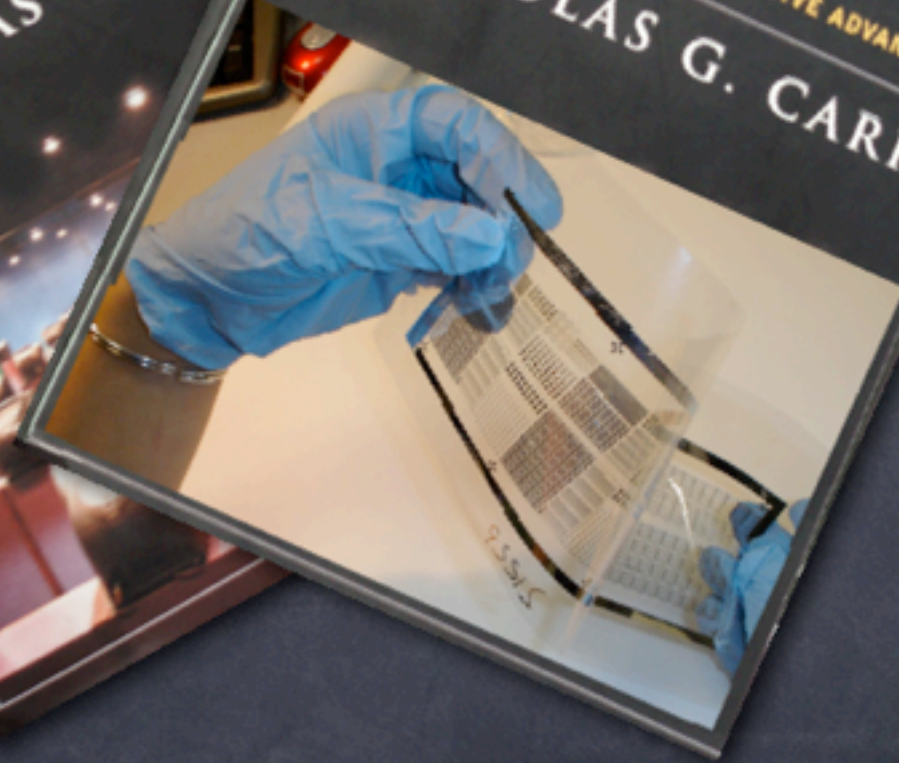
NICHOLAS G. CARR



# DOES IT MATTER?

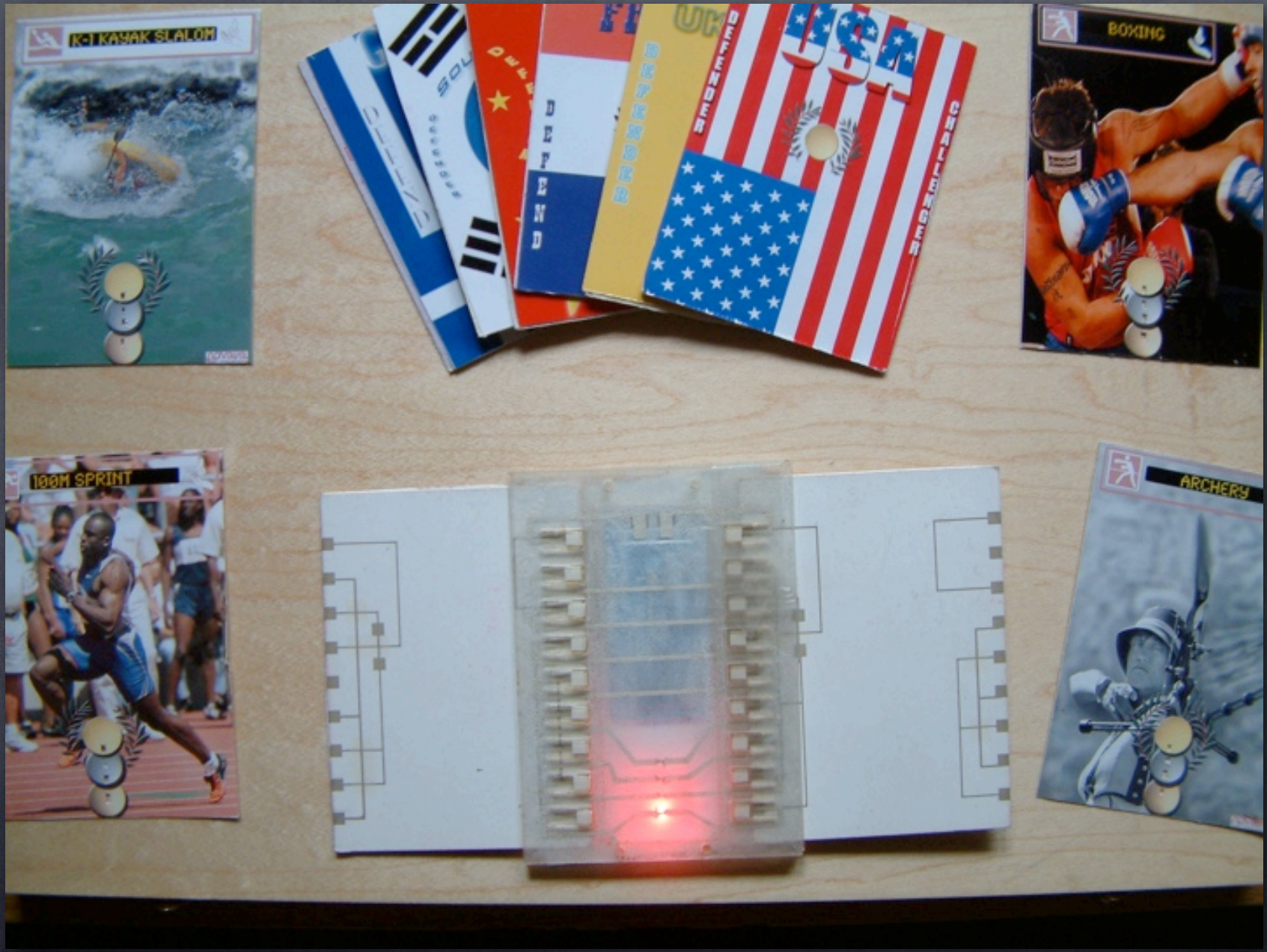
**Manufacturing**  
AND THE CORROSION OF COMPETITIVE ADVANTAGE

NICHOLAS G. CARR





Images courtesy of Dr Nick Stone, Novalia



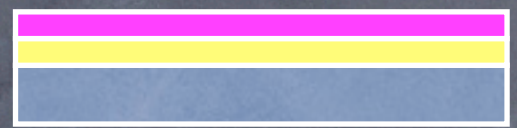
Images courtesy of Dr Nick Stone, Novalia



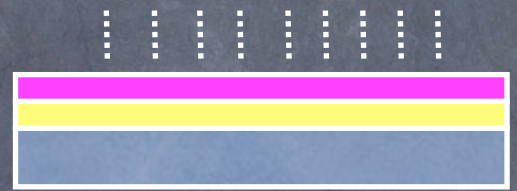
Substrate



Add metal



Add Light sensitive film



Expose through mask

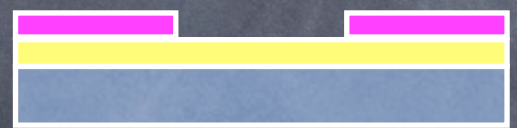
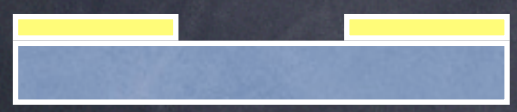


Photo finishing



Etching



Extraction



Substrate



Print



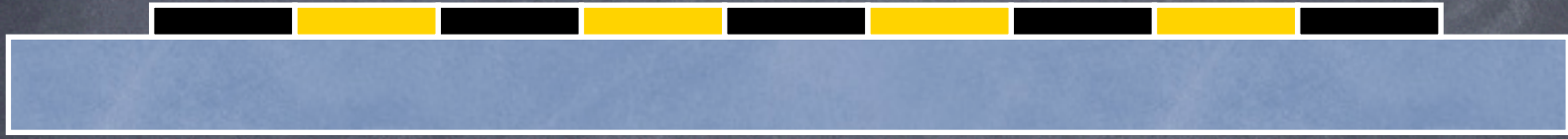
Factory

Ubiquitous  
Distributed  
Manufacture

open source hardware

Image controlled  
application of a material  
to a substrate







courtesy of Katrien Janin, Creative Commons License.





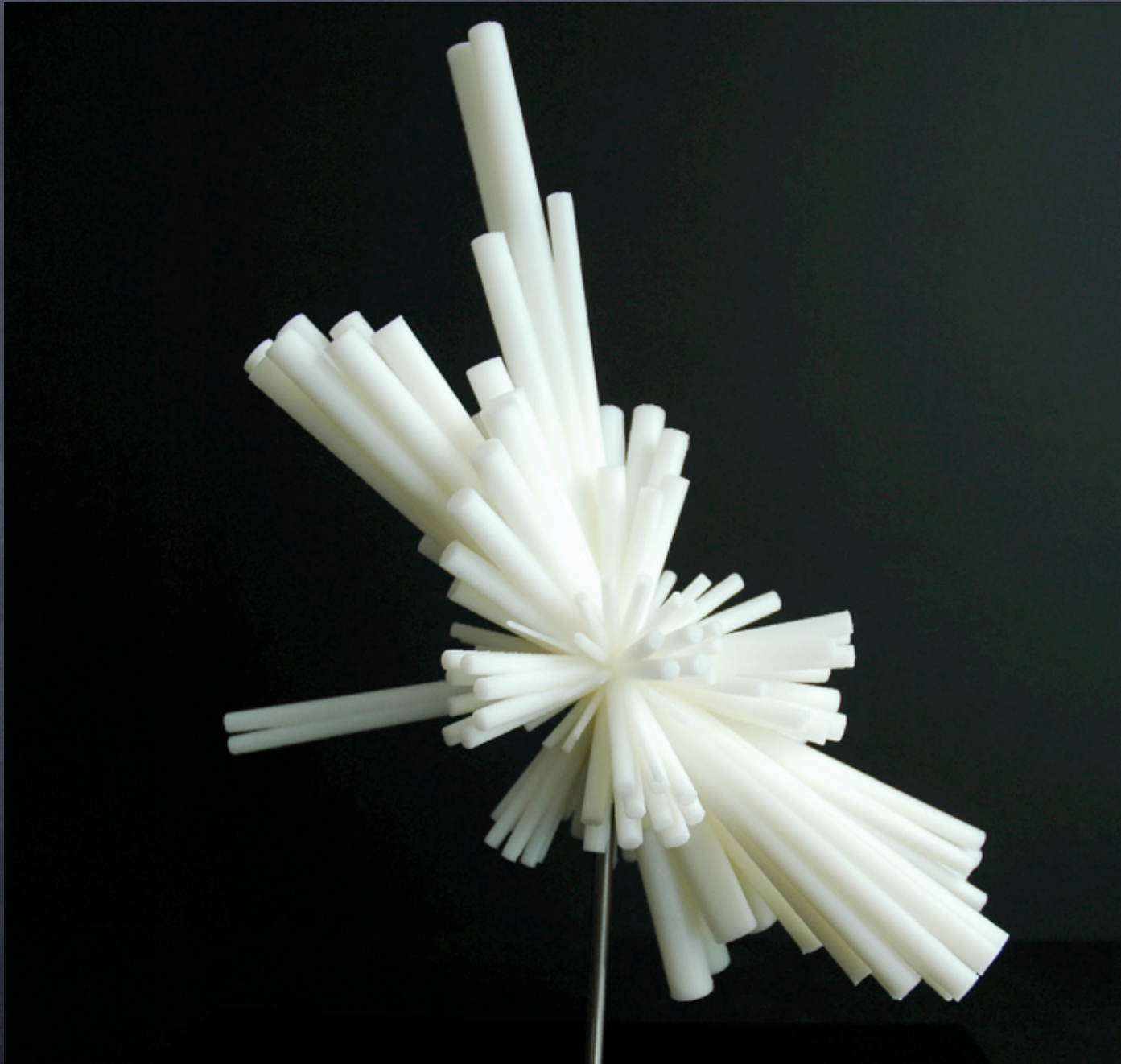


Image courtesy of Rob Wilson, LaserLines

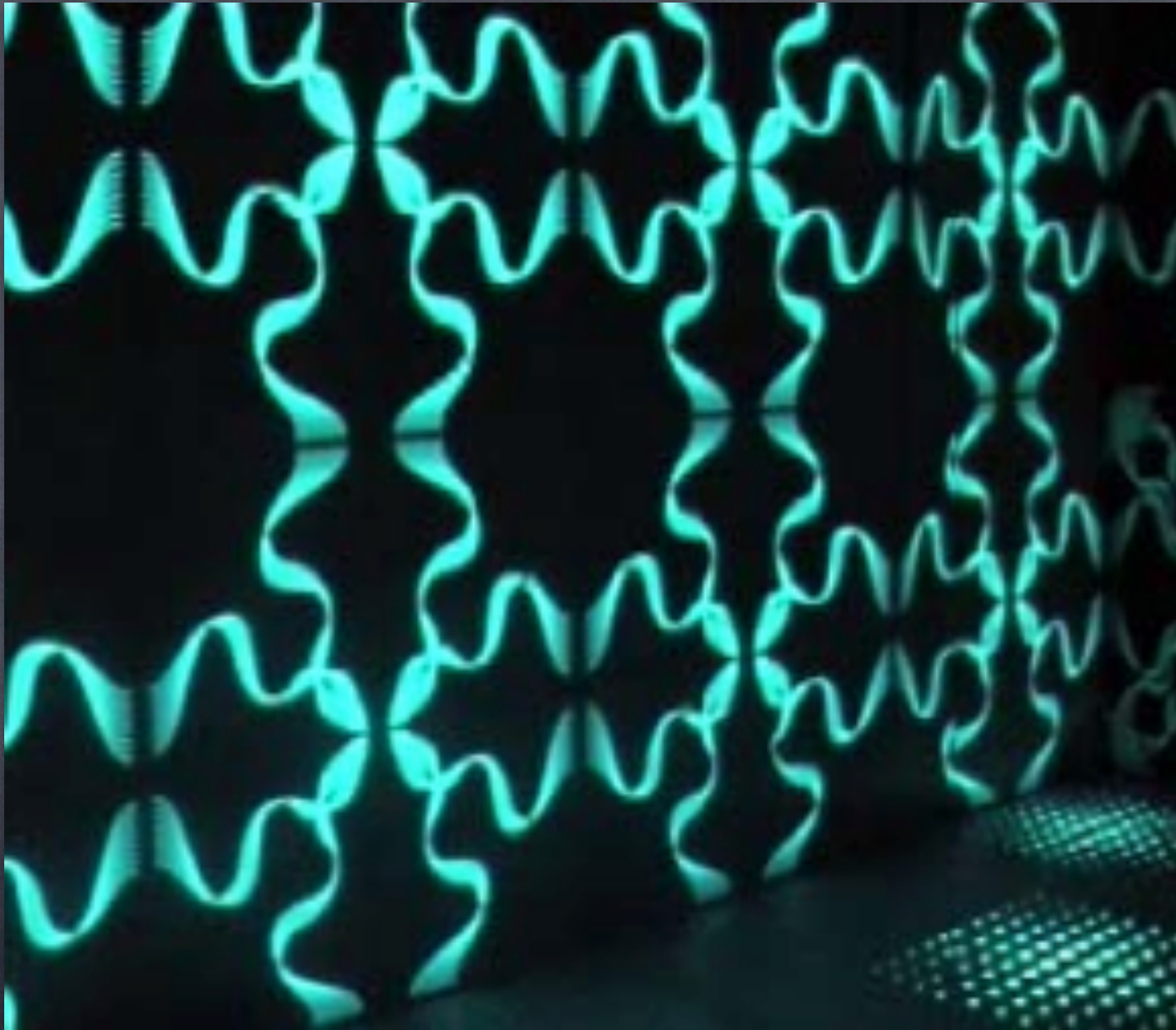


Image courtesy of Elumin8

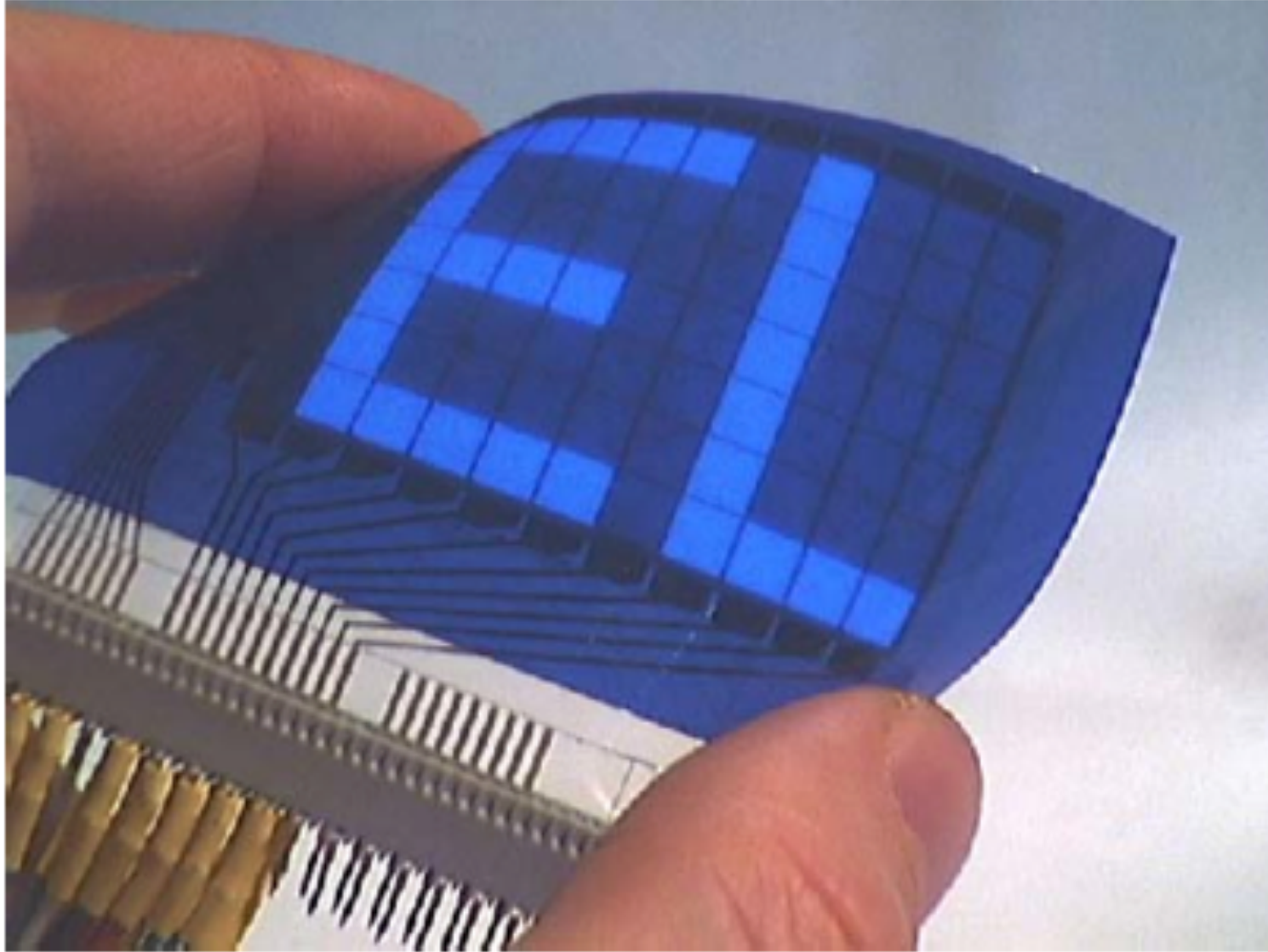


Image courtesy of Pelikon

# Deposition

Flexographic

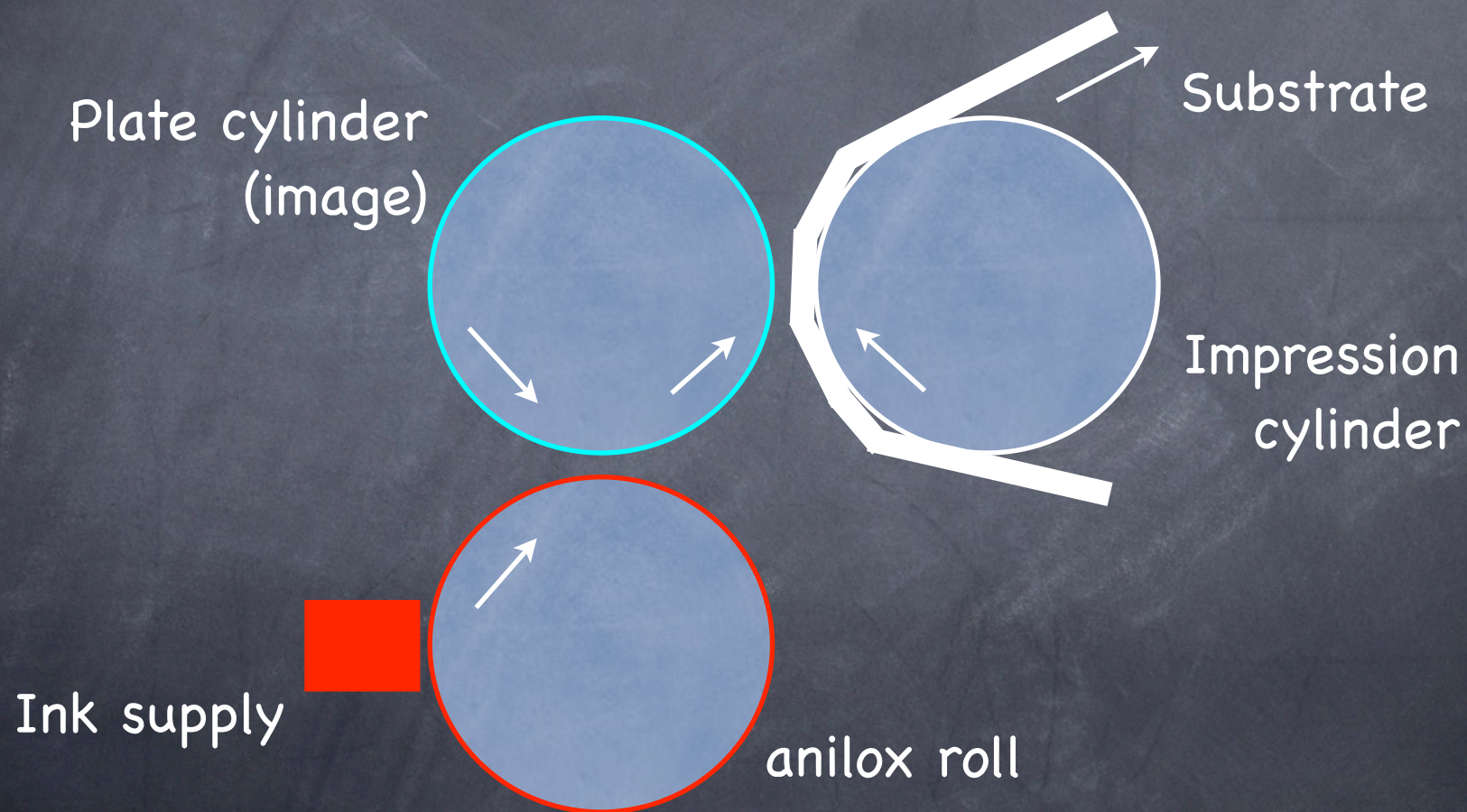
Gravure

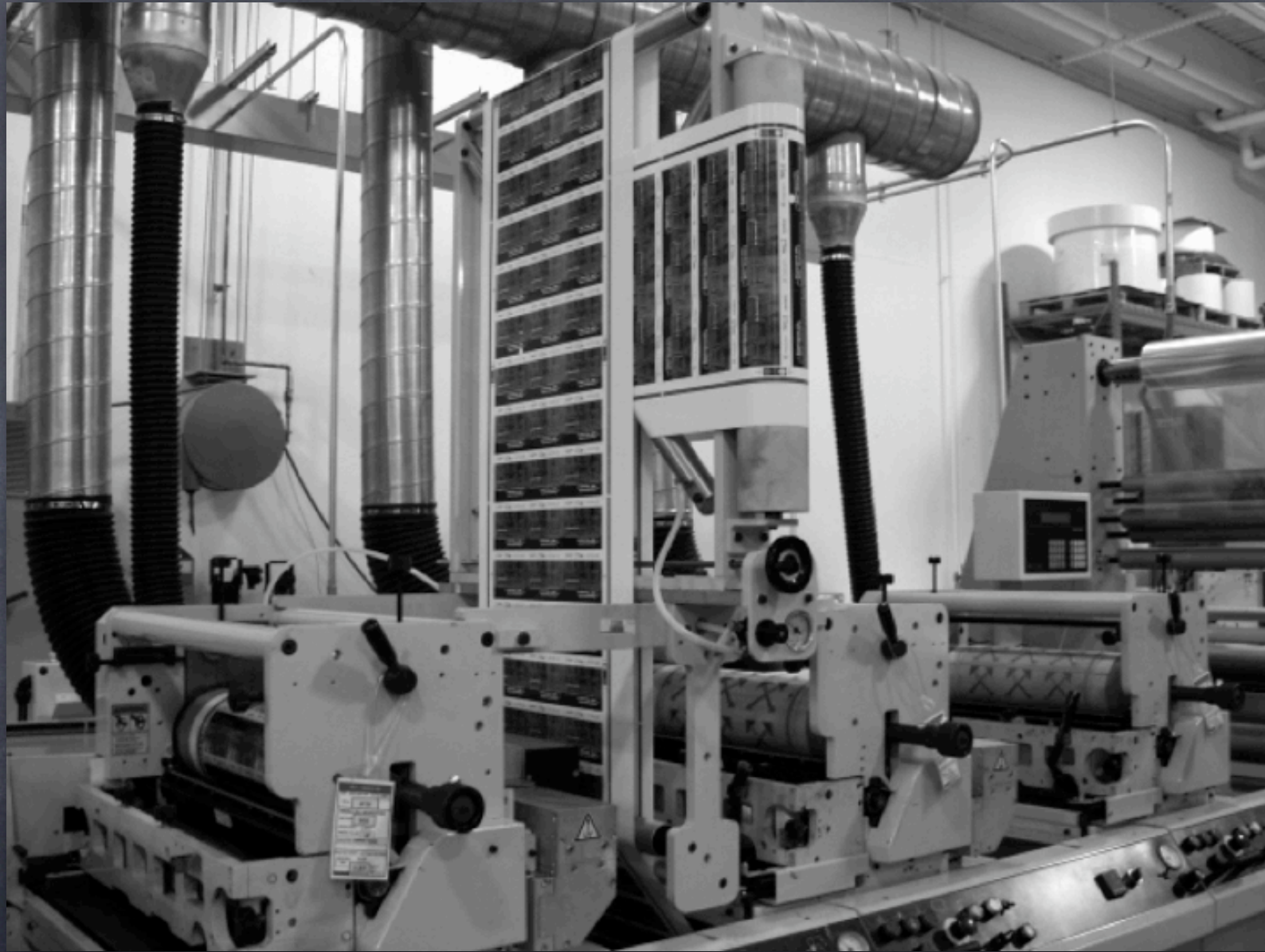
Screen

Offset Litho.

Stamp.

# Flexographic





Bruce Kahn, RIT, 2005

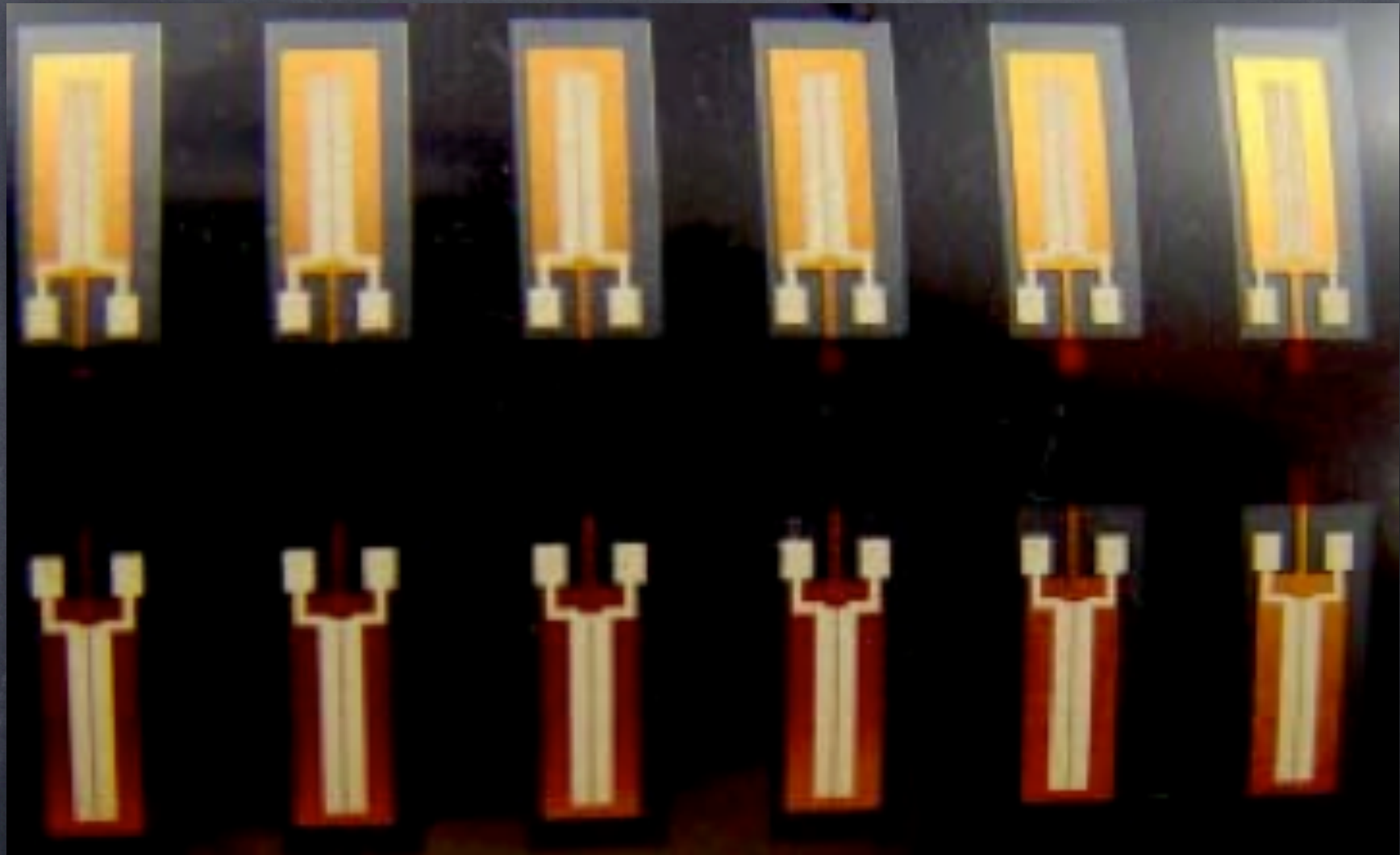


Image courtesy of Jie Zhang, Motorola Printed Electronics Group,  
Printed Electronics Conference

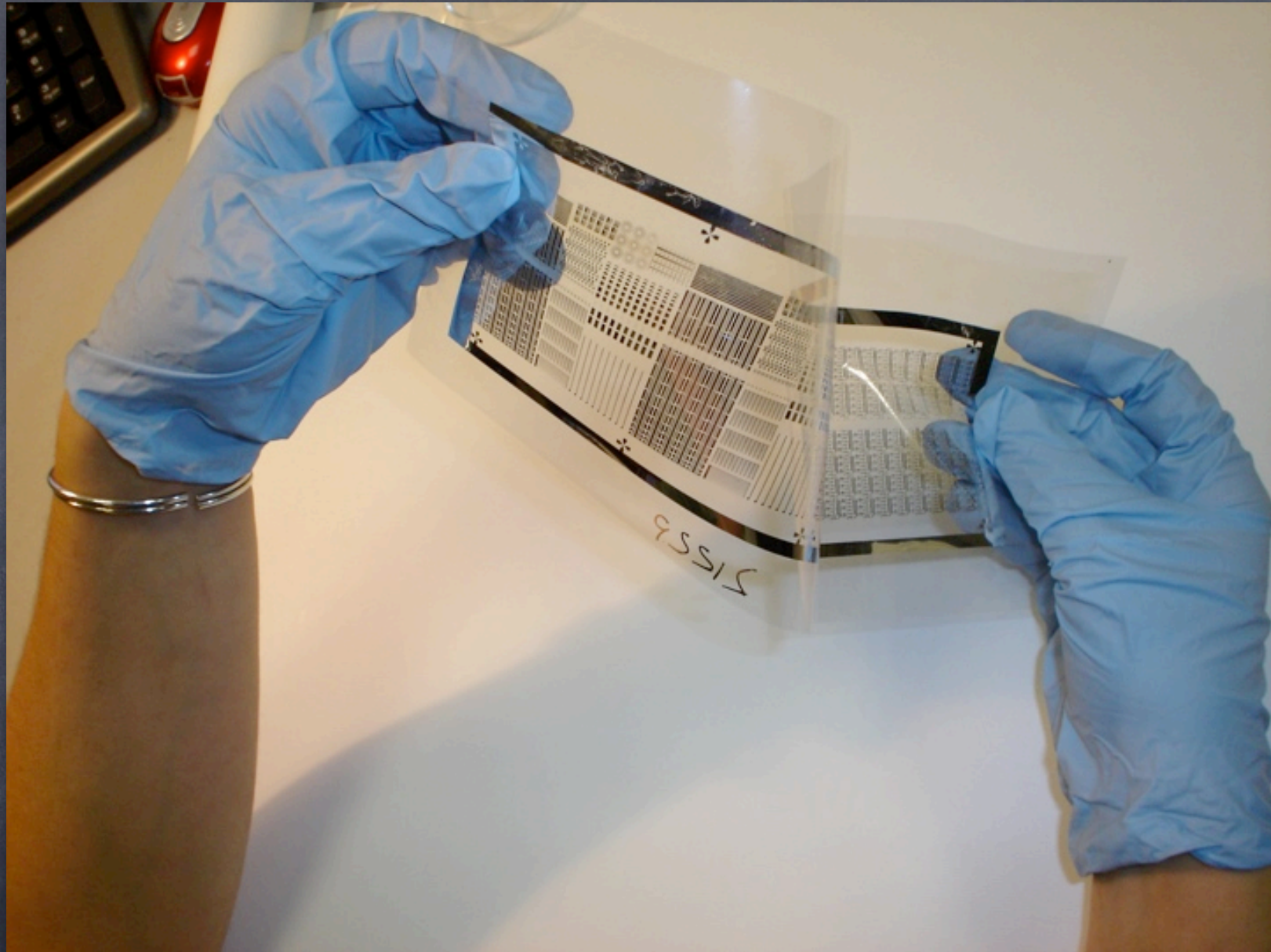
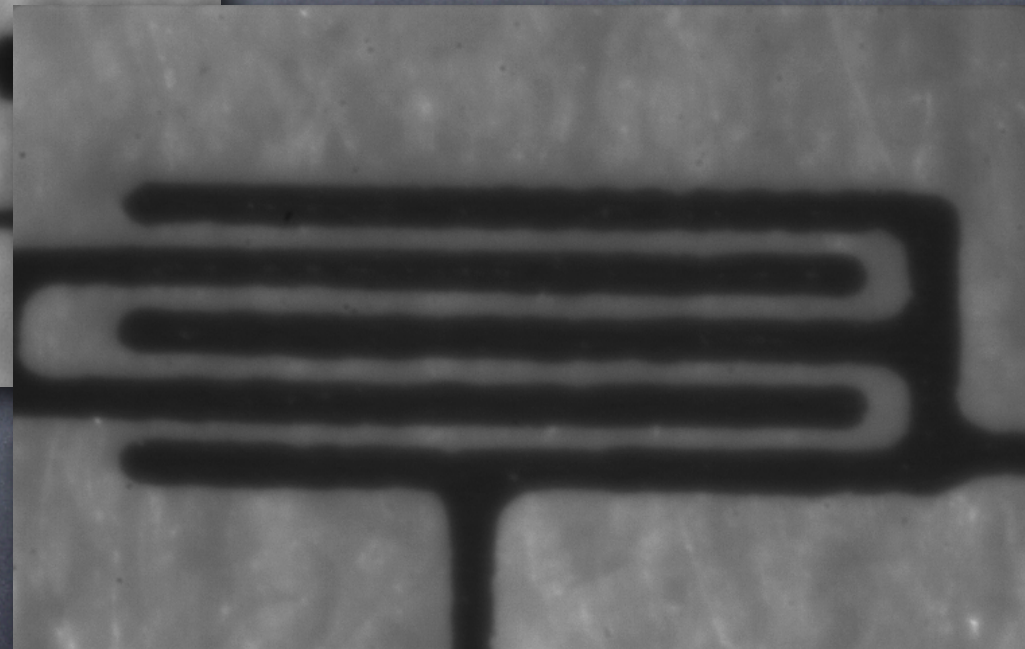
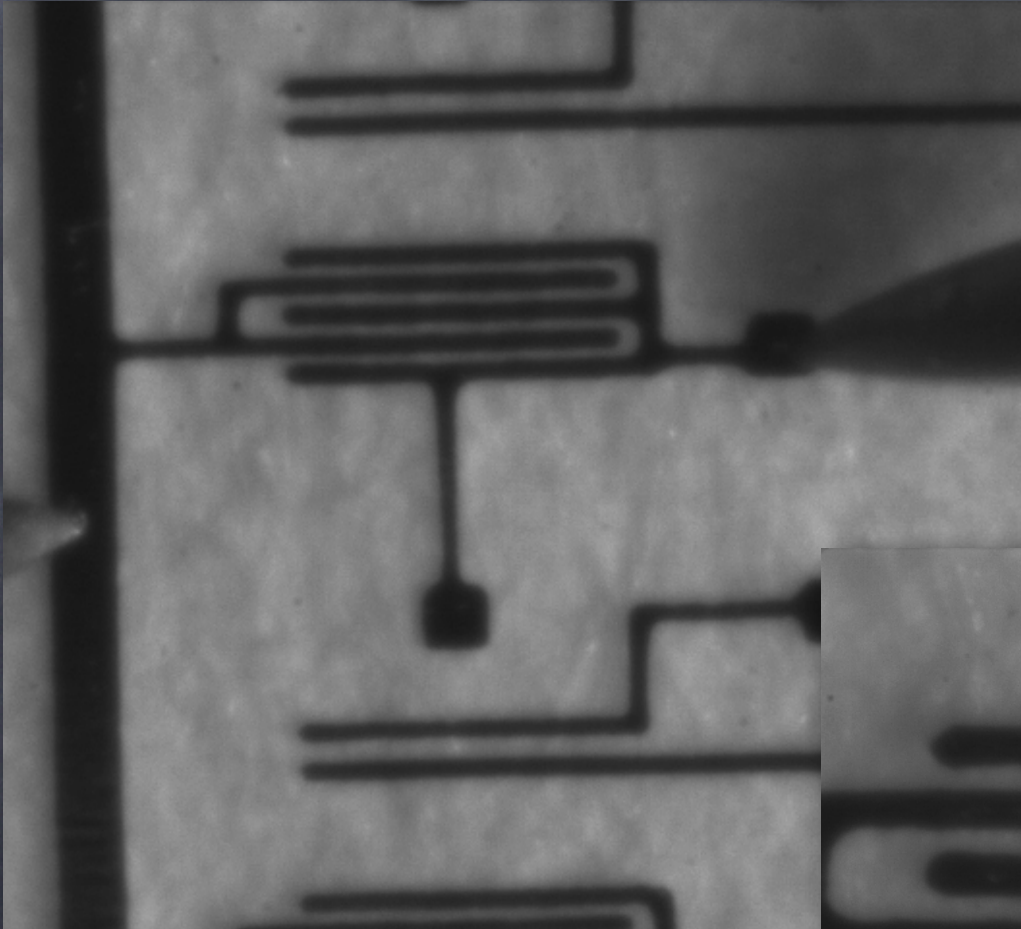


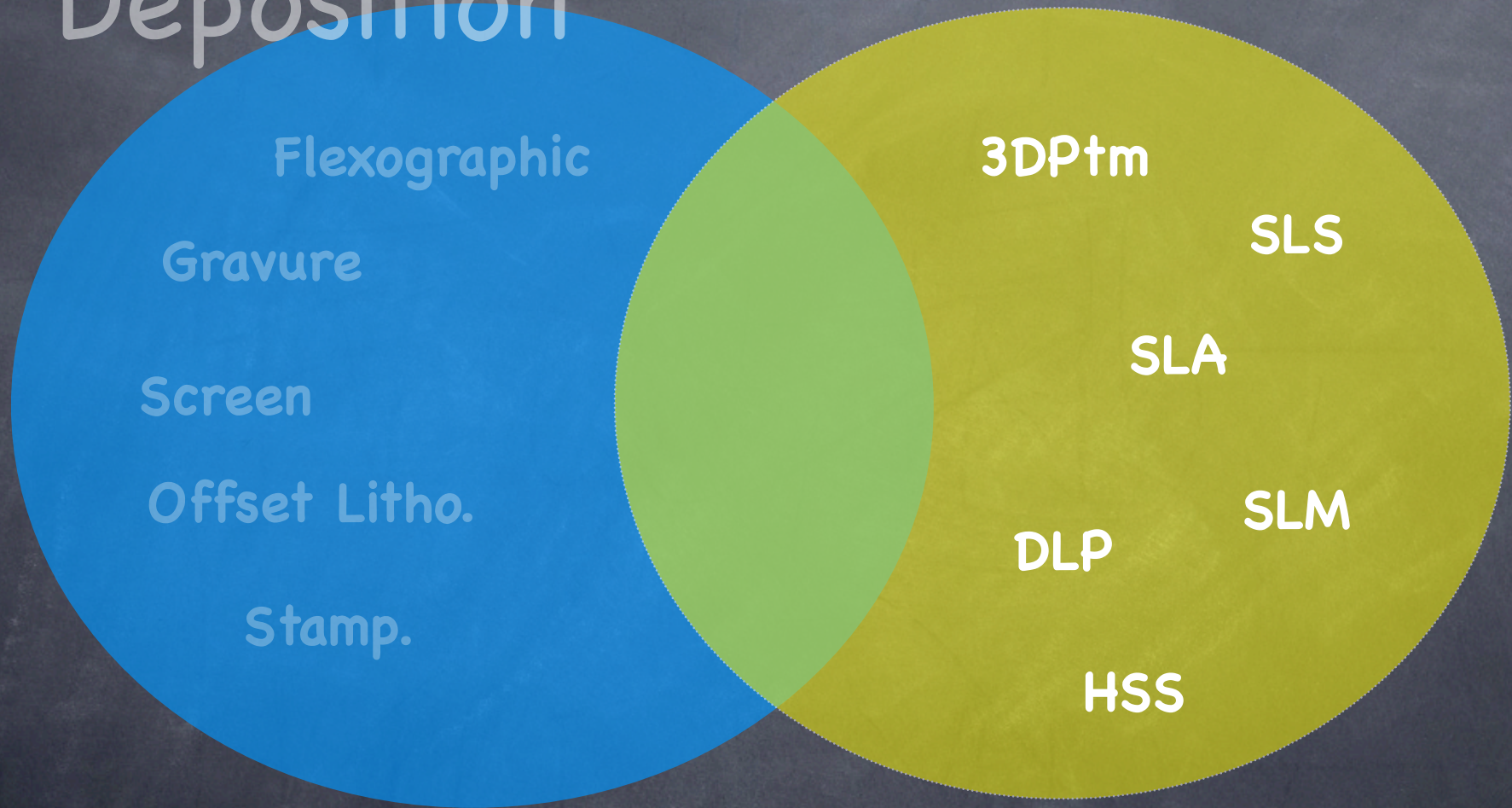
Image courtesy of Dr Nick Stone, Novalia

< 10 Micron  
Track width



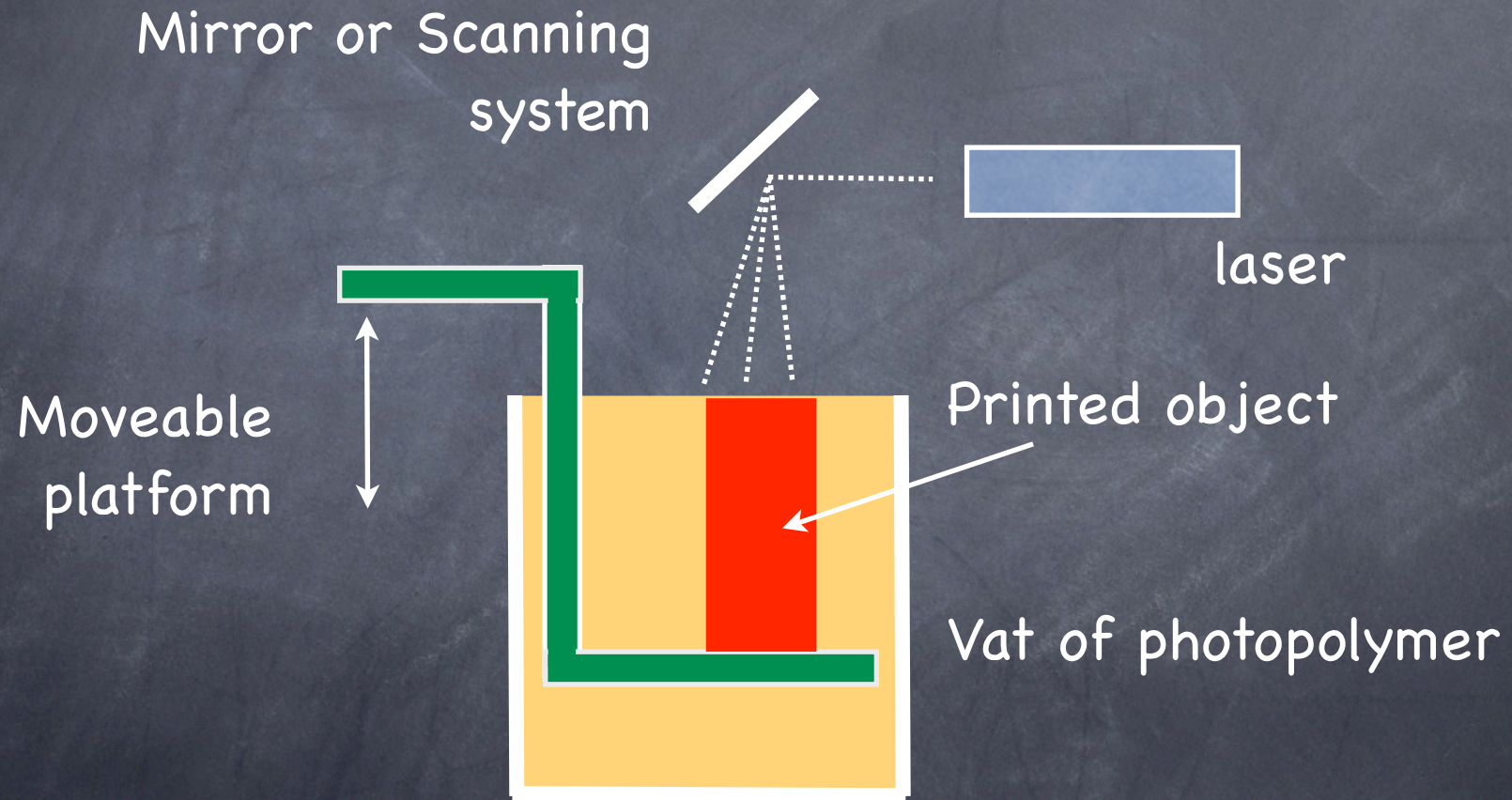
Images courtesy of Dr Nick Stone, Novalia.

# Deposition



# Digital

# SLA



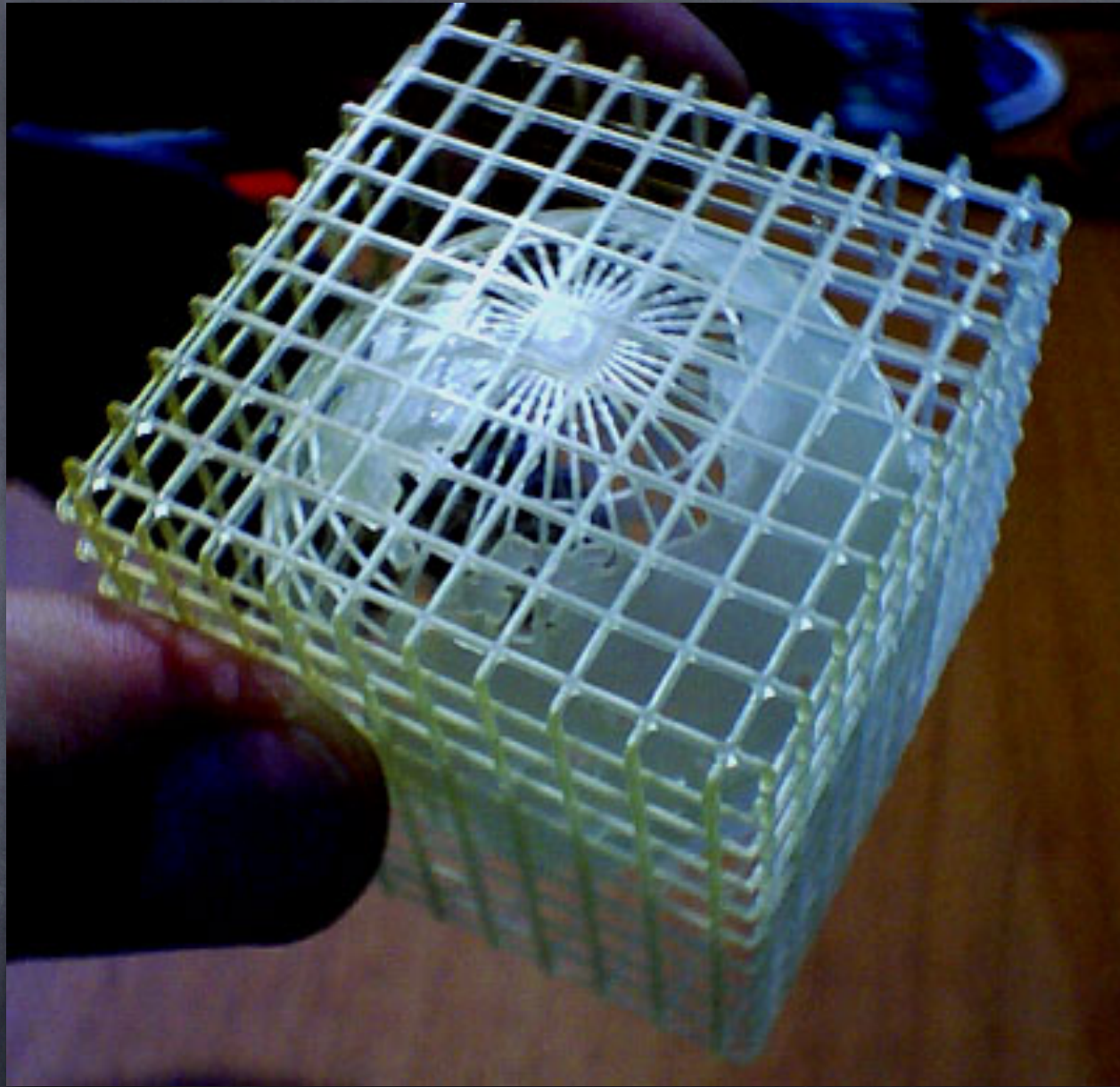
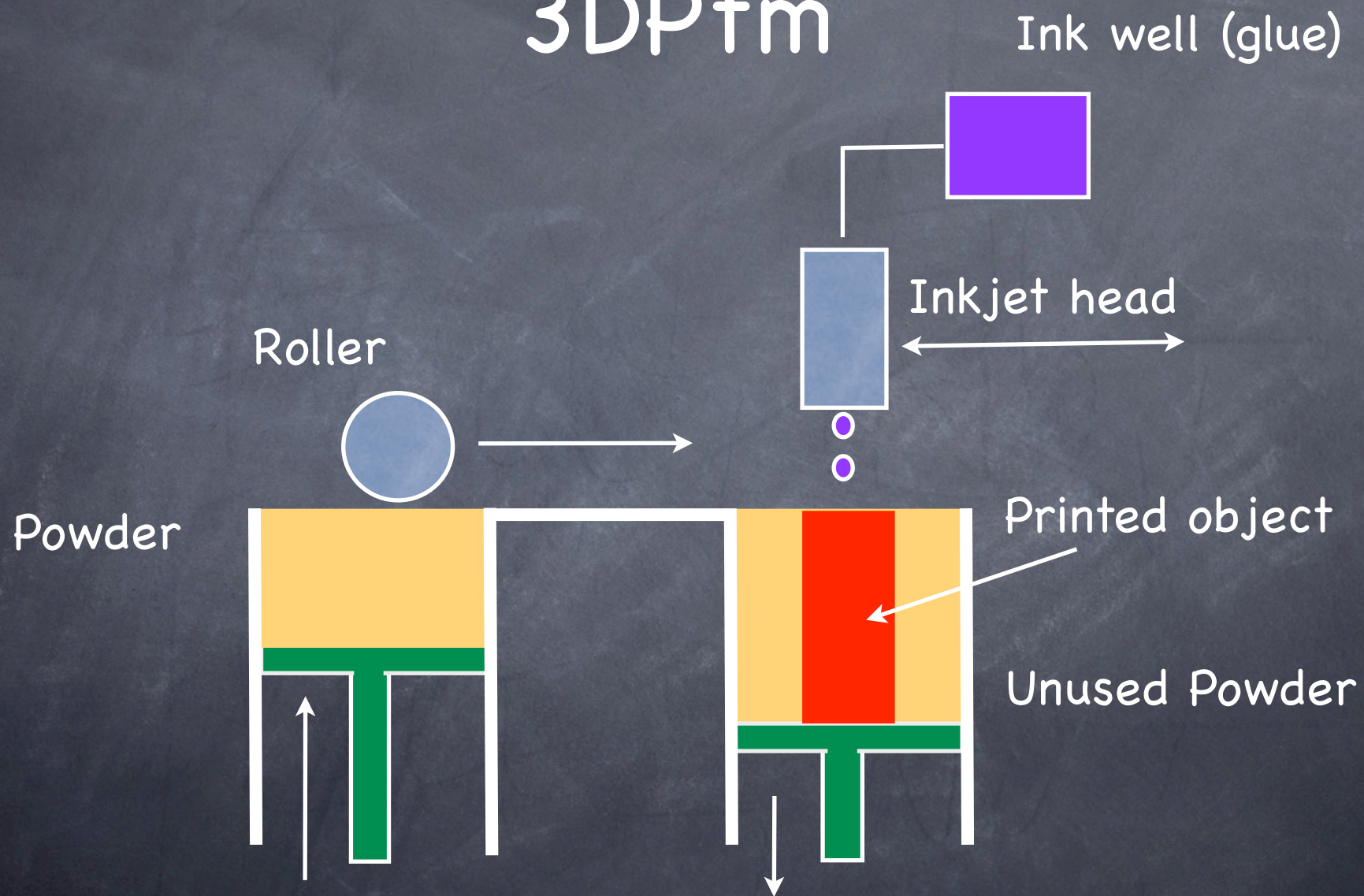


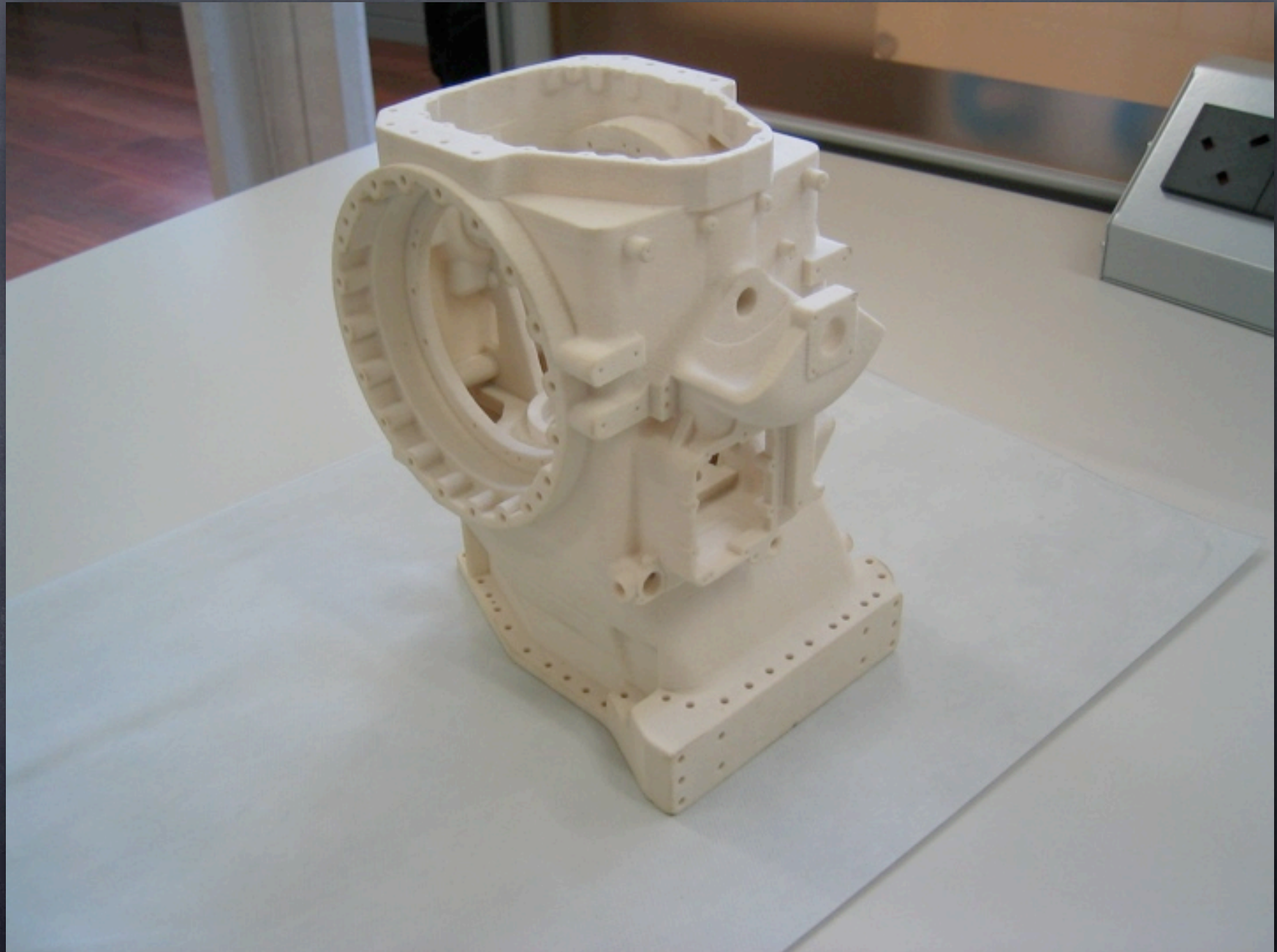
Image from TurkCadCam.net



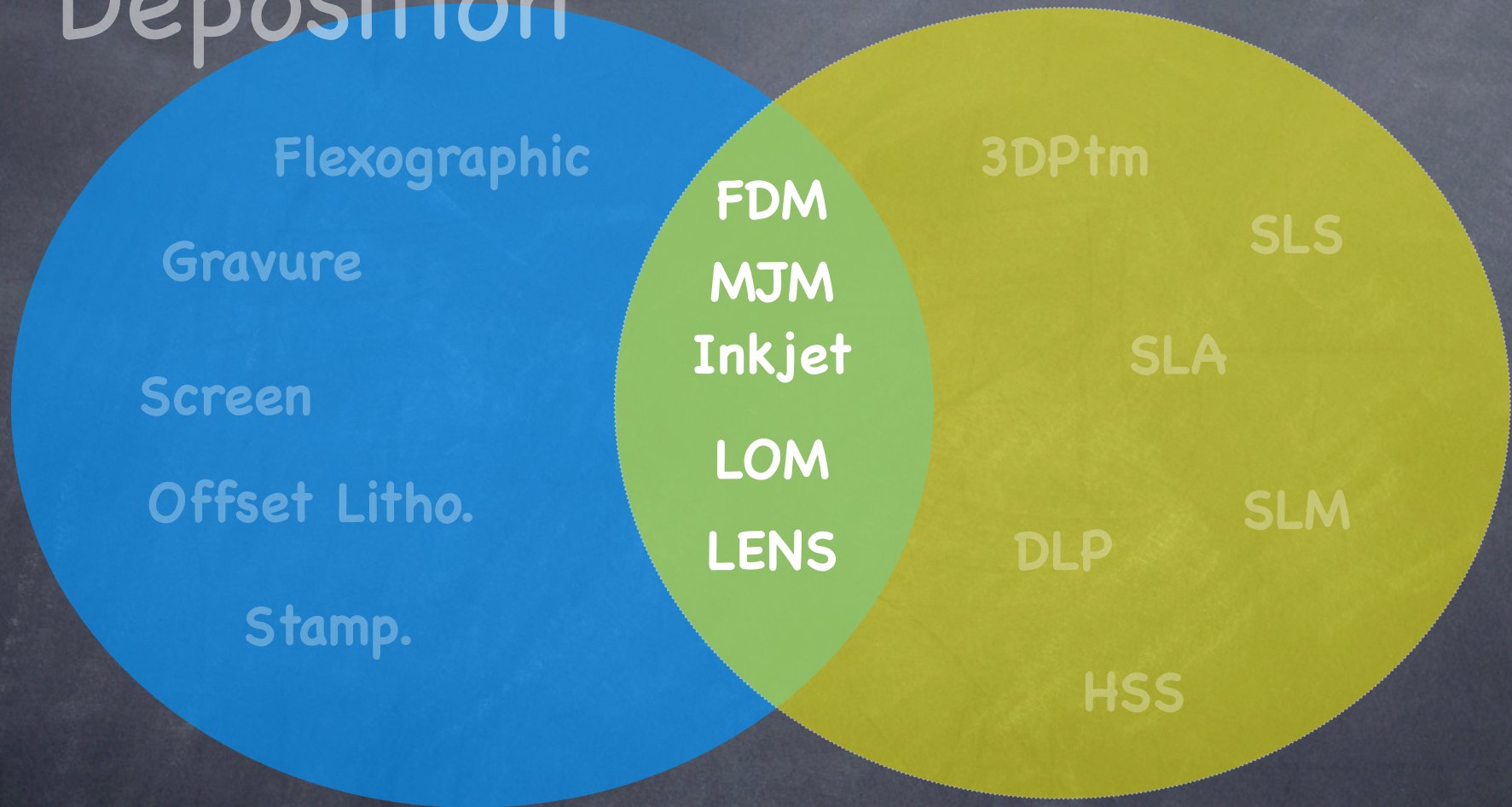
6' Kouros Statue, Image courtesy of Materialise

# 3DPtm





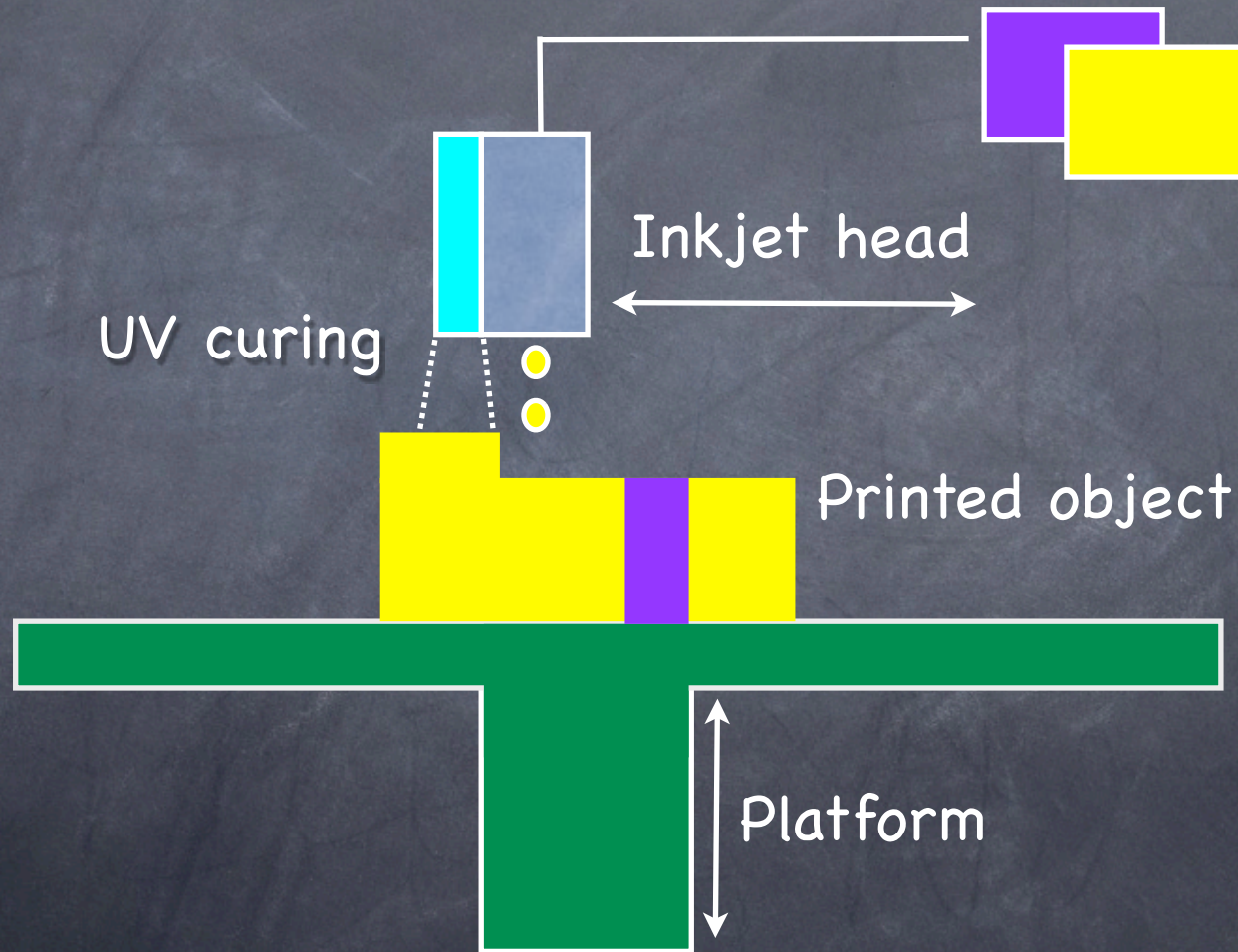
# Deposition



# Digital

# Inkjet

Ink wells (material)



3dmodelprinting.com



*InVision SR*  
*Robot Design*



*Simon Robinson*  
*simonrobinsonsculptor@hotmail.com*

Image courtesy of Inition.

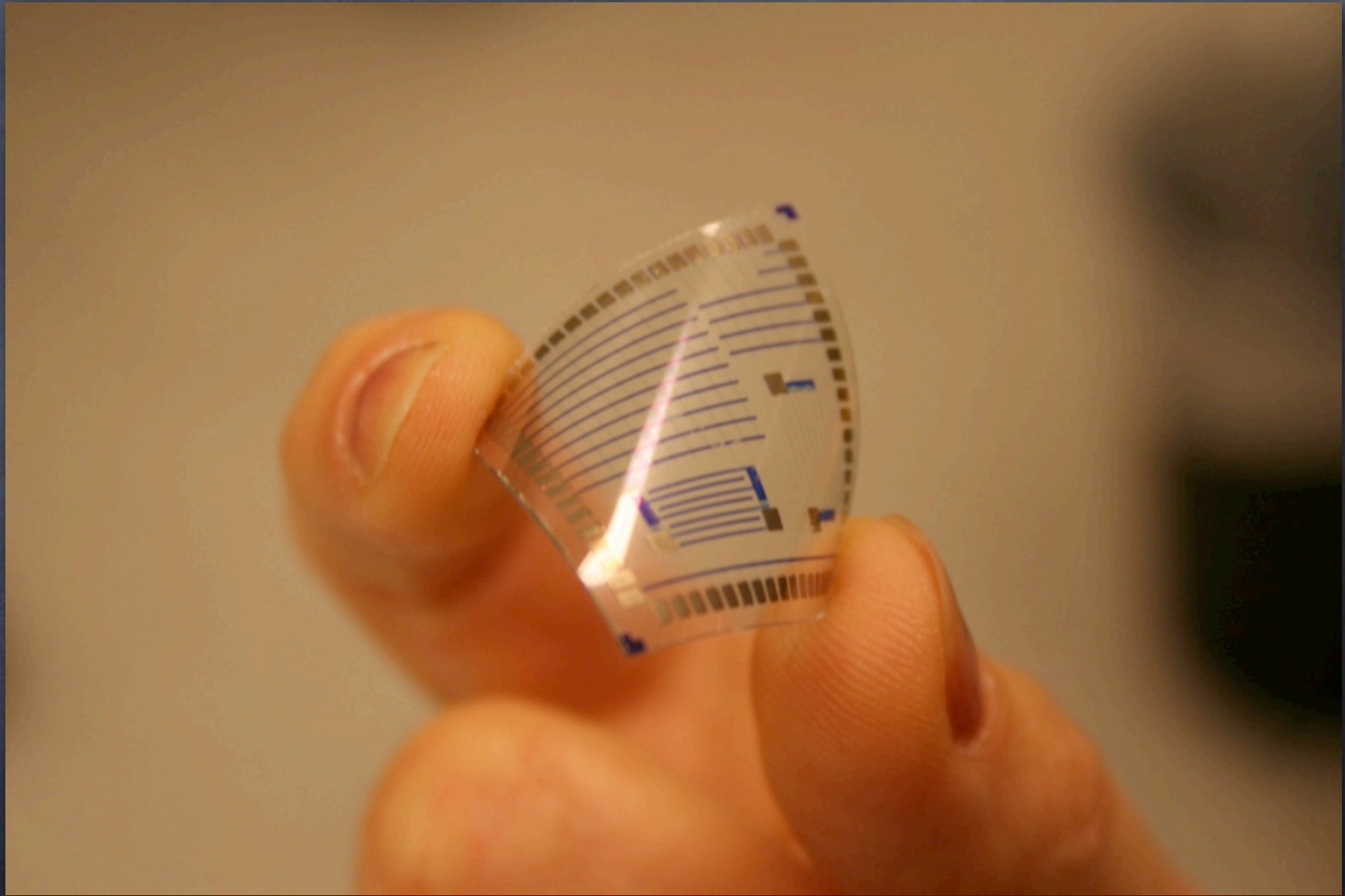


Image courtesy of Thin Film Electronics.

# Inkjet + Metalisation

R2R

0.5 m/s

< 100  $\mu\text{m}$



MetalJet 6000, Image courtesy of Conductive Inkjet Technology.

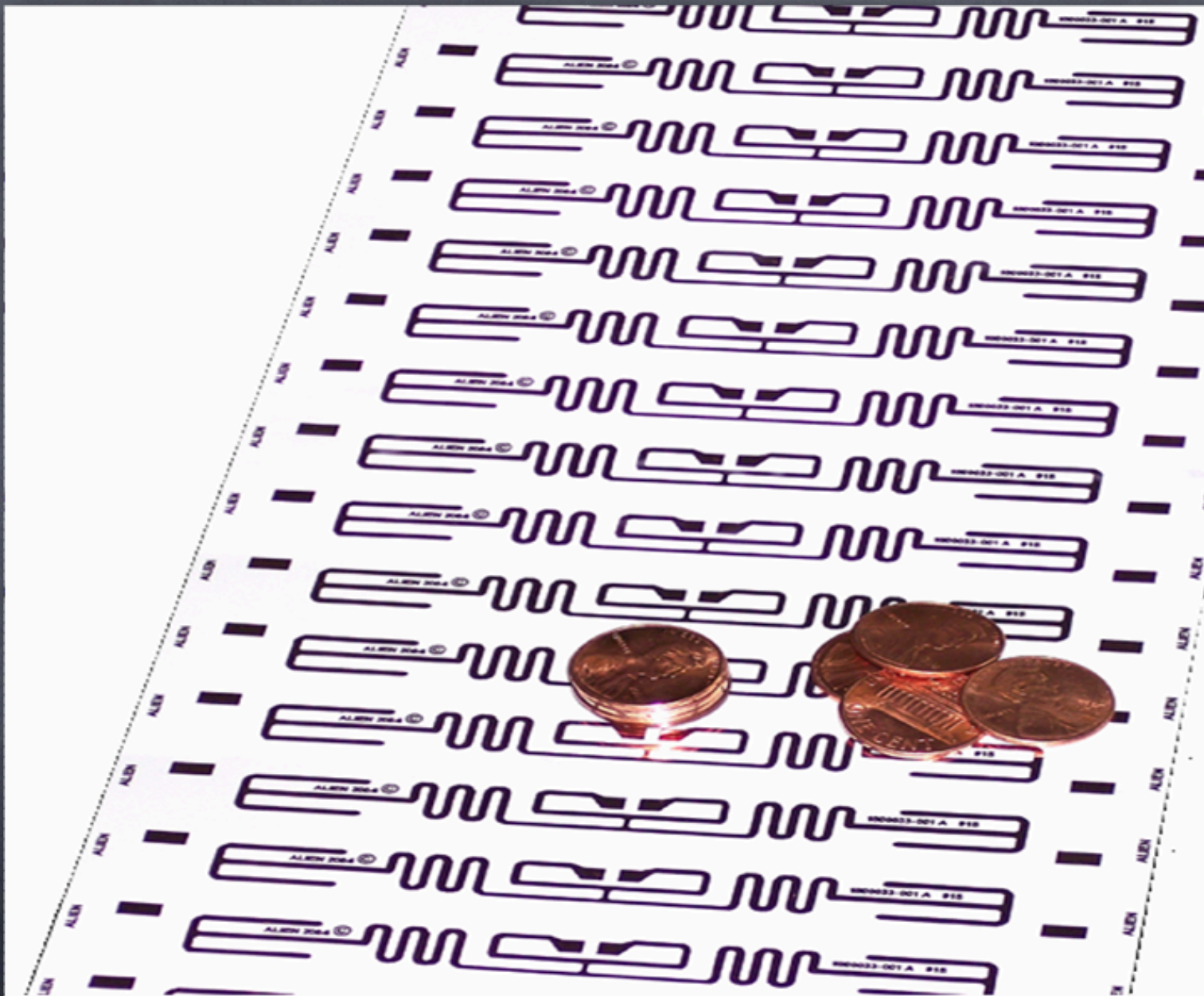


Image courtesy of Conductive Inkjet Technology.



Carbon nanotubes

Metallorganics

Quantum Dots

Metal nano-particles

UV curable polymers

Ceramics

Silica

Adhesives

# The Spime

Digital ↔ Physical

RFID home help



# Second Life Sex Aids

# Greg's Train Time Alarm Clock



hardware > software

≡ silicon 1980s

hardware  $\equiv$  software

Change



Hardware?

Software?

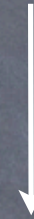
CAD



Instruction  
set

set

Language



Instruction  
set

set



Function

Function

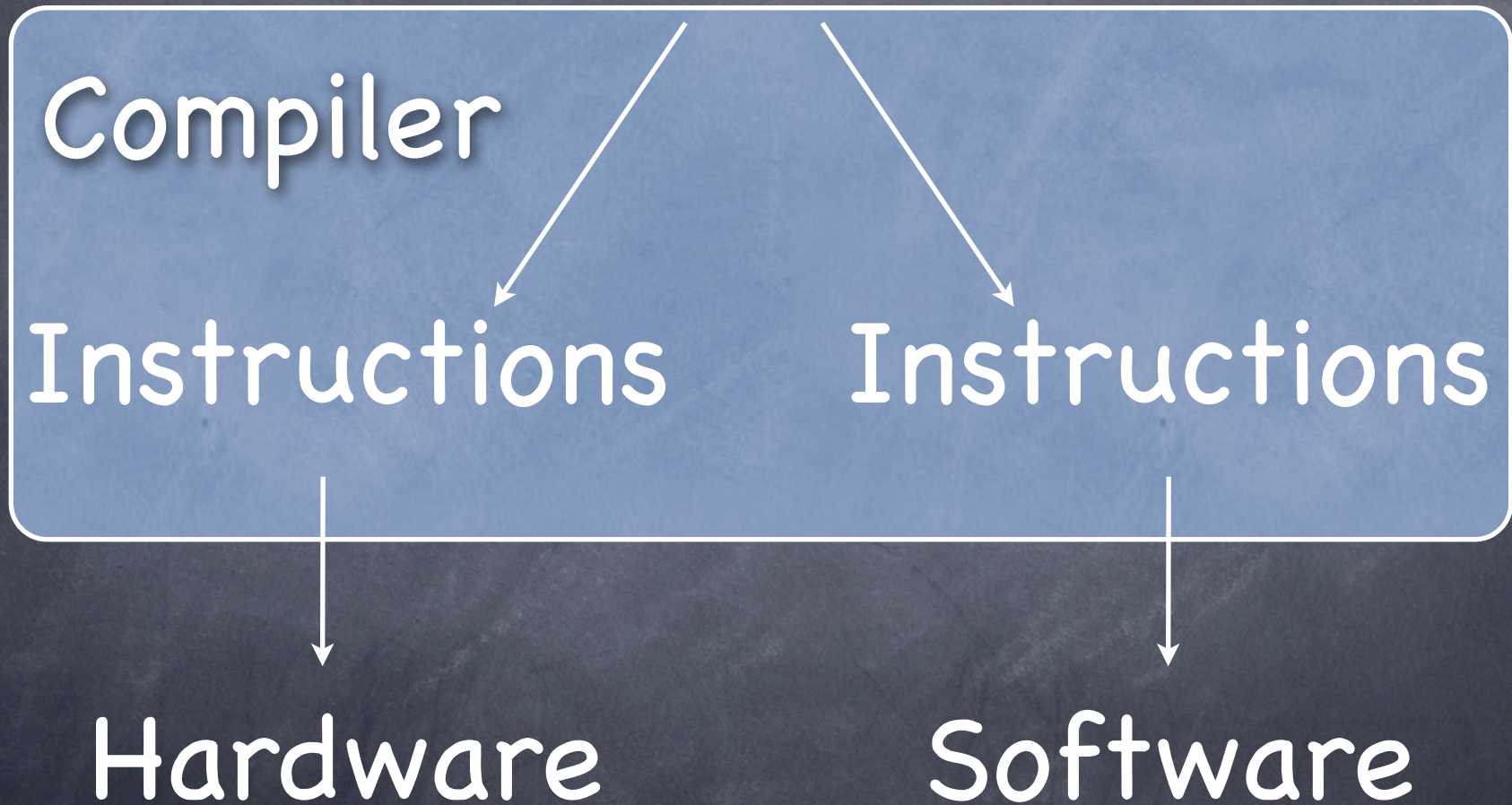
Instructions

Instructions

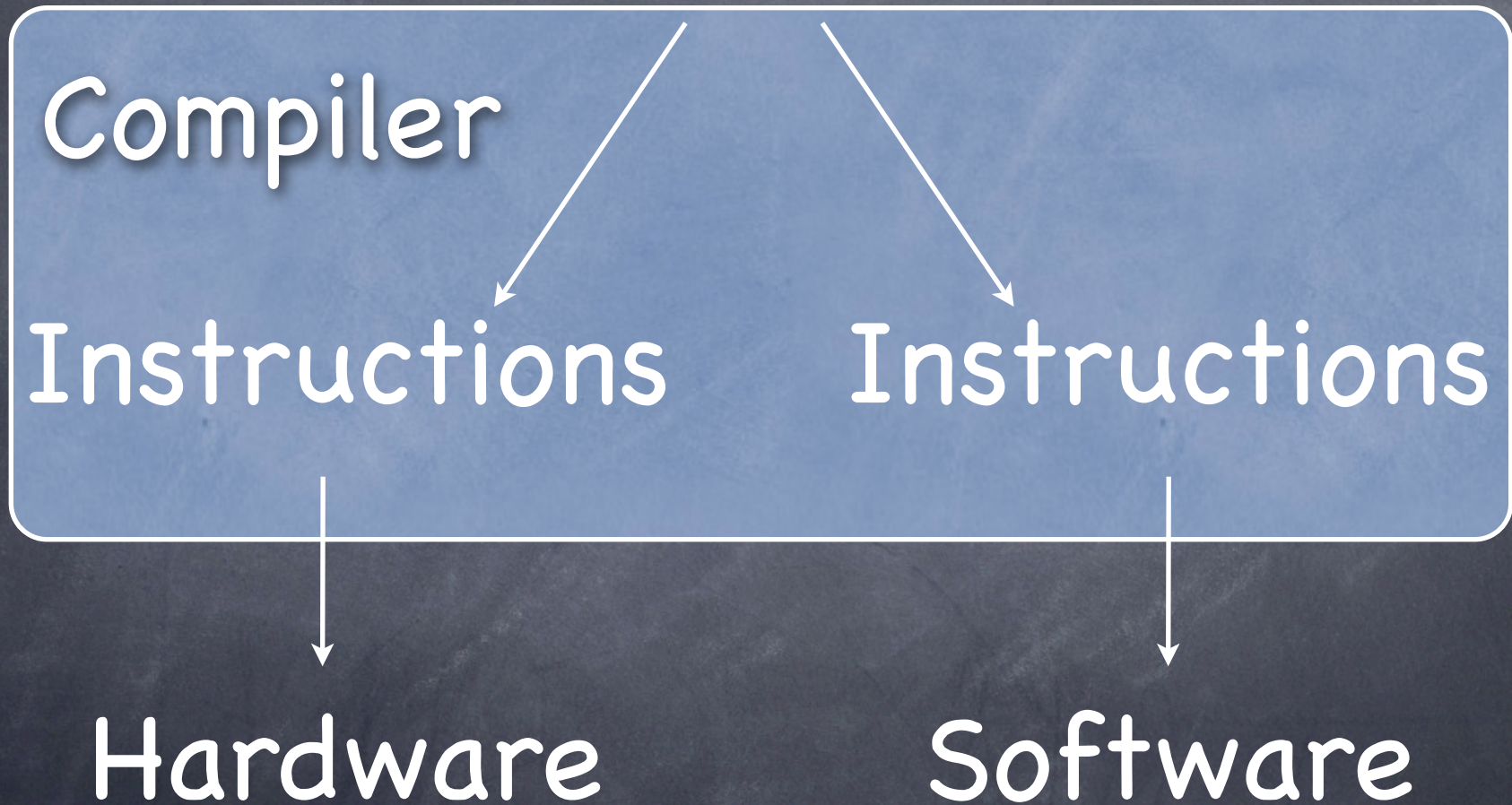
Hardware

Software

# Function



# Spime Script



Building objects and electronics

Distributed manufacturing

Open source hardware

Spine script



"Bah! Humbug!"



“The empires of  
the future are the  
empires of the  
mind.”

Thank you