

# TRANSFORM

Beyond Pixels,  
Towards Radical Atoms

MIT Europe Conference  
in Vienna, March 30, 2017

石井 裕

Hiroshi Ishii  
MIT Media Lab



@ishii\_mit



ishii.mit







ARS ELECTRONICA

# **RADICAL ATOMS**

AND THE ALCHEMISTS OF OUR TIME

Linz, September 8 - 12, 2016



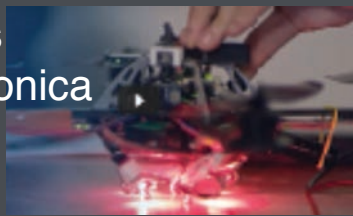
# Ars Electronica Festival 2016

## Radical Atoms Exhibition

September 2016 ~ Linz Austria

guests  
projects

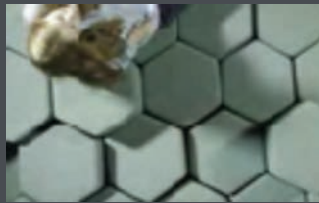
100 Drones  
Ars Electronica  
Futurelab



Infinite Cube  
ART+COM



Lift-Bit  
Carlo Ratti  
Associati



Active Wood  
Self-Assembler Lab



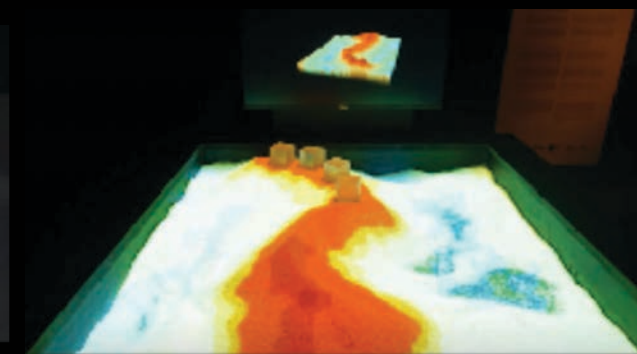
musicBottles



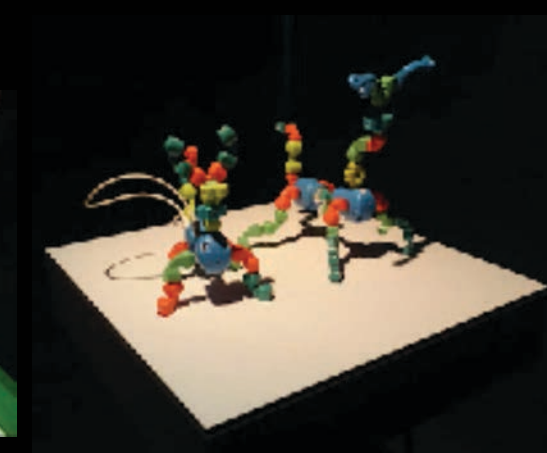
ZeroN



Perfect Red



SandScape



topobo



inFORM



bioLogic



LineFORM



PneUI



jamSheets



Media Lab, Responsive  
Environments Group

Rovables



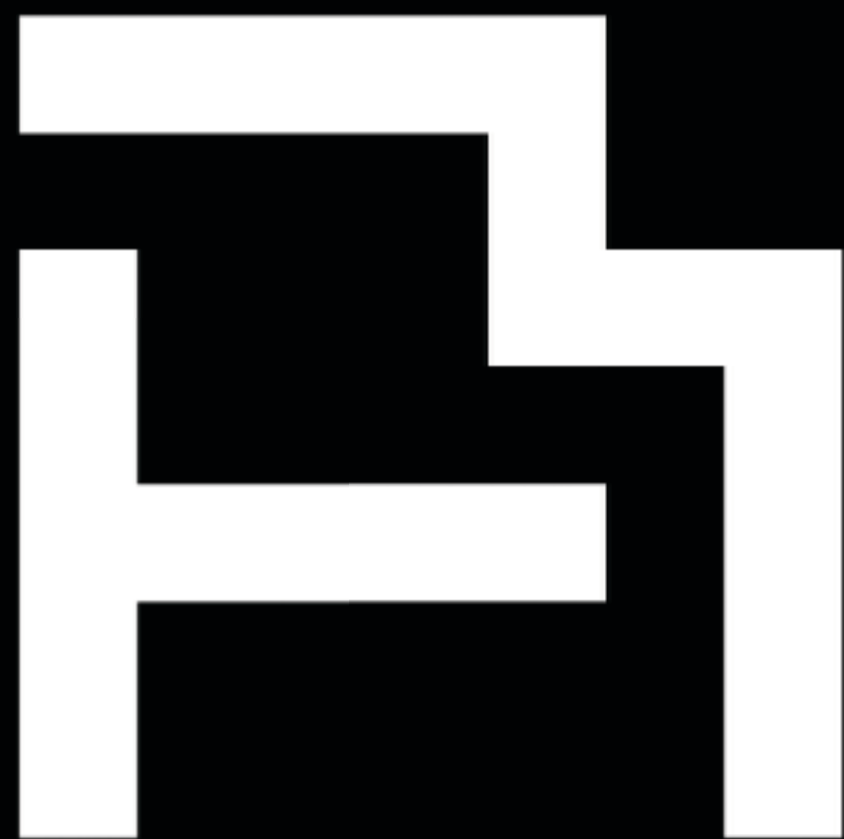
Hiroshi Ishii  
Tangible Media Group  
MIT Media Lab



# Radical Atoms Exhibition @ Ars Electronica Center, Sep. 2016







**tangible  
media**



# 1992

**ClearBoard-1**  
NTT Human Interface Labs  
CHI 92, CSCW 92



# 1992



## ClearBoard-1

NTT Human Interface Labs  
CHI 92, CSCW 92





ClearBoard: Seamless Collaboration Media  
Hiroshi Ishii & Minoru Kobayashi @NTT 1992

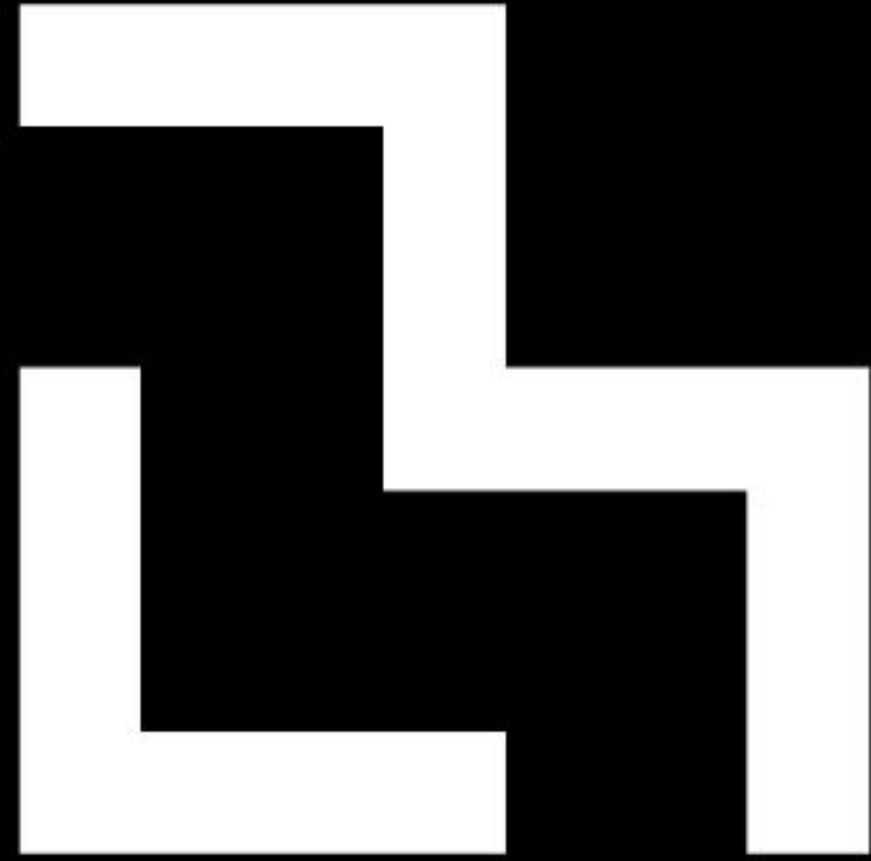
**ClearBoard-1**  
NTT Human Interface Labs  
CHI 92, CSCW 92



1995

**Tangible Media**  
**MIT Media Lab**





**mit**  
**media**  
**lab**

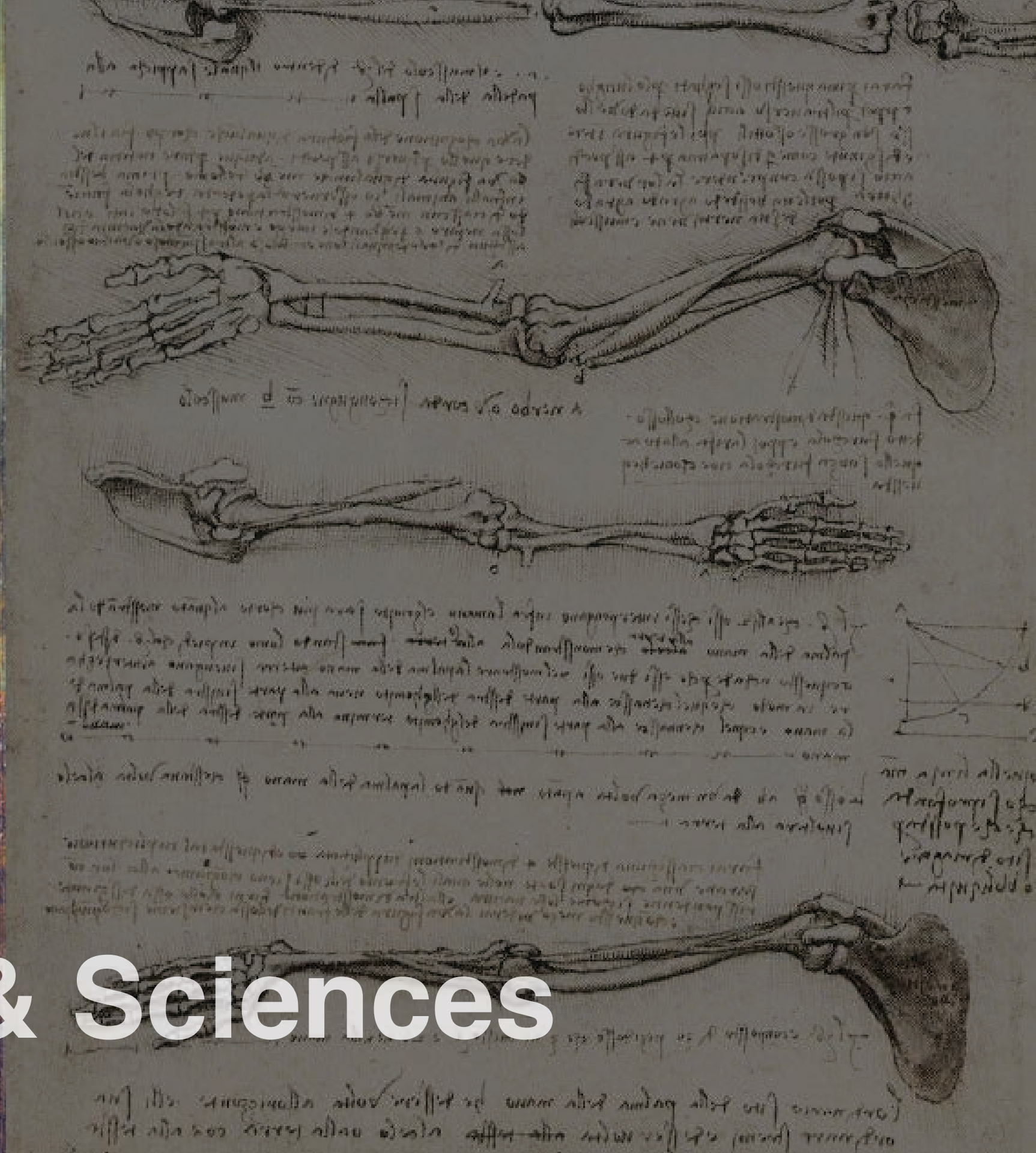
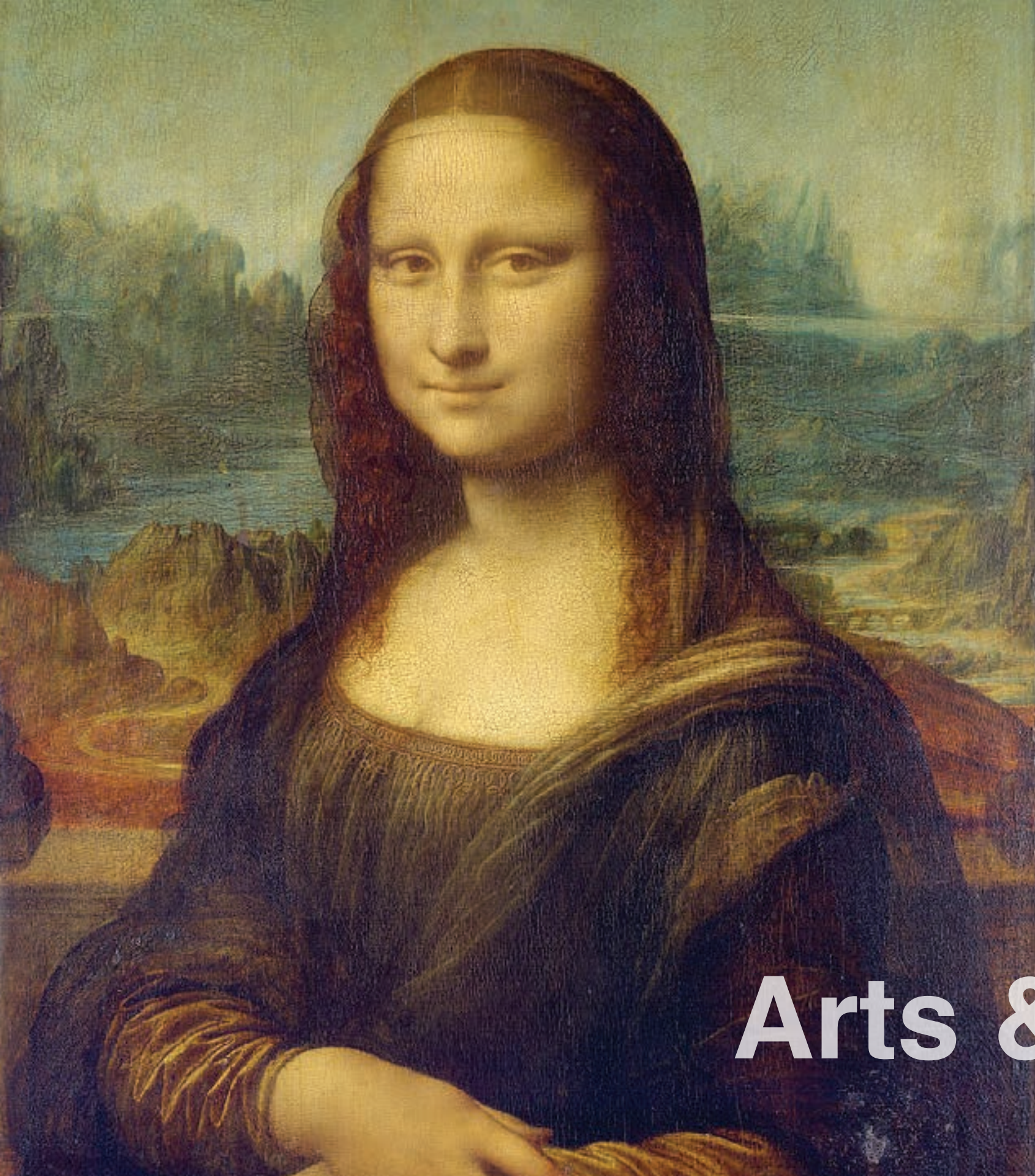


# TRANS-Disciplinary

*Finding opportunity in conflict between disciplines*  
*Breaking down old paradigms to create new archetypes*

“auf-heben”





# Arts & Sciences





# Music & Technology

# MirrorFugue III Xiao Xiao





# MirrorFugue III Xiao Xiao



# Milano

## Design Week

LEXUS DESIGN AMAZING 2014 MILAN

April 8-13, 2014

Tangible Media Group

MIT Media Lab



# TRANSFORM

Tangible Media Group led by Prof. Hiroshi Ishii  
from MIT Media Lab.







**TRANSFORM**  
Tangible Media  
MIT Media Lab

MIT  
Media  
Lab



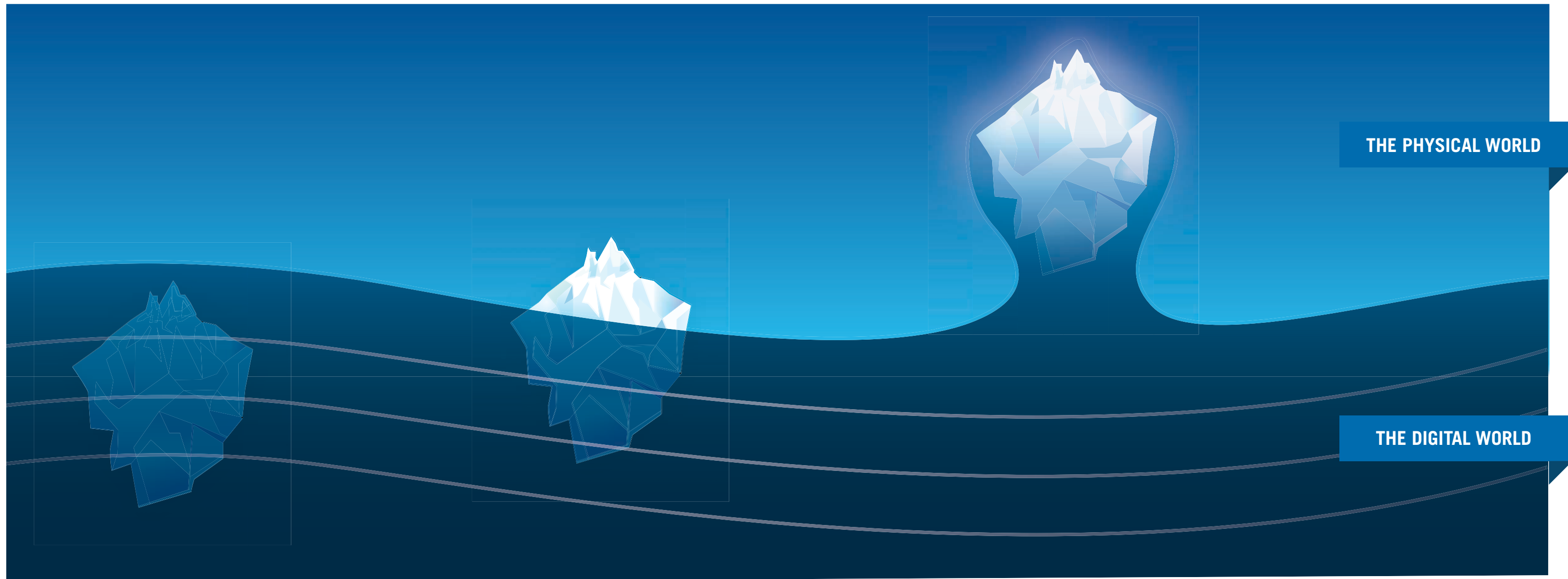
# GUI

PAINTED  
BITS

# TUI

TANGIBLE  
BITS

# RADICAL ATOMS



*A Graphical User Interfaces only let users see digital information through a screen, as if looking through a surface of the water. We interact with the forms below through remote controls such as a mouse, a keyboard or a touch screen.*

*A Tangible User Interface is like an iceberg: there is a portion of the digital that emerges beyond the surface of the water - into the physical realm - that acts as physical manifestations of computation, allowing us to directly interact with the 'tip of the iceberg.'*

*Radical Atoms is our vision for the future of interaction with hypothetical dynamic materials, in which all digital information has physical manifestation so that we can interact directly with it - as if the iceberg had risen from the depths to reveal its sunken mass.*



vision







**Vision**

**Needs**

**Technologies**

Photo courtesy of Nobukazu Kuriki



# Lifespan

**Vision**

**> 100 years**

**Needs**

**~10 years**

**Technologies**

**~1 year**

Photo courtesy of Nobukazu Kuriki



physical

p

tangible bits

d

digital

painted bits



# Tangible Bits

embody digital information to  
interact with directly with hands

Painted bits

GUI

tangible bits

1997

TUI





**bottles**



# musicBottles (classical)



# Origin: Weather Bottle



present for my mother

soy sauce bottle  
in her kitchen







石井 和子

Kazuko ISHII

1926 - 1998

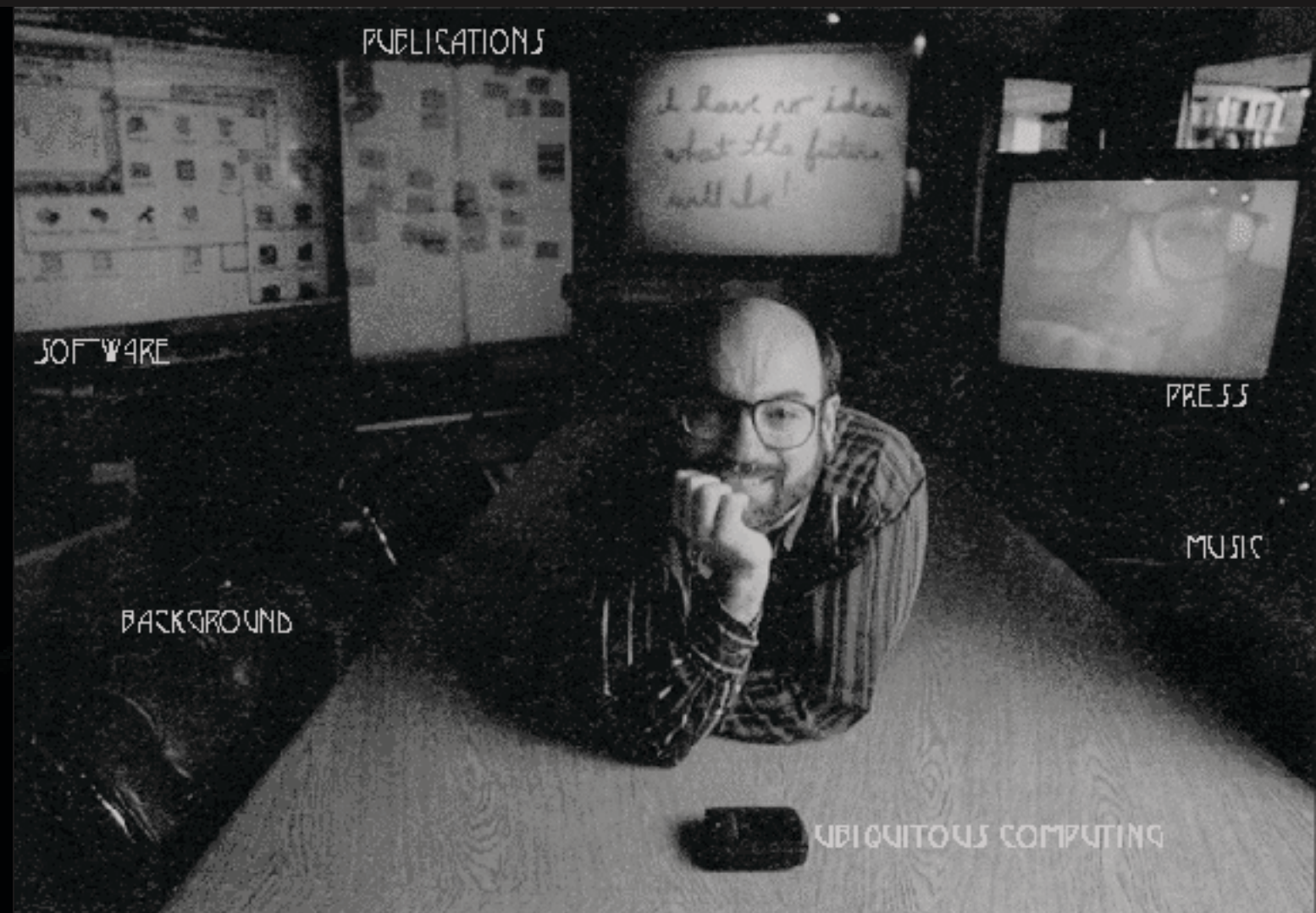
# Mark Weiser 1952 – 1999

## Ubiquitous Computing 1991



The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

~Mark Weiser





# Bottles: A Transparent Interface as a Tribute to Mark Weiser

IEICE TRANS. INF. & SYST., VOL.E87-D, NO.6 JUNE 2004



## Bottles: A Transparent Interface as a Tribute to Mark Weiser

Hiroshi ISHII<sup>1</sup>\*, Nonmember

**SUMMARY** This paper first discusses the misinterpretation of the concept of "ubiquitous computing" that Mark Weiser originally proposed in 1991. Weiser's main message was not the ubiquity of computers, but the transparency of interface that determines users' perception of digital technologies embedded in our physical environment seamlessly. To explore Weiser's philosophy of transparency in interfaces, this paper presents the design of an interface that uses glass bottles as "containers" and "controls" for digital information. The metaphor is a perfume bottle: Instead of text, the bottles have been filled with music — classical, jazz, and techno music. Opening each bottle releases the sound of a specific instrument accompanied by dynamic colored light. Physical manipulation of the bottles — opening and closing — is the primary mode of interaction for controlling their musical contents. The bottles illustrate Mark Weiser's vision of the transparent (or invisible) interface that weaves itself into the fabric of everyday life. The bottles also exploits the practical aspects of glass bottles that are tangible and visual, and evoke the smell of perfume and the taste of exotic beverages. This paper describes the design goals of the bottle interface, the arrangement of musical content, the implementation of the wireless electromagnetic tag technology, and the feedback from users who have played with the system.

**Key words:** Mark Weiser, ubiquitous computing, pervasive computing, invisible computing, transparent interface, tangible interface, tangible bits, bottles, music/bottles, weather bottles

### 1. Introduction

"Ubiquitous" has become a popular buzzword used by virtually every media in Japan today. Unfortunately, however, Mark Weiser's original concept of "ubiquitous computing" [19] was not well understood, and was often misused as a label for the old idea such as "anytime & anyplace computing" or as an acronym of "mobile/wireless broadband services."

This paper first discusses the core message of Weiser's "ubiquitous computing" vision based on my personal communication with him, and then presents "bottles" as a tribute to him. The bottles illustrate Weiser's vision of *profound technologies* that disappear by weaving themselves into the fabric of everyday life.

### 2. Ubiquitous

#### 2.1 Anytime & Anyplace?

The word *ubiquitous*, meaning "omnipresent," is often interpreted as "anytime & anyplace." However, the concept of "anytime & anyplace" is nothing especially new. This

Manuscript received December 12, 2003.

Manuscript revised February 20, 2004.

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a) E-mail: ishi1@media.mit.edu

ISHII: BOTTLES: A TRANSPARENT INTERFACE AS A TRIBUTE TO MARK WEISER

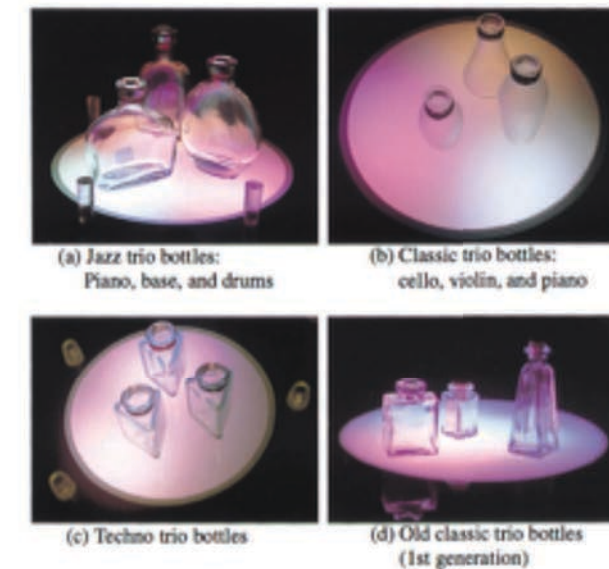


Fig. 5 musicBottles sampler.



Fig. 6 A weather bottle that contains the weather forecast of Sapporo-city.



I/O Brush  
painter = color maker



# I/O Brush

Kimiko Ryokai, Stefan Marti, & Hiroshi Ishii 2004



# I/O Brush History Mode

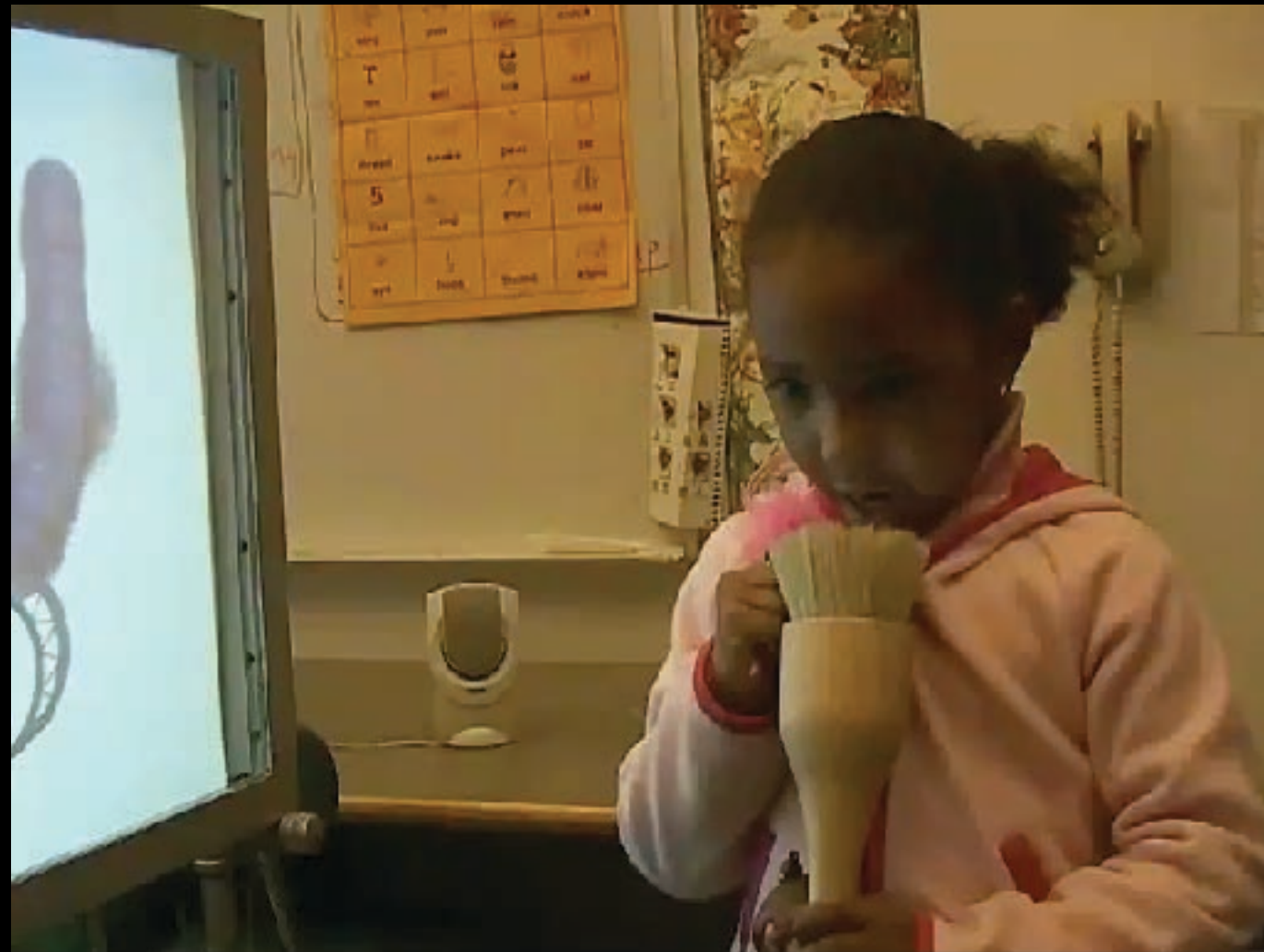
Kimiko Ryokai, Stefan Marti, & Hiroshi Ishii 2004





# I/O Brush History Mode

Kimiko Ryokai, Stefan Marti, & Hiroshi Ishii 2004



Capturing and weaving the (hi)story for every stroke





**“The World as the Palette”**  
Colors in Barcelona



# PingPongPlus

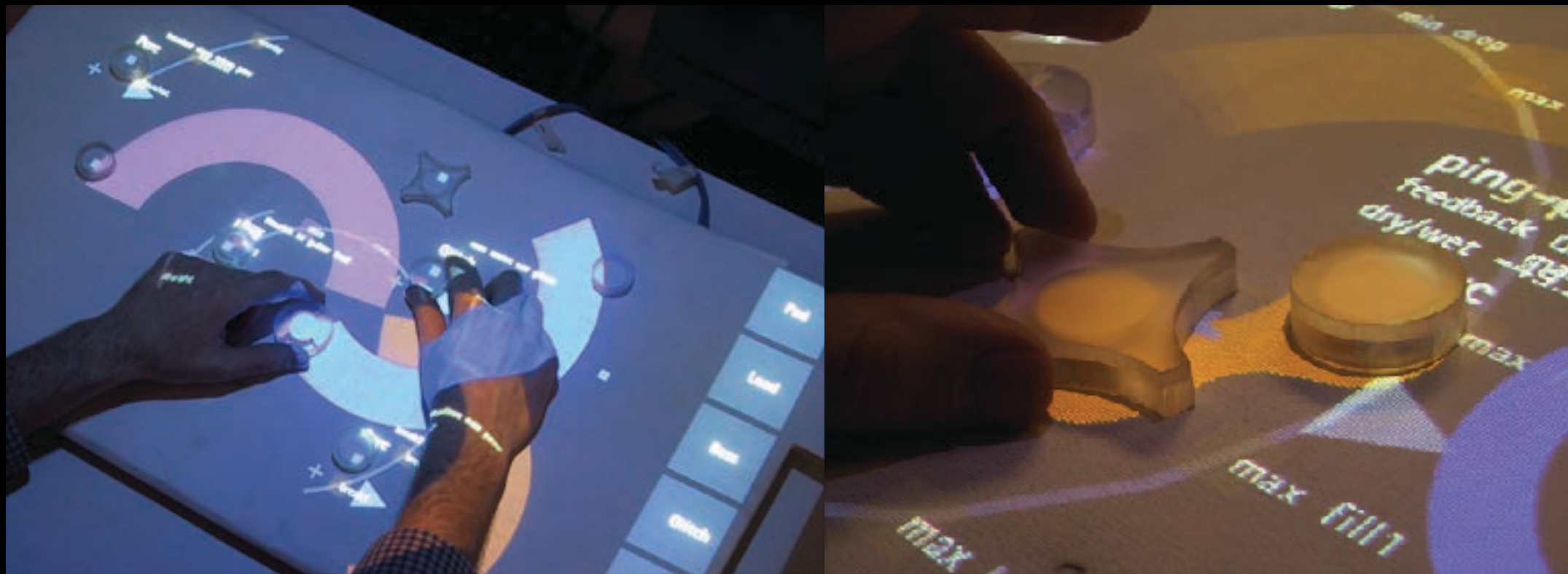
Ishii, Lee, Wisneski, Orbanes 1999

- ICC, Tokyo 2000
- Centre Pompidou, Paris 2003
- Victoria and Albert Museum, London 2005



# Audiopad

James Patten and Ben Recht (Physics & Media)

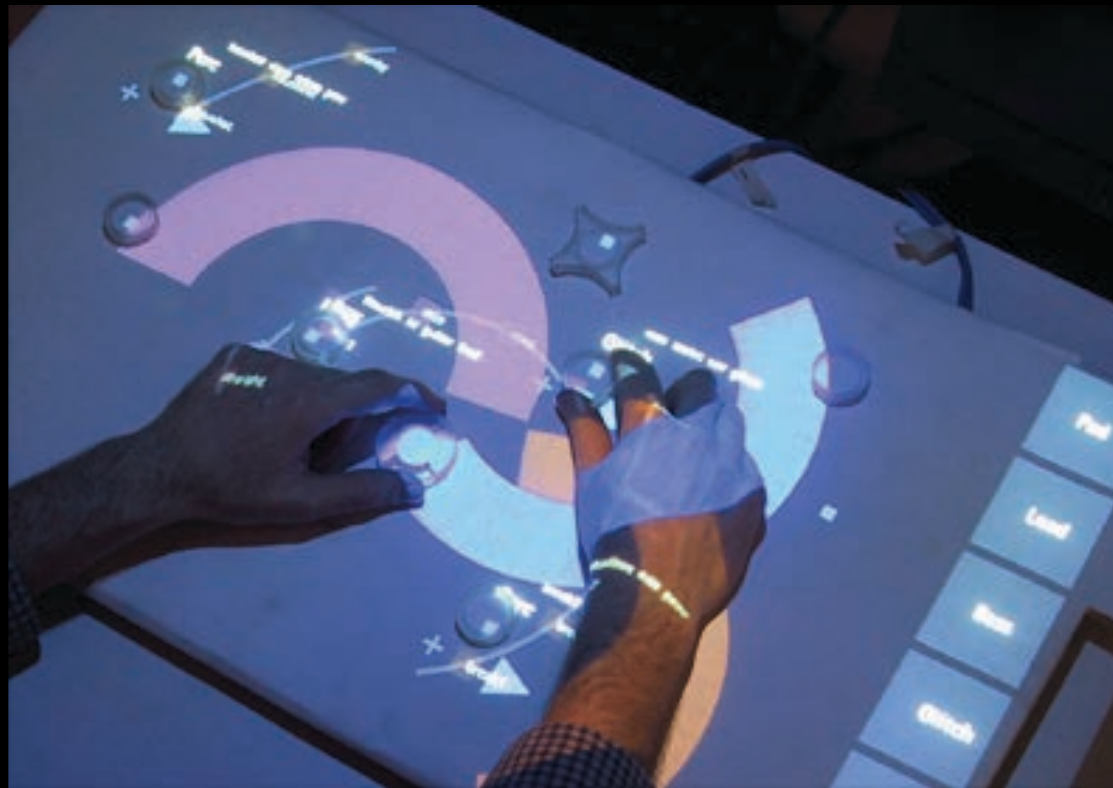


- A new way to perform electronic music.
- Designed to combine the expressive power of traditional musical instruments with the modularity of a computer
- Based on the Sensetable project.



# Audiopad

James Patten and Ben Recht (Physics & Media)



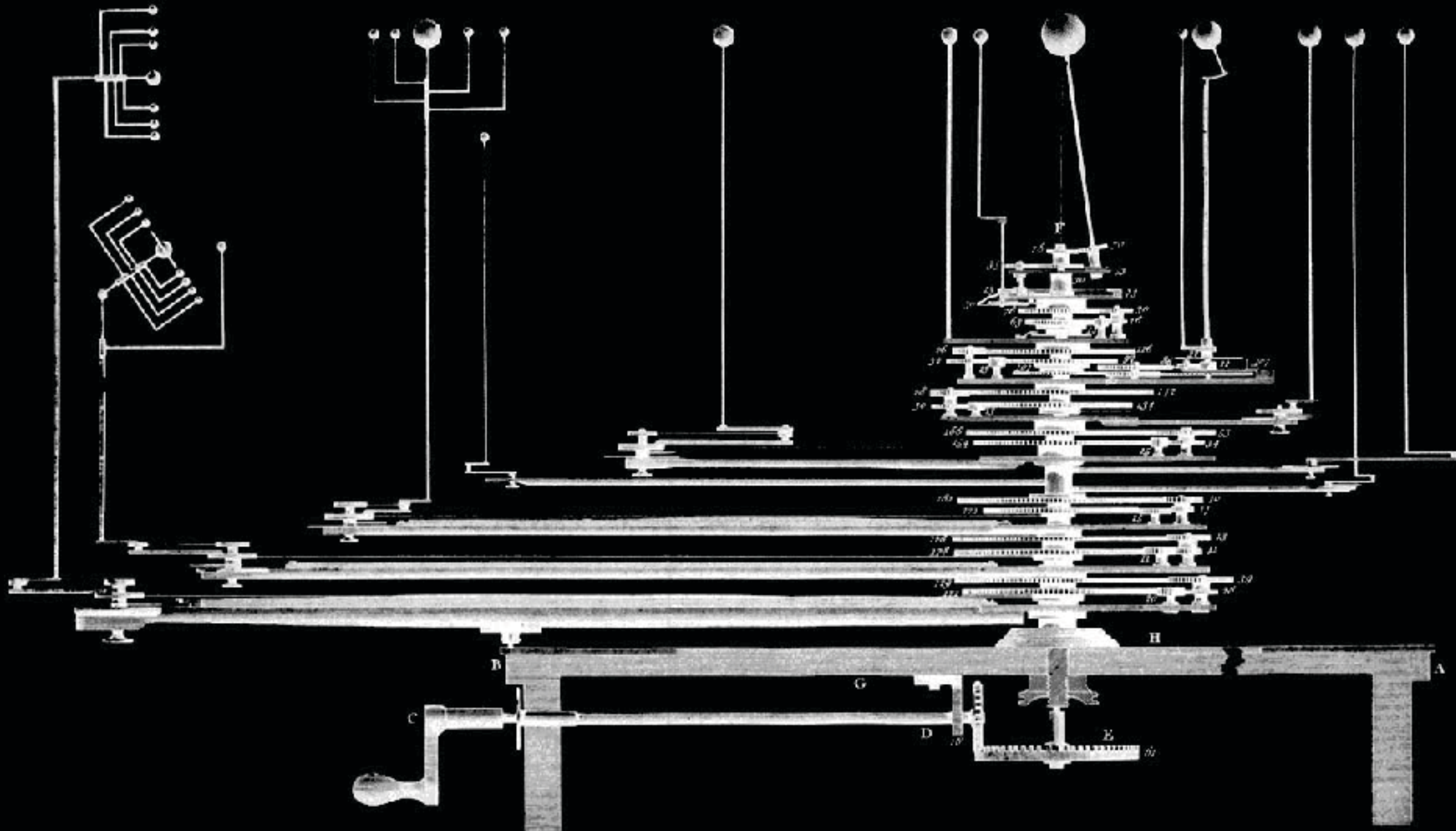
- A new way to perform electronic music.
- Designed to combine the expressive power of traditional musical instruments with the modularity of a computer
- Based on the Sensetable project.

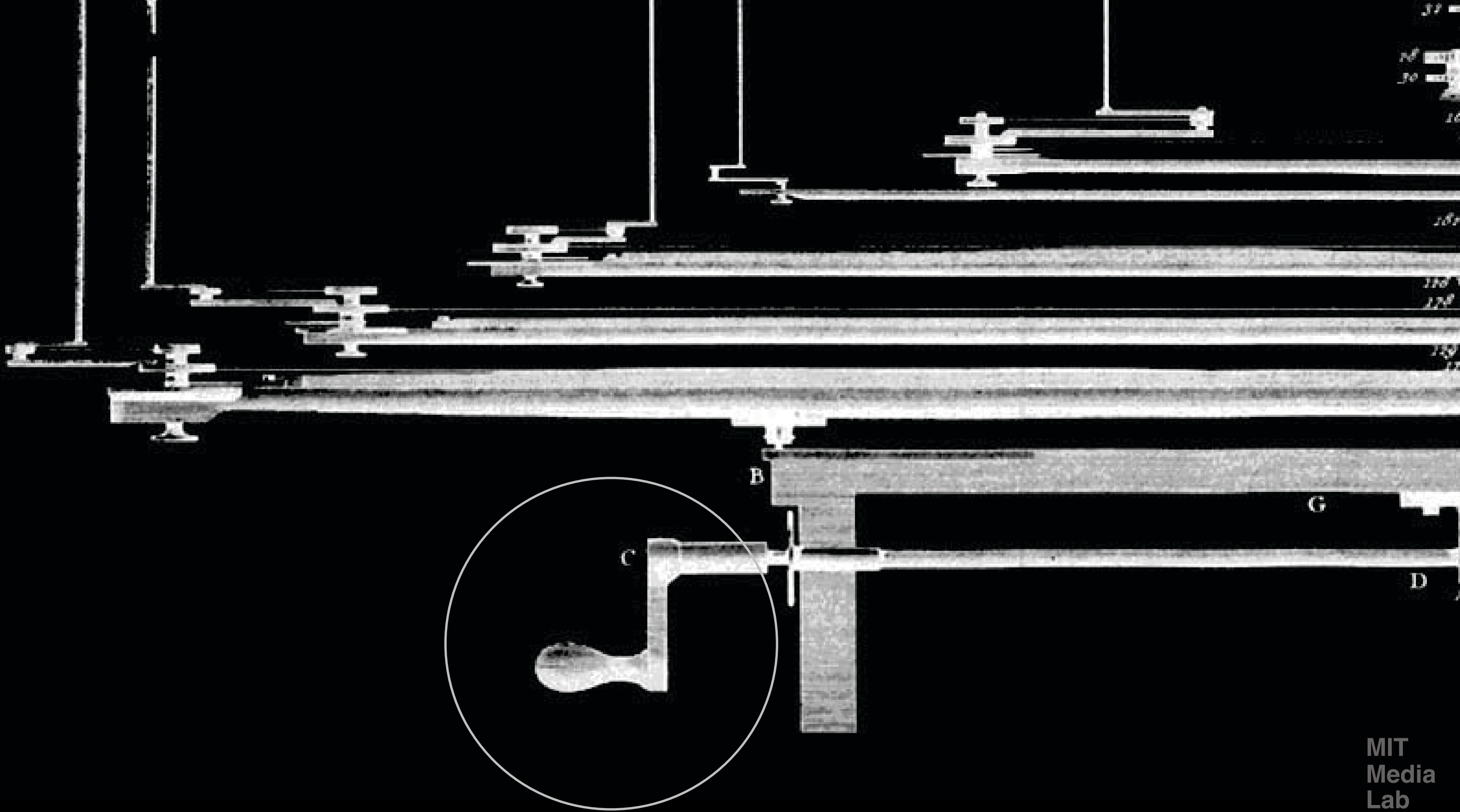




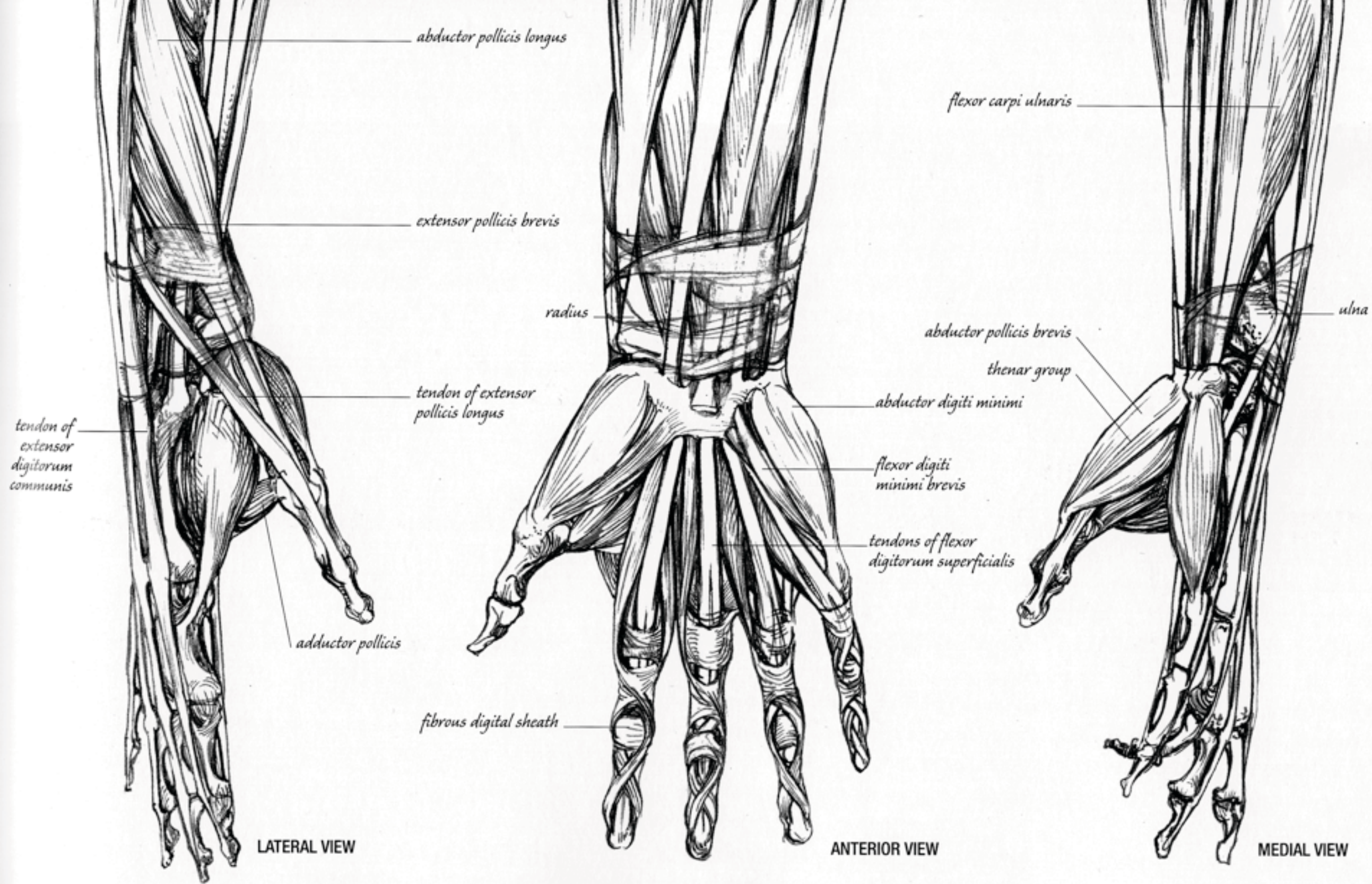
# Orrery

Tangible Representation of Knowledge









**hands**



# collaboration



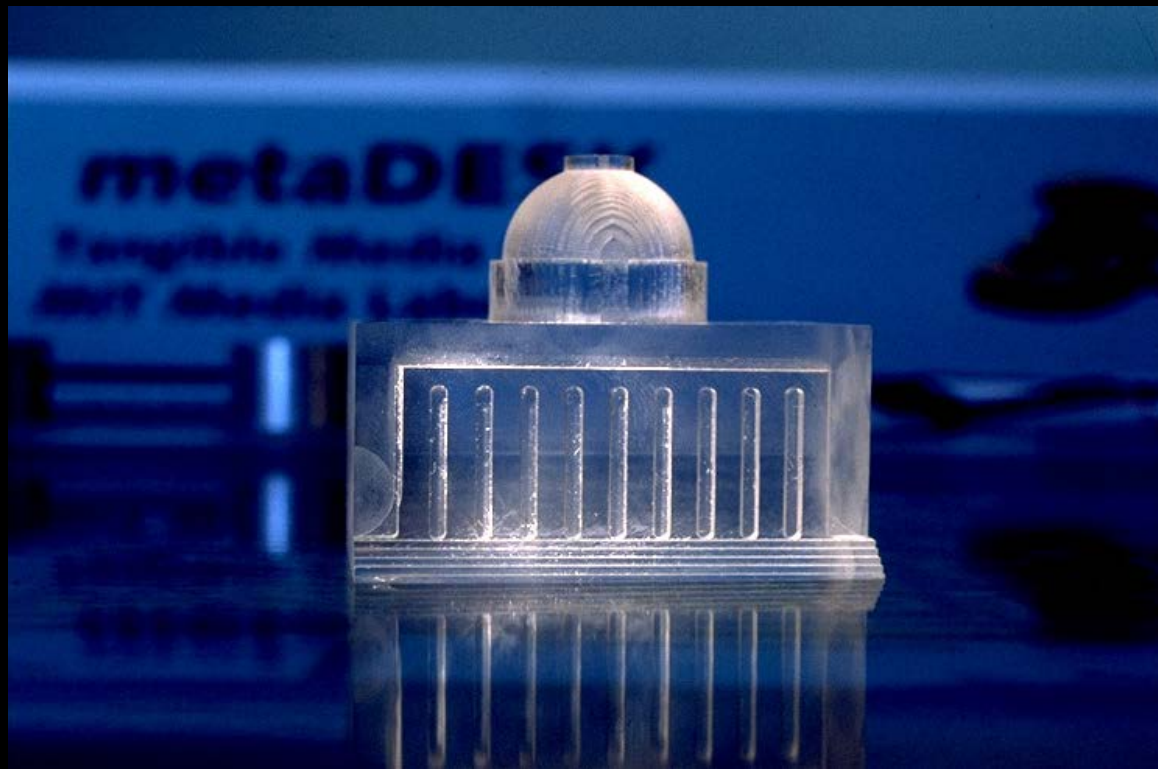
*A Philosopher Giving a Lecture on the Orrery* (sometimes called simply *The Orrery*) is a painting (oil on canvas, ca. 1766) by Joseph Wright of Derby depicting a public lecture about a model solar system, with a lamp—in place of the sun—illuminating the faces of the audience. [http://en.wikipedia.org/?title=Portal:History\\_of\\_science/Previous\\_pictures#/media/File:Wright\\_of\\_Derby,\\_The\\_Orrery.jpg](http://en.wikipedia.org/?title=Portal:History_of_science/Previous_pictures#/media/File:Wright_of_Derby,_The_Orrery.jpg)



1997

**Tangible Bits**  
**CHI '97 paper**

# Tangible Bits



March 1997

“Tangible Bits” paper  
presented at CHI '97 in Atlanta

Published in the Proceedings of CHI '97, March 22-27, 1997, © 1997 ACM

## Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms

Hiroshi Ishii and Brygg Ullmer

MIT Media Laboratory  
Tangible Media Group  
20 Ames Street, Cambridge, MA 02139-4207 USA  
[ishii, ullmer]@media.mit.edu

### ABSTRACT

This paper presents our vision of Human Computer Interaction (HCI). “Tangible Bits.” Tangible Bits allows users to “grasp & manipulate” bits in the context of users’ attention by coupling the bits with everyday physical objects and architectural surfaces. Tangible Bits also enables users to be aware of background bits at the periphery of human perception using ambient display media such as light, sound, airflow, and water movement in an augmented space. The goal of Tangible Bits is to bridge the gaps between both cyberspace and the physical environment, as well as the foreground and background of human activities.

This paper describes three key concepts of Tangible Bits: interactive surfaces; the coupling of bits with graspable physical objects; and ambient media for background awareness. We illustrate these concepts with three prototype systems — the metaDESK, metaBOARD and ambientROOM — to identify underlying research issues.

### Keywords

tangible user interface, ambient media, graspable user interface, augmented reality, ubiquitous computing, context and periphery, foreground and background

### INTRODUCTION: FROM THE MUSEUM

Long before the invention of personal computers, our ancestors developed a variety of specialized physical artifacts to measure the passage of time, to predict the movement of planets, to draw geometric shapes, and to compute [10]. We studied these beautiful artifacts made of oak and brass in museums such as the Collection of Historic Scientific Instruments at Harvard University (Fig. 1).

We were inspired by the aesthetics and rich traditions of these historical scientific instruments, most of which have disappeared from schools, laboratories, and design studios and have been replaced with the most general of appliances: personal computers. Through grasping and manipulating these instruments, users of the past never have developed rich languages and cultures which valued haptic interaction with real physical objects. Also, much of this richness has been lost to the rapid flood of digital technologies.

We began our investigation of “looking to the future of HCI” at this museum by looking for what we have lost with the advent of personal computers. Our intention was to regain the richness of the physical world as HCI.

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© 1997 ACM 0-89591-902-0/97/03...\$2.50  
Copyright 1997 ACM 0-89591-902-0/97/03...\$2.50

### BITS & ATOMS

We live between two scales: our physical environment and cyberspace. Despite our dual citizenship, the absence of seamless couplings between these parallel constructs leaves a great divide between the worlds of bits and atoms. At the present, we are torn between these parallel but disjoint spaces.

We are now almost comically “wired” so that we can be here (physical space) and there (cyberspace) simultaneously [14]. Streams of bits leak out of cyberspace through a myriad of rectangular sensors into the physical world as photon beams. However, the interaction between people and cyberspace are now largely confined to traditional GUI (Graphical User Interface)-based boxes sitting on desktops or laptops. The interaction with these GUIs are separated from the ordinary physical environment within which we live and interact.

Although we have developed various skills and work practices for processing information through haptic interactions with physical objects (e.g., writing messages on Post-It™ notes and spatially manipulating them on a wall) as well as peripheral senses (e.g., being aware of a change in weather through ambient light), most of these practices are neglected in current HCI design because of the lack of diversity of input/output media, and too much bias towards graphical output at the expense of input from the real world [3].

### Outline of this paper

To look towards the future of HCI, this paper will present our vision of Tangible Bits and introduce design projects including the metaDESK, metaBOARD and ambientROOM systems to illustrate our key concepts. This paper is not intended to propose a solution in any one single problem. Rather, we will propose a new view of interface and raise a set of new research questions to go beyond GUI.

### FROM DESKTOP TO PHYSICAL ENVIRONMENT

In 1981, the Xerox Star workstation set the stage for the first generation of GUI [15], establishing a “desktop metaphor” which mimicked a desktop on a bit-mapped



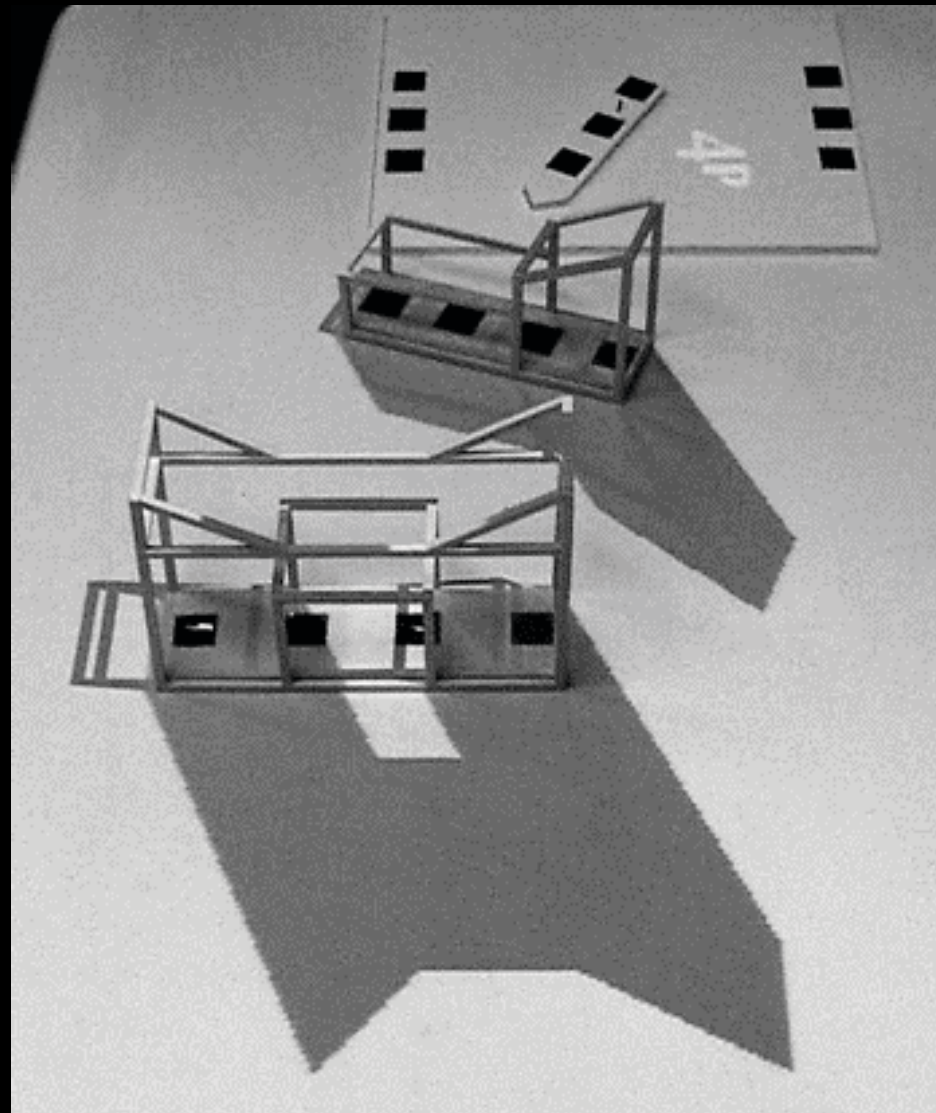
Figure 1. Sketches made in Collection of Historical Scientific Instruments at Harvard University



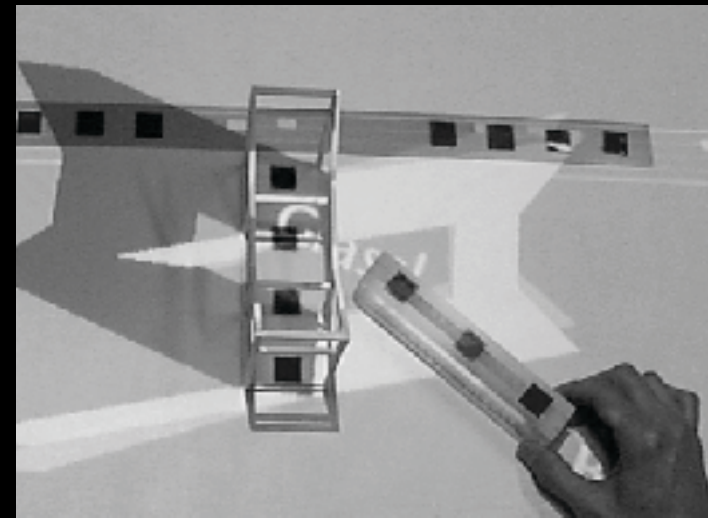
# Urp:

## Urban Planning Workbench

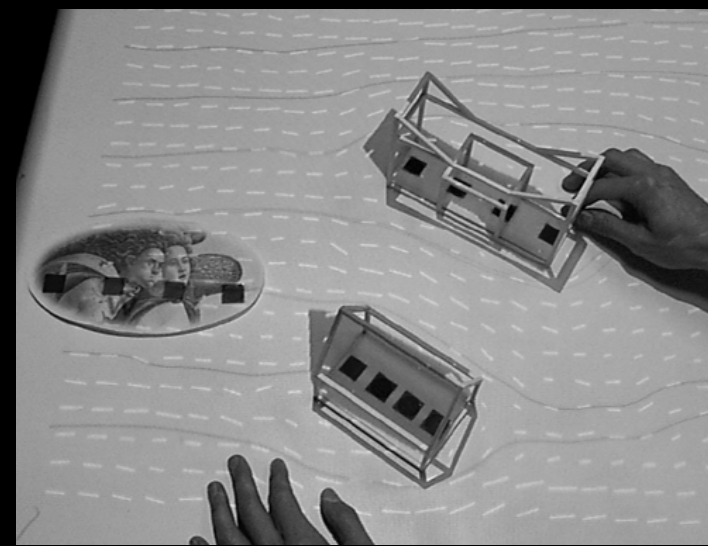
John Underkoffler and Hiroshi Ishii, 1997 - 1999



digital shadows



light reflections



wind



**Illuminating Clay 2002**



### SandScape An illuminated experience for landscape design

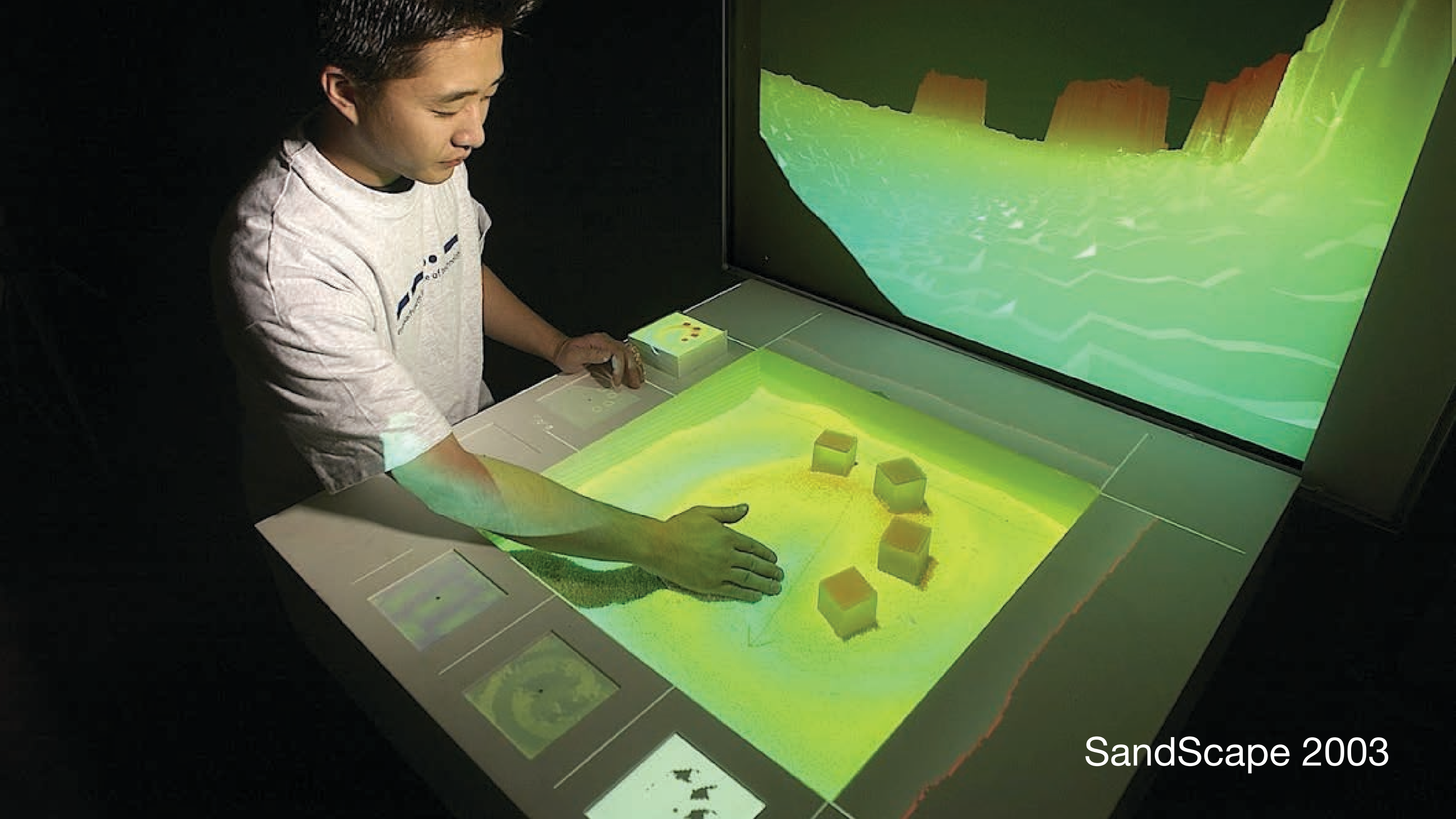
SandScape is a new machine designed to help landscape architects understand the possibilities for the creation of a landscape. The machine is a computerized landscape design and generation tool. It is designed to help landscape architects understand the possibilities for the creation of a landscape. The machine is a computerized landscape design and generation tool. It is designed to help landscape architects understand the possibilities for the creation of a landscape.

SandScape is a new machine that uses a series of digital simulation techniques to generate the understanding of the creation of a landscape. The machine is a computerized landscape design and generation tool. It is designed to help landscape architects understand the possibilities for the creation of a landscape. The machine is a computerized landscape design and generation tool. It is designed to help landscape architects understand the possibilities for the creation of a landscape.

© 2003 SandScape, Inc. All rights reserved.  
1000 University Ave., Suite 1000, San Francisco, CA 94103  
Tel: 415.774.1000  
www.sandscape.com

**SandScape 2003**





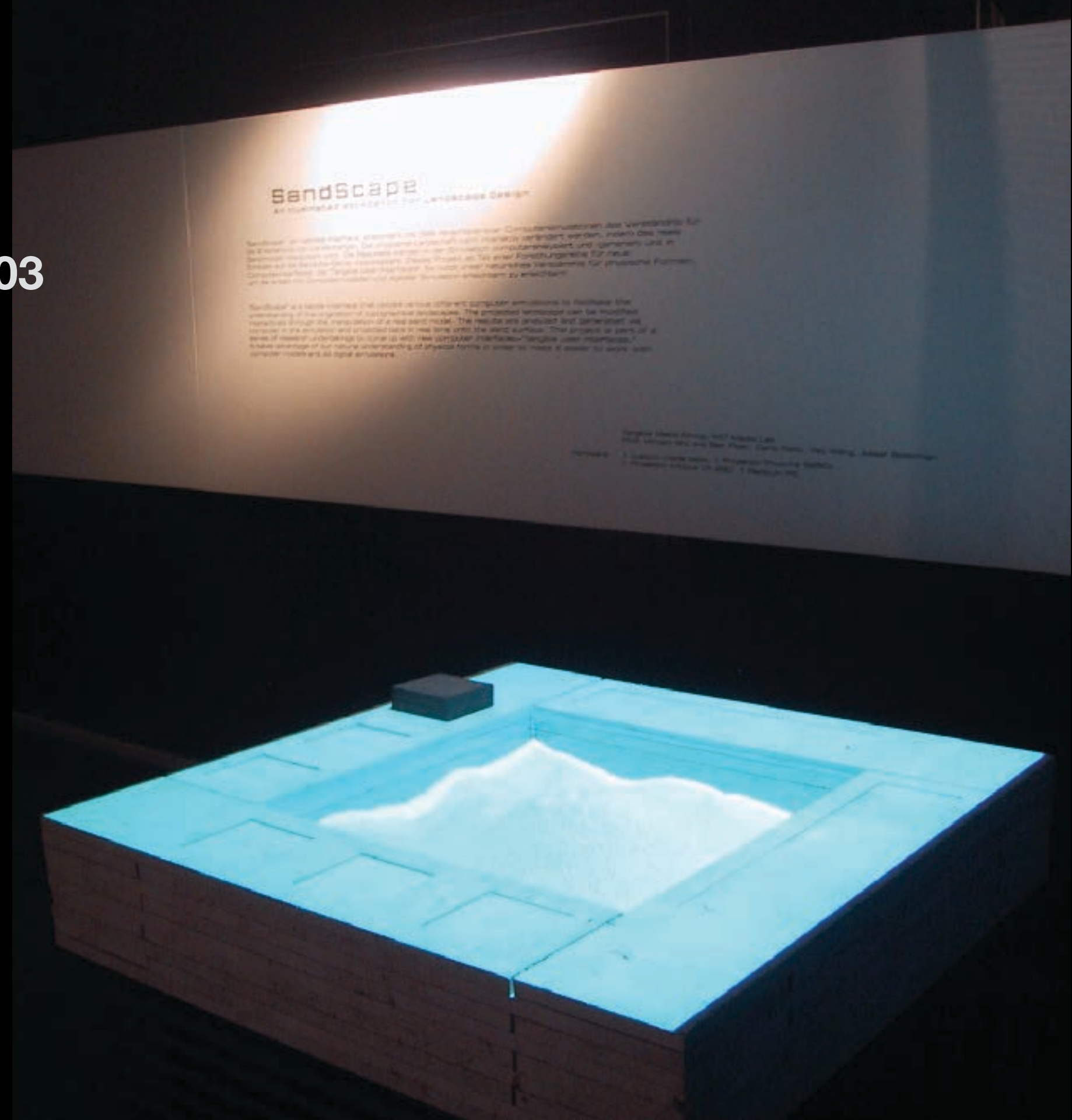
SandScape 2003

# SandScape

Ars Electronic Center 2003

Hiroshi Ishii,  
Carlo Ratti,  
Ben Piper,  
Yao Wang, and  
Assaf Biderman

Tangible Media Group  
MIT Media Laboratory





radical atoms  
2012

tangible bits  
1997

# Radical Atoms

Dynamic Future Material that  
Transform, Conform & Inform

# Two Material Options Exist Today

## 1. Frozen Atoms:

inert, rigid, passive physical materials  
(incl. metal, wood, glass and plastic)

## 2. Intangible Pixels:

dynamic, virtual and intangible pixels (bits)  
trapped behind a 2D flat screen



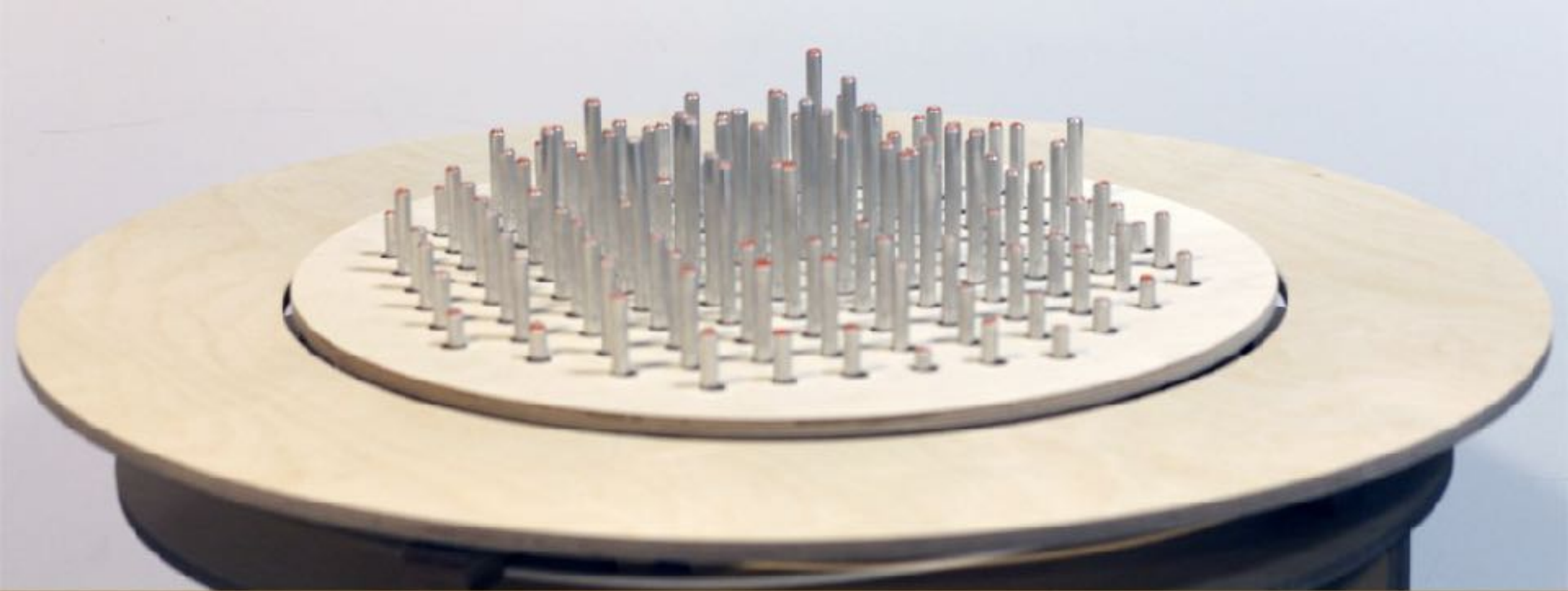
# Introducing The Third Material

## 3. Radical Atoms:

dynamic, physical and computational  
materials that transform, driven by bits







## Relief: A 2.5D Shape Display

Daniel Leithinger & Hiroshi Ishii



# TimeScape

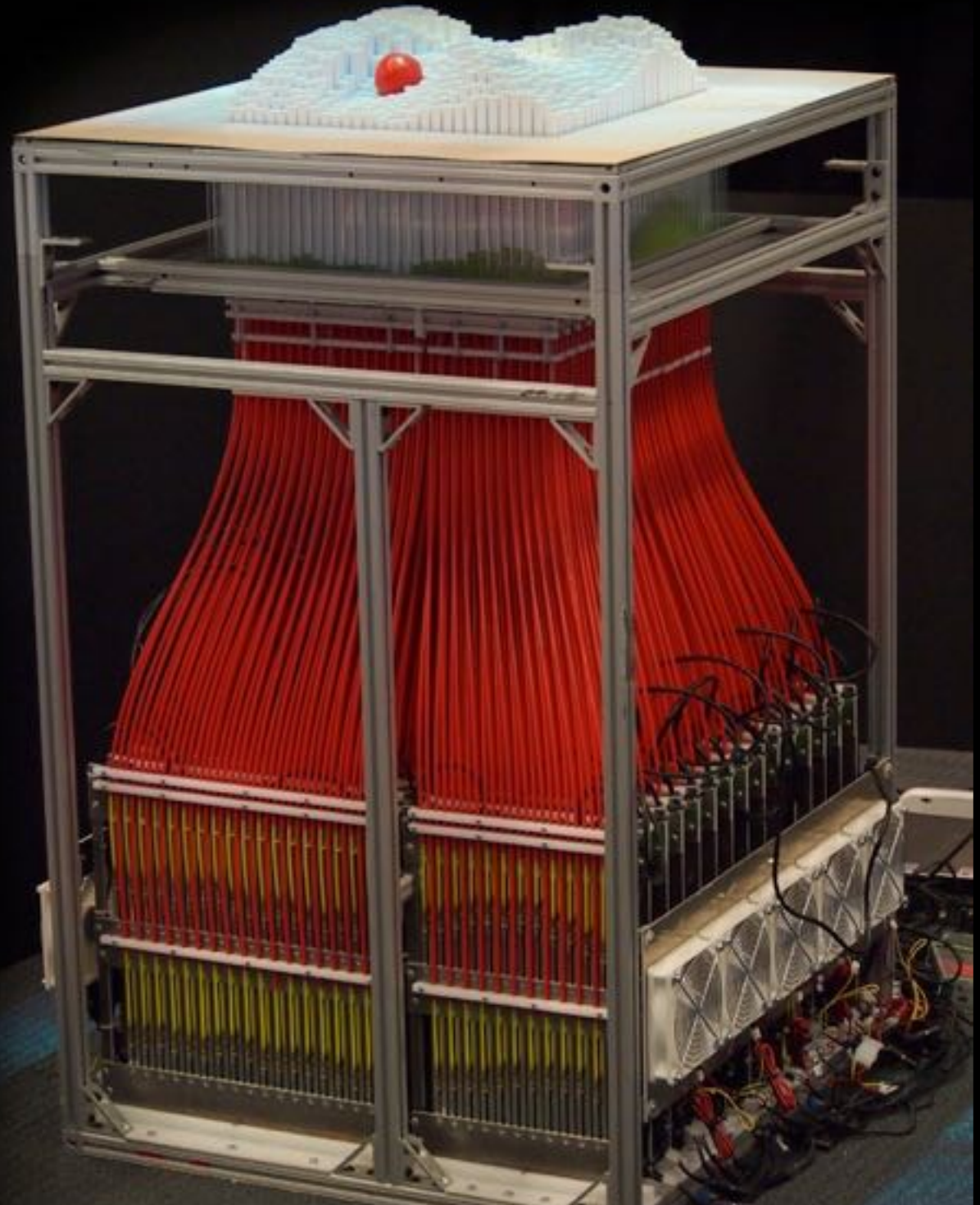
based on Relief



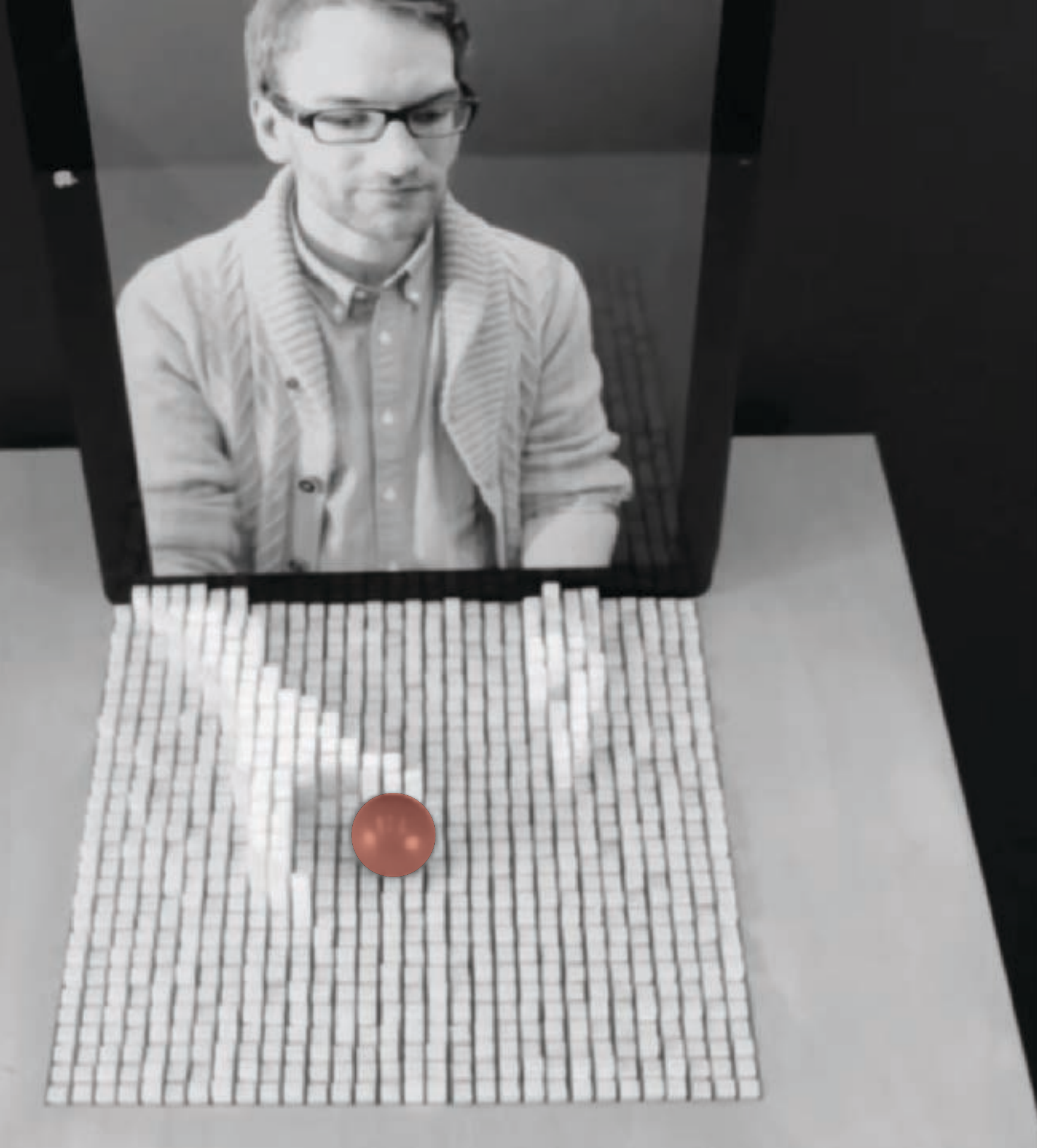
Daniel Leithinger, Jinha Lee, Sean Follmer, Austin Lee, Matthew Chang & Hiroshi Ishii



# inFORM 2013



Sean Follmer, Daniel Leithinger, Alex Olwal, Akimitsu Hogge, Hiroshi Ishii



# inFORM

Daniel Leithinger, Sean Follmer, Hiroshi Ishii

**Fast Company** Innovation by Design Awards: Winner - Experimental

**Red Dot Award:** Best of the Best - Design Concept

**Laval Virtual 2014 Award** - INDUSTRIAL DESIGN & SIMULATION

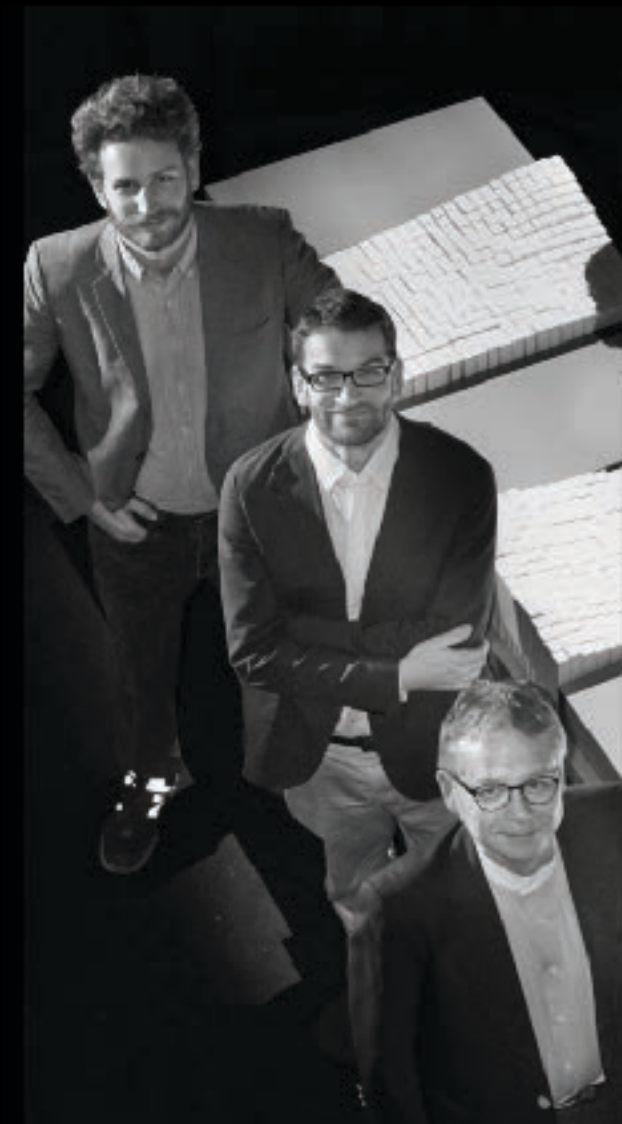
**Core 77 Award** - Interaction Student Winner

**IDSA IDEA Award** Bronze

Dr. Sean Follmer

Dr. Daniel Leithinger

Prof. Hiroshi Ishii







# Cooper Hewitt Design Museum inFORM Exhibition

Dec. 2014 - May 2015, New York



Daniel Leithinger,  
Dr. Sean Follmer  
Philipp Schoessler,  
Jared Counts,  
Ken Nakagaki,  
David Doan,  
Basheer Tome and  
Prof. Hiroshi Ishii

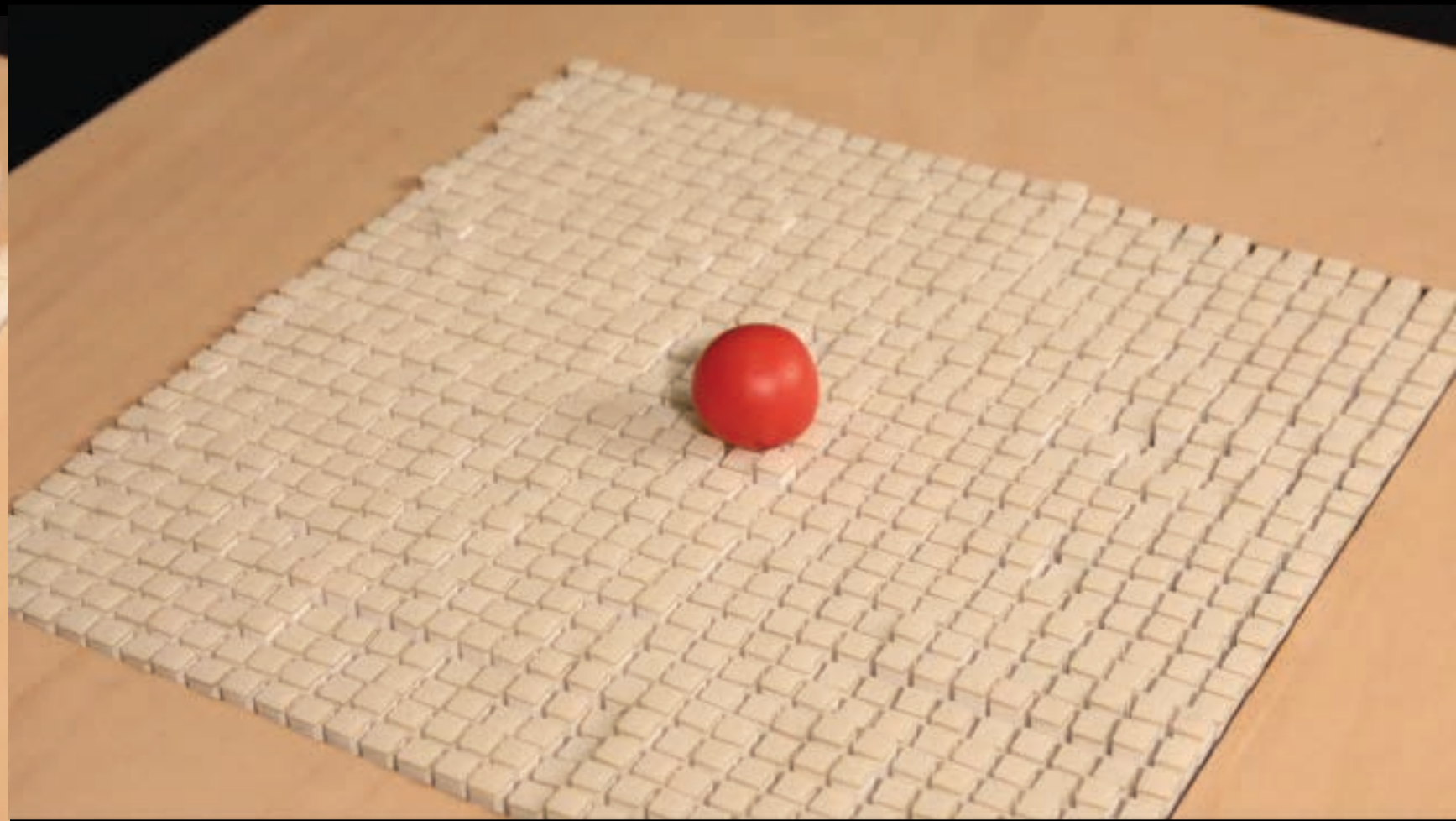
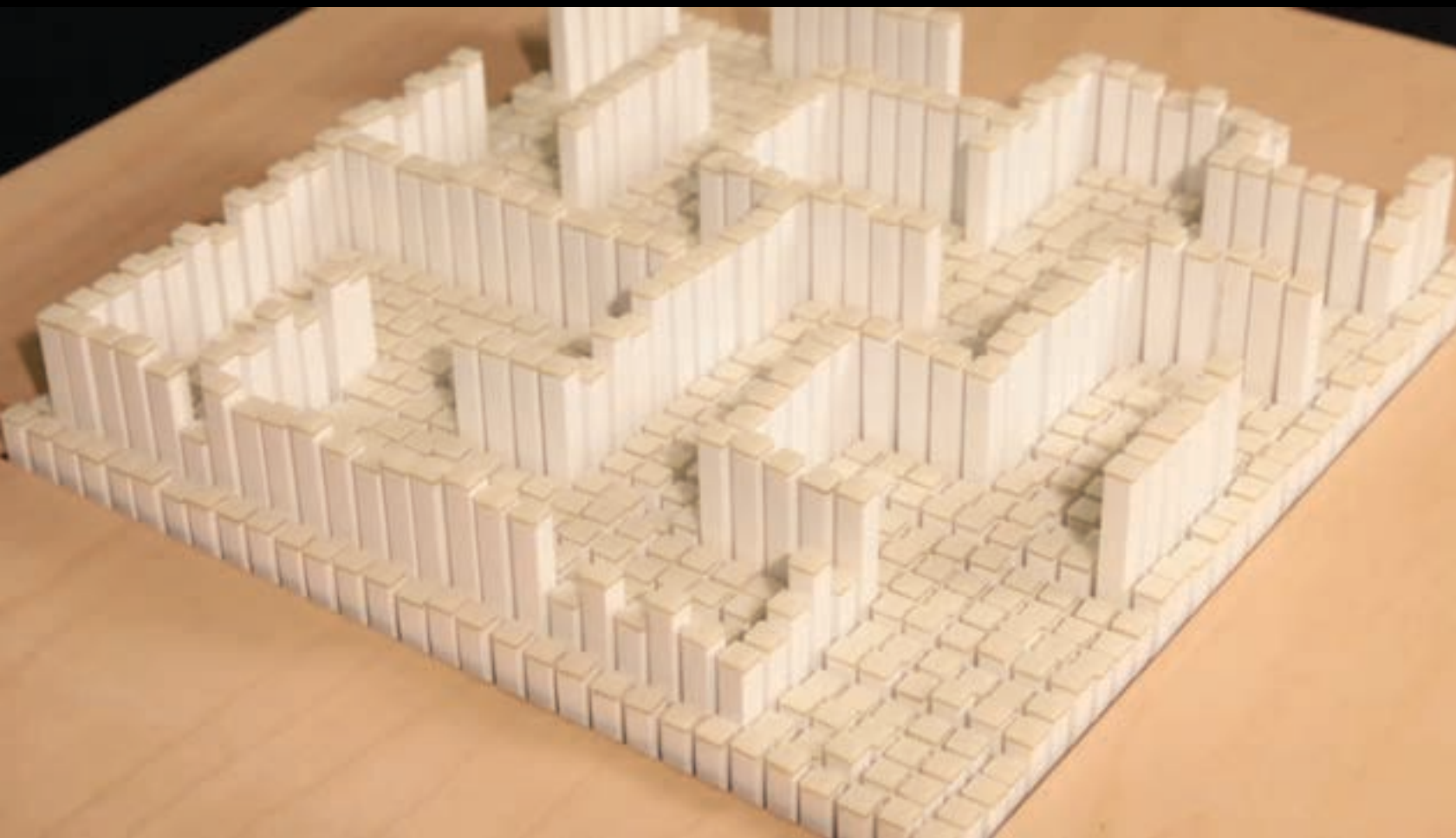


Hiroshi Ishii  
Tangible Media Group  
MIT Media Lab



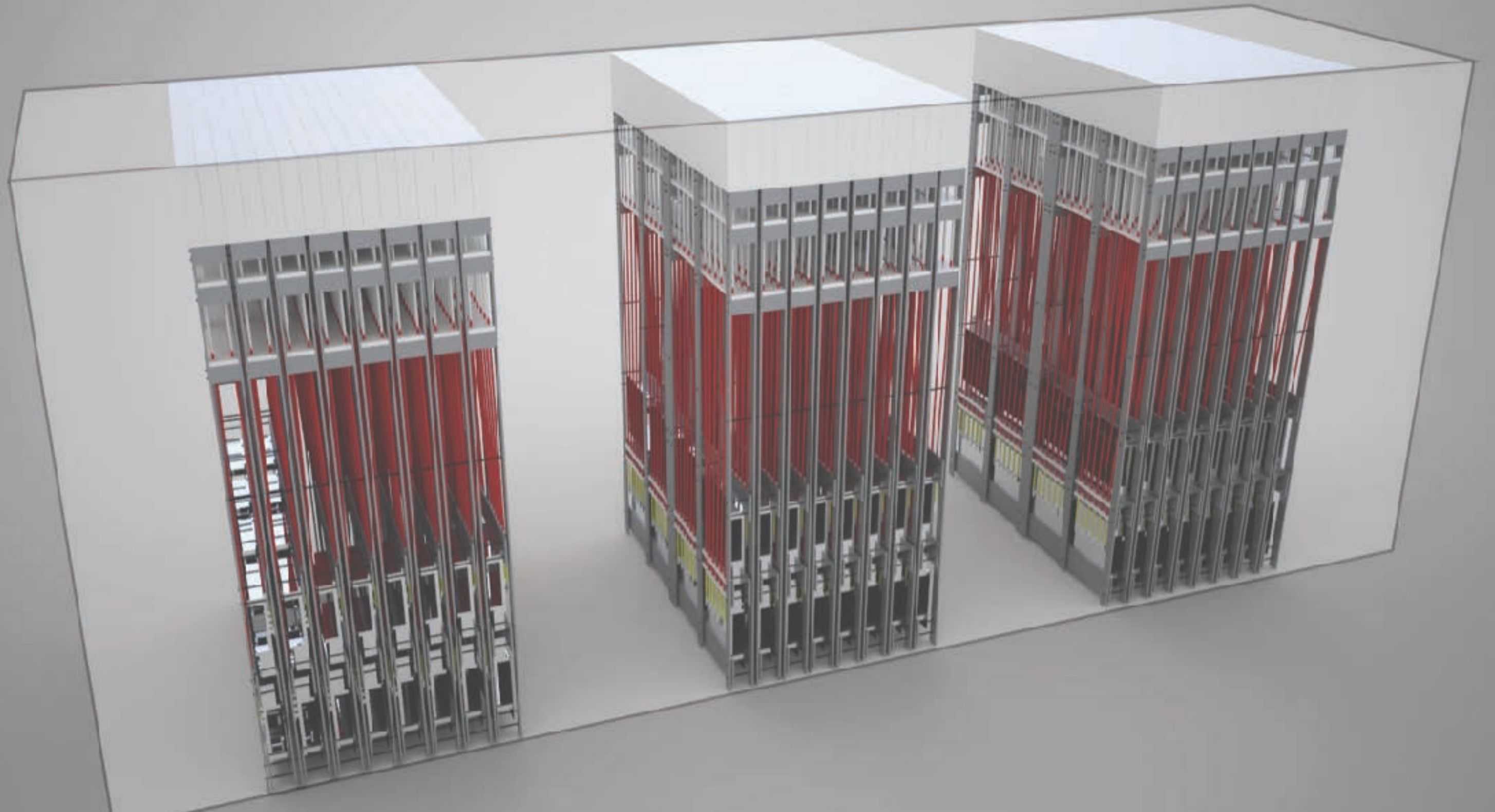
# “ESCHER” Motion Design

by Philipp Schoessler in Nov. 2013



# inFORM ENGINES

Designed by Daniel Leithinger & Sean Follmer, and Rendered by Amit Zoran





# Triptych



Francis Bacon

The three panels of the triptych were sold separately in the mid-1970s.[9] Bacon was unhappy that the panels had been split up, writing on a photograph of the left-hand panel that it was "meaningless unless it is united with the other two panels."

# TRANSFORM

Tangible Media  
MIT Media Lab







The biggest challenge was instead of trying to hide the complex machine,





**TRANSFORM**  
Tangible Media  
MIT Media Lab

MIT  
Media  
Lab





**April 8-13, 2014 in Milan  
5000 visitors interacted**

**~100 said "Amazing!"**



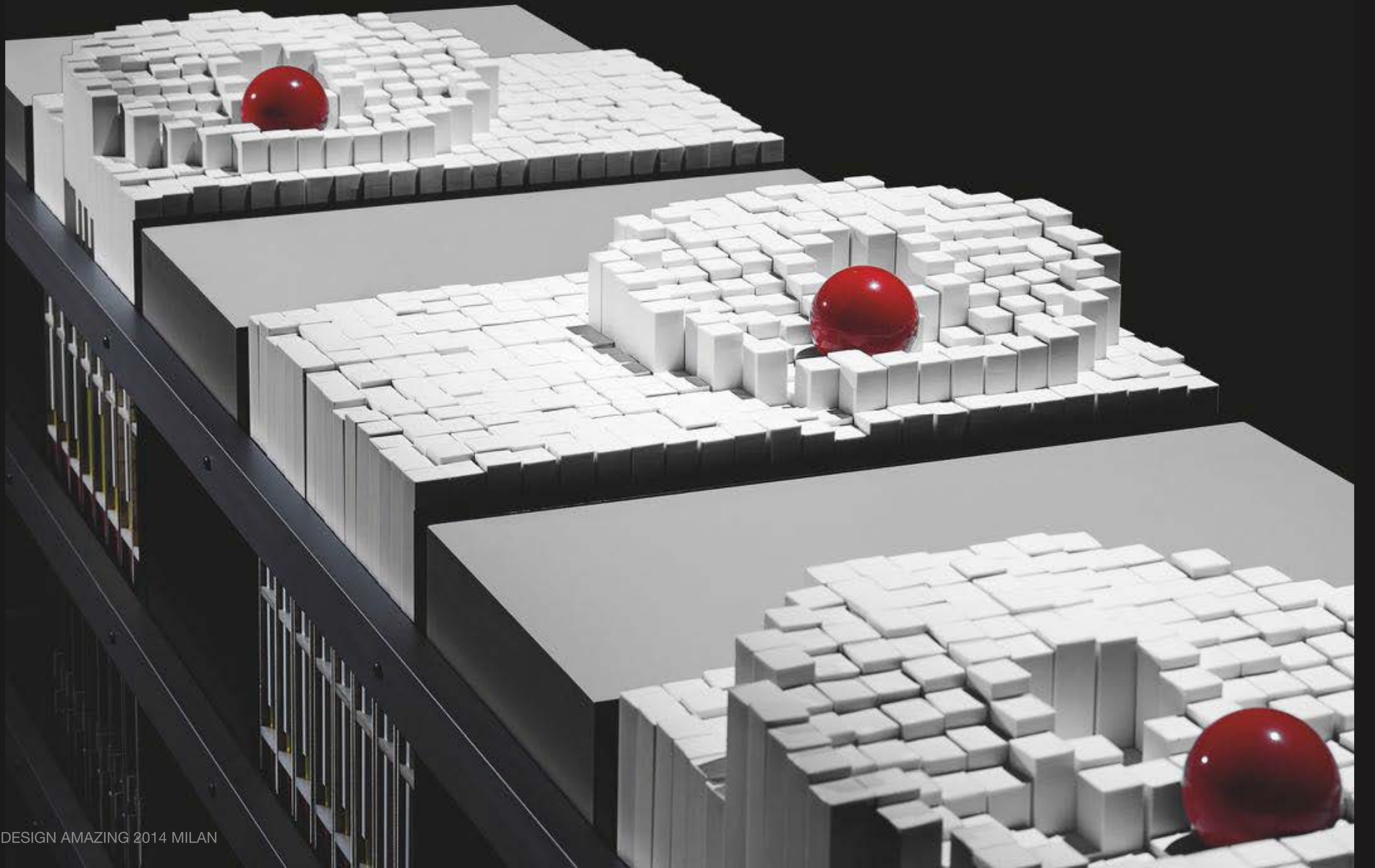


# TRANSFORM

Lexus Design Amazing 2014 Milan  
MIT Media Lab | Tangible Media Group

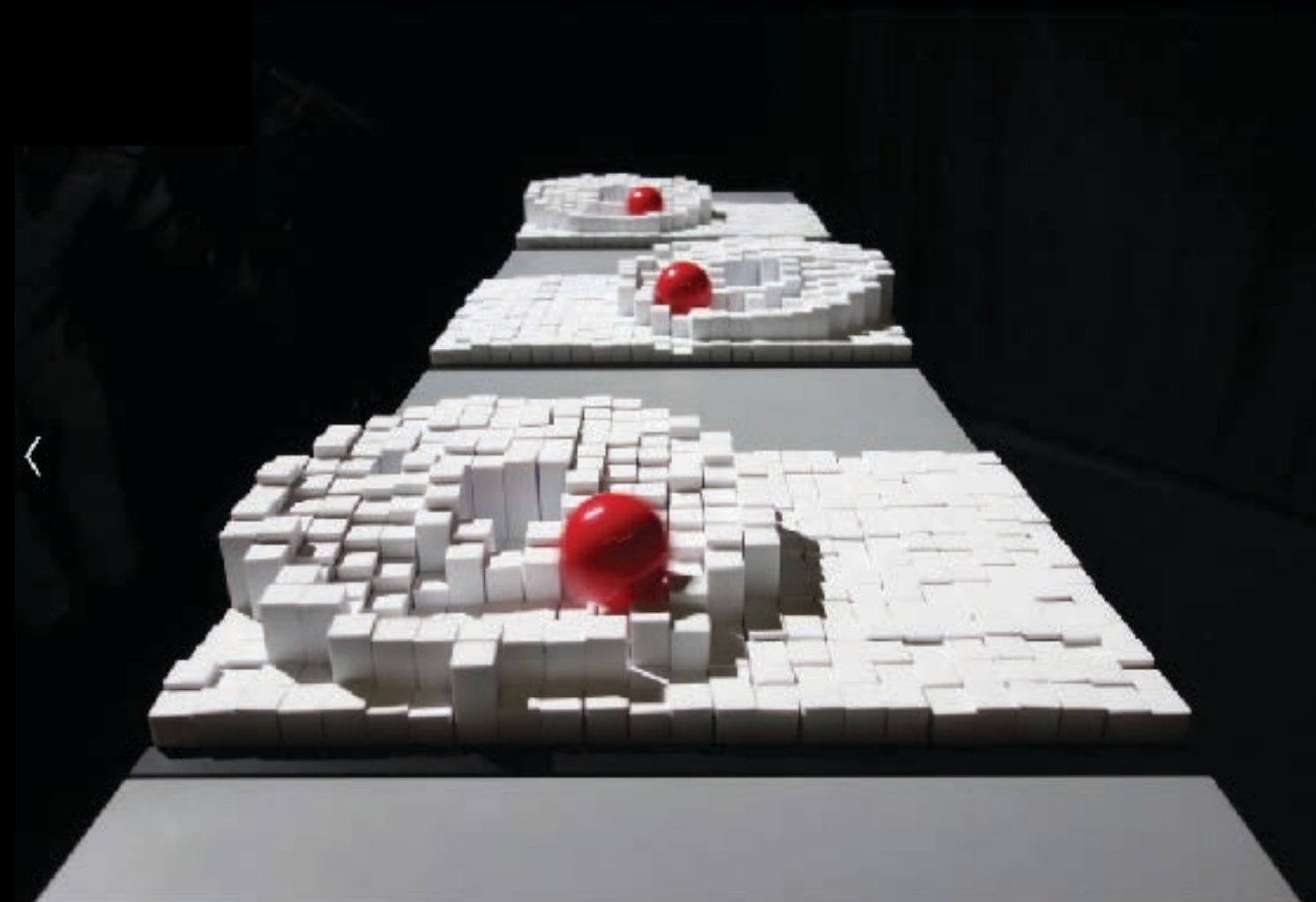






“Intriguing Elegance through Careful Juxtaposition  
of Opposing Elements” - Lfinesse by LEXUS

Design vs Technology  
Stillness vs Motion  
Atoms vs Bits







## the team



Prof. Hiroshi Ishii  
*Concept Design*



Daniel Leithinger  
*Engine Design*



Sean Follmer  
*Engine Design*



Amit Zoran  
*Product Design*



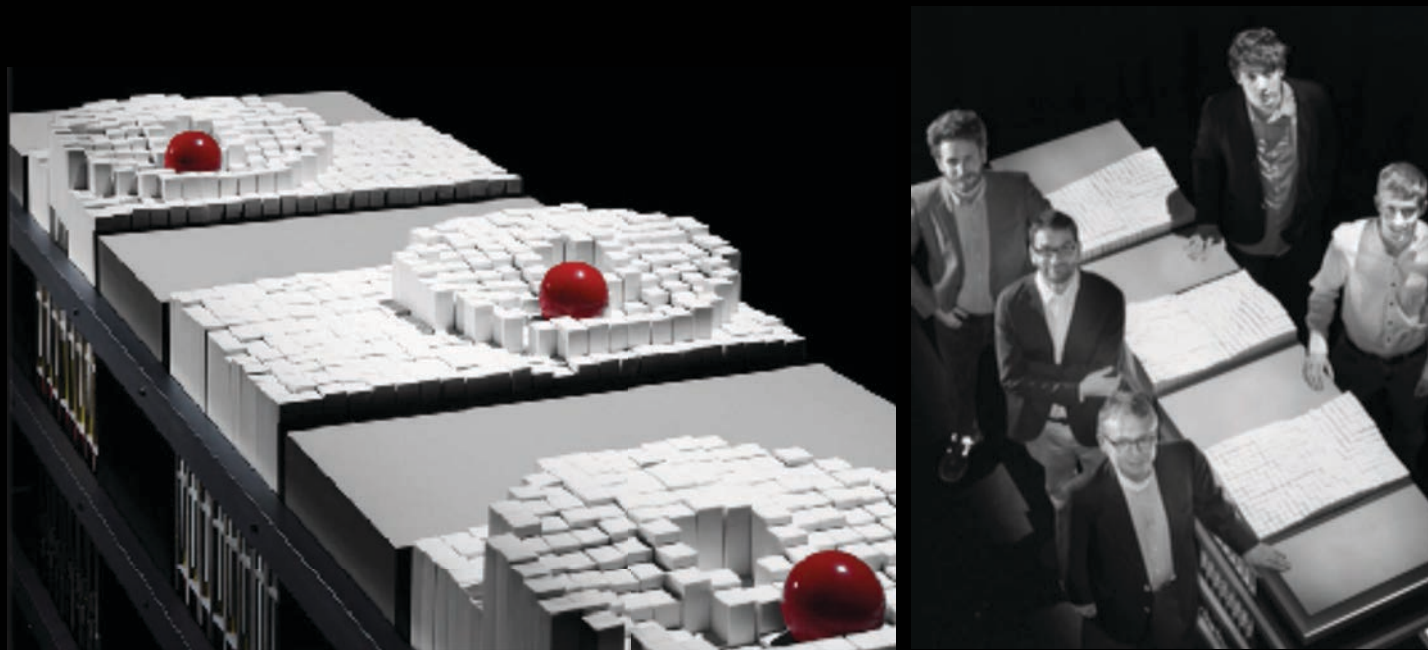
Philipp Schoessler  
*Motion Design*

Tangible Media Group | MIT Media Lab  
@ LEXUS DESIGN AMAZING 2014 MILAN

# Milano Design Week 2014

## TRANSFORM Exhibit

04/08-13/14, Milano, Italia



Prof. Hiroshi Ishii  
Daniel Leithinger  
Dr. Sean Follmer  
Dr. Amit Zoran  
Philipp Schoessler  
Jared Counts



Platinum A'DESIGN AWARD 2015



Hiroshi Ishii  
Tangible Media Group  
MIT Media Lab



CHI 2015 Golden Mouse Award

# TRANSFORM

AS ADAPTIVE AND DYNAMIC FURNITURE

LUKE VINK • VIIRJ KAN • KEN NAKAGAKI • DANIEL LEITHINGER  
SEAN FOLLMER • PHILIPP SCHOESSLER • AMIT ZORAN • HIROSHI ISHII

Luke Vink, Viirj Kan, Ken Nakagaki, Daniel Leithinger, Sean Follmer, Philipp Schoessler, Amit Zoran, and Hiroshi Ishii  
Tangible Media Group | MIT Media Lab

# MATERIABLE



RENDERING DYNAMIC MATERIAL PROPERTIES IN RESPONSE TO  
DIRECT PHYSICAL TOUCH WITH SHAPE CHANGING INTERFACES

KEN NAKAGAKI\* • LUKE VINK\* • JARED COUNTS • DANIEL WINDHAM •  
DANIEL LEITHINGER • SEAN FOLLMER • HIROSHI ISHII

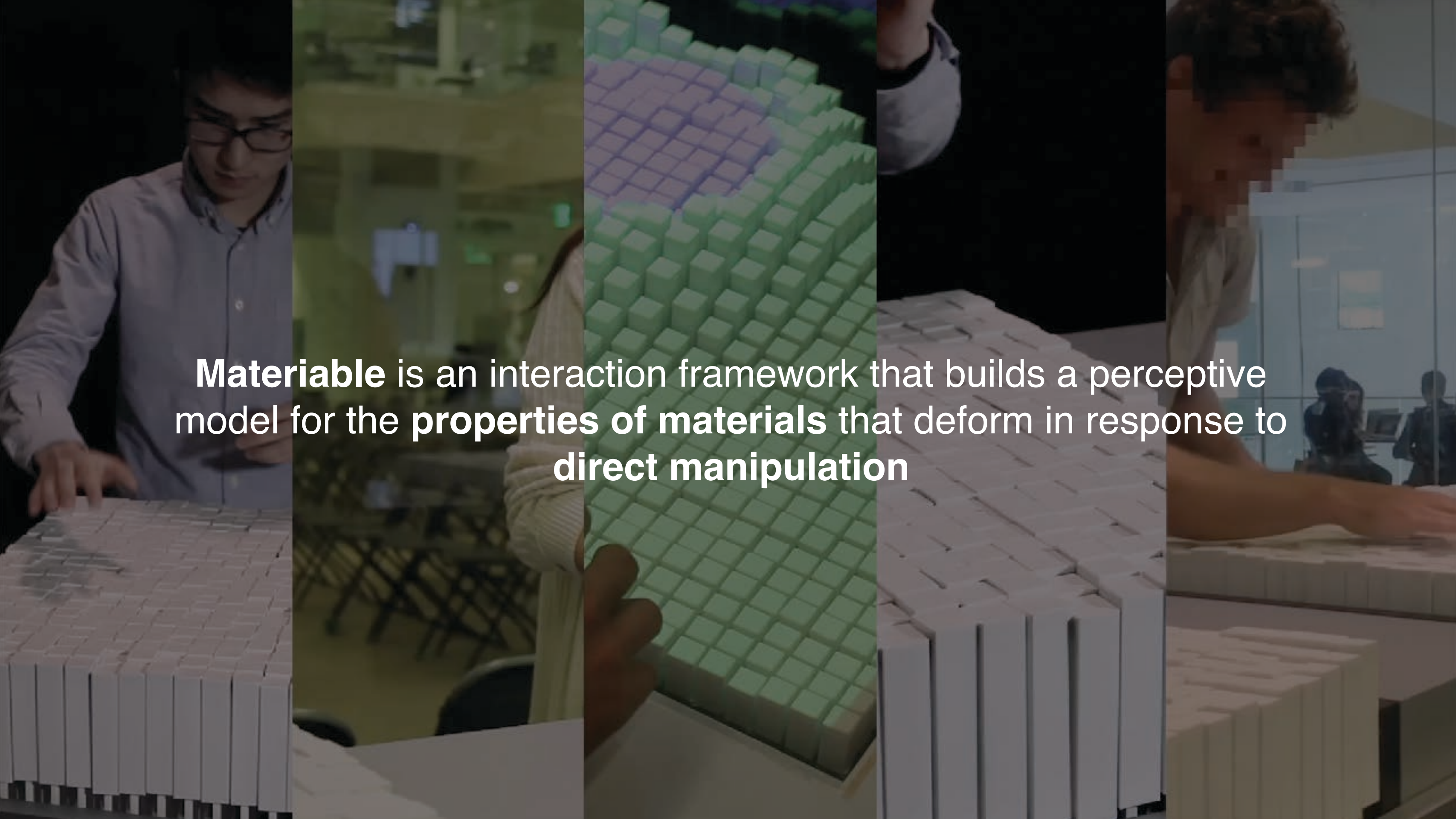


MIT Media Lab

CHI 2016

\*Contributed Equally

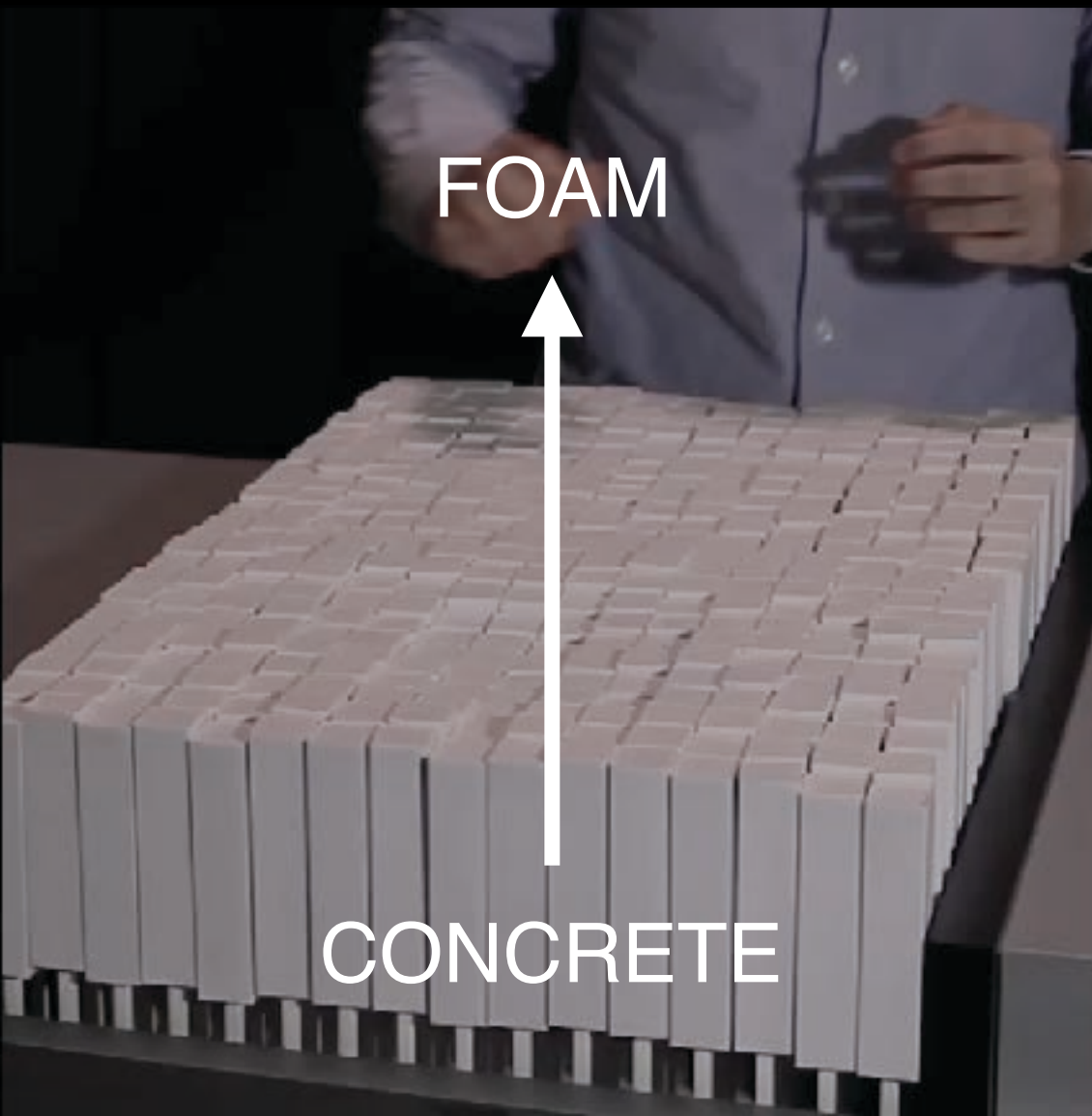




**Material** is an interaction framework that builds a perceptive model for the **properties of materials** that deform in response to **direct manipulation**

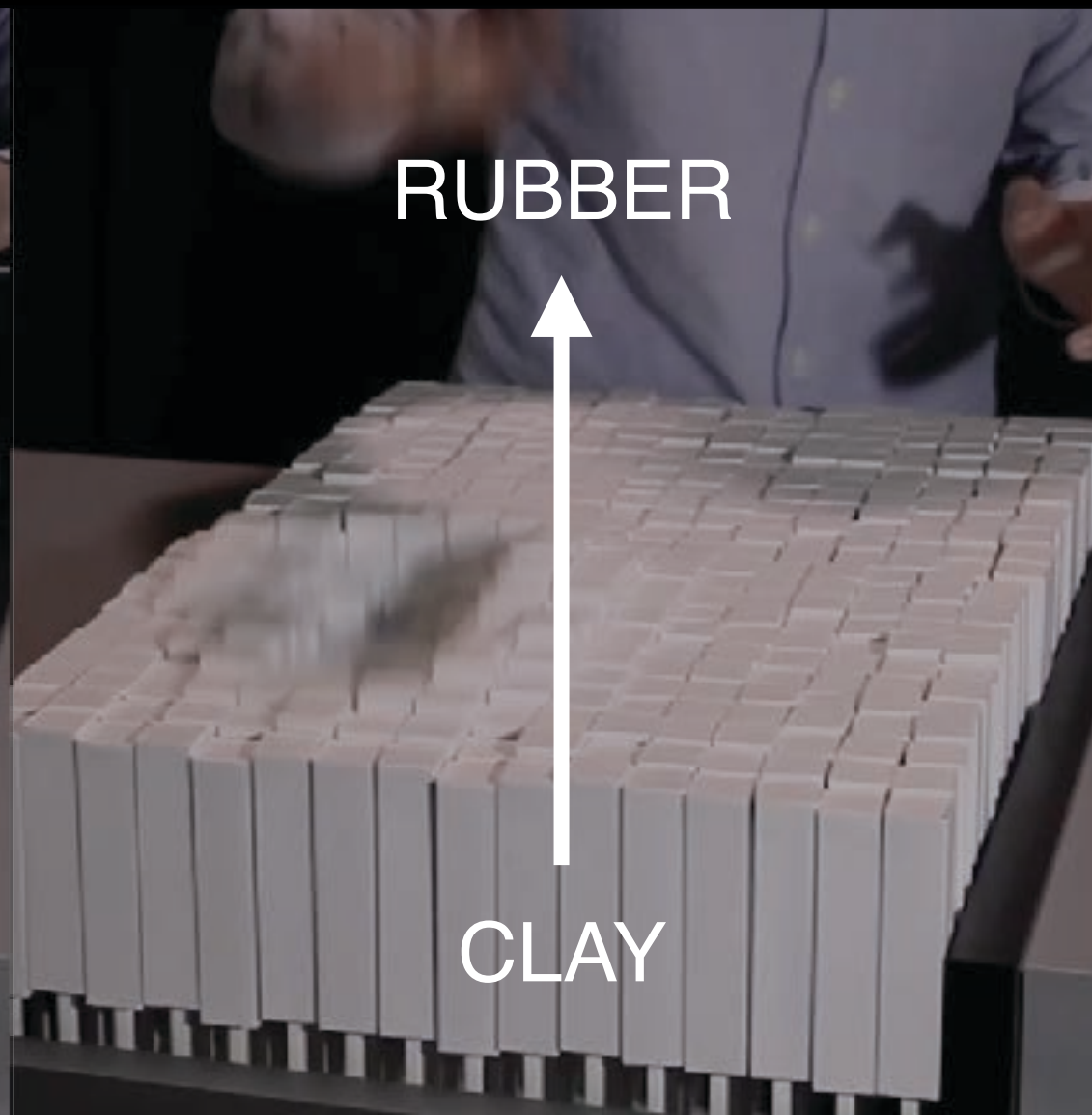
# FLEXIBILITY

The extent to which a material can be **deformed** in response to an applied force



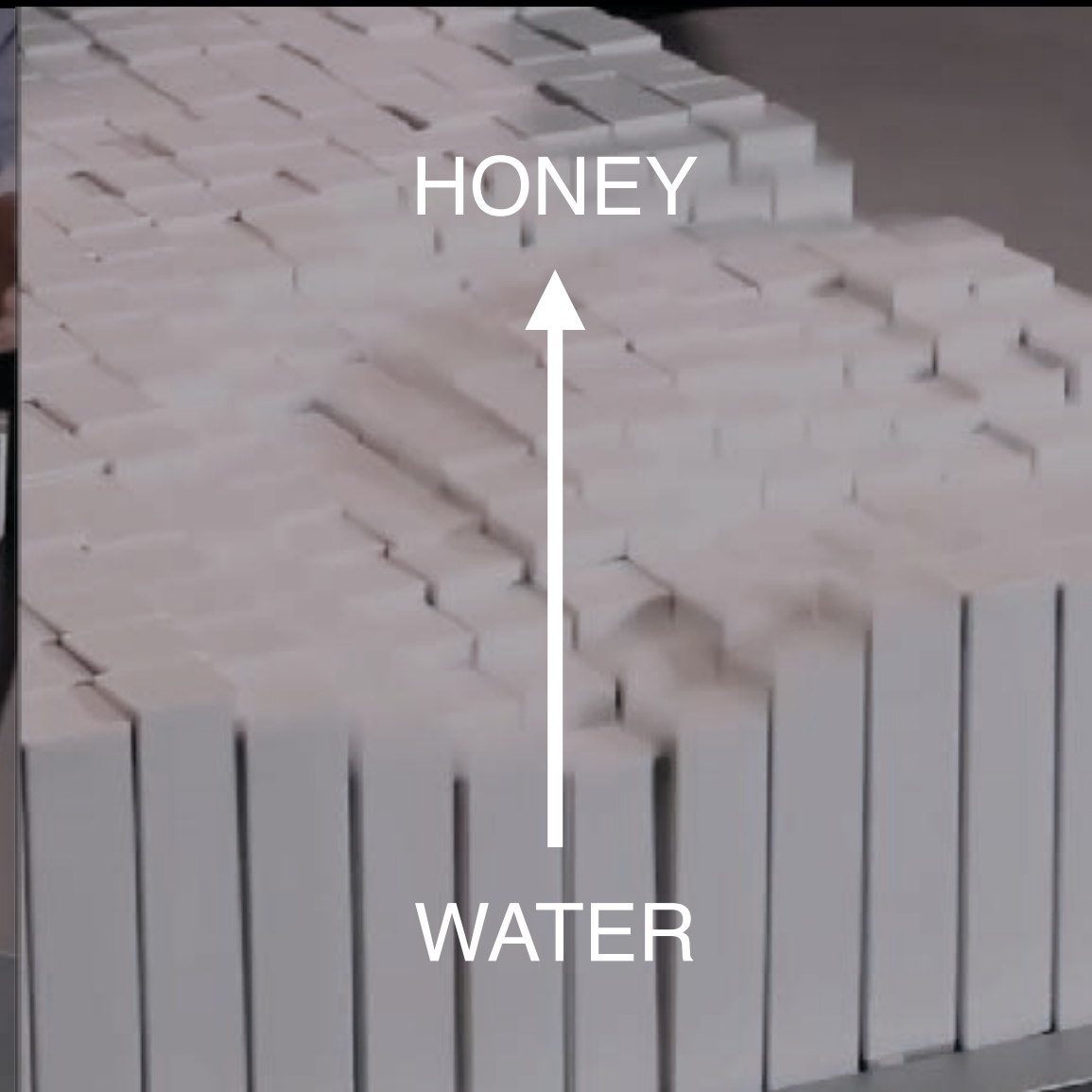
# ELASTICITY

The ability for a material to **resist** an applied force and to **return** to its original shape



# VISCOSITY

A measure of a fluid's **resistance to gradual deformation** by shear stress or tensile stress





Relief + Recompose

SHAPE  
CHANGE  
+  
DIRECT  
MANIPULATION



Leithinger et al. (TEI2010, UIST2011, CHI2011)

inForm + TRANSFORM

PHYSICAL  
TELEPRESENCE  
+  
INTERMATERIAL  
INTERACTION  
+  
DYNAMIC  
AFFORDANCES

Follmer, Leithinger, et al. (UIST2013, UIST2014)

inForm @CH + TRANSFORM

MATERIAL PROPERTY  
INTERACTION

Nakagaki, Vink, et al. (CHI 2016)



radical atoms  
2012



tangible bits  
1997



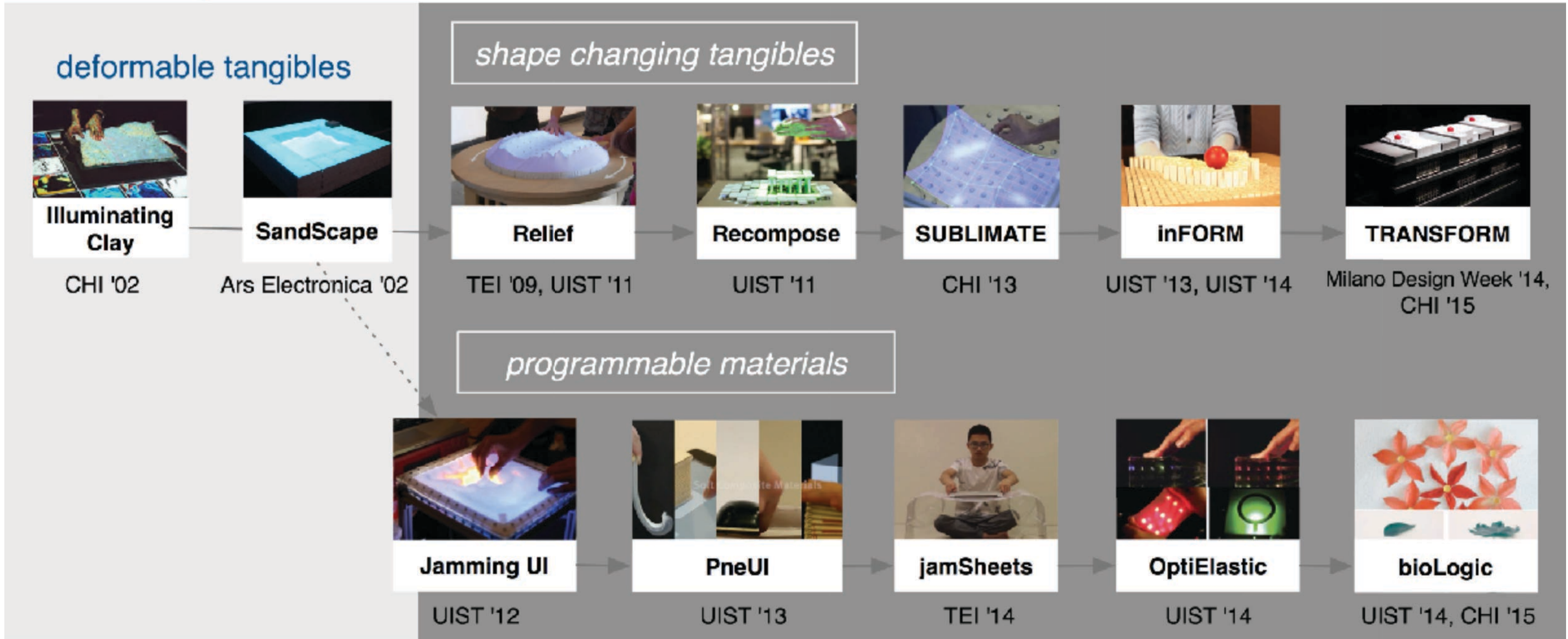
# Radical Atoms

Dynamic Future Material that  
Transform, Conform & Inform



# Radical Atoms: Dynamic Shape Displays & Programmable Materials

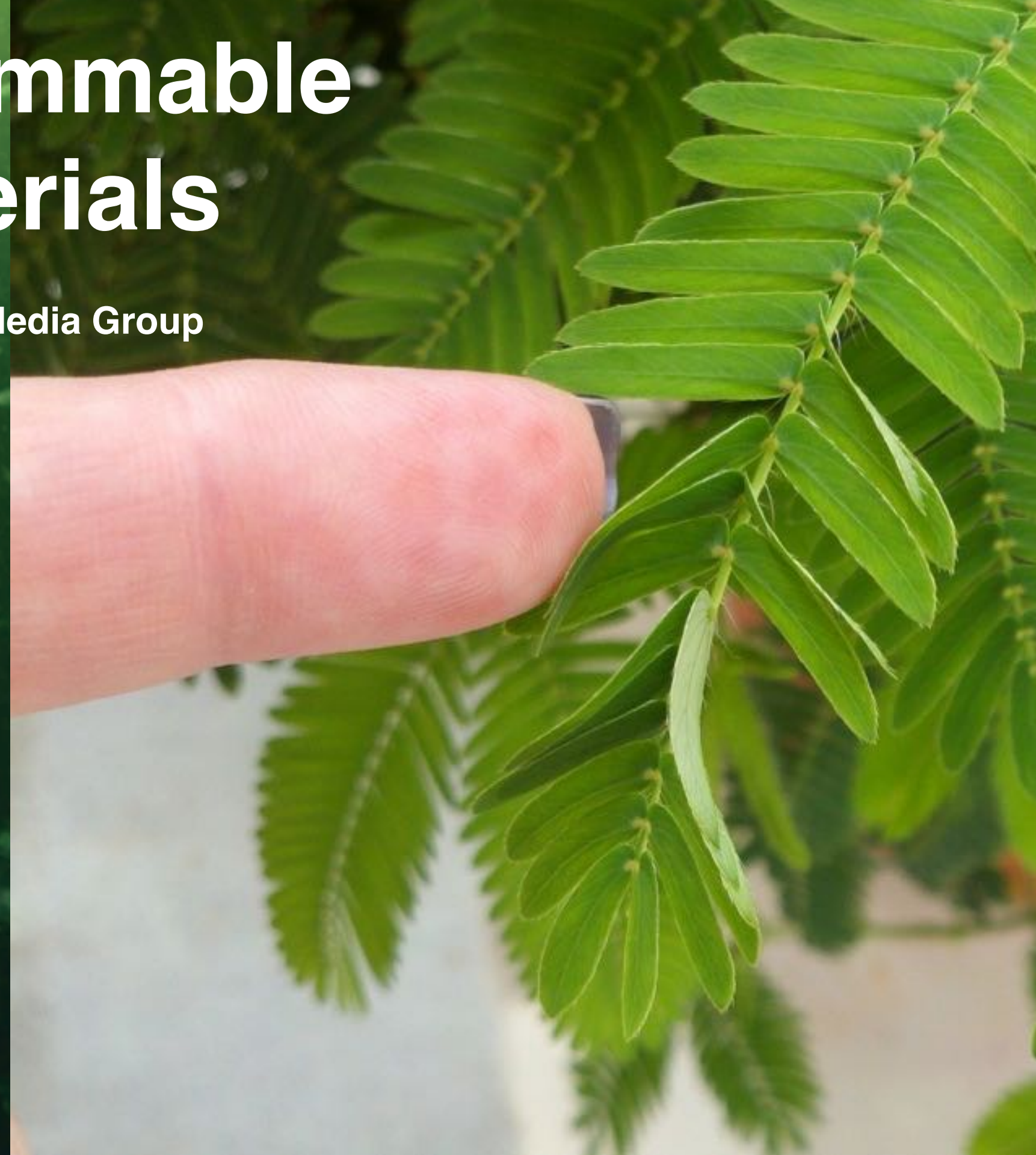
static / passive → kinetic / active






# Programmable Materials

Tangible Media Group





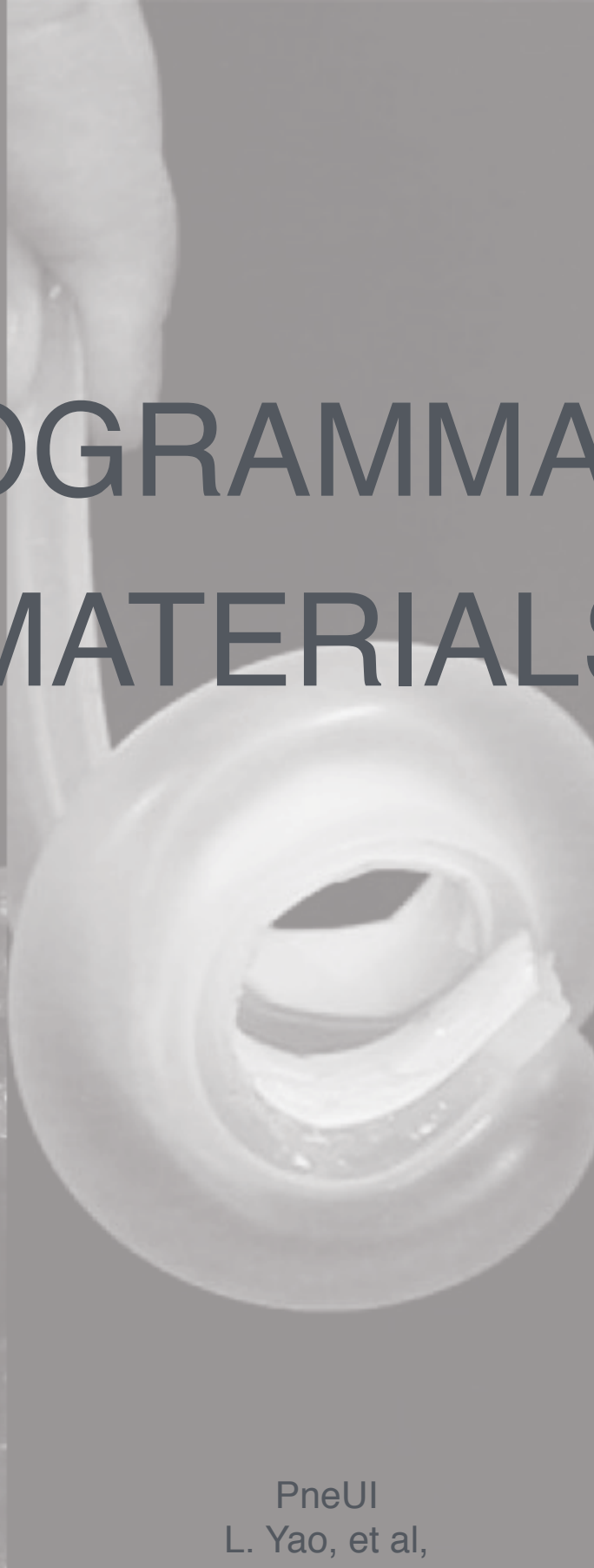
# PROGRAMMABLE MATERIALS




jamSheets,  
J. Ou, et al,  
TEI (2014)




optiElastic  
L. Yao, et al,  
UIST(2014)



PneUI  
L. Yao, et al,  
UIST(2013)



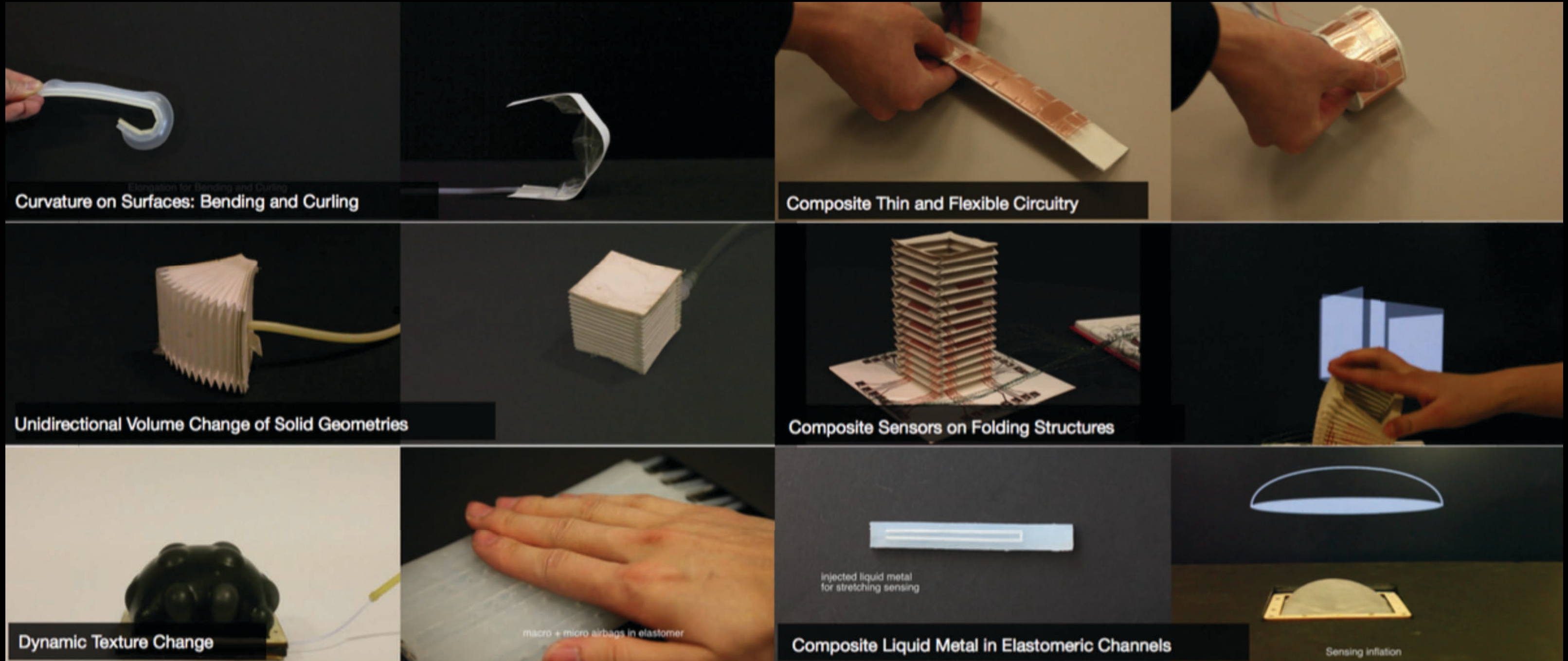
bioLogic  
L. Yao, et al,  
CHI(2015)



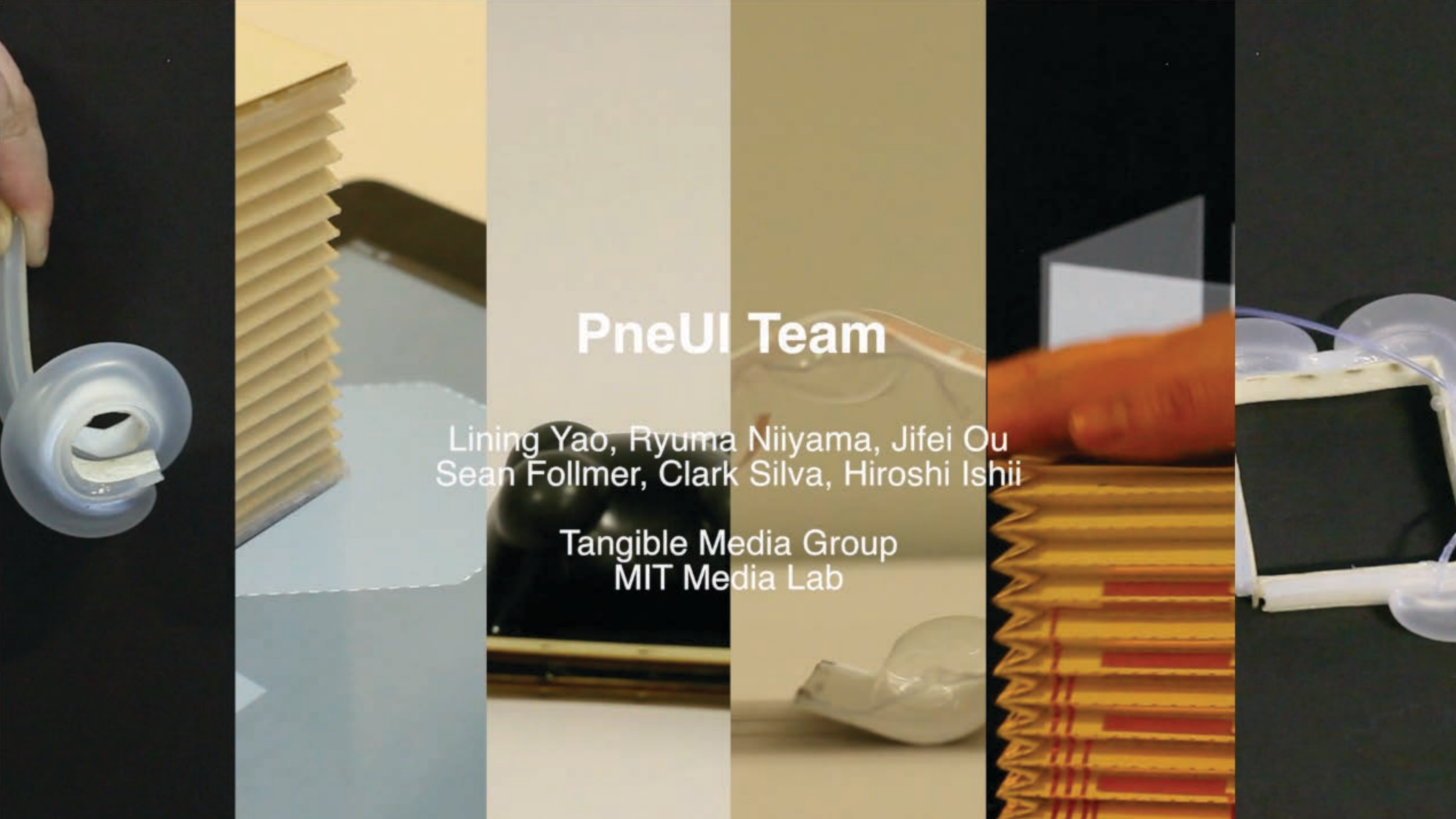
Cillia,  
J. Ou, et al,  
CHI (2016)



# PneUI (2013): Programmable Materials (1)





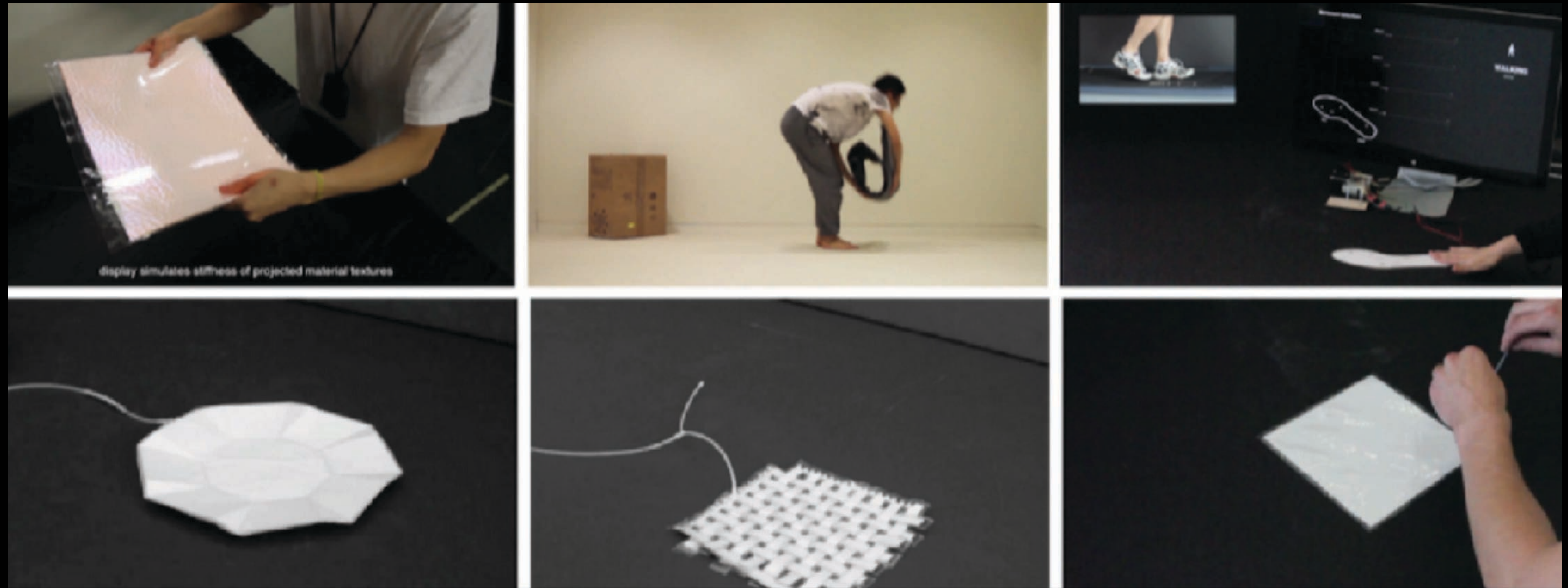


# PneUI Team

Lining Yao, Ryuma Niiyama, Jifei Ou  
Sean Follmer, Clark Silva, Hiroshi Ishii

Tangible Media Group  
MIT Media Lab


# jamSheets (TEI 2014)





# Cillia - 3D Printed Functional Hair Structure

Jifei Ou, Gershon Dublon, Chin-Yi Cheng, Liang Zhou, Felix Heibeck and Hiroshi Ishii

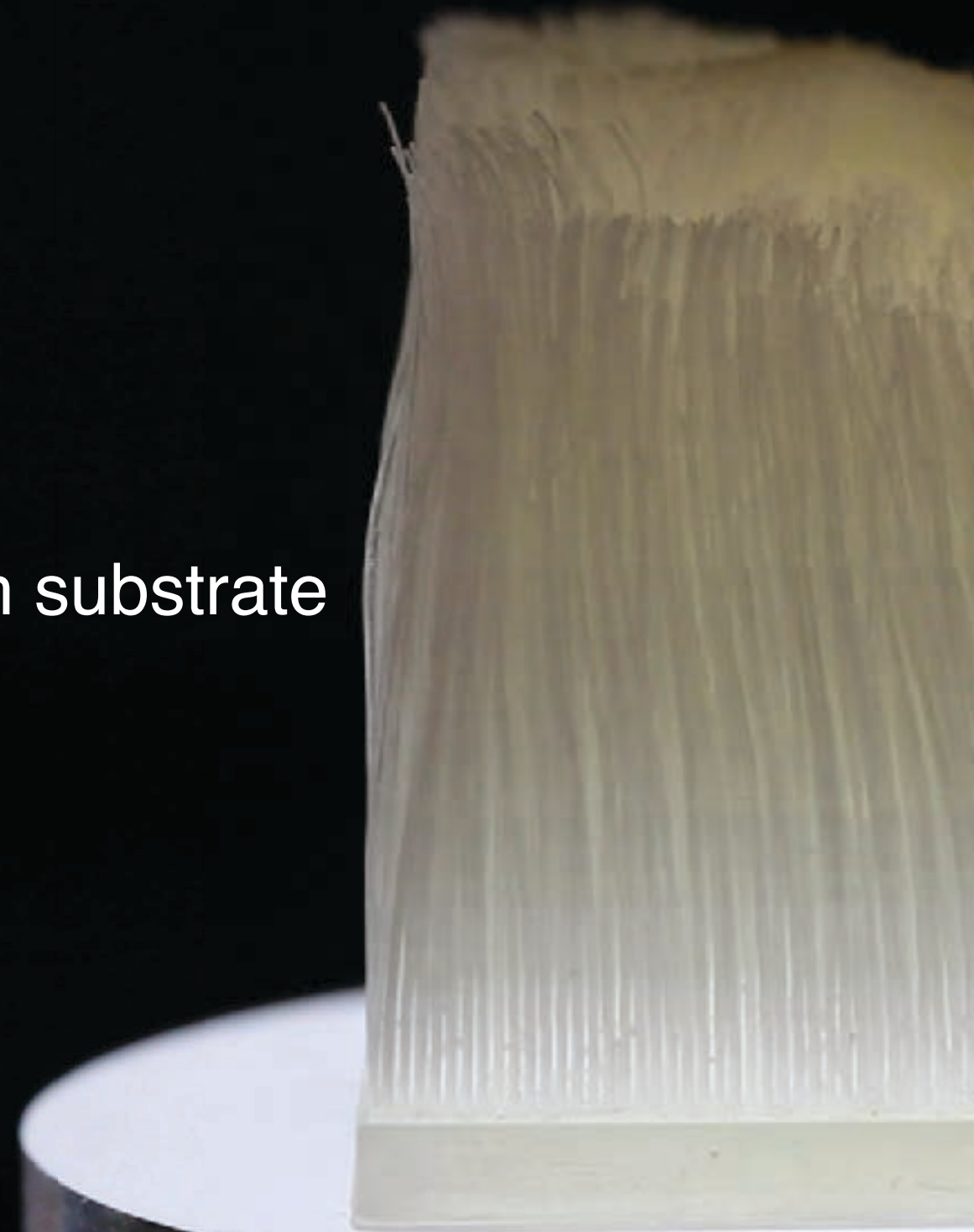


printing figures that have detailed surface texture

Cillia presents a computational method of 3D printing hair structures. It allows us to design and generate hair geometry at 50 micrometer resolution and assign various functionalities to the hair. The ability to fabricate customized hair structures enables us to create super fine surface texture; mechanical adhesion property; new passive actuators and touch sensors on a 3D printed artifact.



14,400 strands of hair on a 4cm by 4cm substrate





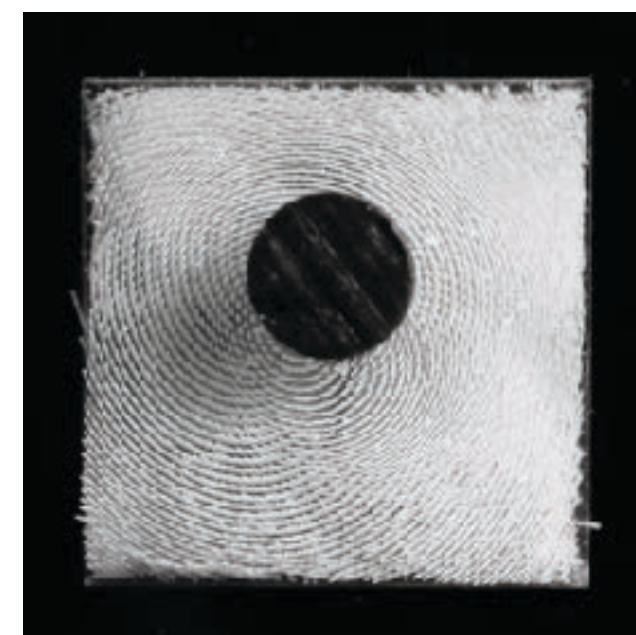
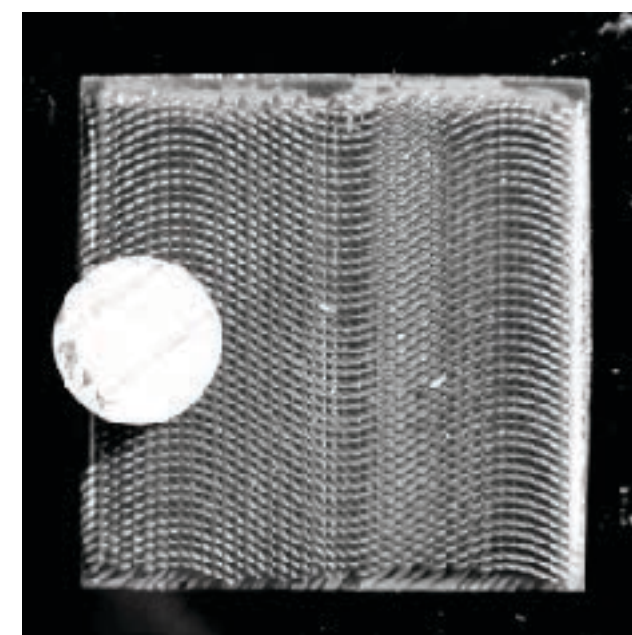
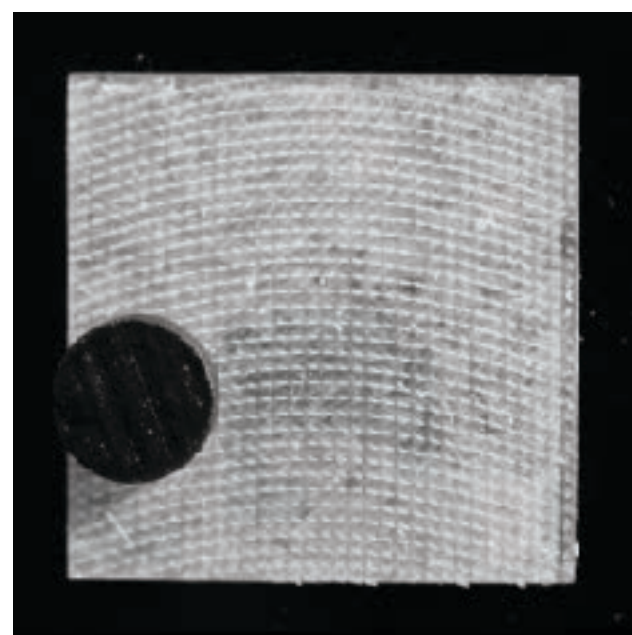
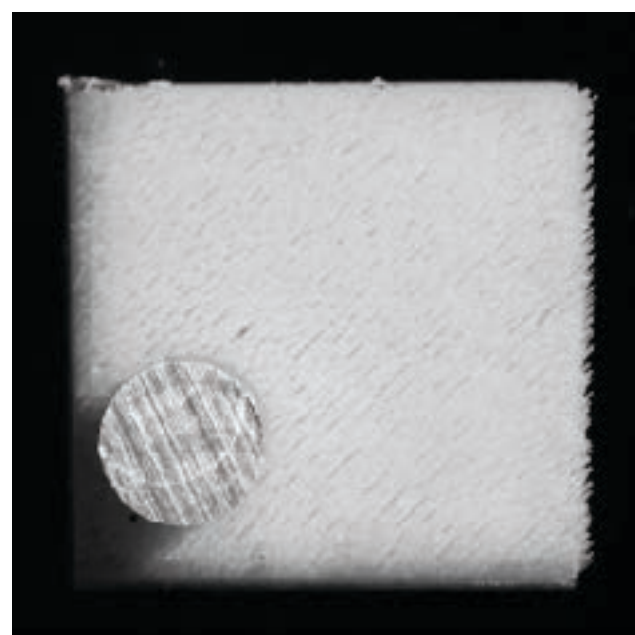
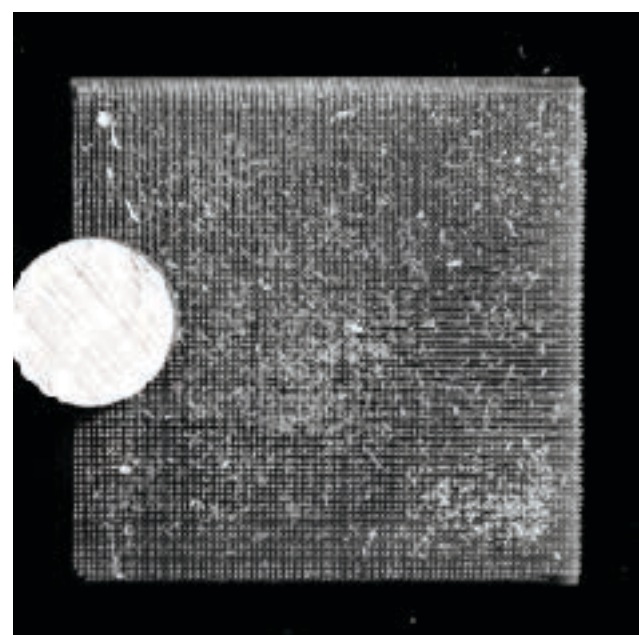
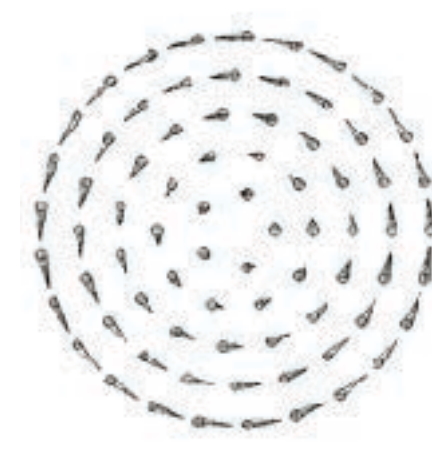
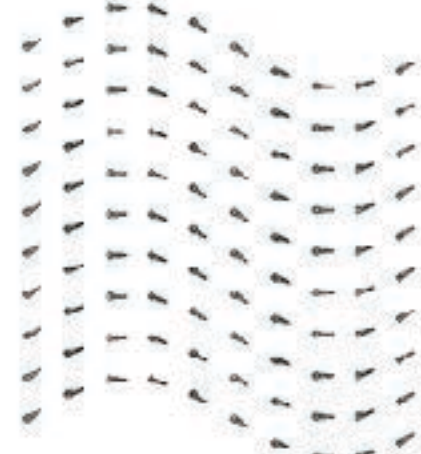
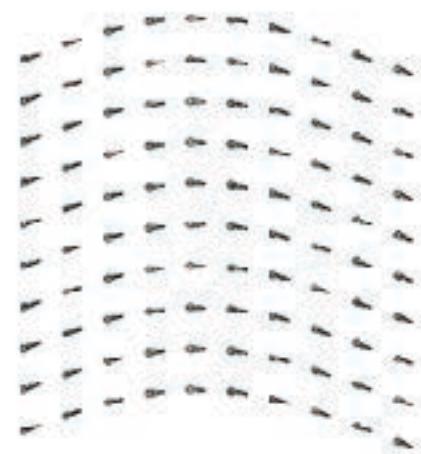
surface with mechanical adhesion



# Moving Direction Control

Linear

Curved

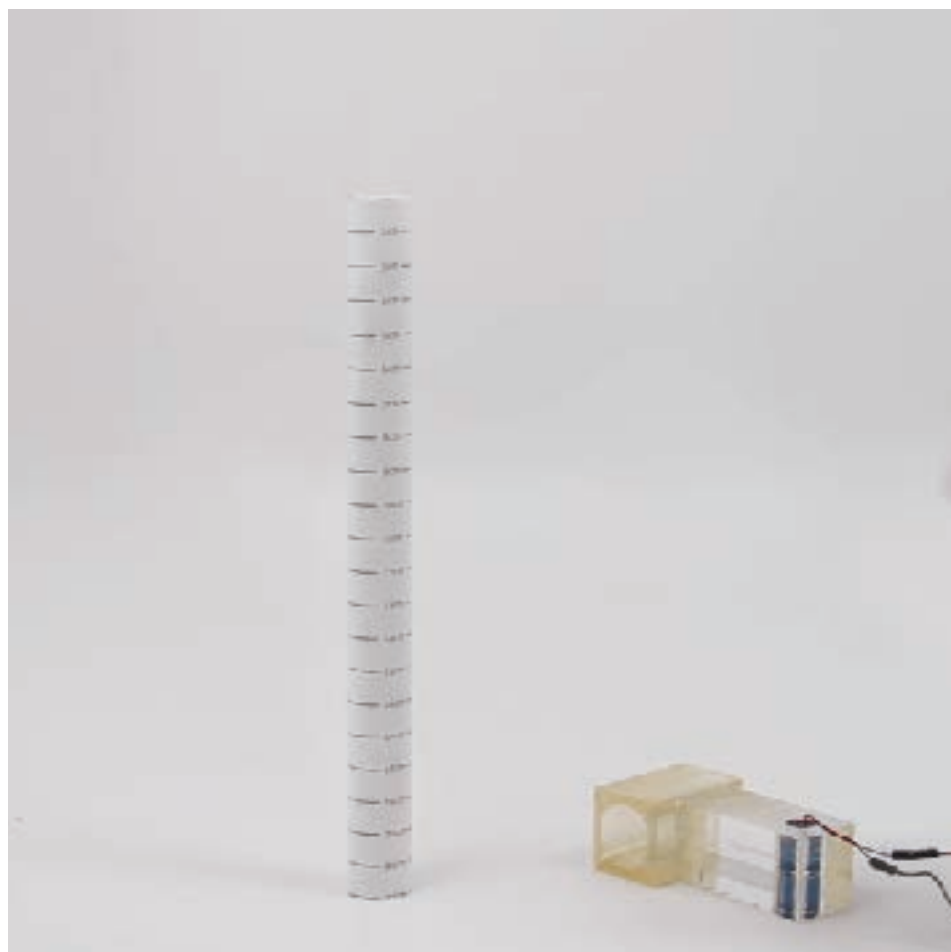
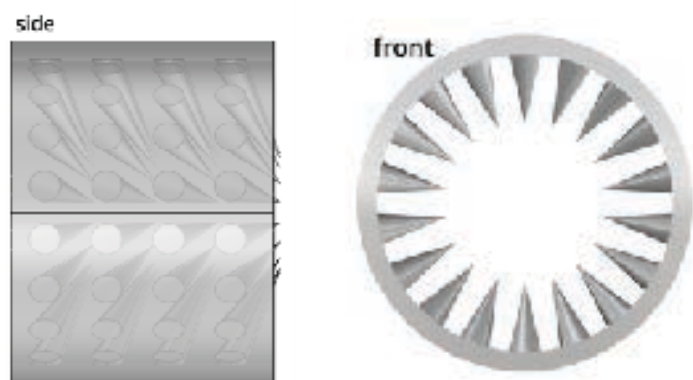




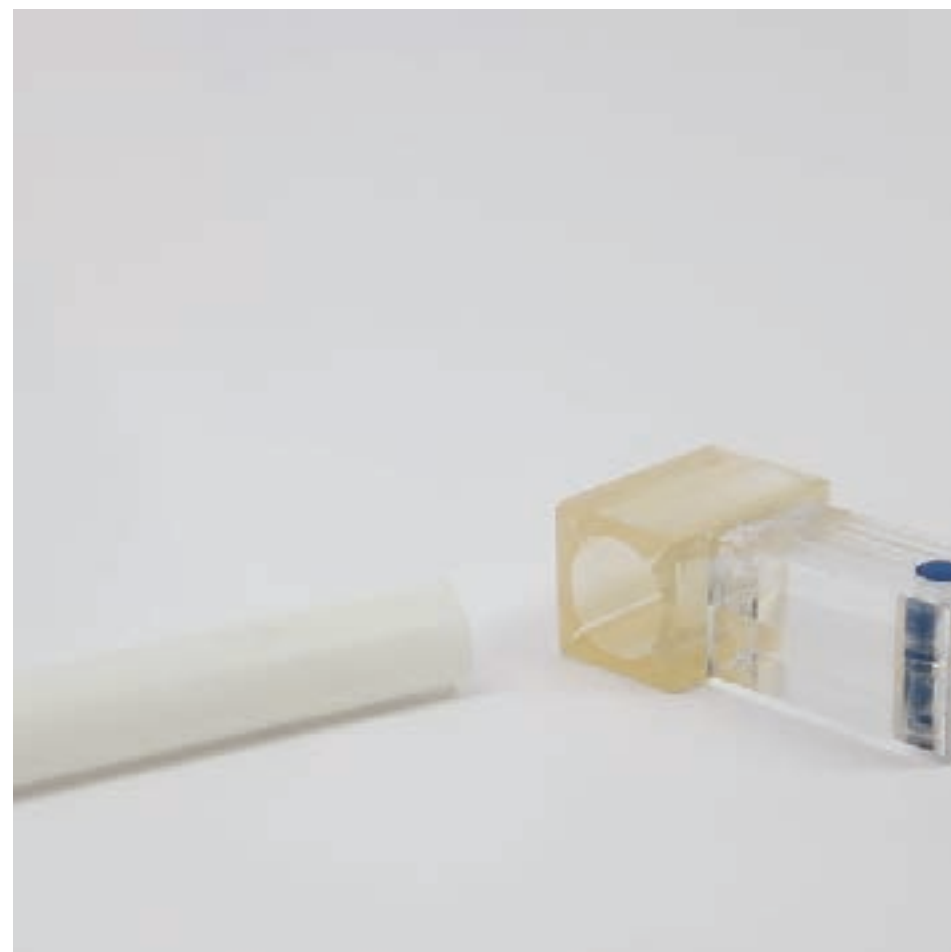
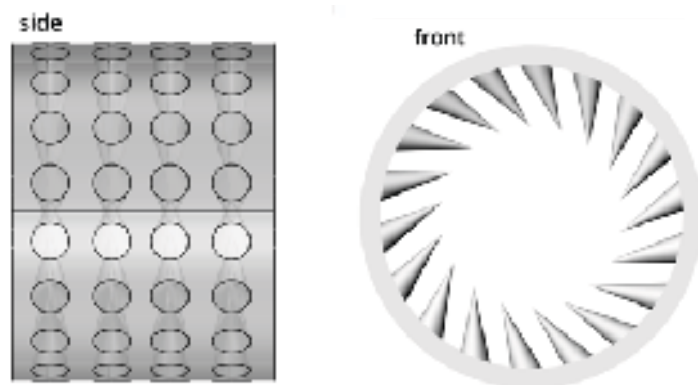


Printed figures with encoded movement

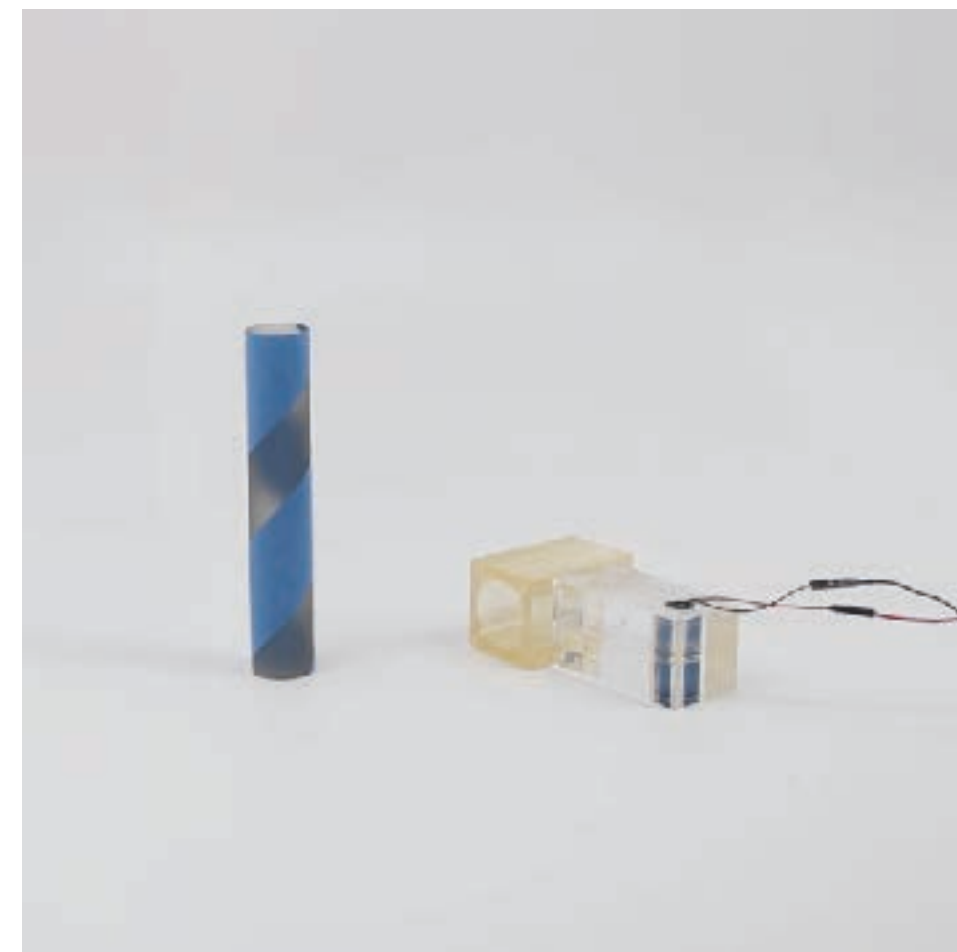
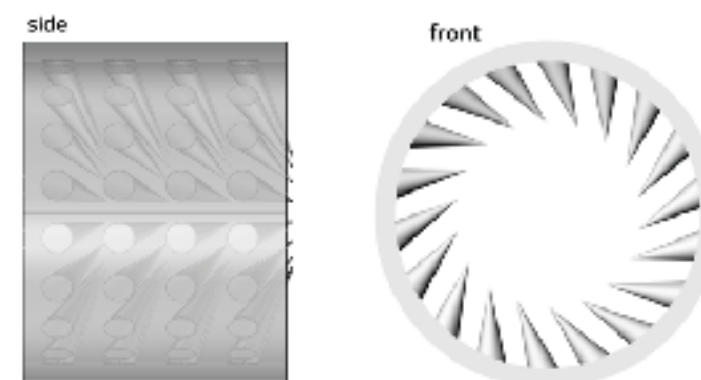
# Linear



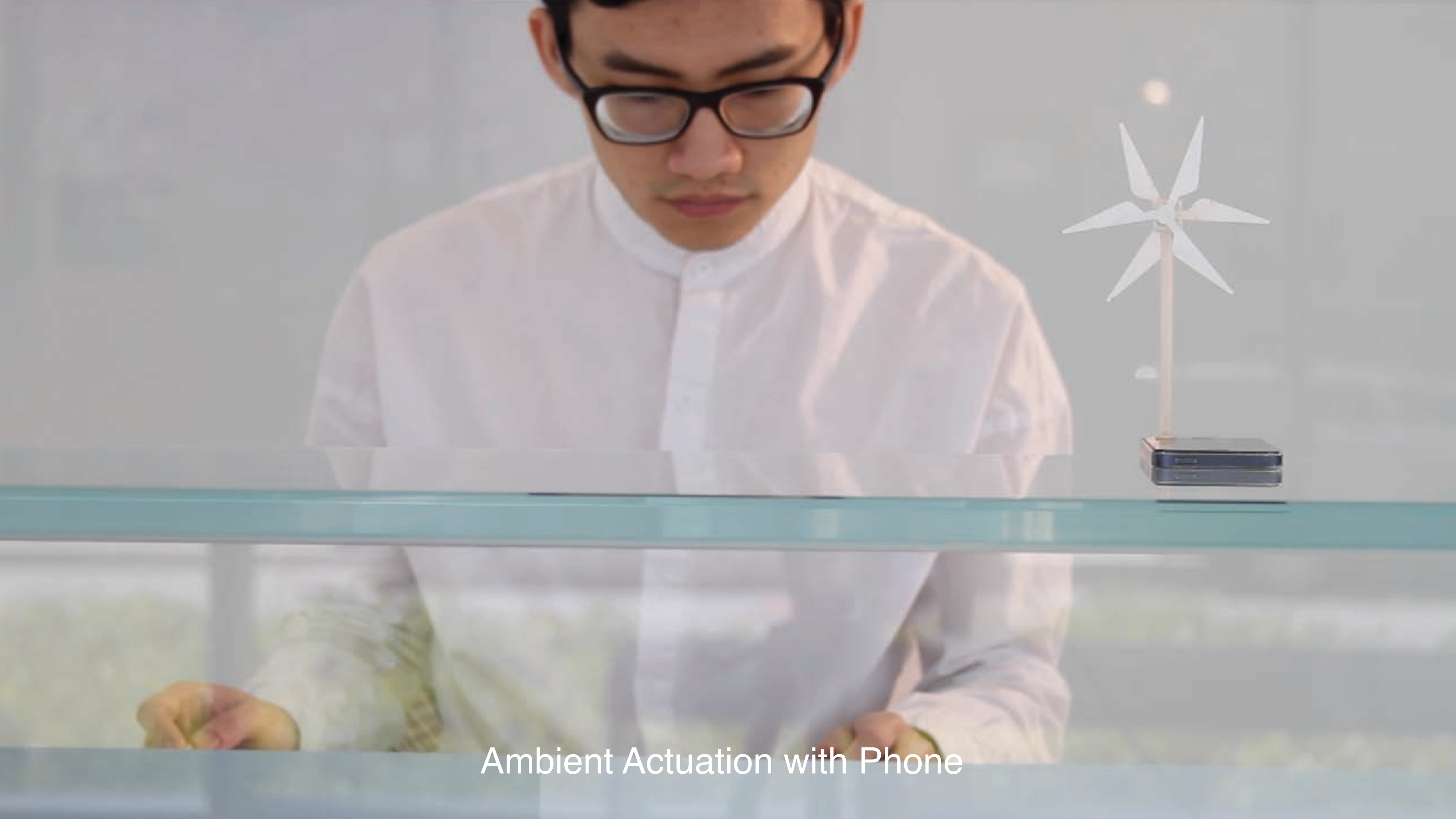
# Rotary



# Combined







Ambient Actuation with Phone



Mimosa  
Active Transformation



Wheat Awns  
Stimuli: Humidity  
Passive transformation



Venus flytrap leaf  
Stimuli: active transformation



Sunflowers  
Stimuli: Light  
Active transformation




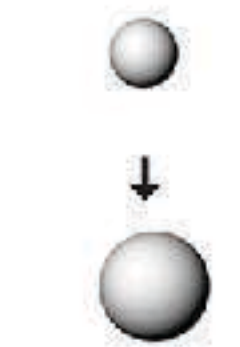



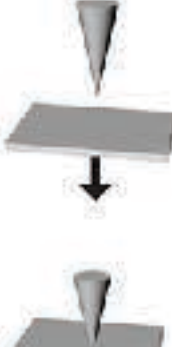





























	Orientation		Volume	Spatiality	Permeability	Snap-buckling	Drilling	Growth
2D Bending	2D Coiling (Spiral)	3D Coiling (Helix)						
								
								
								
Pine Cones	<i>Selaginella lepidophylla</i>	Chiral seed pod	Natto Cells	Euglena cells	Lotus pod	Flytrap	Erodium awns	Slim Mold



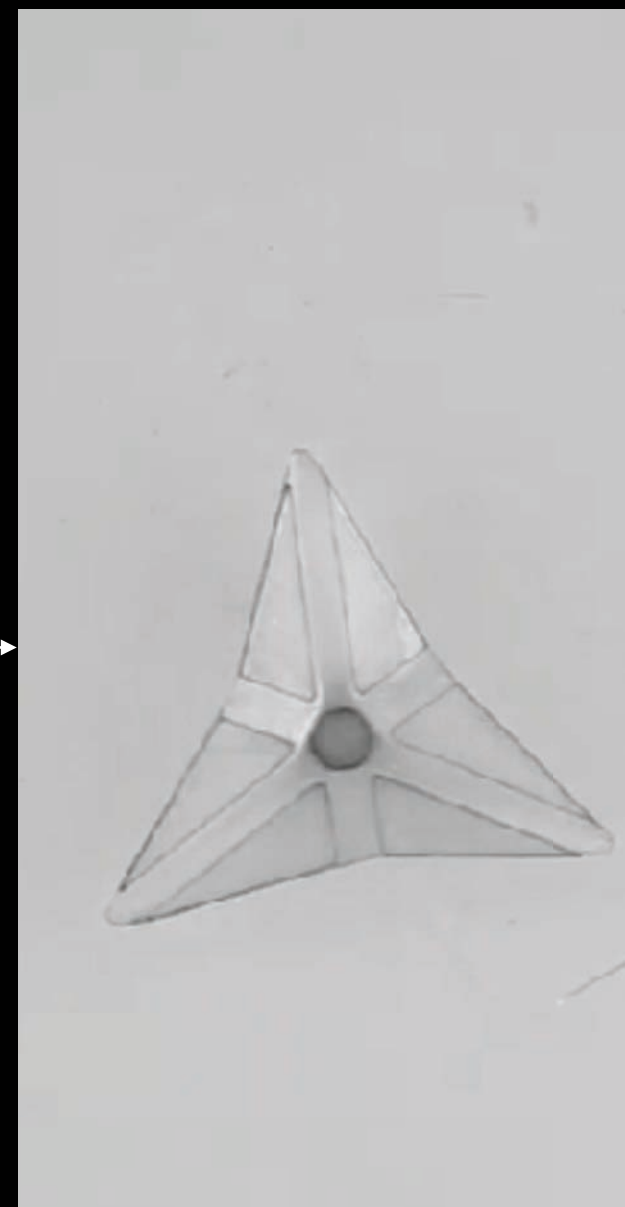
**“Bio is the new Digital”**

Nicholas Negroponte 2015





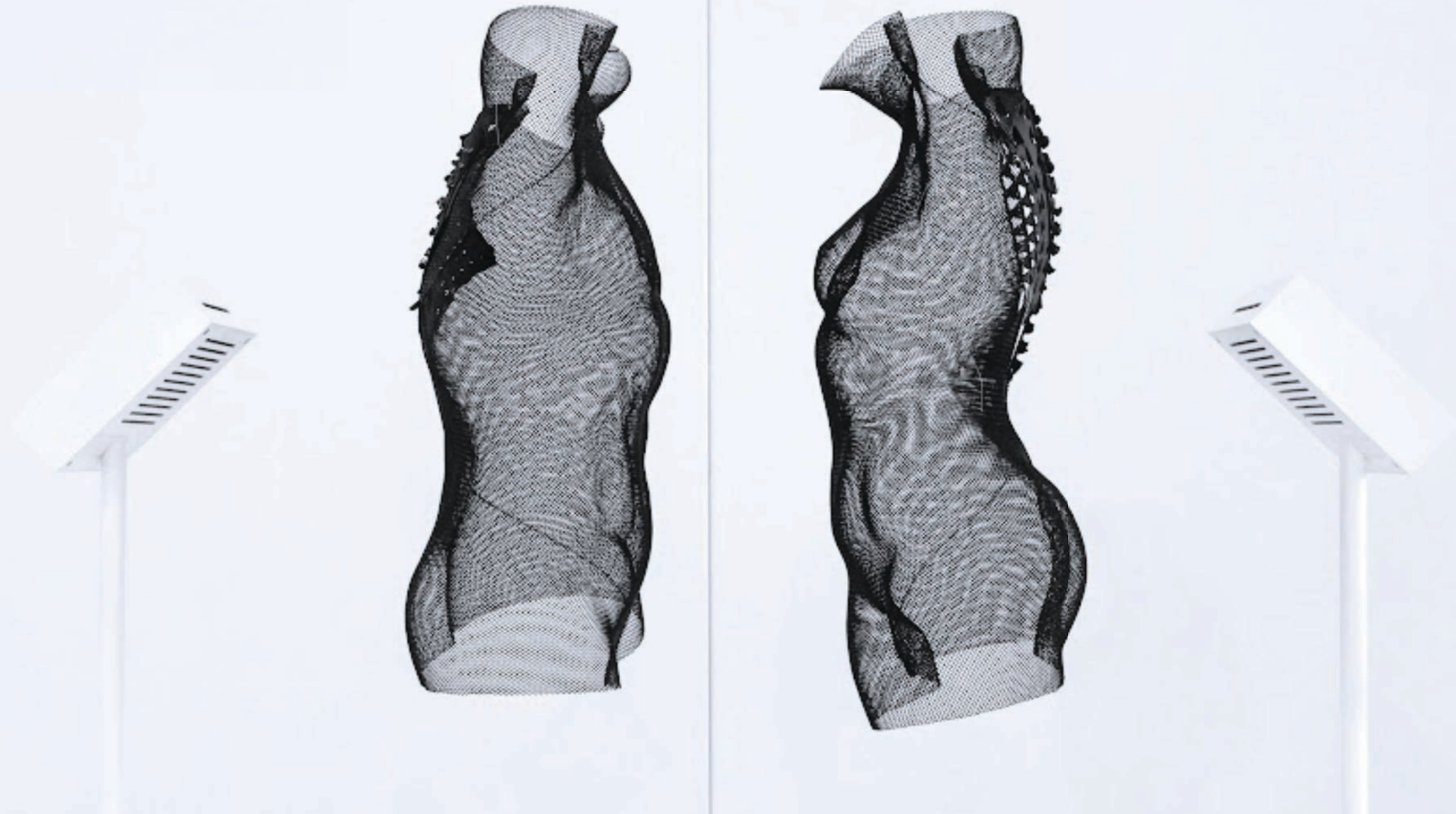
# BioLogic



Lining Yao, Jifei Ou, Chin-Yi Cheng, Helene Steiner, Wen Wang, Guanyun Wang, Hiroshi ishii.  
bioLogic: Natto Cells as Nanoactuators for Shape Changing Interfaces. In Proc. of CHI 2015. ACM



# “Bio is the new Interface”



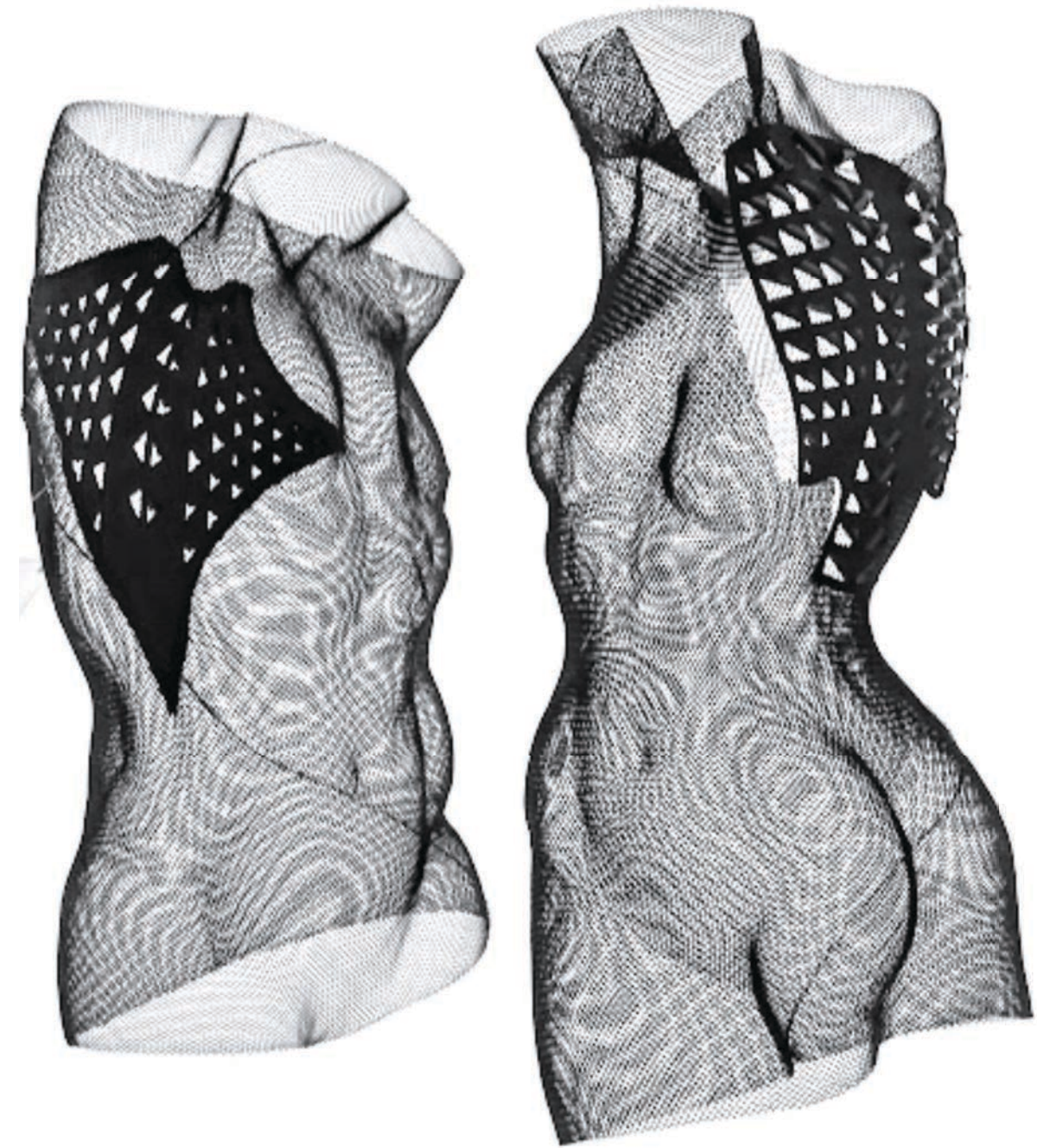


BIOLOGIC

TANGIBLE MEDIA GROUP, MIT MEDIA LAB

# “Bio is the new Interface”

Tangible Media Group



bioLogic Exhibit at  
MIT Media Lab E14 lobby





# BIOLOGIC EXHIBITION

to Celebrate the MIT Media Lab's 30th Anniversary

Tangible Media Group, MIT Media Lab

# bioLogic Team



Lining Yao, concept creation, interaction design and fabrication, MIT Media Lab



Wen Wang, biotechnology and material science, MIT Dept. of Chemical Engineering



Guanyun Wang, industrial design and fabrication, MIT Media Lab/Zhejiang University



Helene Steiner, interaction design, MIT Media Lab/Royal College of Art



Chin-Yi Cheng, computational design and simulation, MIT Architecture



Jifei Ou, concept design and fabrication, MIT Media Lab



Oksana Anilionyte, fashion design, MIT Media Lab/Royal College of Art



Prof. Hiroshi Ishii, advising and directing, Tangible Media Group, MIT Media Lab

## 3 A'DESIGN AWARDS 2016



**Textile**  
**Platinum**



**Wearable**  
**Gold**



**Fashion**  
**Silver**





from build

Man-Made

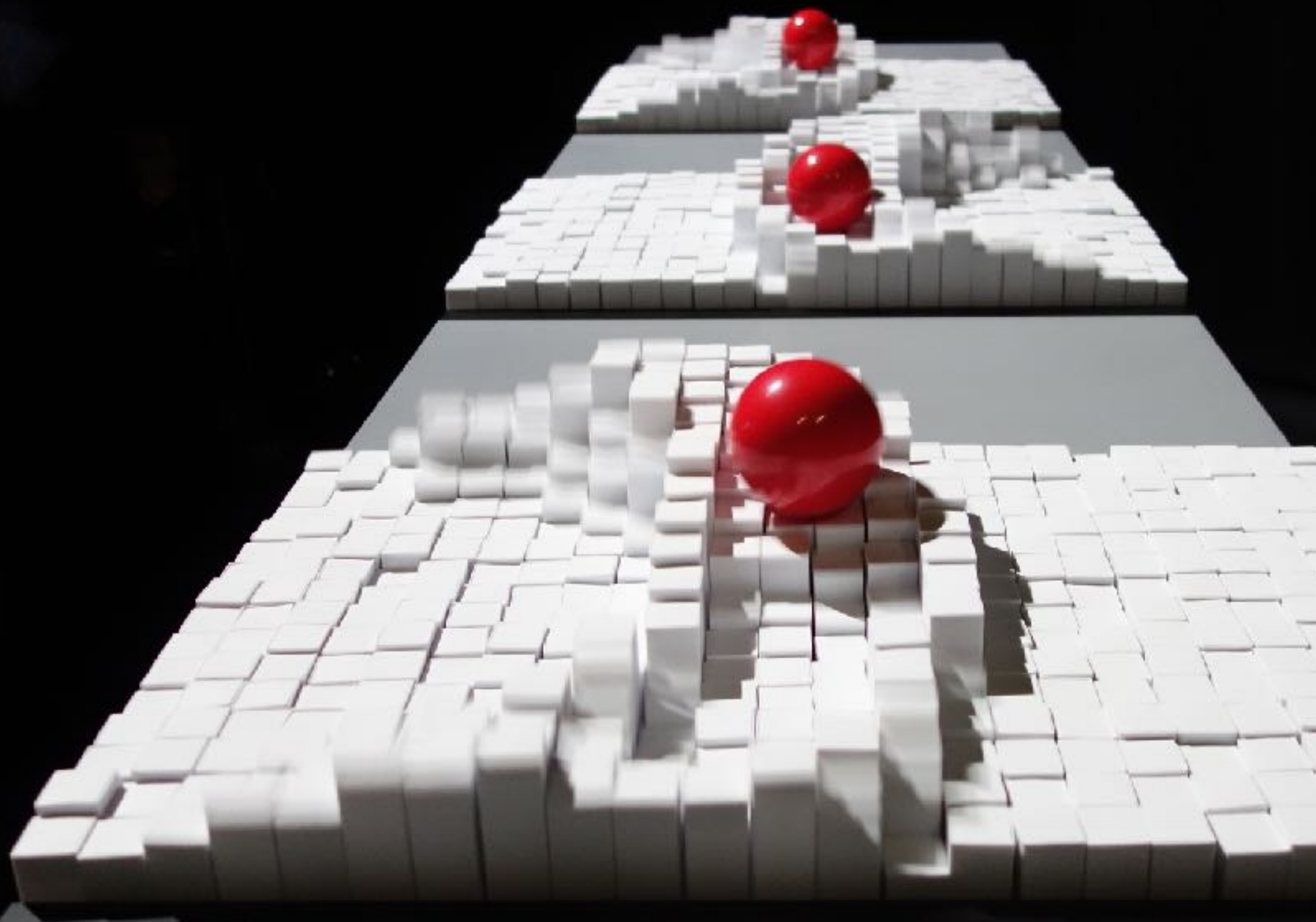


to grow

Nature-Derived



# Dance





A futuristic scene set in a dark blue environment. In the center, a glowing white sphere is mounted on a thin, dark vertical stand that sits on a circular, glowing white platform. To the right, another glowing white sphere floats in the air. The background is a smooth gradient of blue, and a bright light source is visible at the top, creating a lens flare effect.

**Levitate**

# ZeroN



Jinha Lee, MIT Media Lab

Rehmi Post, MIT Center for Bits and Atoms

Hiroshi Ishii, MIT Media Lab





ZeroN: Tangible Media Group



Infinite Cube

ART+COM

# Radical Atoms Exhibition @ Ars Electronica Center



100 Drones

Ars Electronica Futurelab





ZeroN: Tangible Media Group



# Levitate

Infinite Cube

ART+COM



100 Drones

Ars Electronica Futurelab





ZeroN: Tangible Media Group



Infinite Cube

ART+COM



100 Drones

Ars Electronica Future Lab

# Defy Gravity

# The Future

is not to predict,  
but to invent

Alan Kay 1971

This is the century in which you can be proactive about the future; you don't have to be reactive. The whole idea of having scientists and technology is that those things you can envision and describe can actually be built.



# Envision

Photo courtesy of Nobukazu Kuriki



**Envision**

**Art &  
Philosophy**

**Embody**

**Design &  
Technology**

**Inspire**

**Art &  
Aesthetics**





# PERSPECTIVE









**Earthbound Observers**





# Hawaii - Mauna Kea - Milky Way Overhead

## Earthbound Observers

<http://www.nwicon.com/hawaii-mauna-kea-milkyway-over-observatories.htm>



# NASA Deployed the Hubble Space Telescope in 1990

## Unconstrained Perspective





# Perspective of Hubble Space Telescope

<http://hubblesite.org/gallery/album/star/pr2010013a/>



**Pillar and Jets HH 901/902**  
Hubble Space Telescope • WFC3/UVIS

<http://hubblesite.org/gallery/album/star/pr2005037a/>



**Crab Nebula • M1**  
Hubble Space Telescope • WFPC2

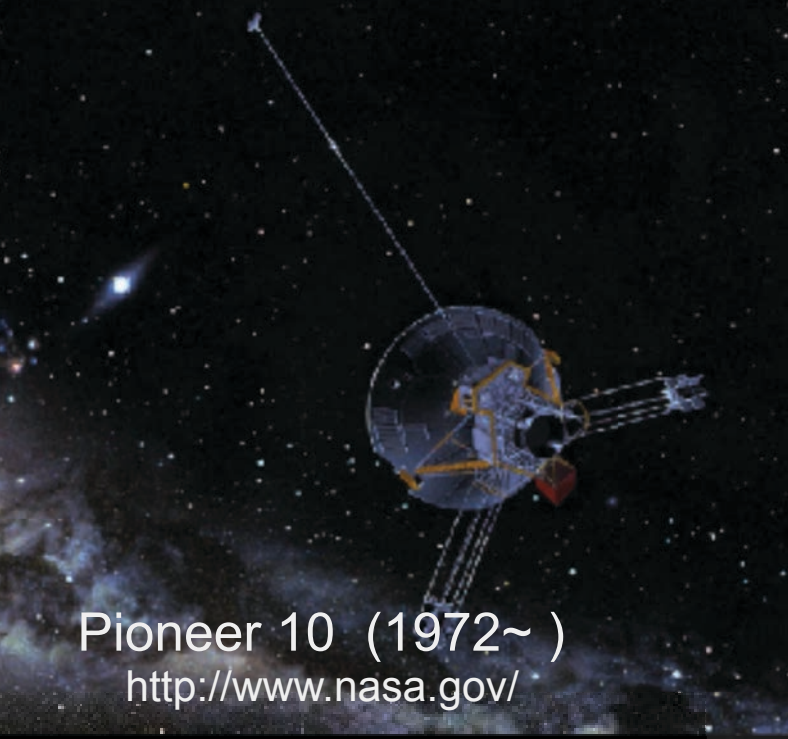




# Voyager 1 Deployed in 1977

## Unconstrained Perspective





Pioneer 10 (1972~ )  
<http://www.nasa.gov/>



Pioneer 11 (1973~ )  
<http://www.nasa.gov/>



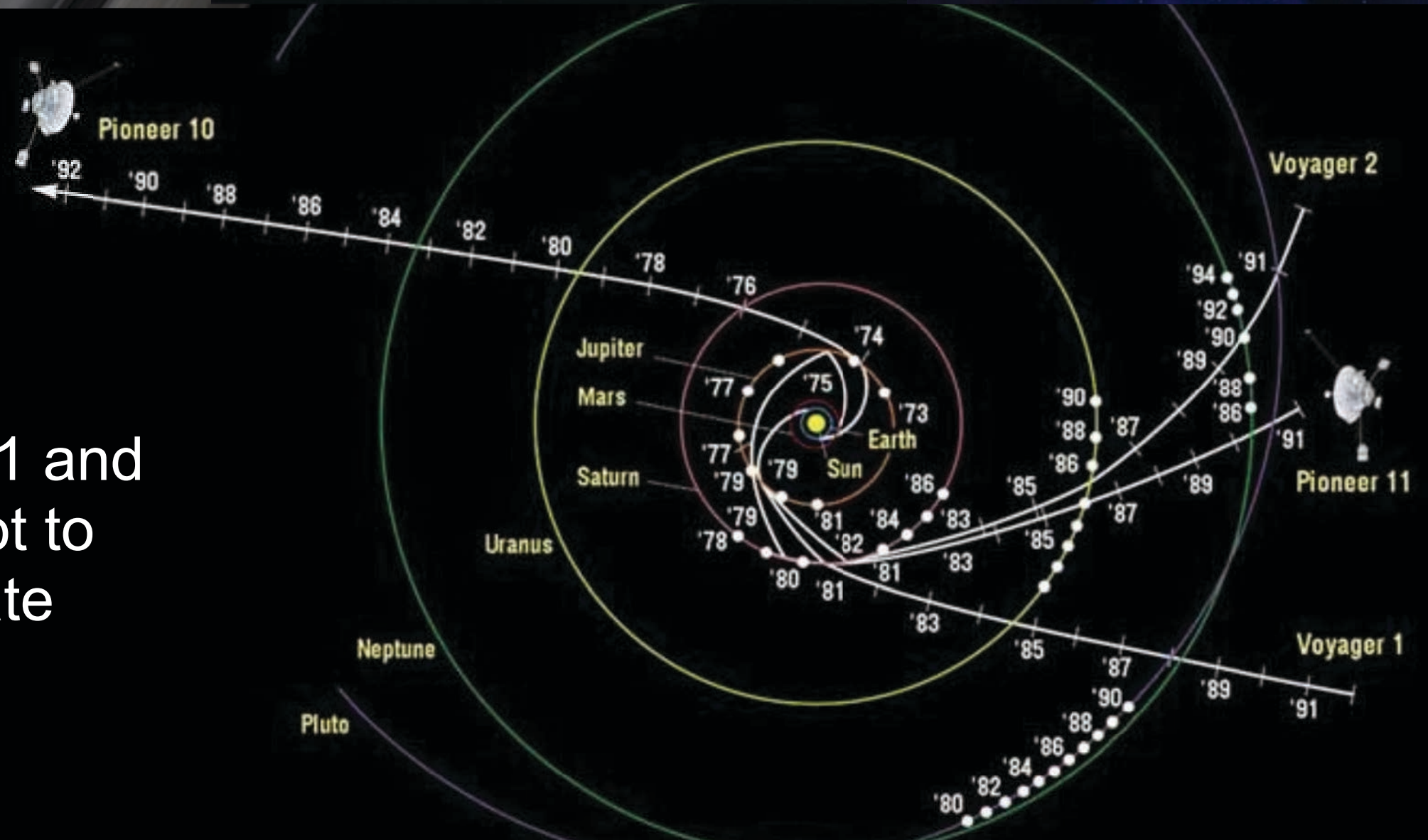
Voyager 1 (1977~ )  
<http://voyager.jpl.nasa.gov/>



Voyager 2 (1977~ )  
<http://voyager.jpl.nasa.gov/>

## Gravitational Slingshot

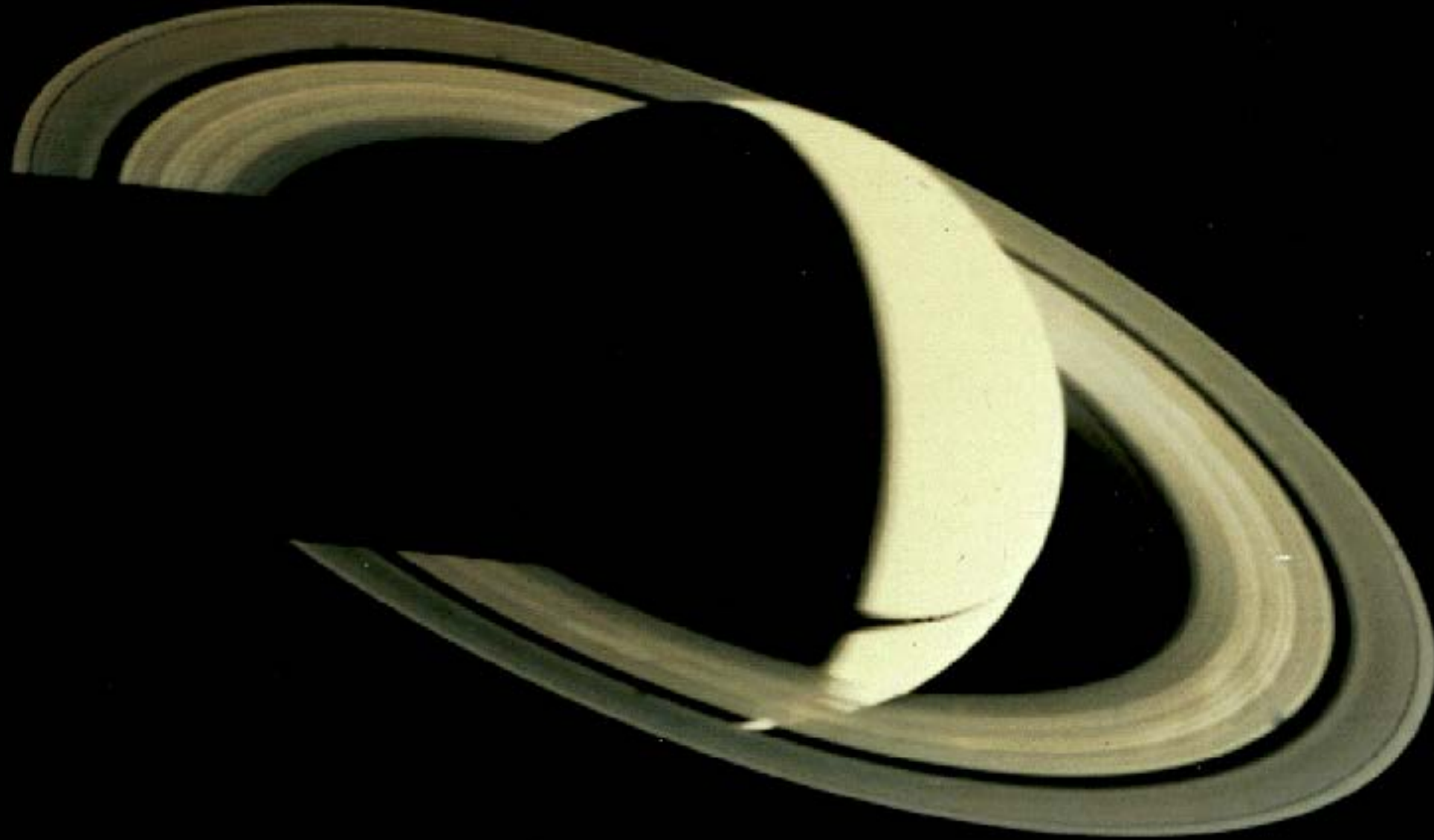
Pioneer 10 and 11 and Voyager 1 and 2 used the power of this slingshot to shift their trajectory and accelerate from planet to planet





# Saturn from the Voyager 1's Perspective

## Unconstrained Perspective

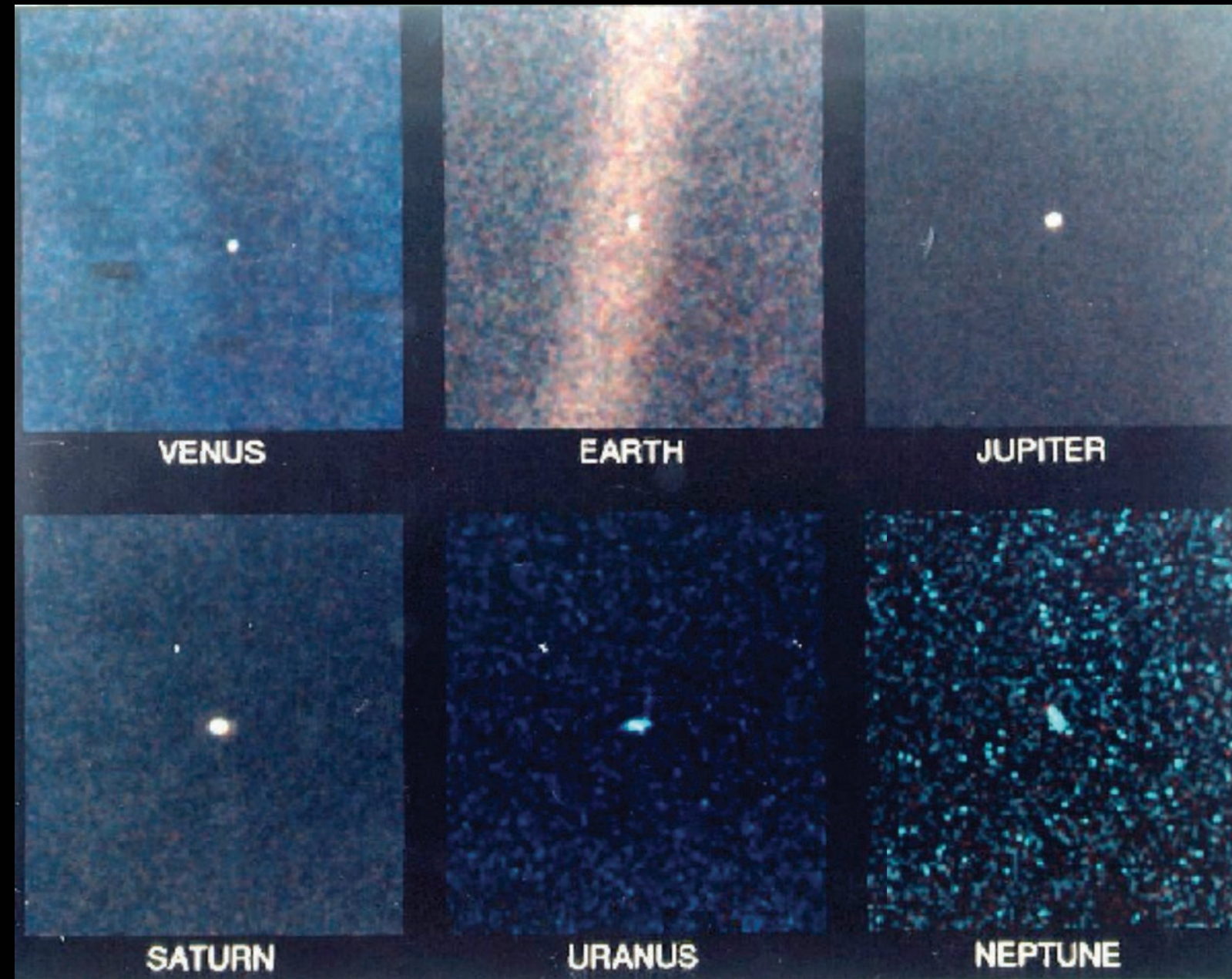


[https://en.wikipedia.org/wiki/Voyager\\_1#/media/File:Crescent\\_Saturn\\_as\\_seen\\_from\\_Voyager\\_1.jpg](https://en.wikipedia.org/wiki/Voyager_1#/media/File:Crescent_Saturn_as_seen_from_Voyager_1.jpg)



# Planets from the Voyager 1's Perspective

## Unconstrained Perspective







**People could only see the world from their own perspective**

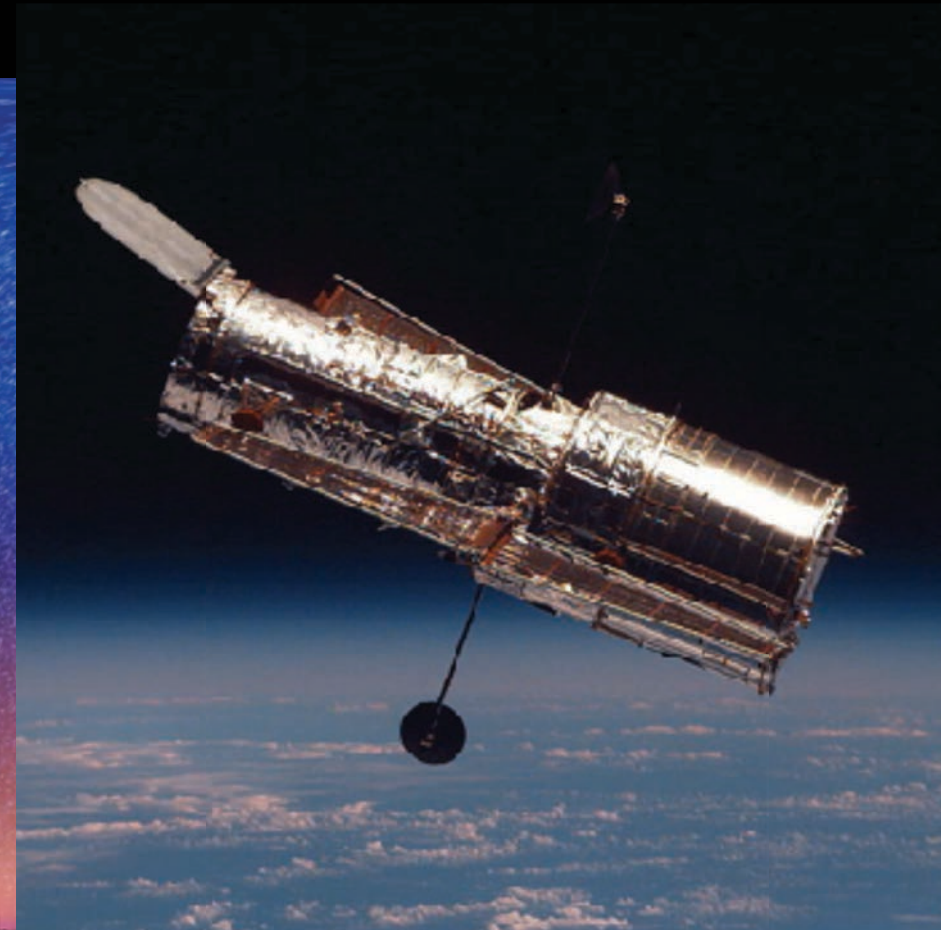


# Towards Holistic Worldview

Enhance

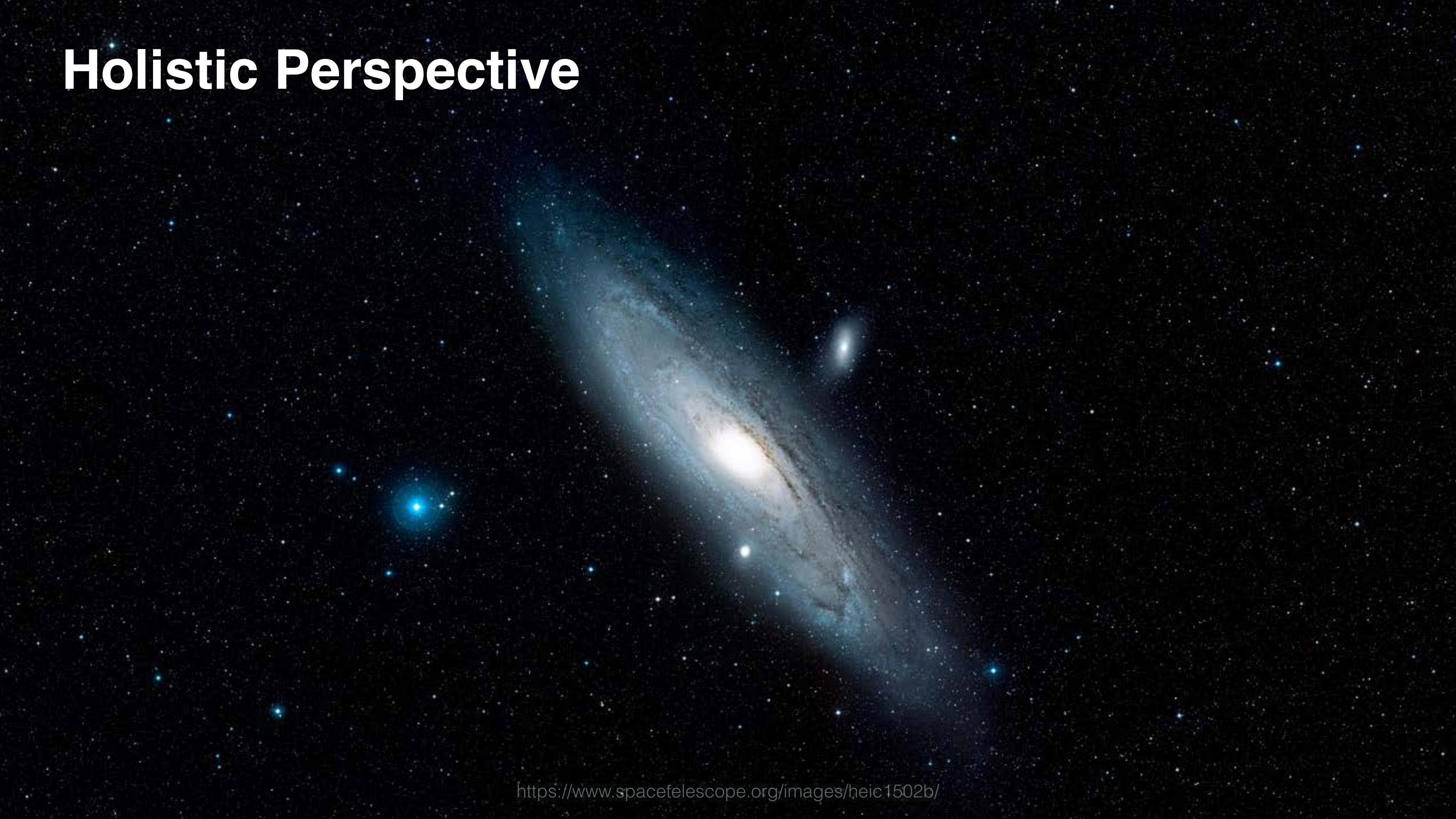
Expand

Escape





# Holistic Perspective





# Holistic Perspective & Heuristic Focus



<https://www.spacetelescope.org/images/heic1502b/>

<http://uncyclopedia.wikia.com/wiki/File:Earth.jpg>



# TRANS-Disciplinary

*Finding opportunity in conflict between disciplines*  
*Breaking down old paradigms to create new archetypes*

“auf-heben”



# Art

Art provides new perspective that  
turns our gaze to a new horizon



# Thanks!

石井 裕

Hiroshi Ishii  
MIT Media Lab



@ishii\_mit



ishii.mit

MIT  
Media  
Lab