TRANSFORM

Beyond Pixels,
Towards Radical Atoms

January 27, 2017 in Tokyo

MIT Japan Conference

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 Eelectronica
Futurelab

Infinite Cube
ART+COM

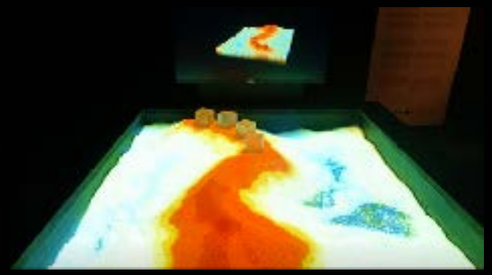
Lift-Bit
Carlo Ratti
Associati

Active Wood
Self-Assembler Lab

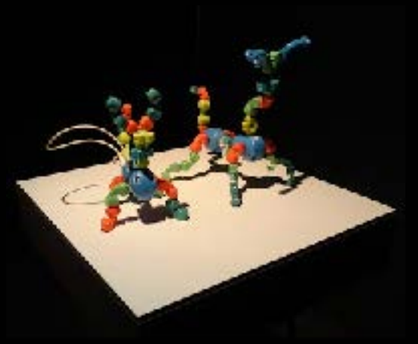
musicBottles

ZeroN

Perfect Red



SandScape



topobo

inFORM

bioLogic

LineFORM

PneUI

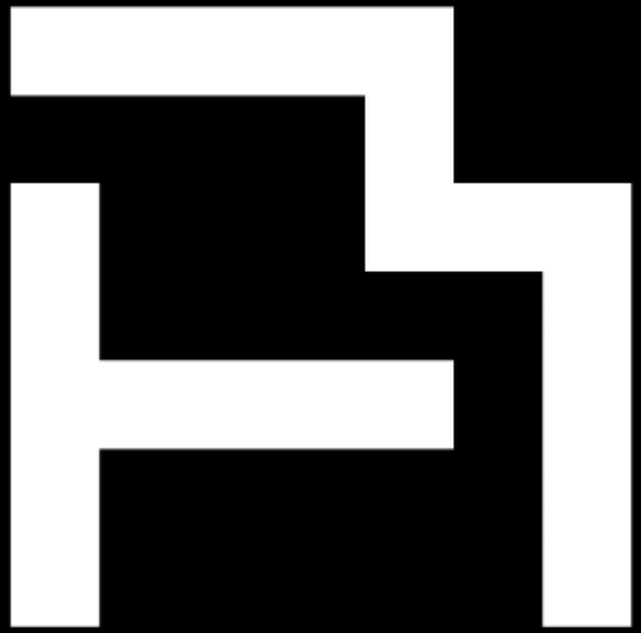
jamSheets

Media Lab, Responsive Environments Group

Rovables

Hiroshi Ishii
Tangible Media Group
MIT Media Lab

Radical Atoms Exhibition @ Ars Electronica Center, Sep. 2016



tangible
media

ClearBoard-1

NTT Human Interface Labs

CHI 92, CSCW 92


1992
ClearBoard-1
NTT Human Interface Labs
CHI 92, CSCW 92

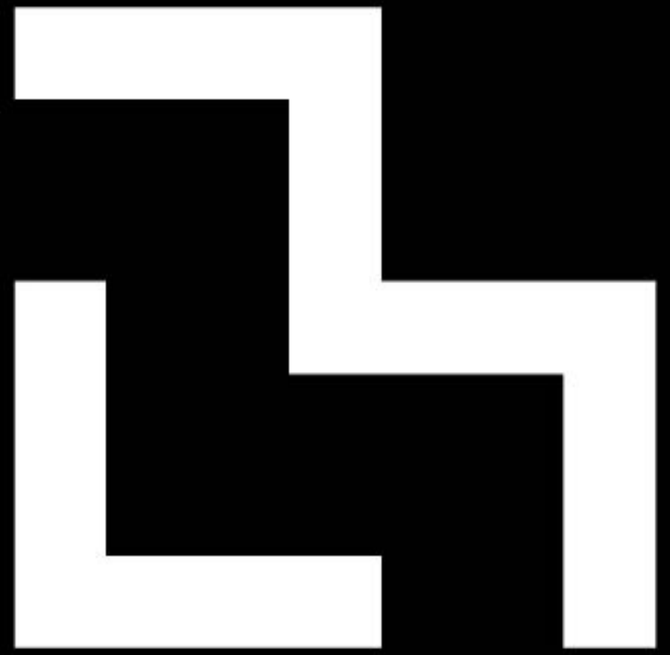
ClearBoard: Seamless Collaboration Media
Hiroshi Ishii & Minoru Kobayashi @NTT 1992

ClearBoard-1

NTT Human Interface Labs

CHI 92, CSCW 92


1995
Tangible Media
MIT Media Lab



mit
media
lab

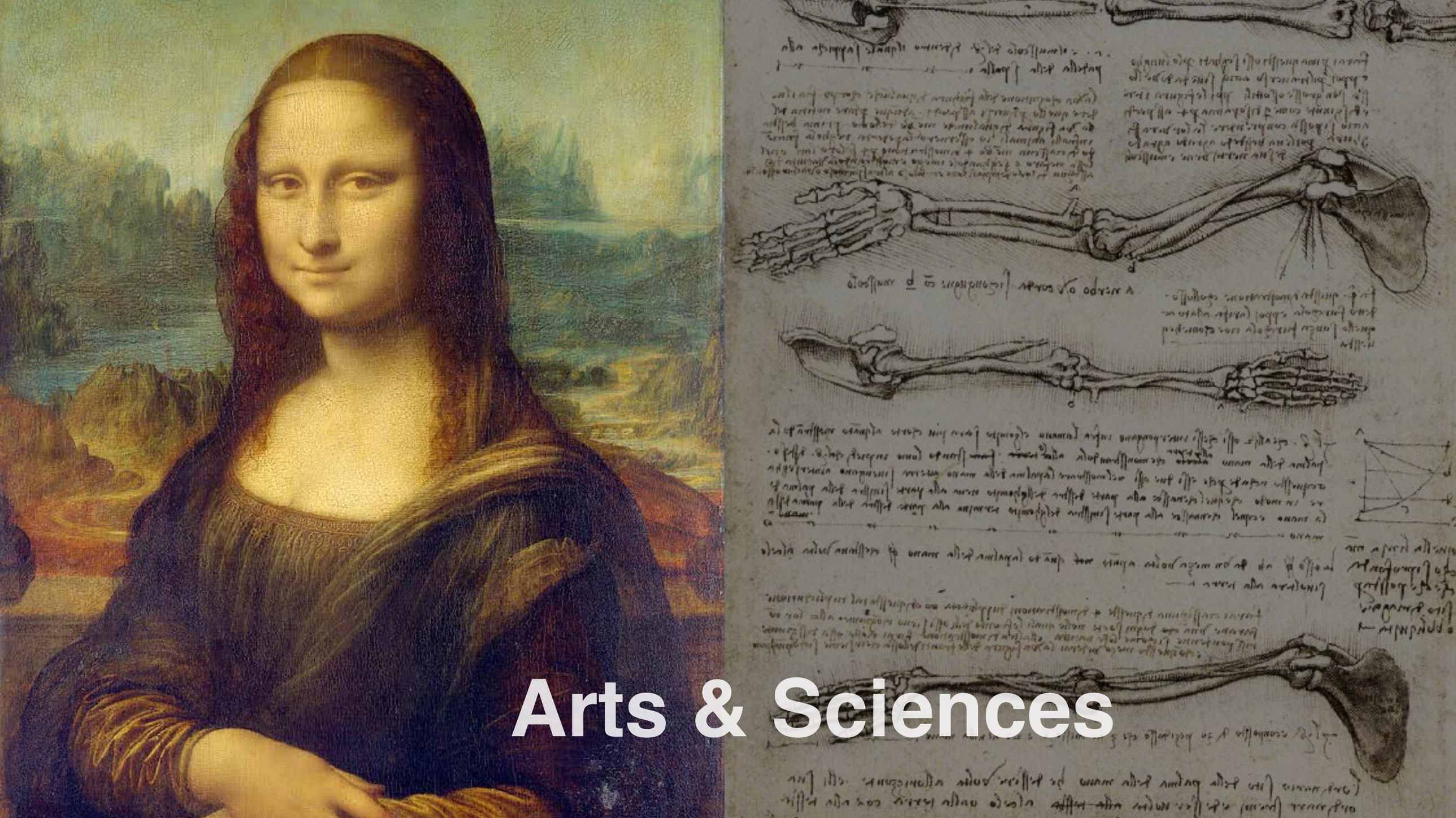
TRANS-Disciplinary

Finding opportunity in conflict between disciplines

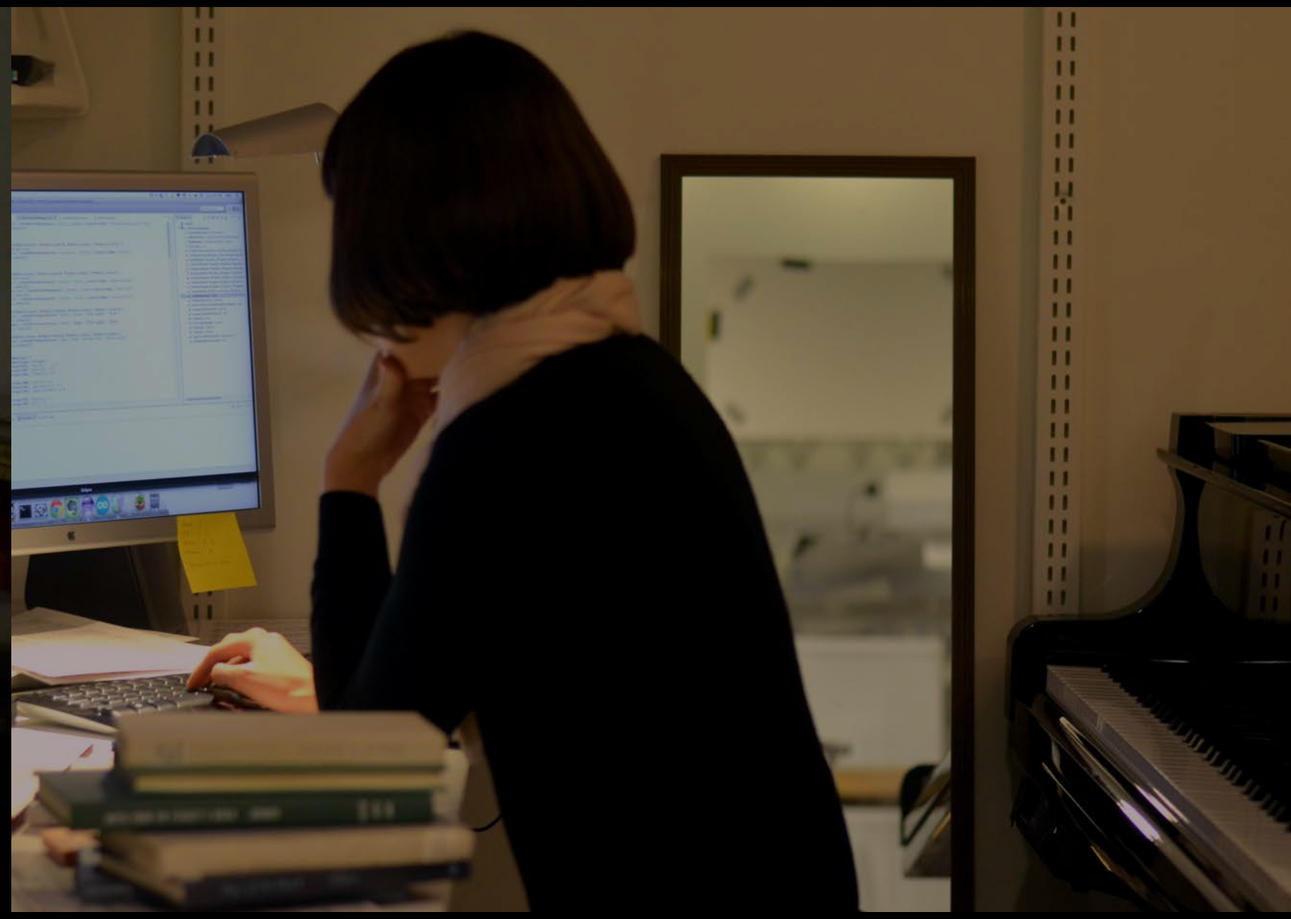
Breaking down old paradigms to create new archetypes

“auf-heben”

https://www.flickr.com/photos/79203622@N02/9734698717/



Arts & Sciences



Music & Technology

MIT
Media
Lab

MirrorFugue III Xiao Xiao

MIT Media Lab

MirrorFugue III Xiao Xiao

MIT Media Lab

Milano

Design Week

LEXUS DESIGN AMAZING 2014 MILAN

April 8-13, 2014

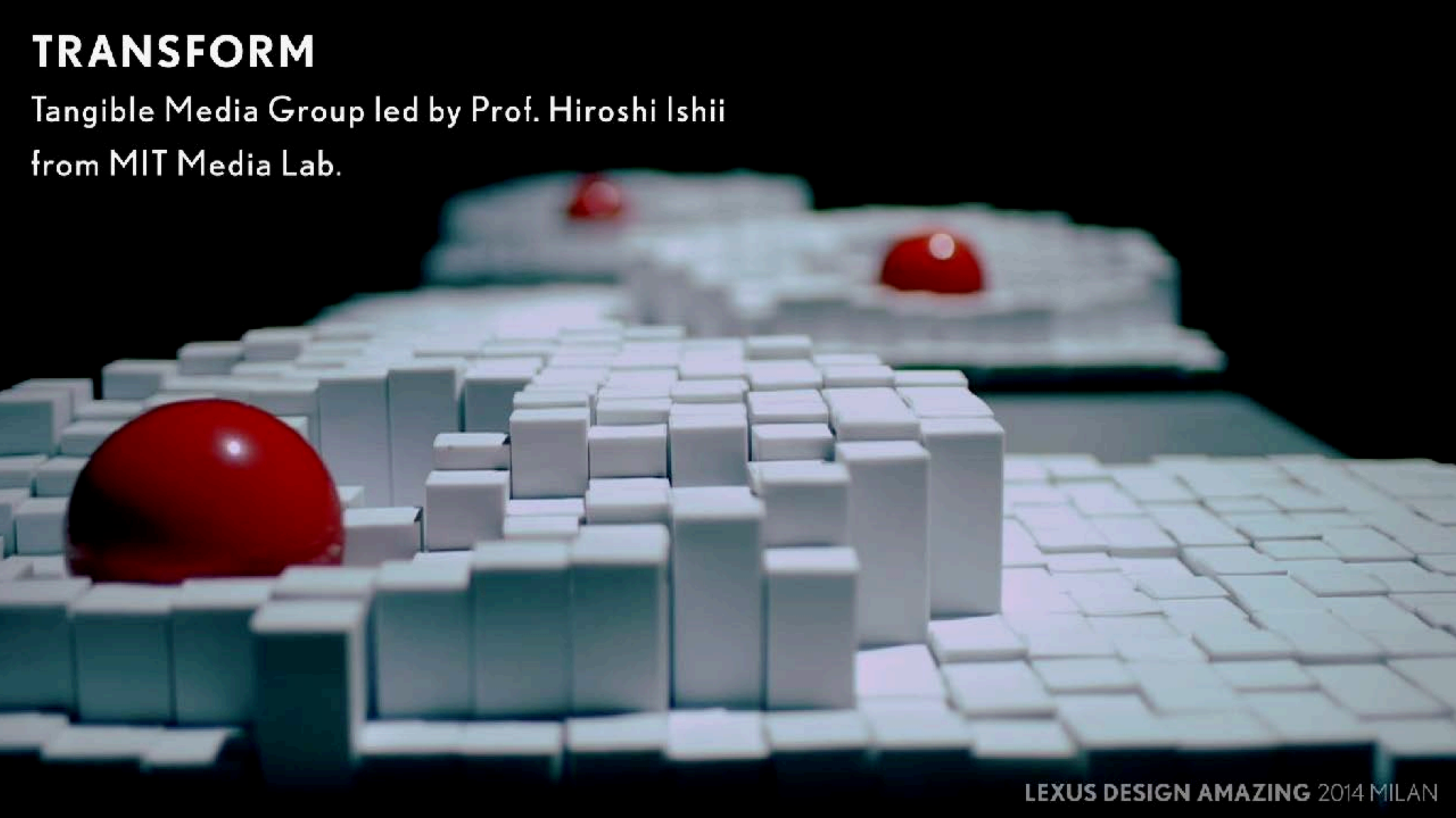
Tangible Media Group

MIT Media Lab

MIT
Media
Lab

TRANSFORM

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



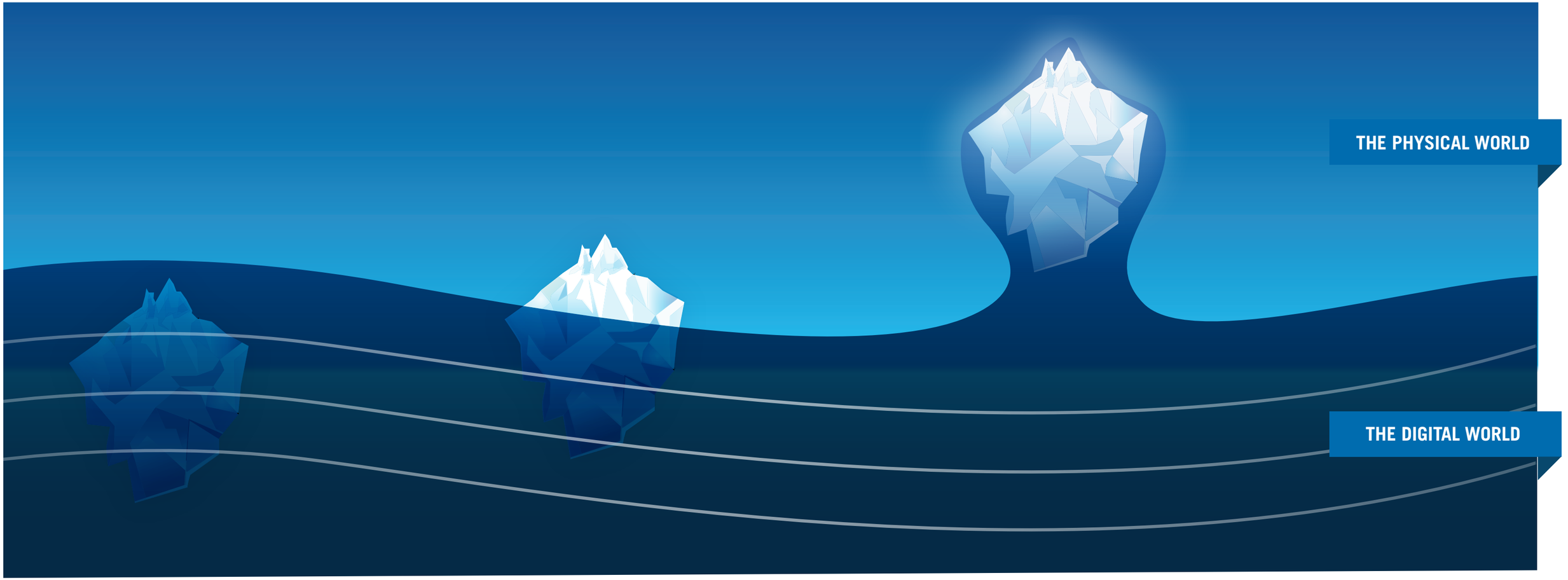
LEXUS DESIGN AMAZING 2014 MILAN


TRANSFORM
Tangible Media
MIT Media Lab
MIT
Media
Lab

GUI PAINTED BITS

TUI TANGIBLE BITS

RADICAL ATOMS

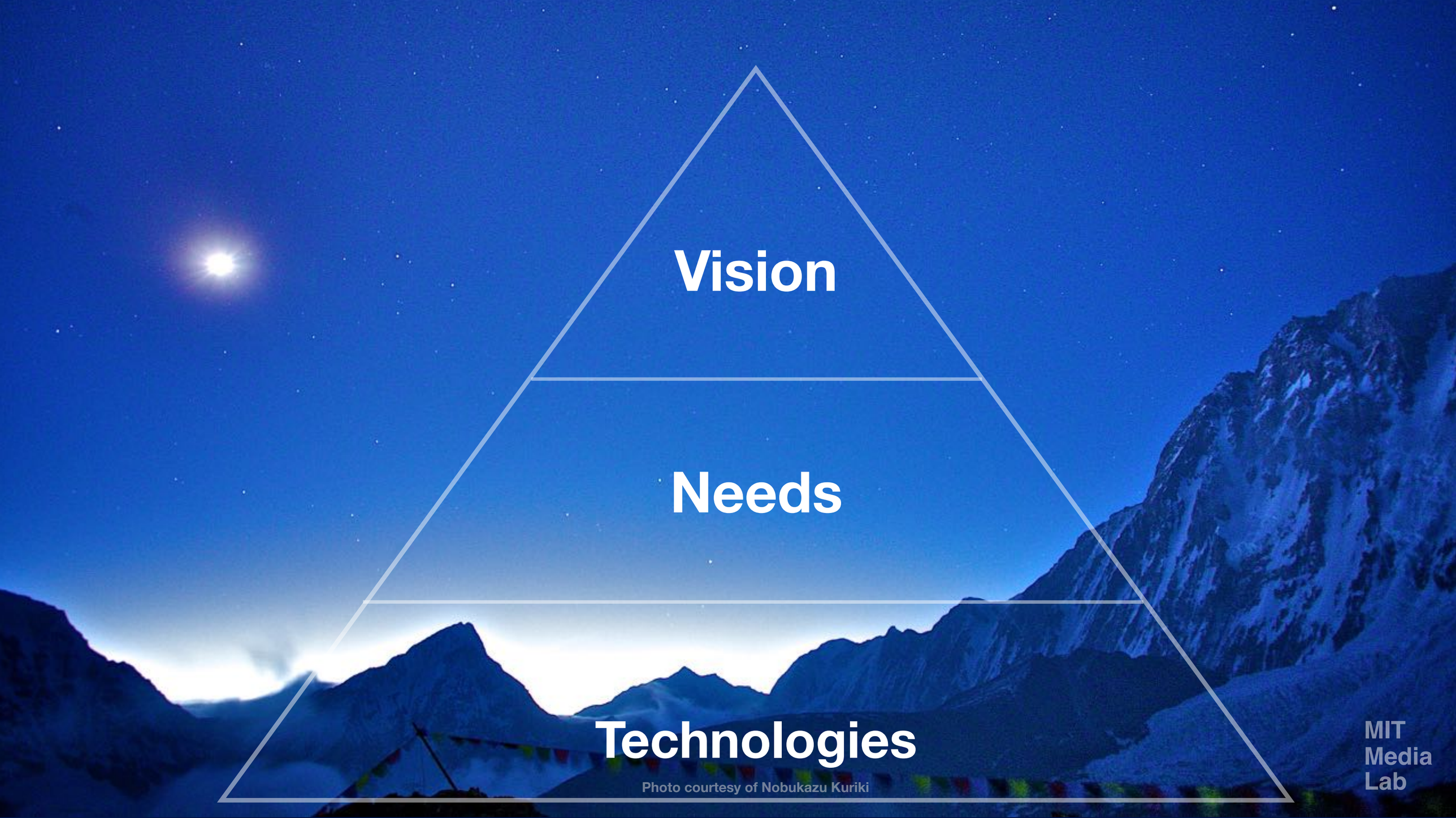


A Graphical User Interfaces only let users see digital information through a screen, as if looking through a surface of the water. We interact with the forms below through remote controls such as a mouse, a keyboard or a touch screen.

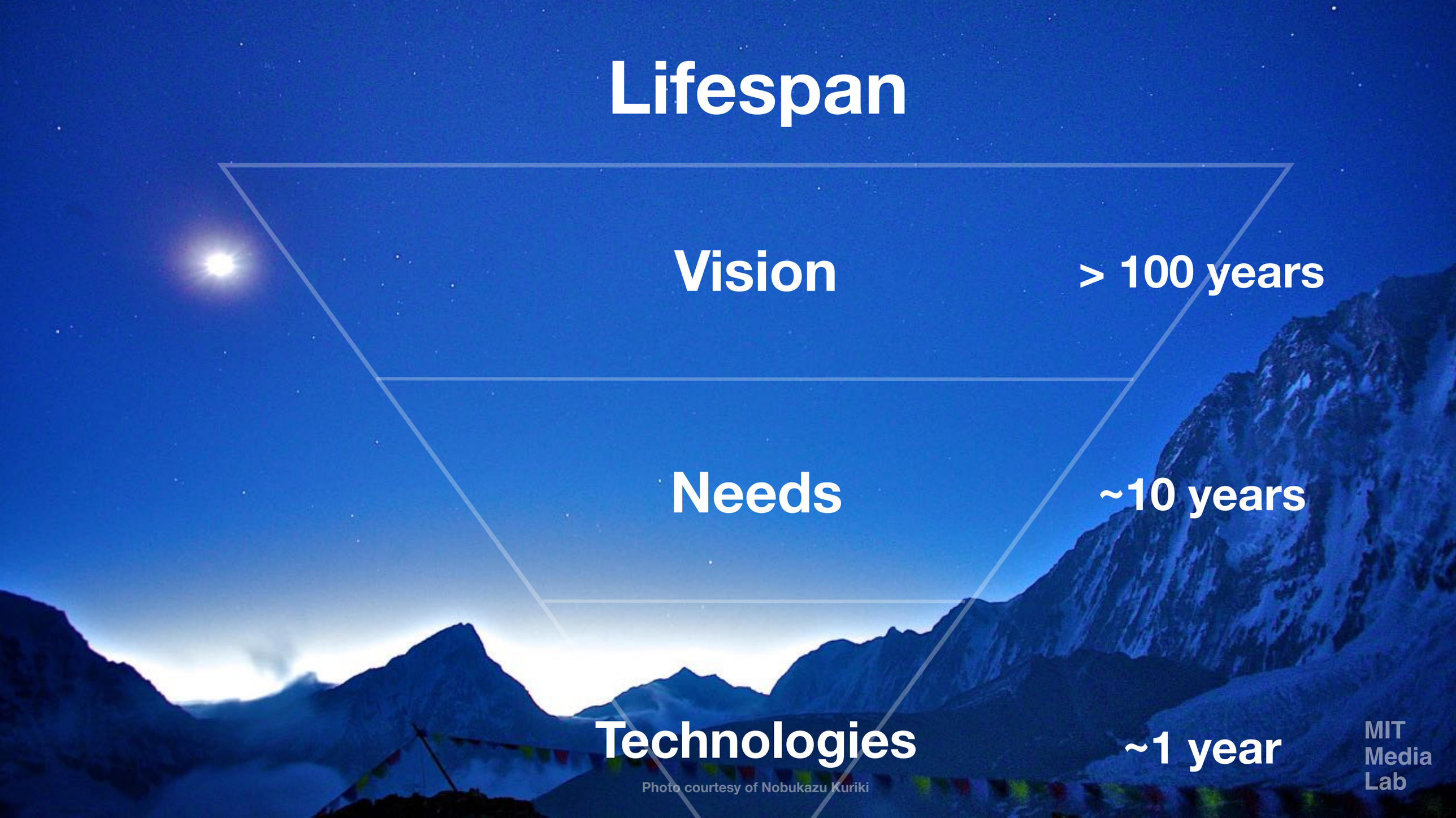
A Tangible User Interface is like an iceberg: there is a portion of the digital that emerges beyond the surface of the water - into the physical realm - that acts as physical manifestations of computation, allowing us to directly interact with the 'tip of the iceberg.'

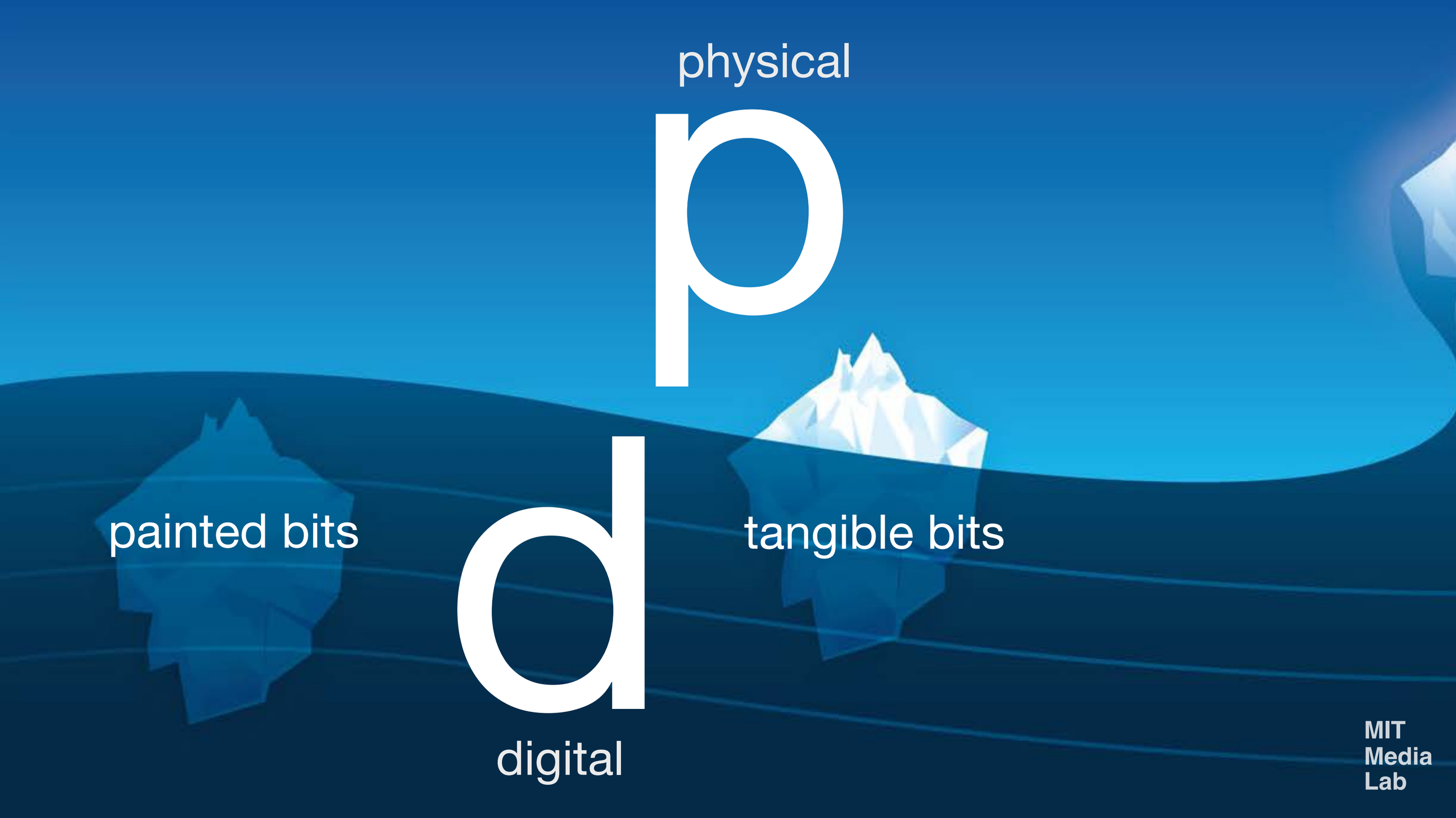
Radical Atoms is our vision for the future of interaction with hypothetical dynamic materials, in which all digital information has physical manifestation so that we can interact directly with it - as if the iceberg had risen from the depths to reveal its sunken mass.


vision


Vision
Needs
Technologies
Photo courtesy of Nobukazu Kuriki
MIT
Media
Lab

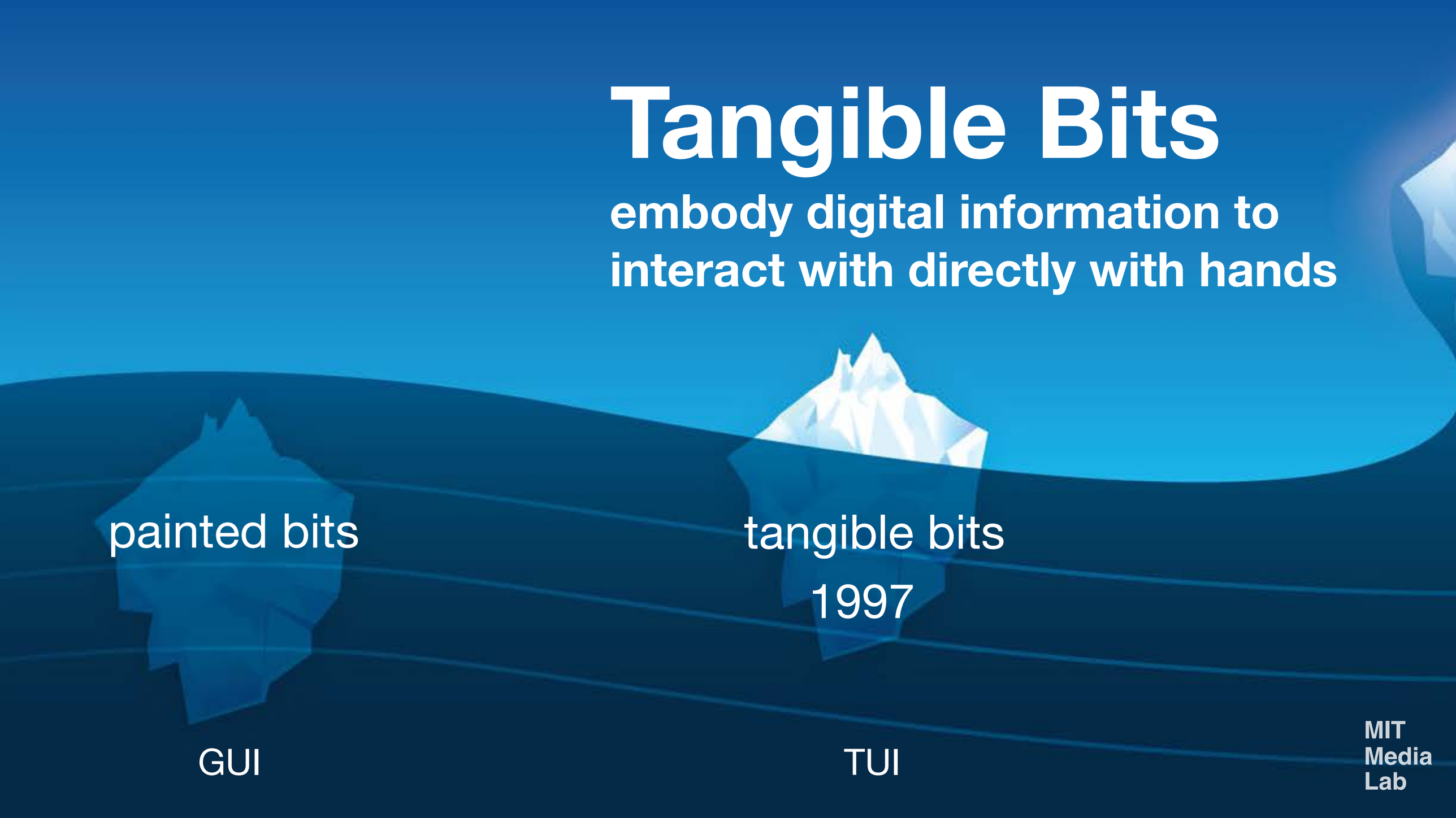
Lifespan


Vision
> 100 years
Needs
~10 years
Technologies
~1 year
Photo courtesy of Nobukazu Kuriki
MIT
Media
Lab


physical
p
painted bits
d
tangible bits
digital
MIT
Media
Lab

Tangible Bits

embody digital information to interact with directly with hands




bottles

musicBottles (classical)

Origin: Weather Bottle

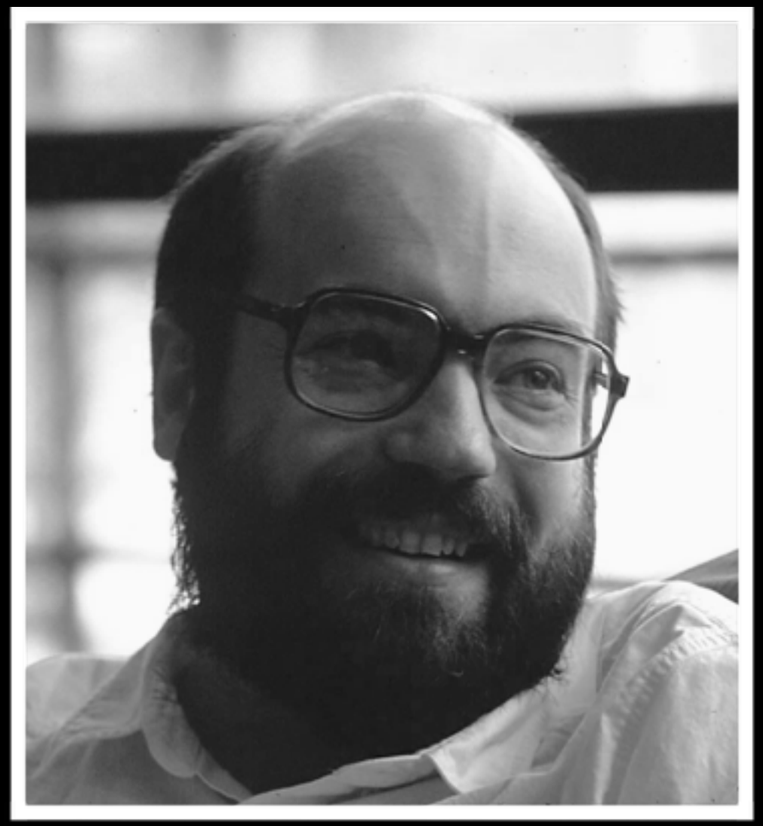
present for my mother

soy sauce bottle
in her kitchen

石井 和子

Kazuko ISHII

1926 - 1998

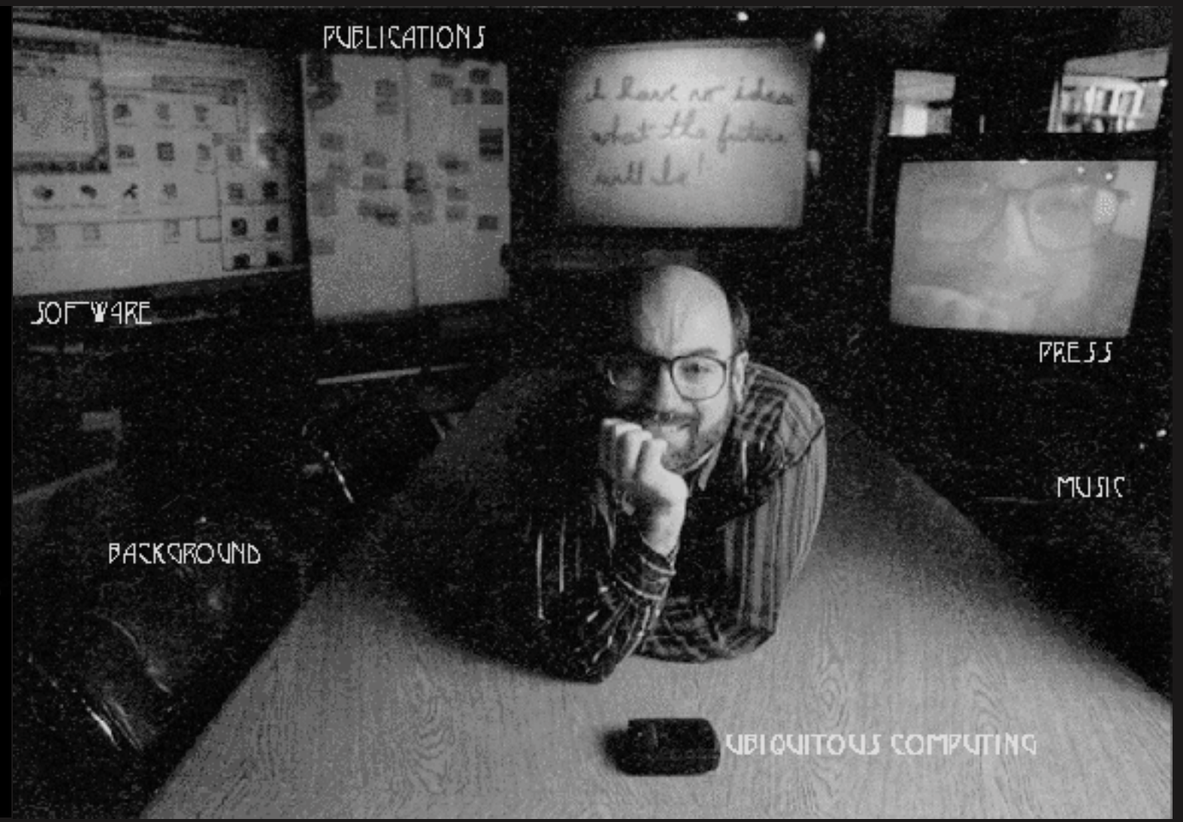


Mark Weiser
1952 – 1999

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

INVITED PAPER Special Section on Human Communication I

Bottles: A Transparent Interface as a Tribute to Mark Weiser

Hiroshi ISHII[†a)], *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 interfaces 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 scent, 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* illustrates Mark Weiser's vision of the *transparent* (or *invisible*) interface that weaves itself into the fabric of everyday life. The *bottles* also exploits the emotional 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, musicBottles, weather bottle*

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* illustrates 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

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Manuscript revised February 20, 2004.
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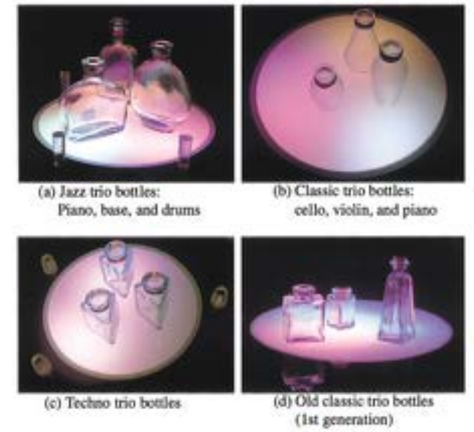


(a) Jazz trio bottles: Piano, base, and drums
(b) Classic trio bottles: cello, violin, and piano
(c) Techno trio bottles
(d) Old classic trio bottles (1st generation)

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

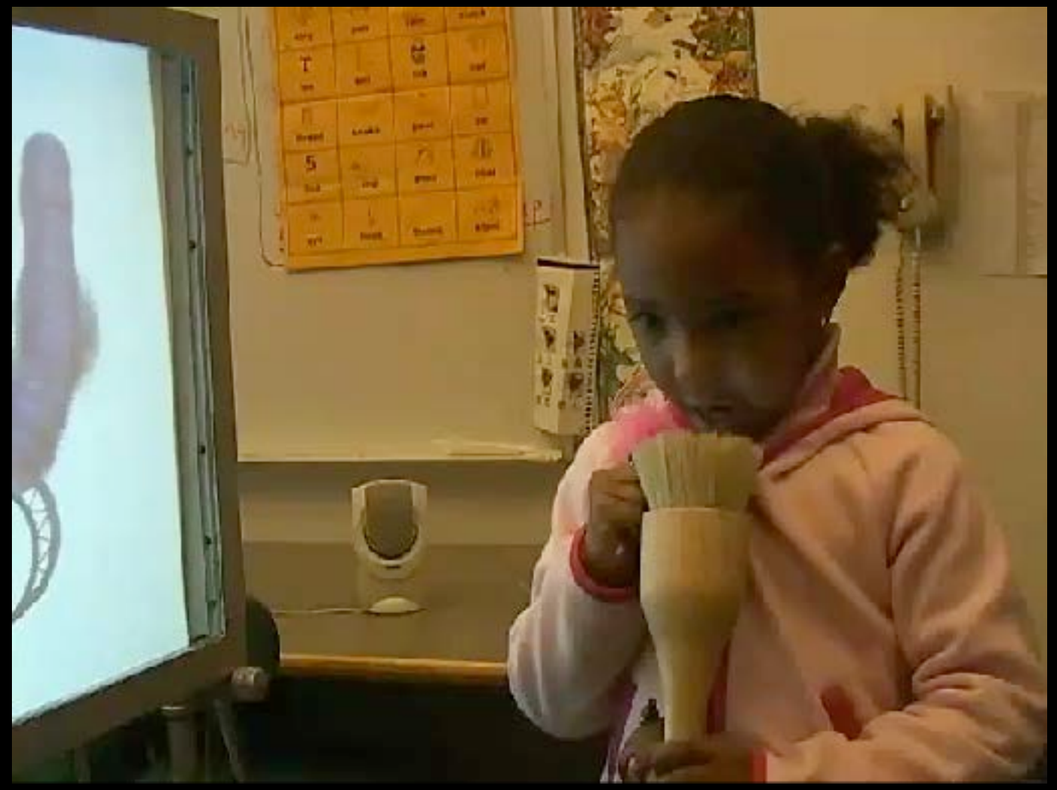
Kimiko Ryokai, Stefan Marti, & Hiroshi Ishii 2004

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

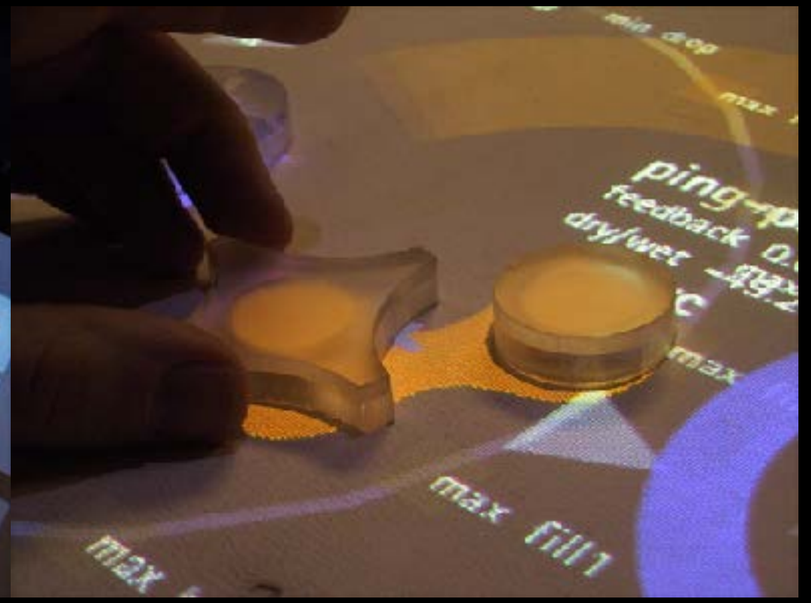
PingPongPlus

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)

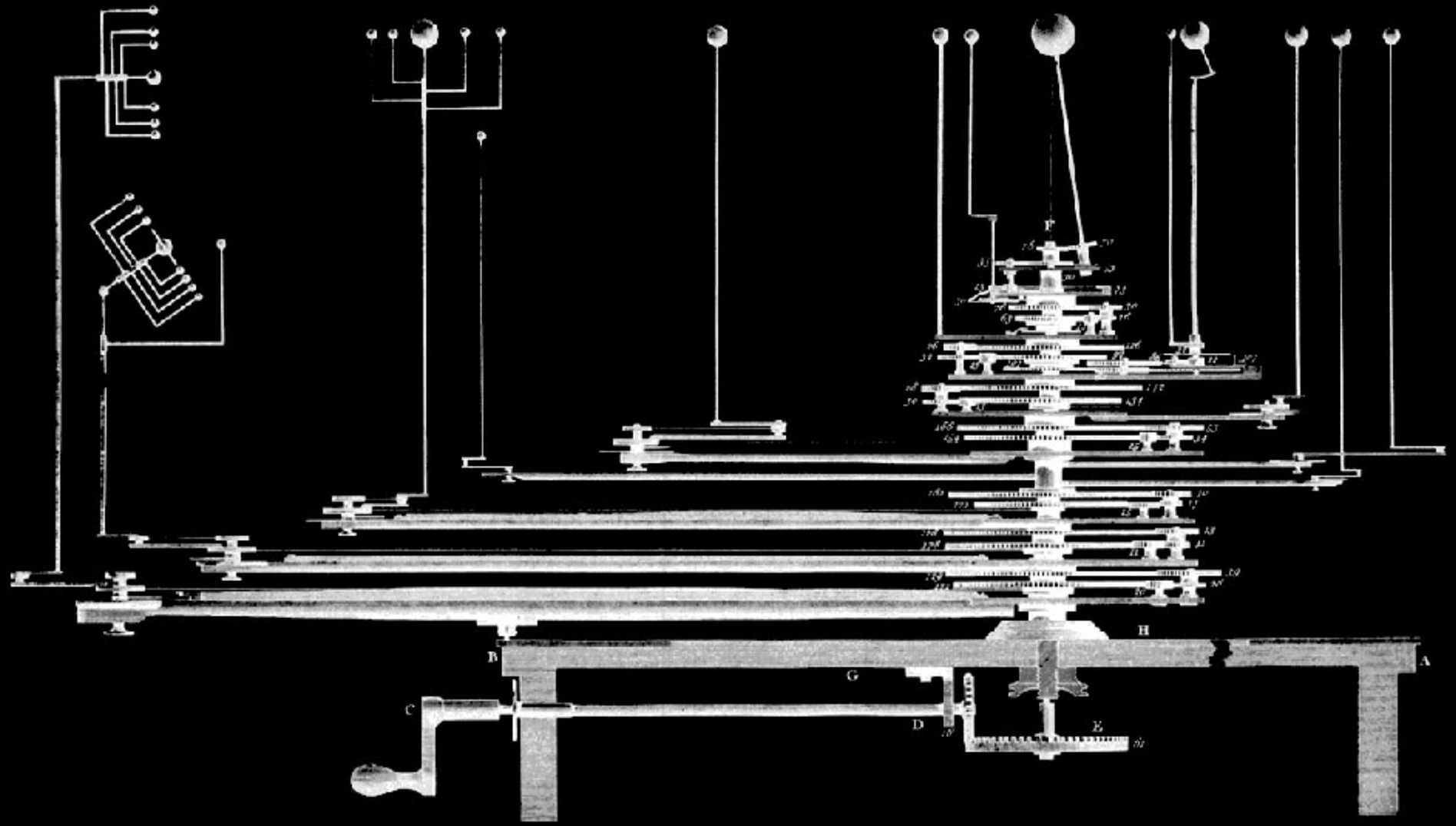


- A new way to perform electronic music.
- Designed to combine the expressive power of traditional musical instruments with the modularity of a computer
- Based on the Sensetable project.

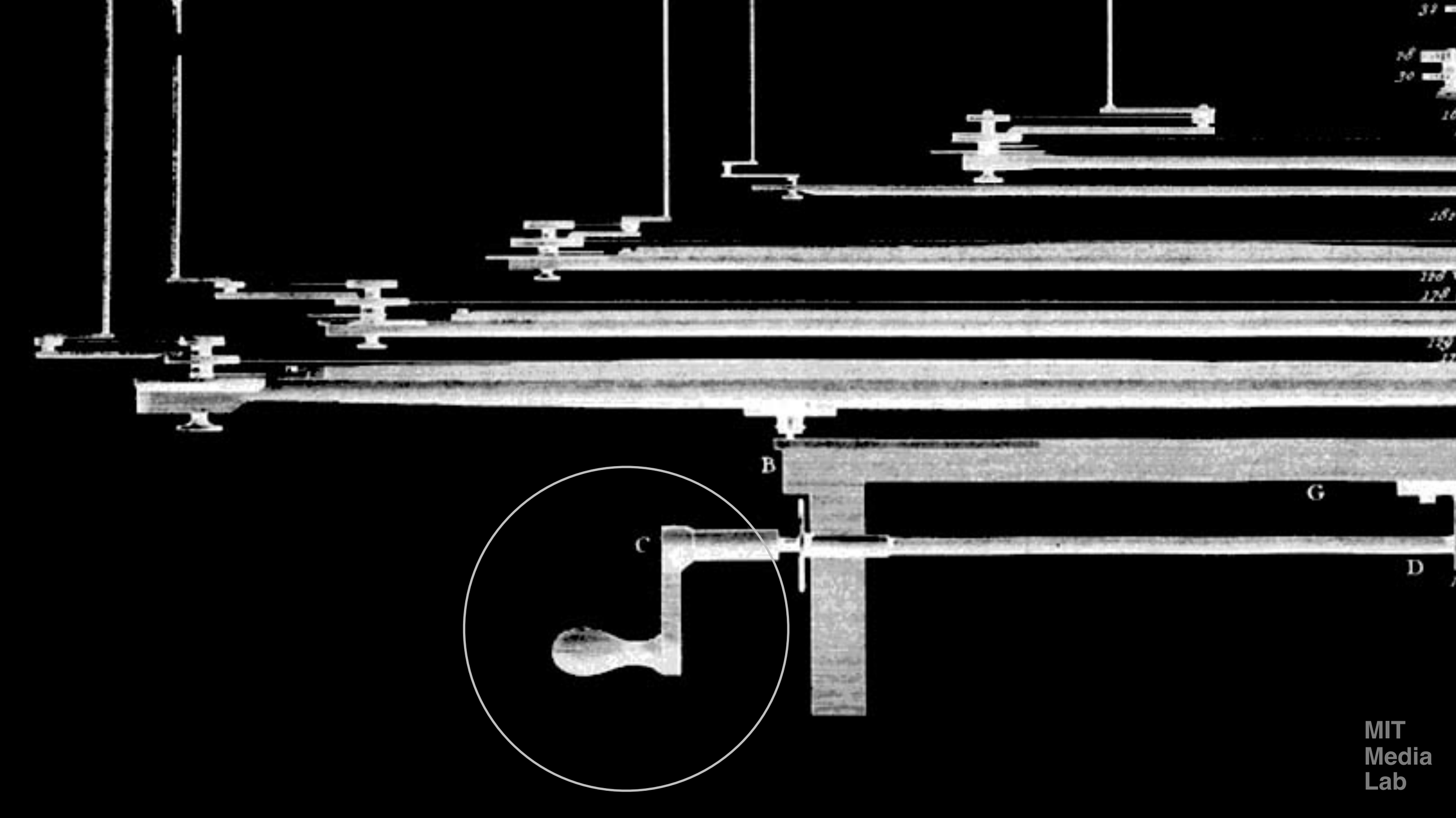
http://en.wikipedia.org/wiki/File:Grand_orrery_in_Putnam_Gallery,_2009-11-24.jpg

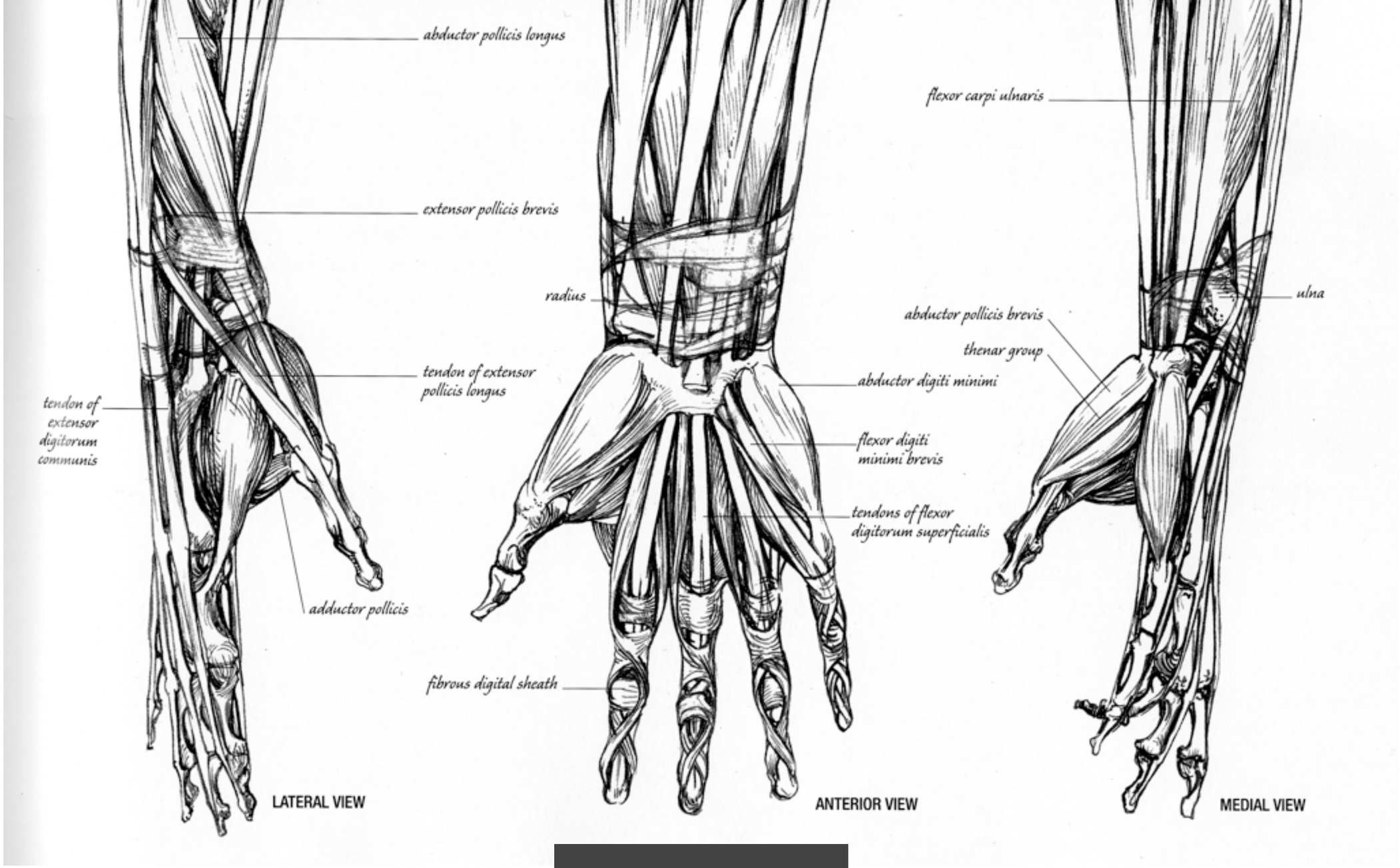
Orrery

Tangible Representation of Knowledge



MIT Media Lab




abductor pollicis longus
extensor pollicis brevis
tendon of extensor pollicis longus
tendon of extensor digitorum communis
adductor pollicis
LATERAL VIEW
radius
fibrous digital sheath
abductor digiti minimi
flexor digiti minimi brevis
tendons of flexor digitorum superficialis
ANTERIOR VIEW
flexor carpi ulnaris
ulna
abductor pollicis brevis
thenar group
MEDIAL VIEW

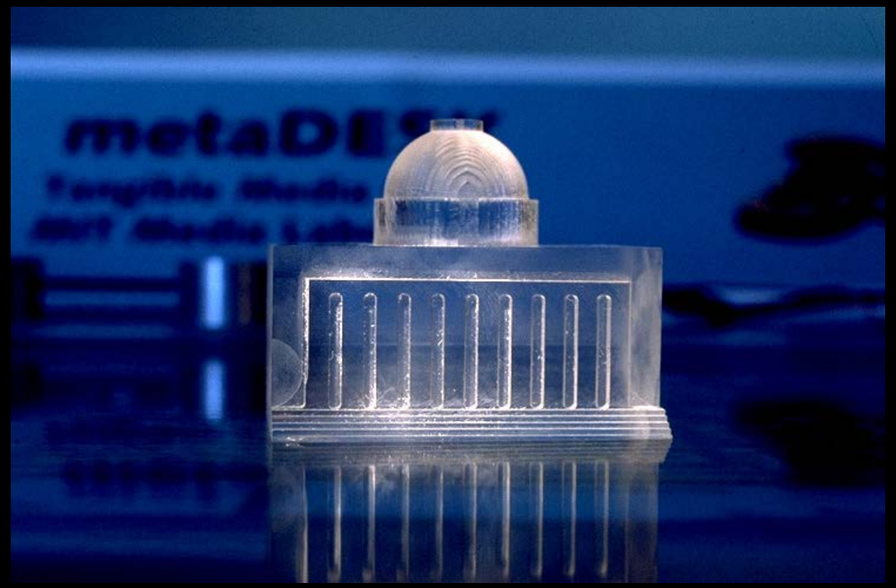
hands

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


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

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Tangible Media Group
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{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 center 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, transBOARD and ambientROOM – to identify underlying research issues.

Keywords
tangible user interface, ambient media, graspable user interface, augmented reality, ubiquitous computing, center 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 can find these beautiful artifacts made of coal 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 affordances of these historical scientific instruments, many 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 must have developed rich languages and cultures which valued haptic interaction with real physical objects. Alas, 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 the 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 in HCI.

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

Figure 1: Sketches made in Collection of Historical scientific instruments at Harvard University

We are now almost constantly "wired" so that we can be here (physical space) and there (cyberspace) simultaneously [14]. Streams of bits flow across the seamless seas of cyberspace, through a myriad of rectangular screens into the physical world as photon beams. However, the interactions between people and cyberspace are now largely confined to traditional GUI (Graphical User Interface)-based boxes sitting on desktops or laptops. The interactions 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., scribbling 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].

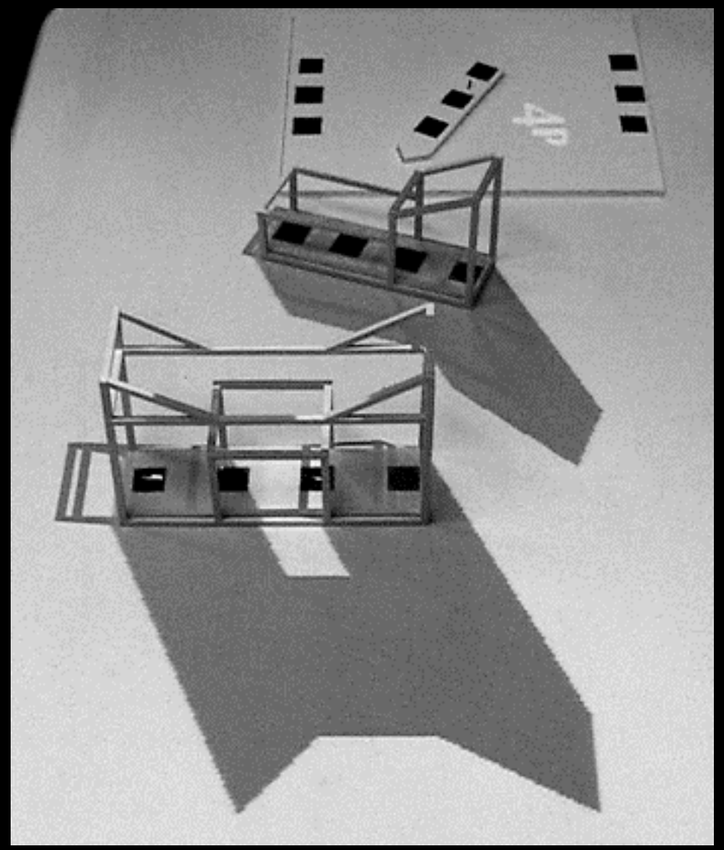
Outline of This Paper
To look towards the future of HCI, this paper will present our vision of Tangible Bits and introduce design projects including the metaDESK, transBOARD and ambientROOM systems to illustrate our key concepts. This paper is not intended to propose a solution to any one single problem. 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 simulates a desktop on a flat mapped

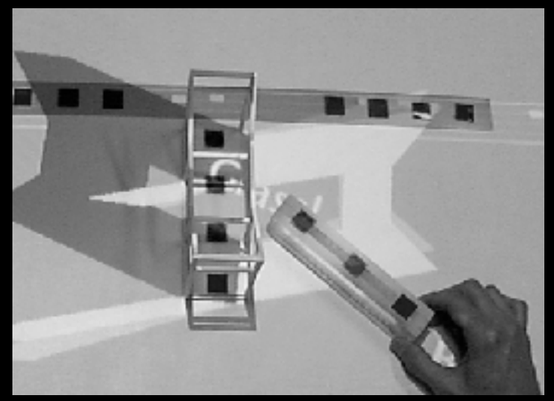
Urp:

Urban Planning Workbench

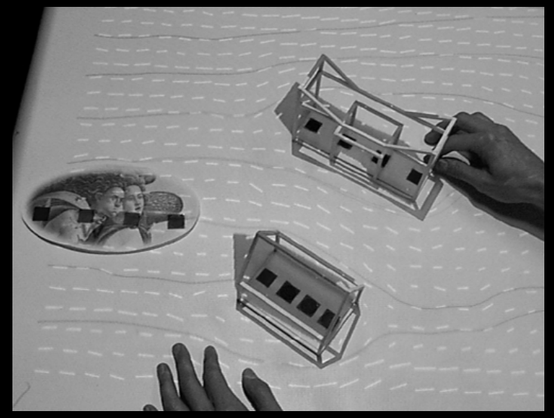
John Underkoffler and Hiroshi Ishii, 1997 - 1999



digital shadows



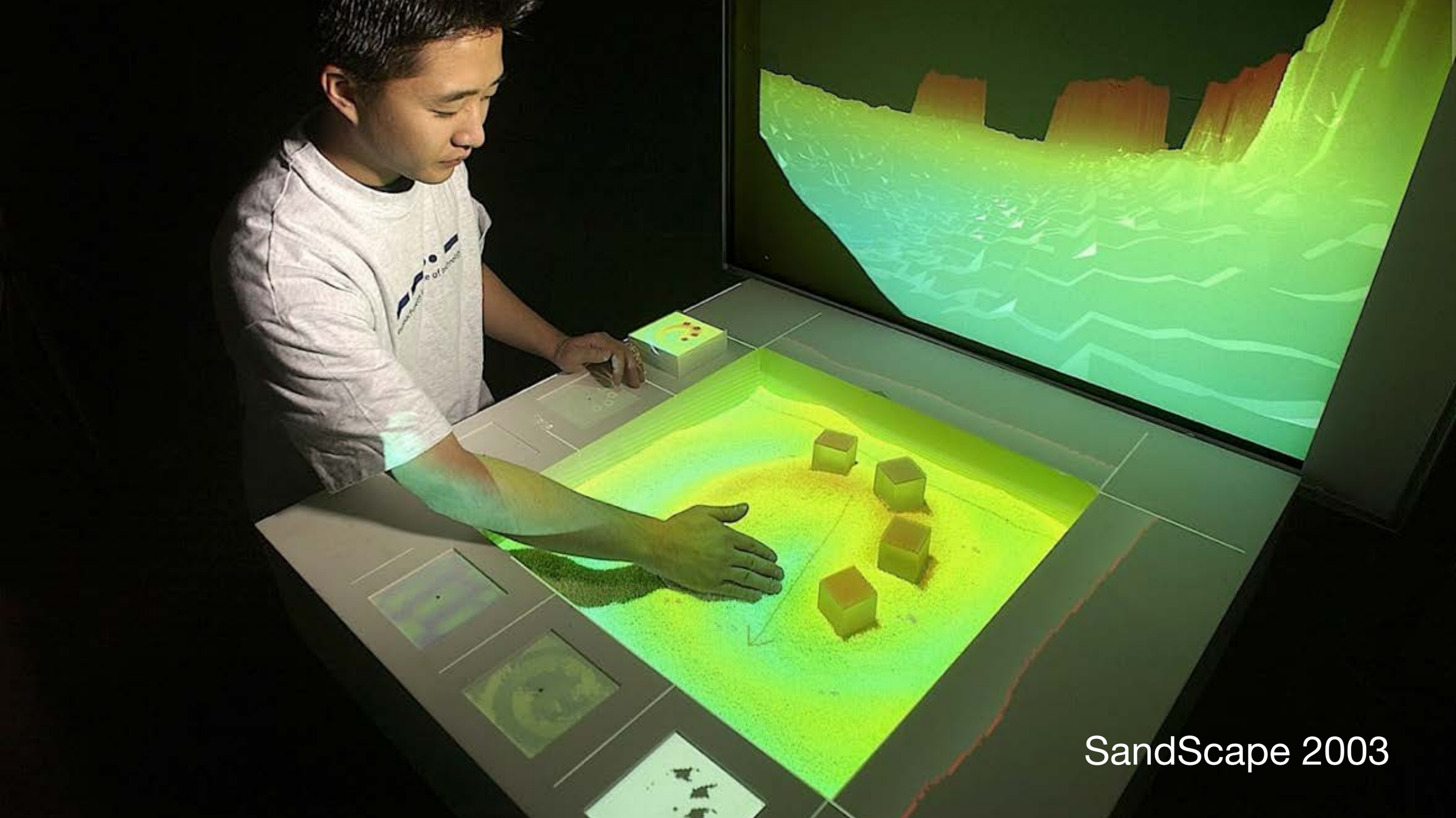
light reflections



wind

Illuminating Clay 2002

SandScape 2003



SandScape 2003

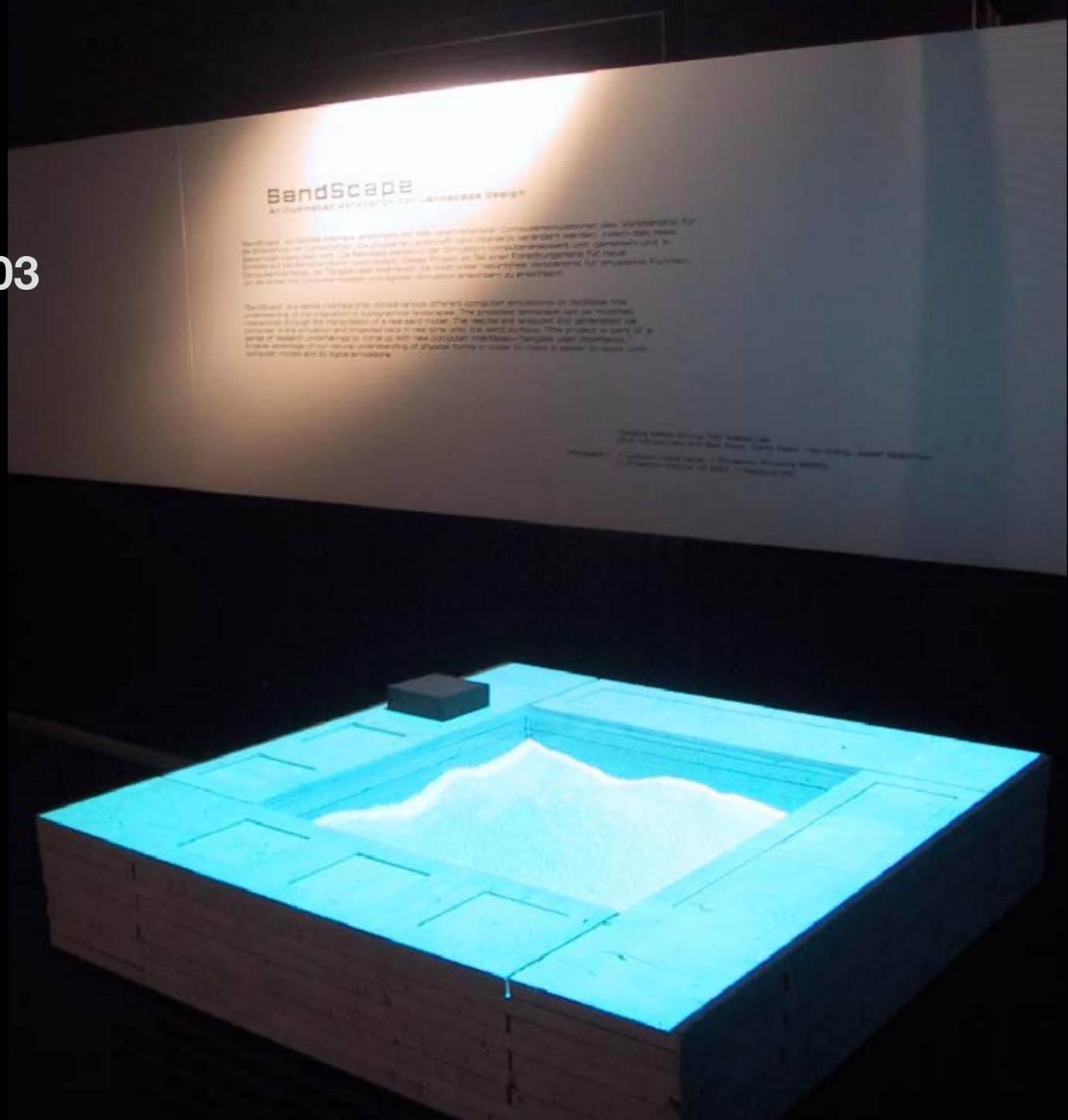
SandScape

Ars Electronic Center 2003

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

Tangible Media Group

MIT Media Laboratory

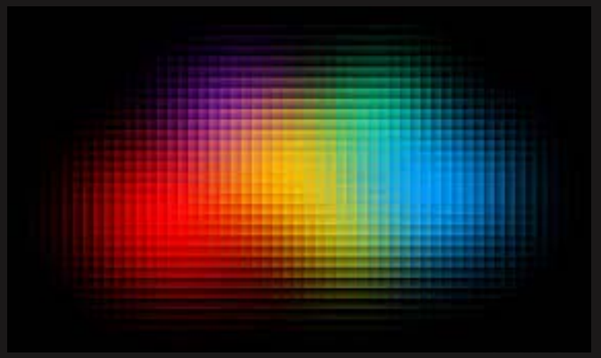



radical atoms
2012
tangible bits
1997
Radical Atoms
Dynamic Future Material that
Transform, Conform & Inform

Two Material Options Exist Today

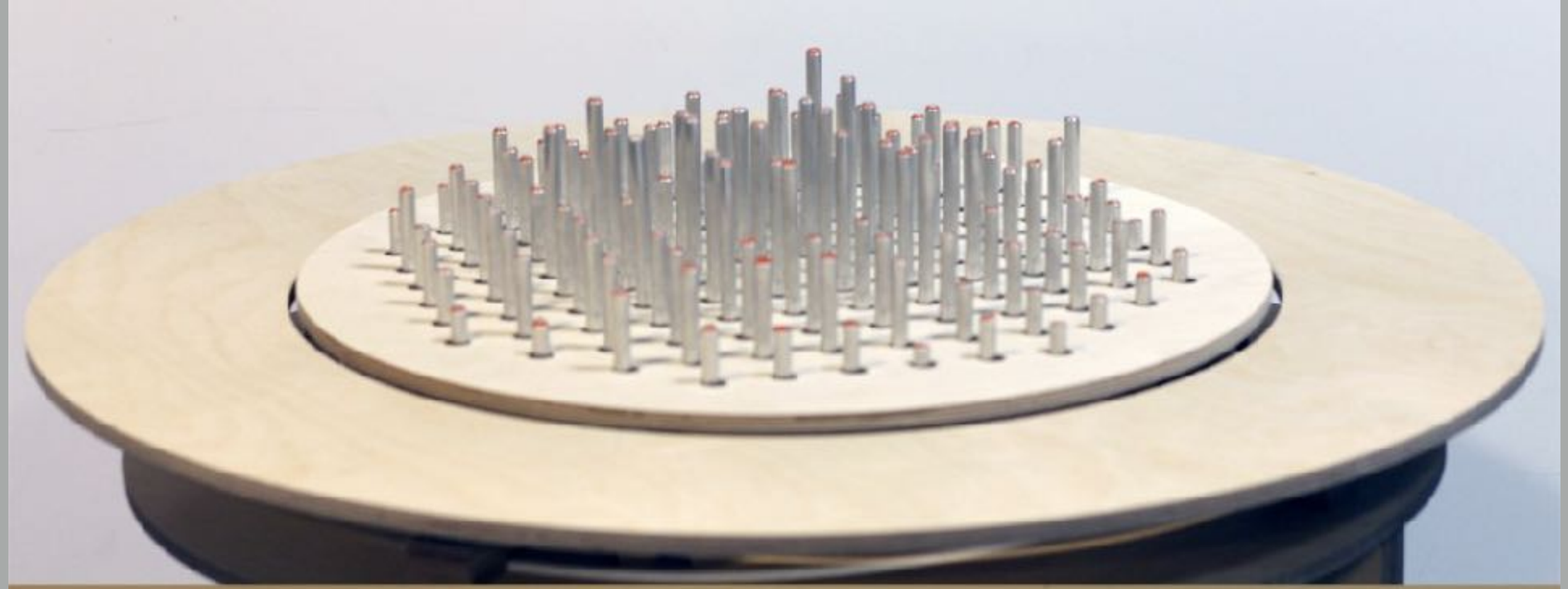
1. **Frozen Atoms:**
   inert, rigid, passive physical materials
   (incl. metal, wood, glass and plastic)

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



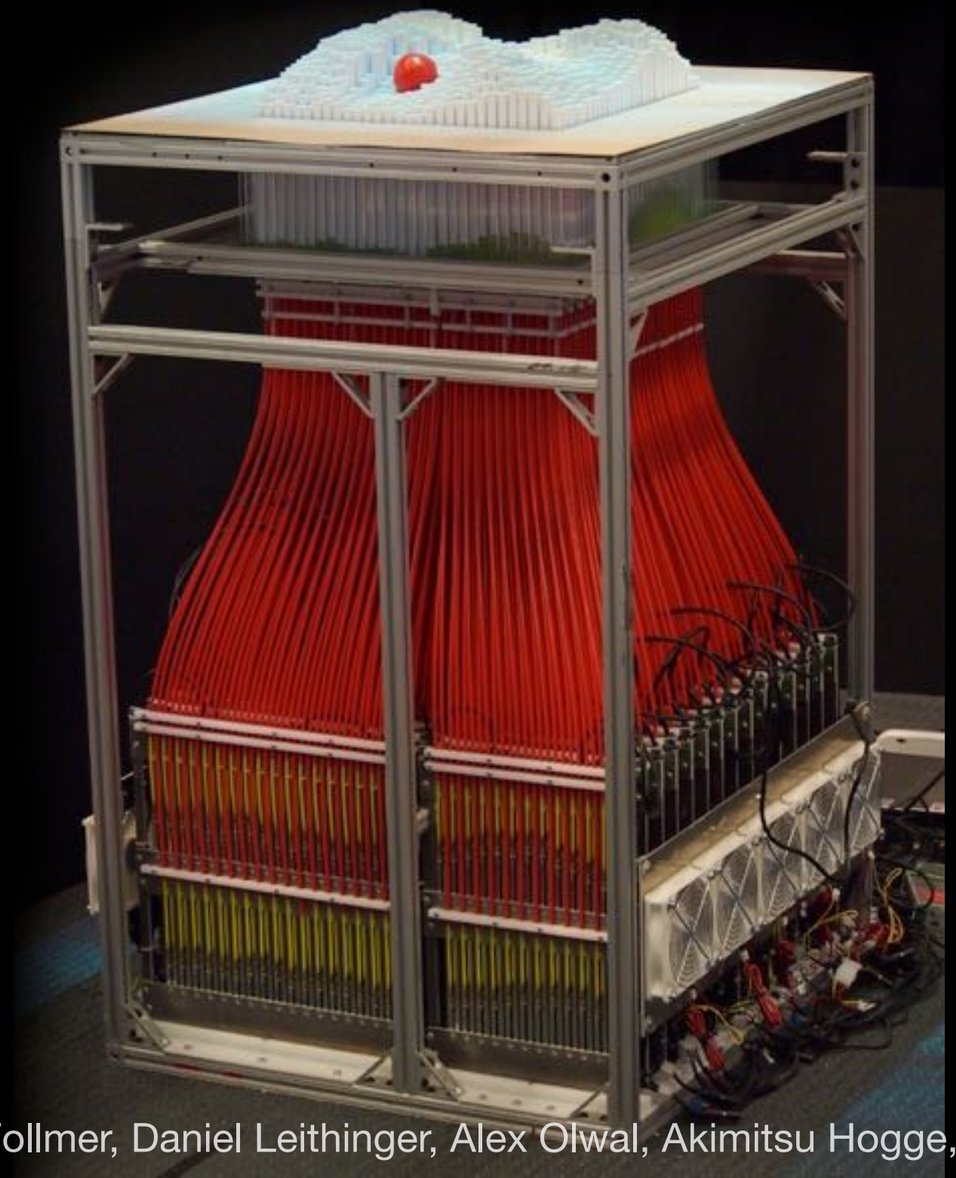
Relief: A 2.5D Shape Display

Daniel Leithinger & Hiroshi Ishii

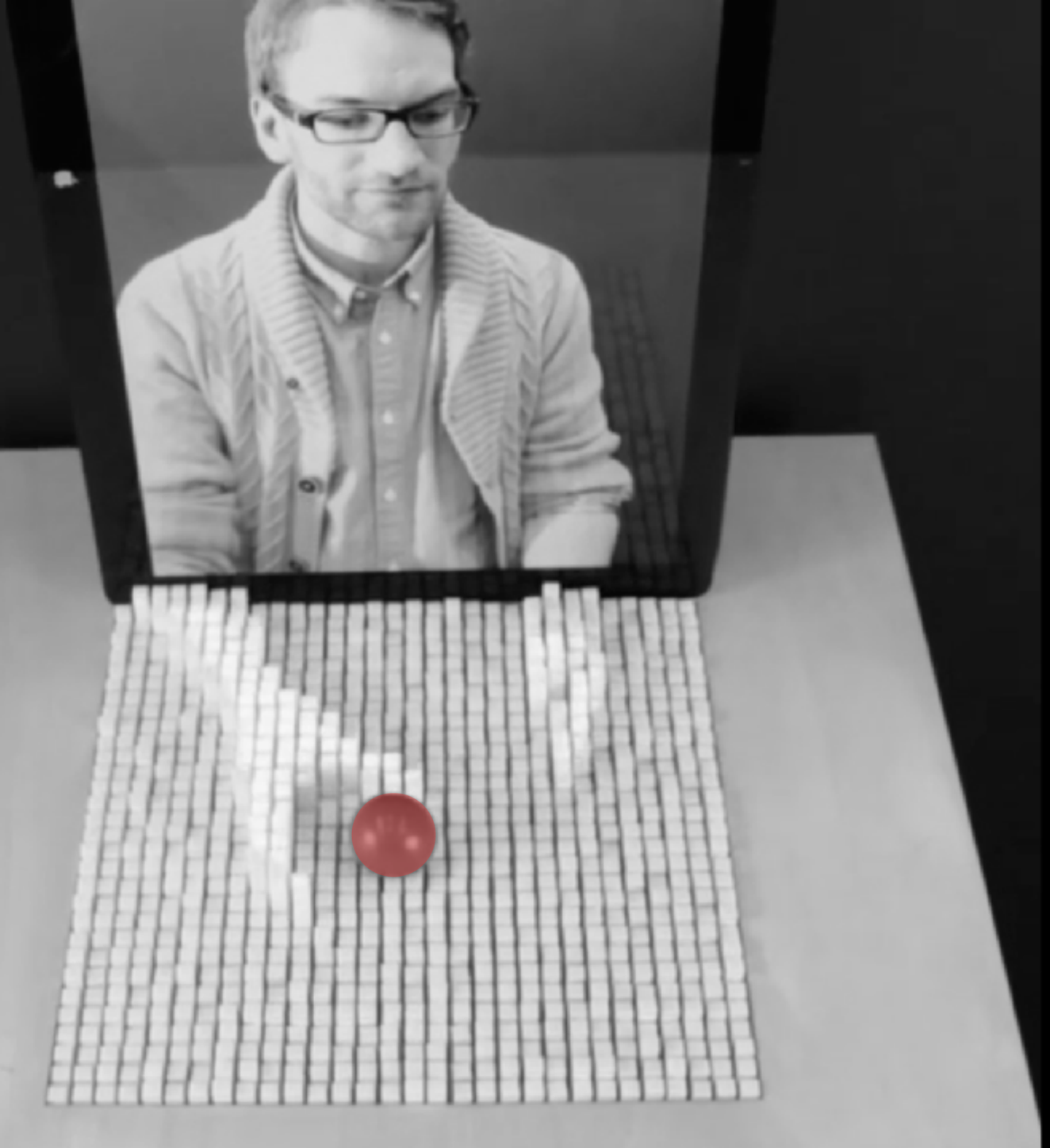
TimeScape
based on Relief

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

inFORM 2013

Daniel Leithinger, Sean Follmer, Alex Olwal, and Hiroshi Ishii

Cooper Hewitt Design Museum
inFORM Exhibition

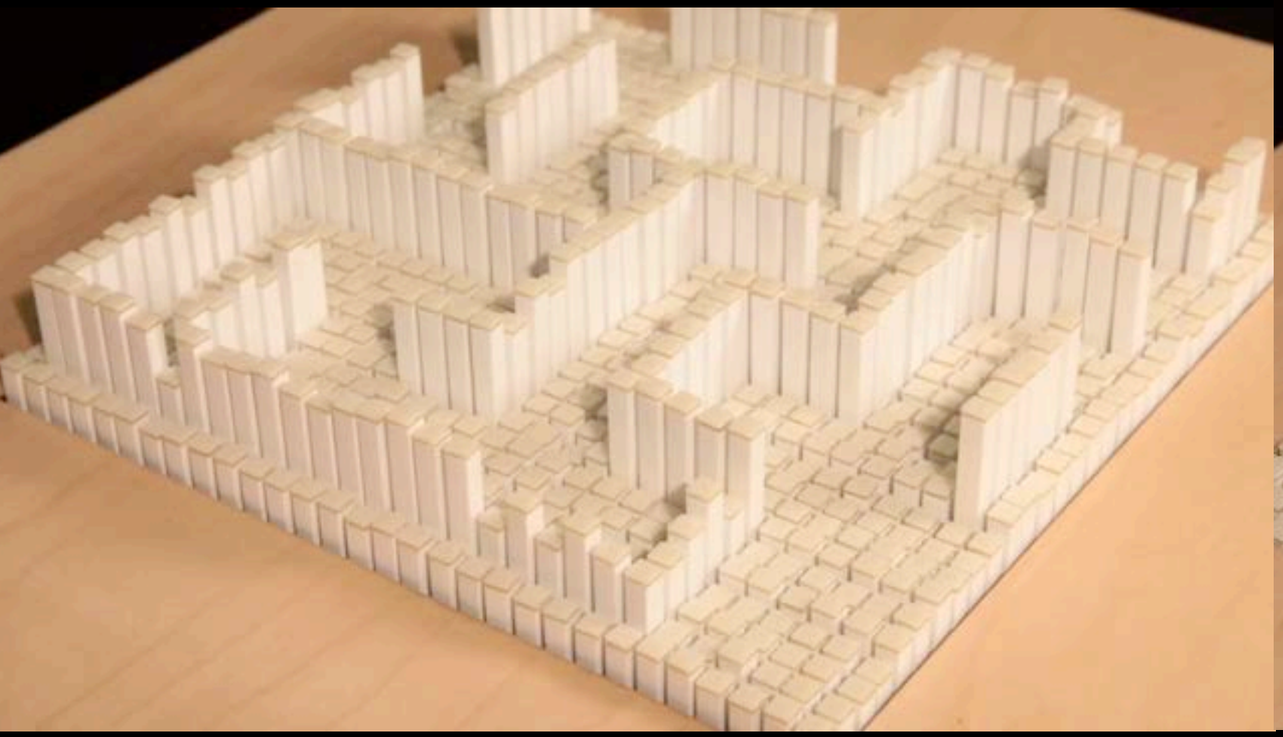
Dec. 2014 - May 2015, New York

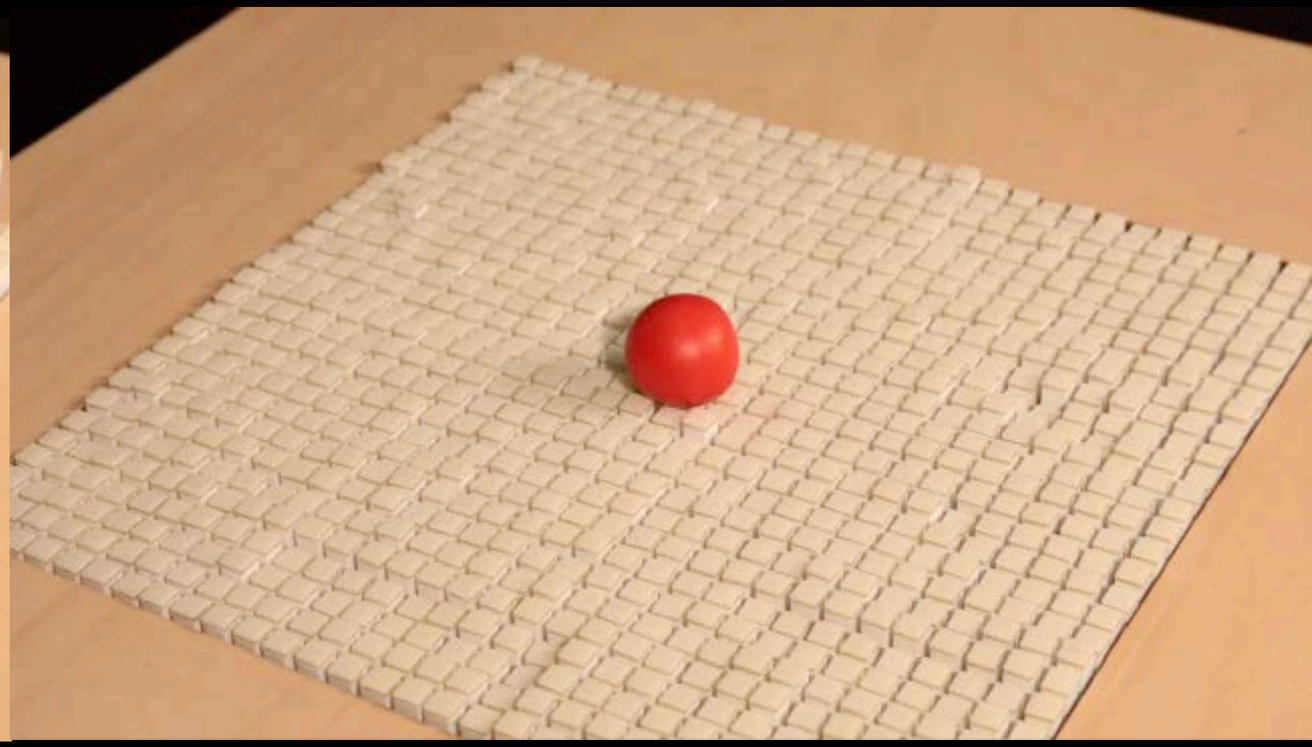
Daniel Leithinger,
Dr. Sean Follmer
Philipp Schoessler,
Jared Counts,
Ken Nakagaki,
David Doan,
Basheer Tome and
Prof. Hiroshi Ishii

Hiroshi Ishii
Tangible Media Group
MIT Media Lab

“ESCHER” Motion Design

by Philipp Schoessler in Nov. 2013





MIT
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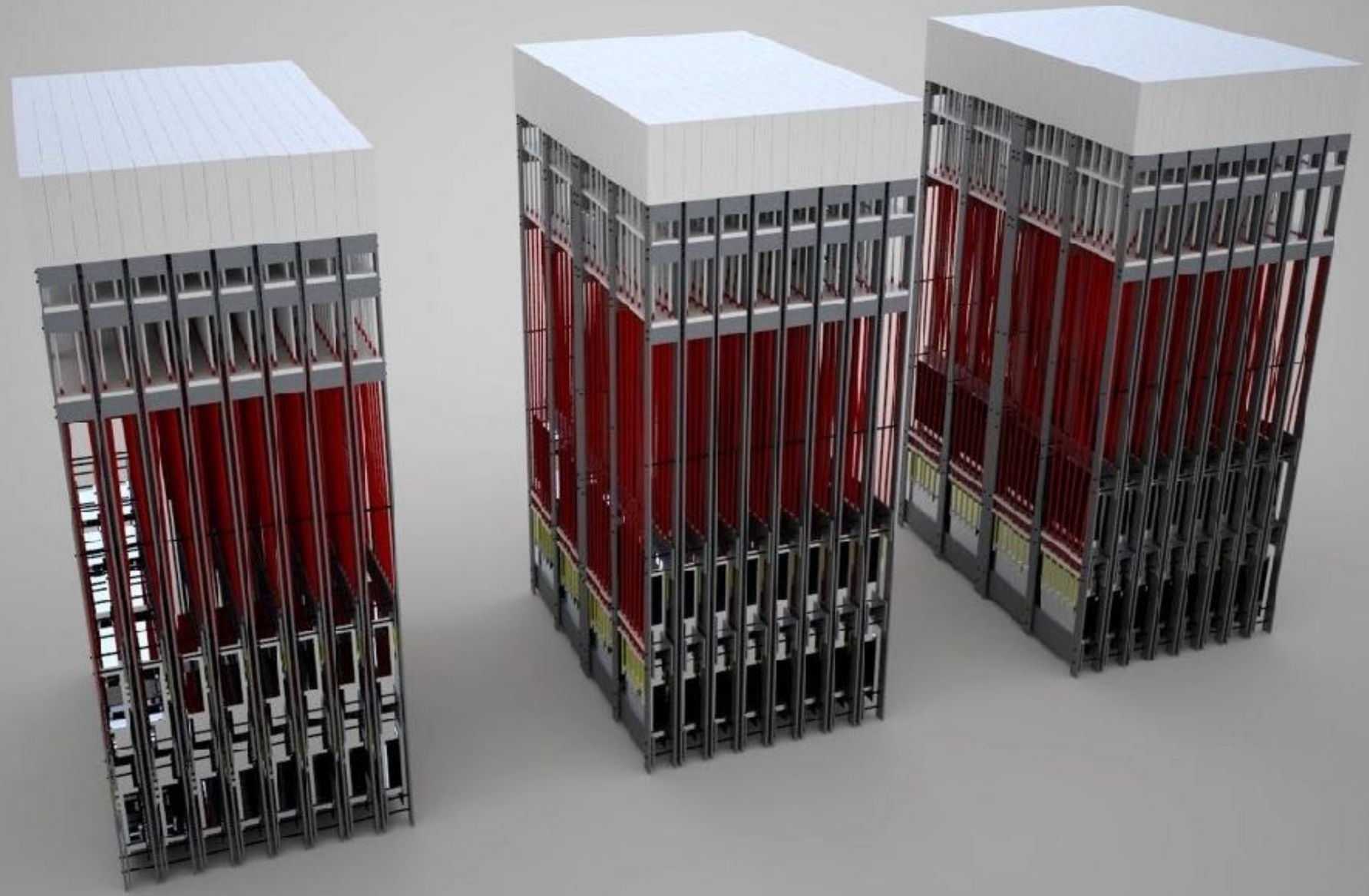
inFORM ENGINES

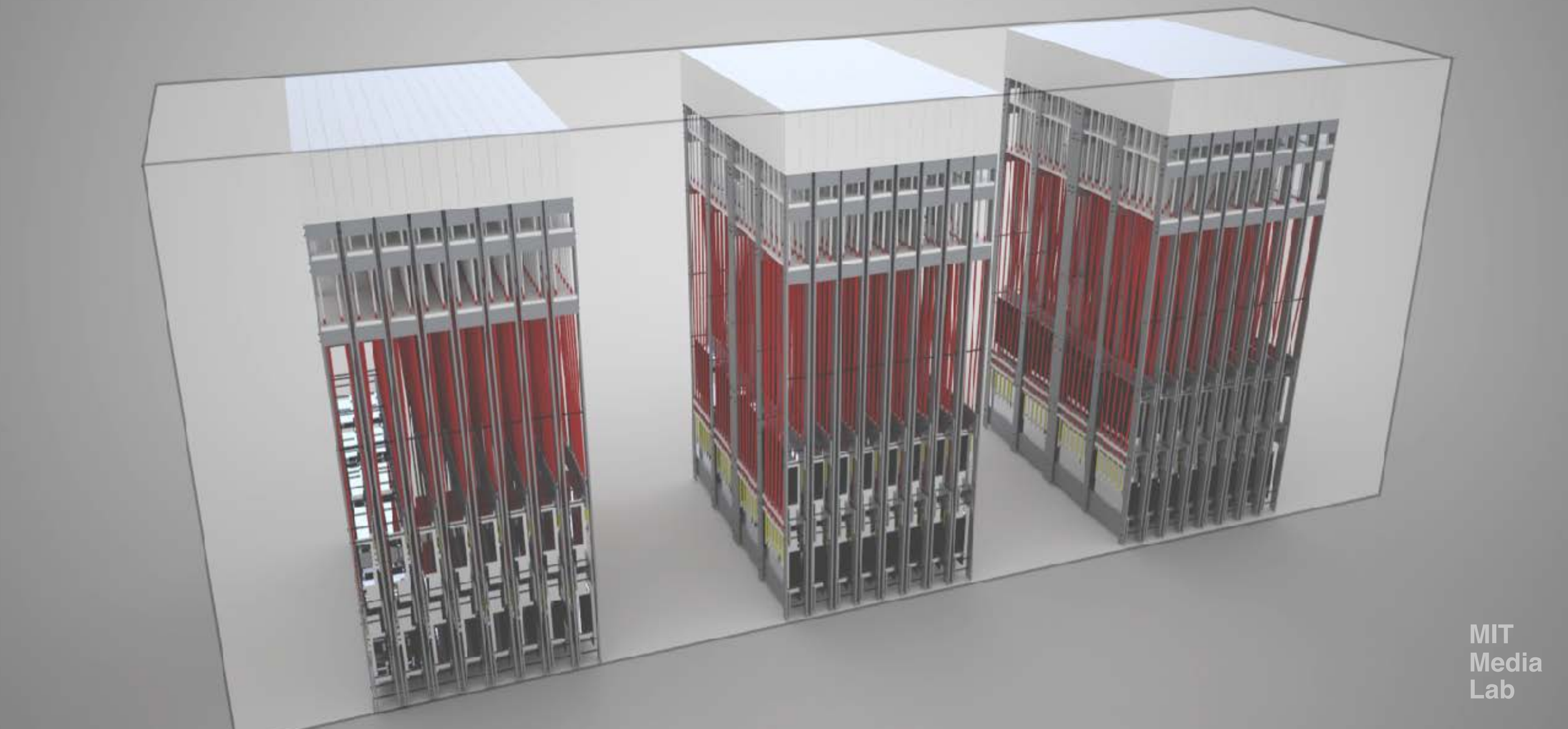
Designed by Daniel Leithinger & Sean Follmer, and Rendered by Amit Zoran



MIT
Media
Lab

inFORM ENGINES

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



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Triptych

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

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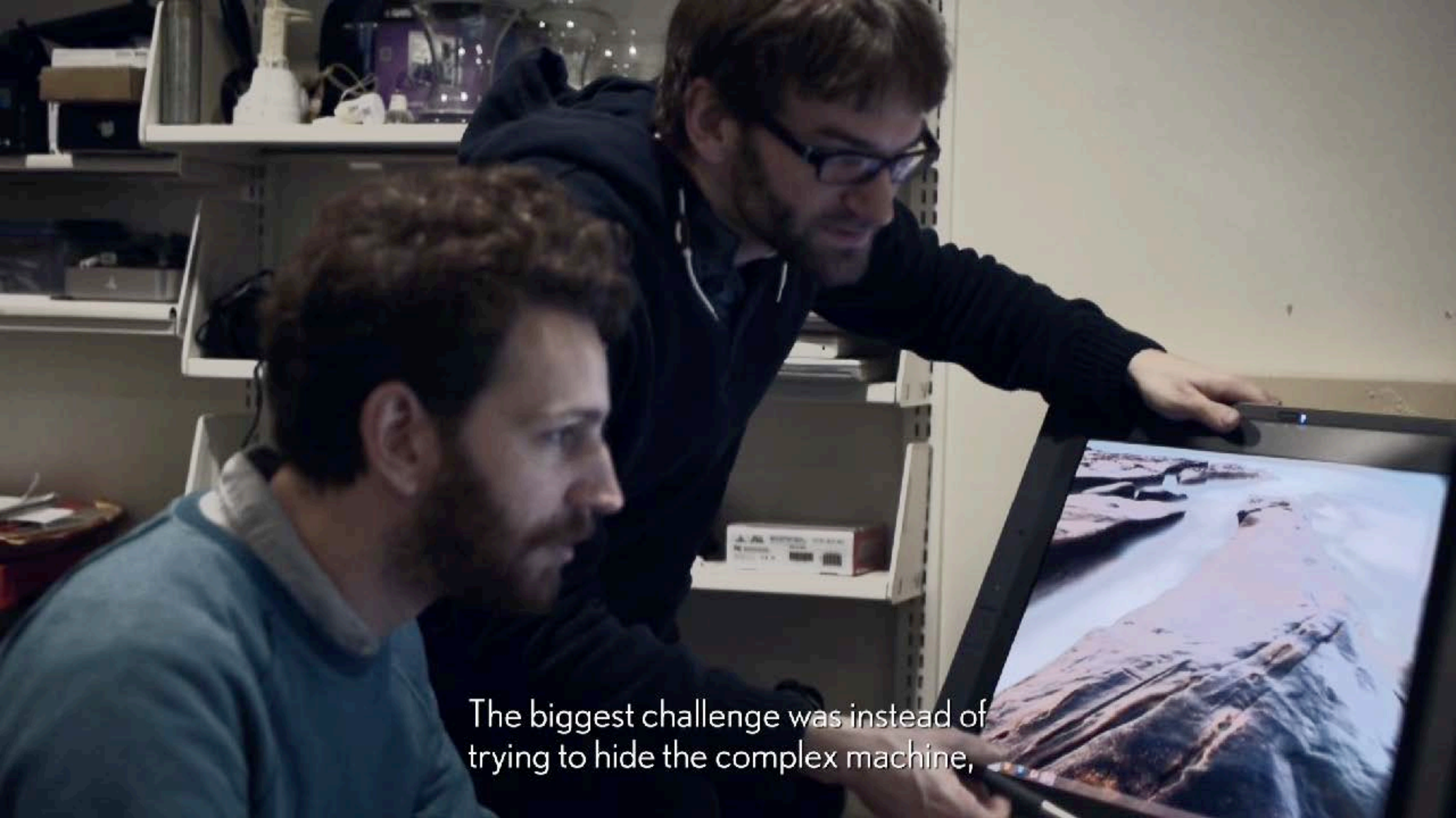

The biggest challenge was instead of
trying to hide the complex machine,

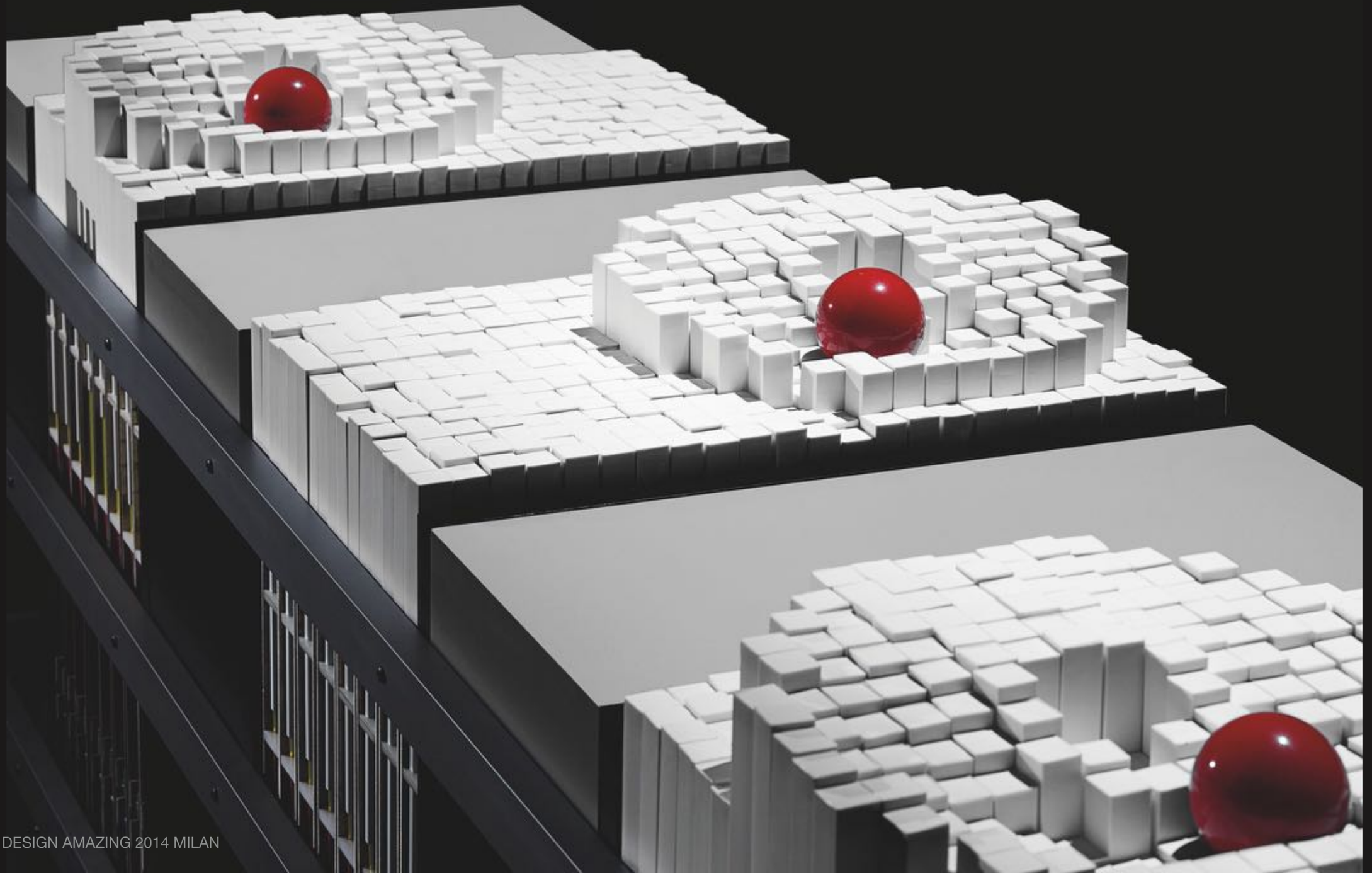

TRANSFORM
Tangible Media
MIT Media Lab
MIT
Media
Lab


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

MIT
Media
Lab

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

the team

Prof. Hiroshi Ishii
Concept Design

Daniel Leithinger
Engine Design

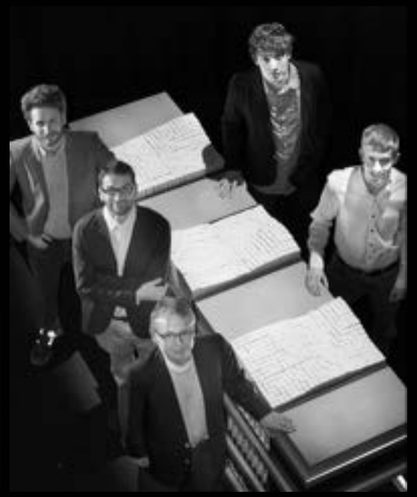
Sean Follmer
Engine Design

Amit Zoran
Product Design

Philipp Schoessler
Motion Design

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

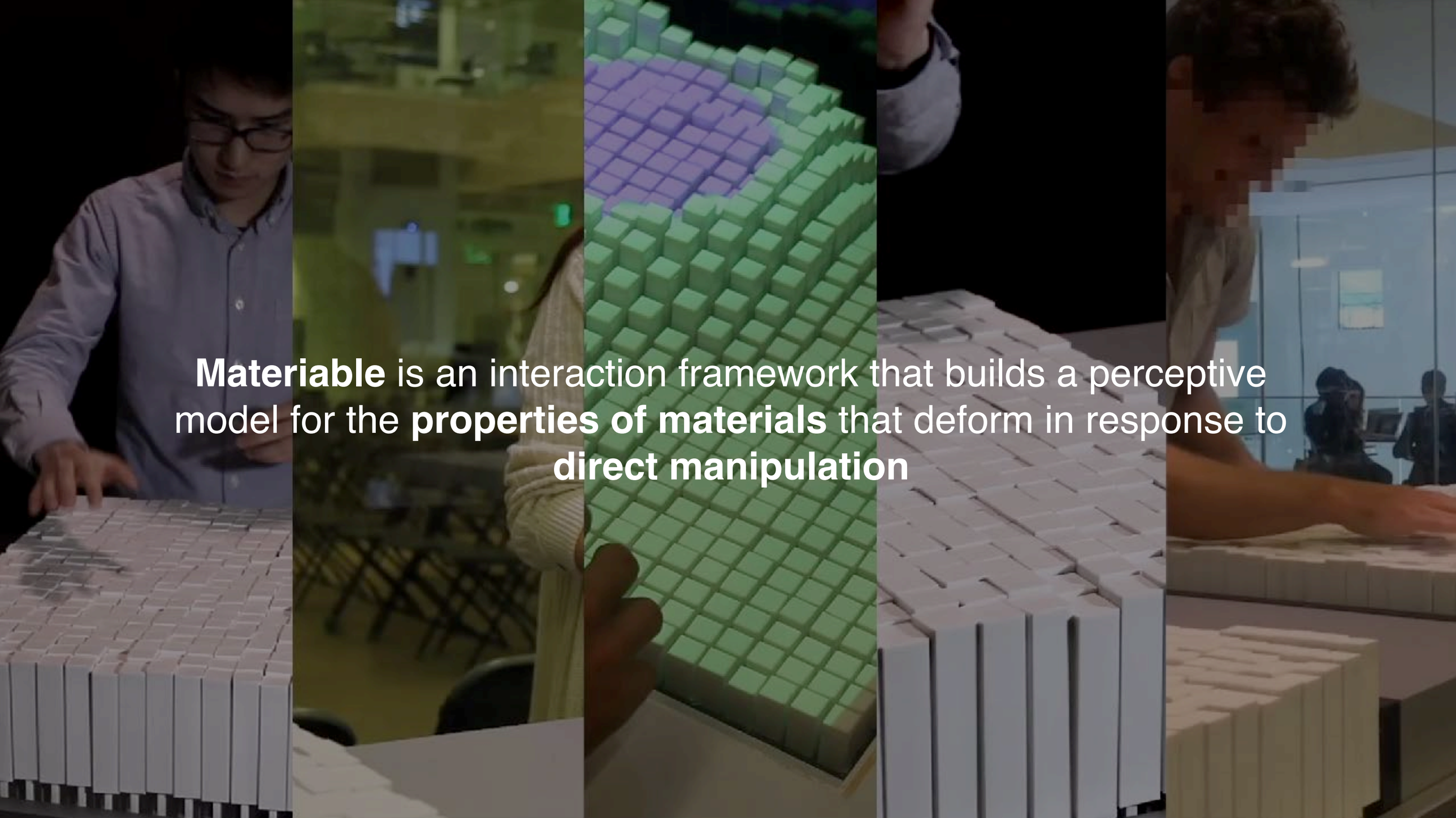
RENDERING DYNAMIC MATERIAL PROPERTIES IN RESPONSE TO DIRECT PHYSICAL TOUCH WITH SHAPE CHANGING INTERFACES

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

CHI 2016

MIT Media Lab

*Contributed Equally



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

FLEXIBILITY

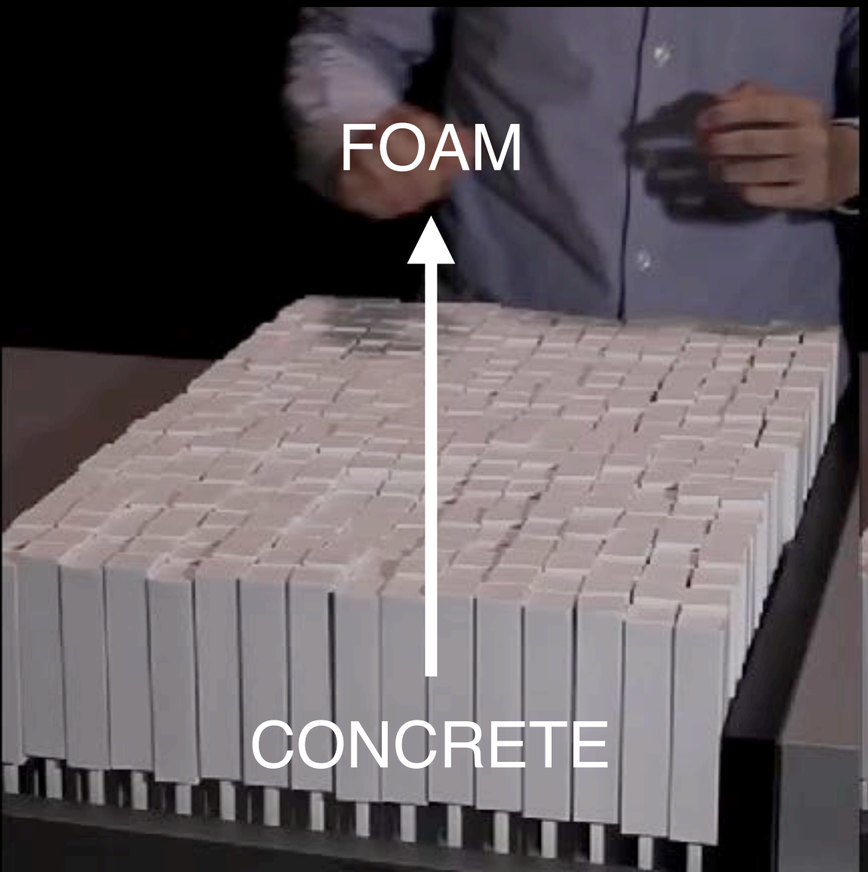
The extent to which a material can be **deformed** in response to an applied force

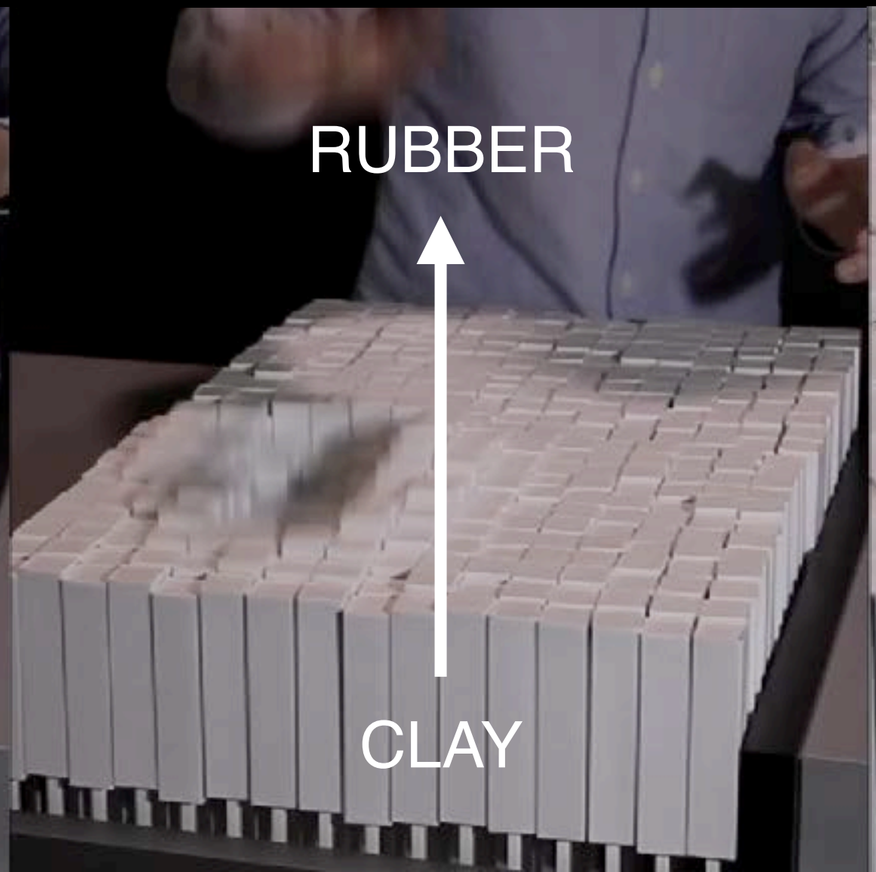
ELASTICITY

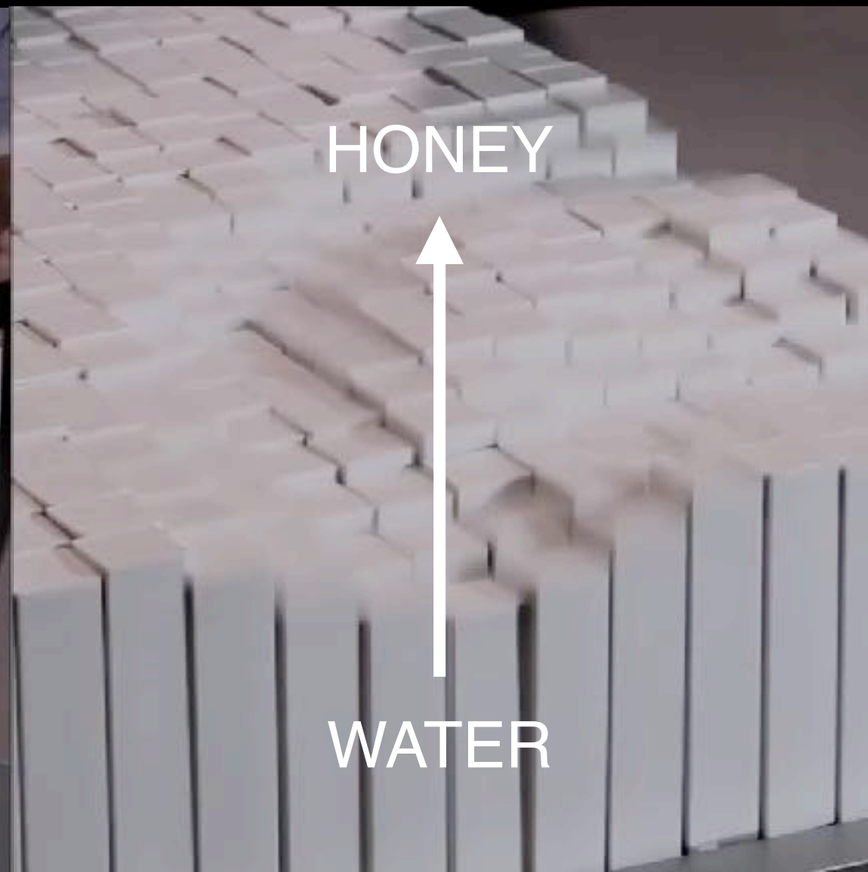
The ability for a material to **resist** an applied force and to **return** to its original shape

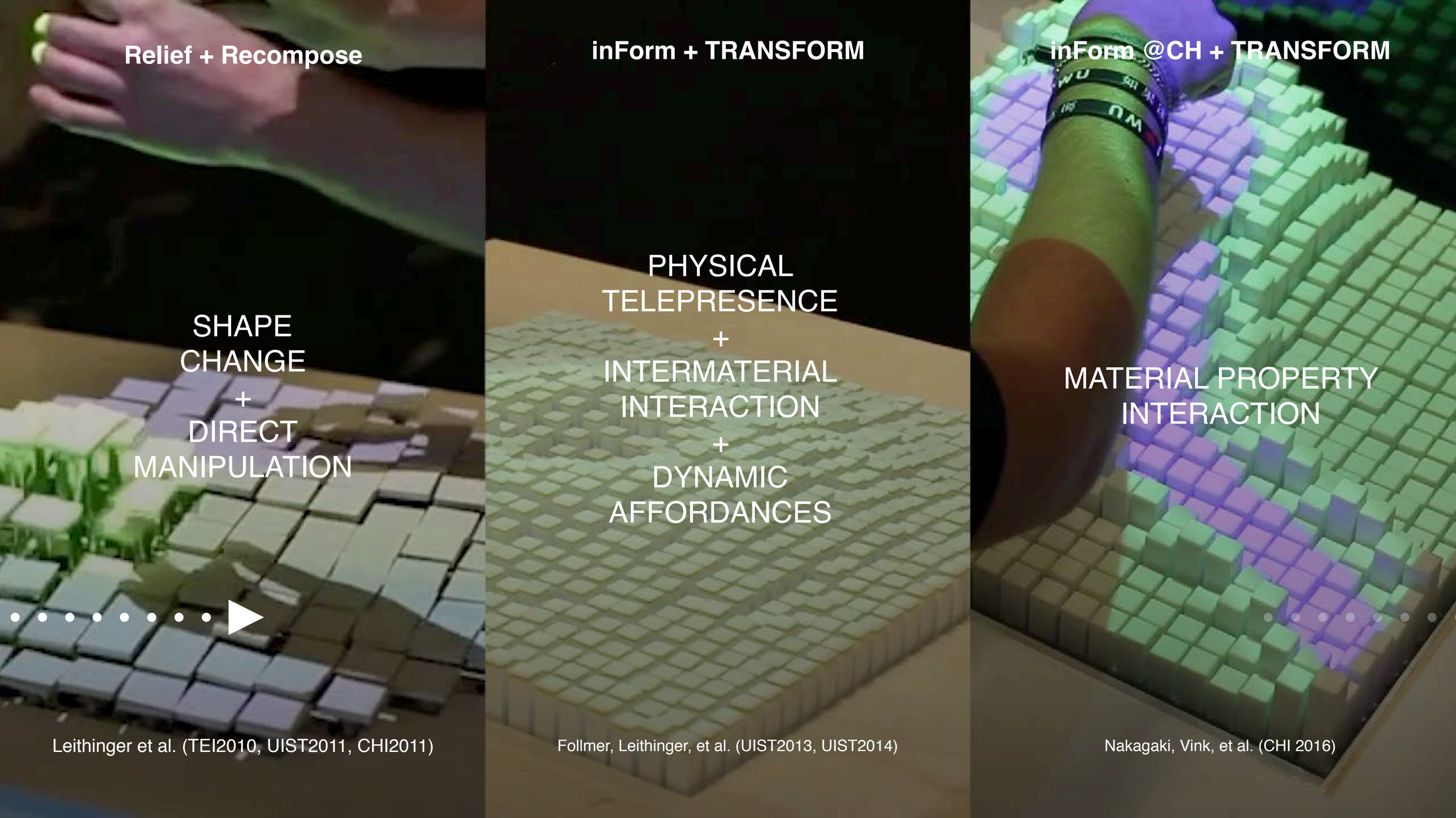
VISCOSITY

A measure of a fluids **resistance** to **gradual deformation** by shear stress or tensile stress



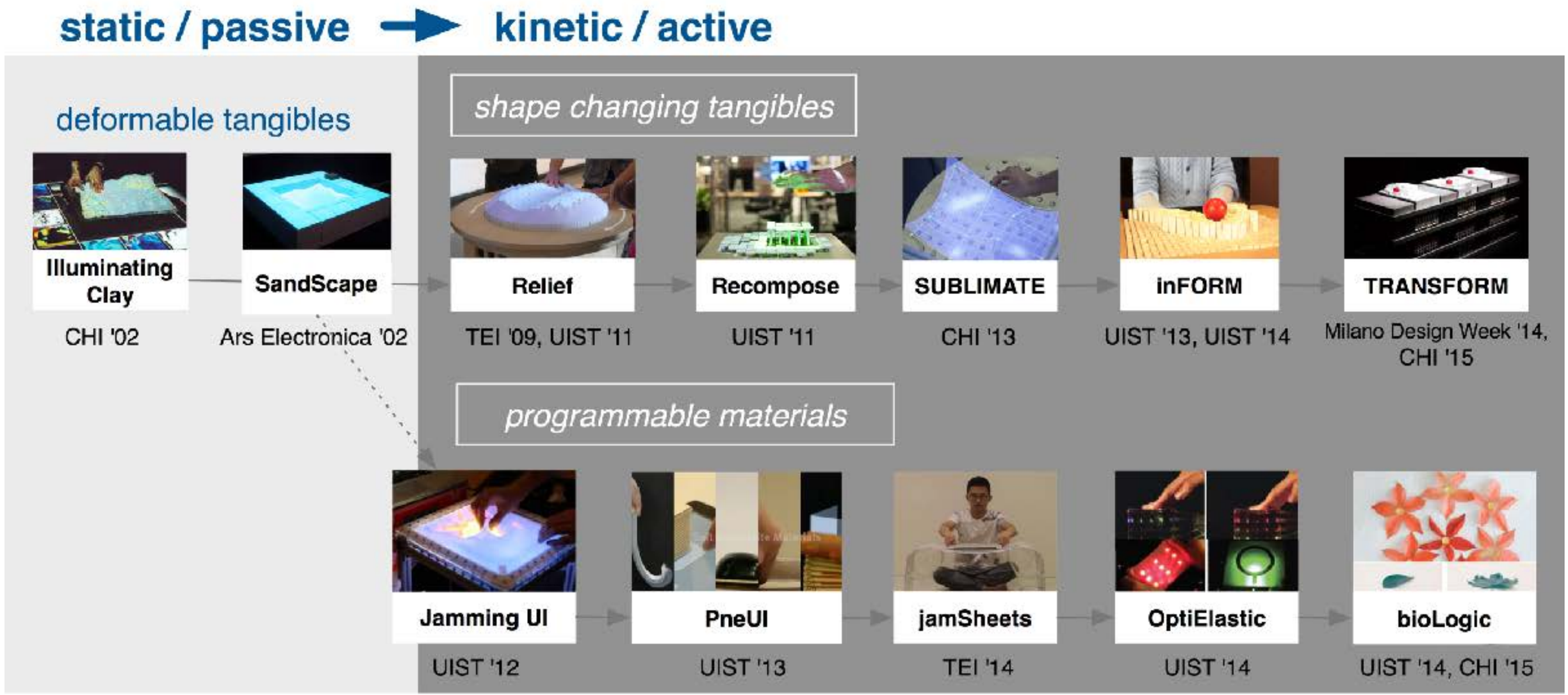





Relief + Recompose
SHAPE
CHANGE
+
DIRECT
MANIPULATION
Leithinger et al. (TEI2010, UIST2011, CHI2011)
inForm + TRANSFORM
PHYSICAL
TELEPRESENCE
+
INTERMATERIAL
INTERACTION
+
DYNAMIC
AFFORDANCES
Follmer, Leithinger, et al. (UIST2013, UIST2014)
inForm @CH + TRANSFORM
MATERIAL PROPERTY
INTERACTION
Nakagaki, Vink, et al. (CHI 2016)

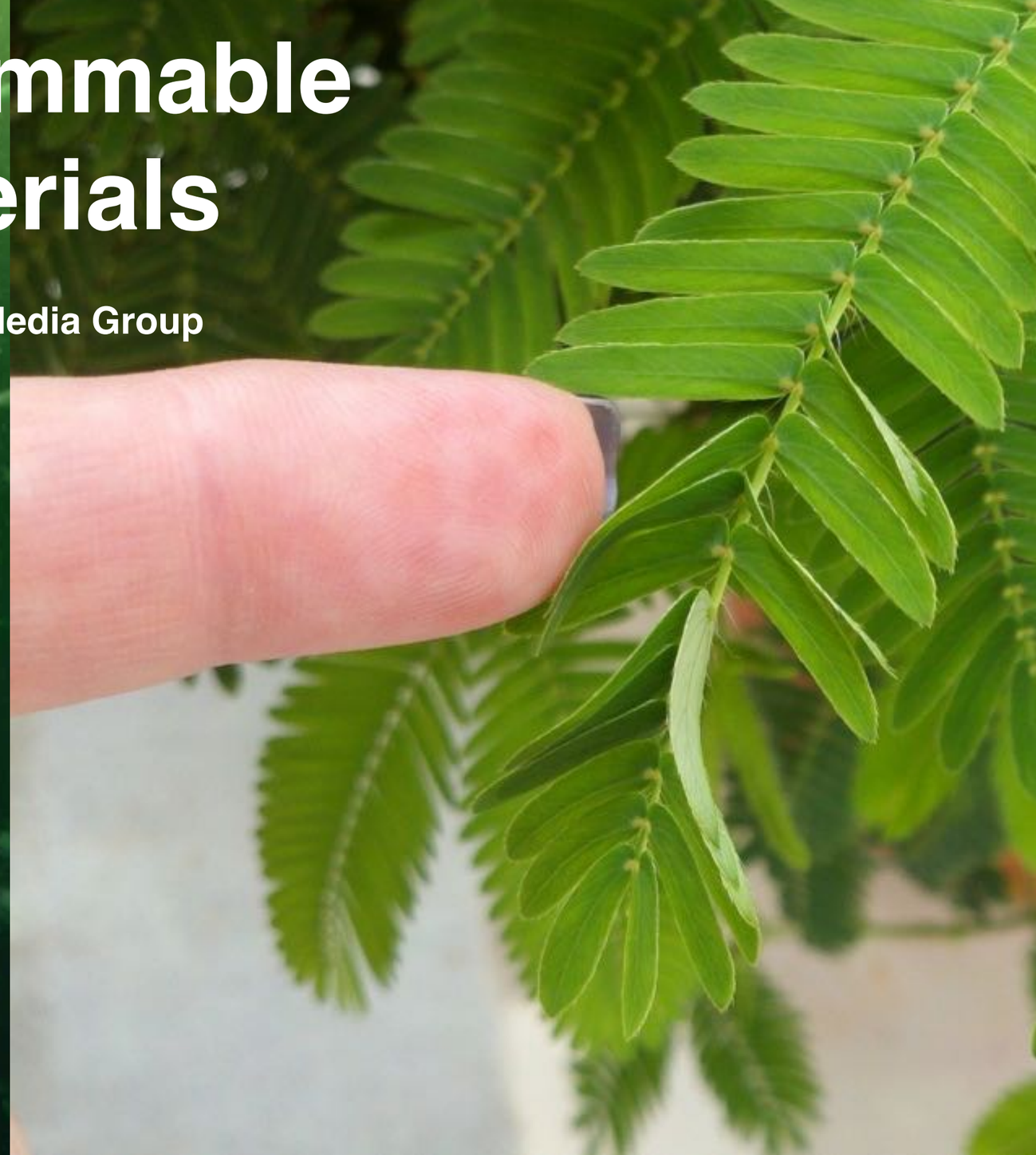

radical atoms
2012
tangible bits
1997
Radical Atoms
Dynamic Future Material that
Transform, Conform & Inform

Radical Atoms: Dynamic Shape Displays & Programmable Materials



Programmable Materials

Tangible Media Group



PROGRAMMABLE MATERIALS

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

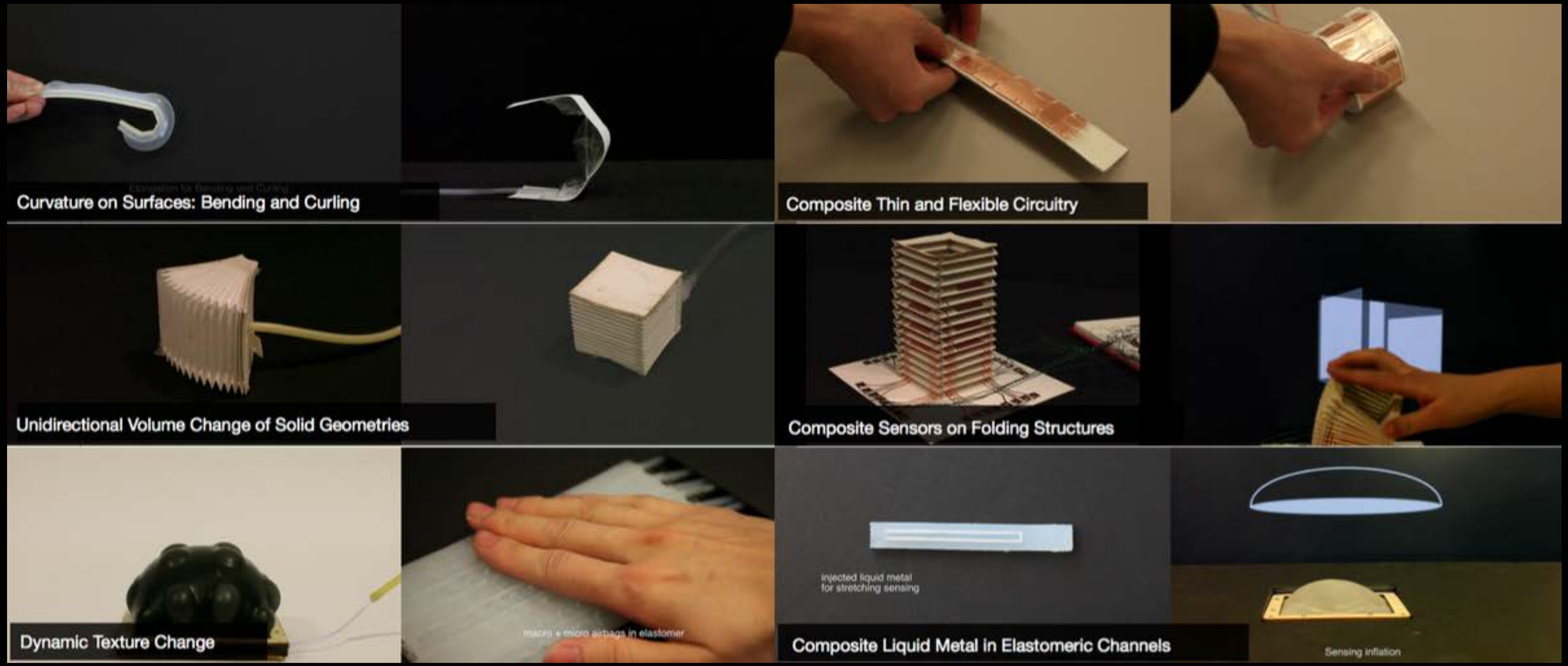
optiElastic
L. Yao, et al,
UIST(2014)

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

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

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

PneUI (2013): Programmable Materials (1)



Hiroshi Ishii
Tangible Media Group
MIT Media Lab

PneUI Team

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

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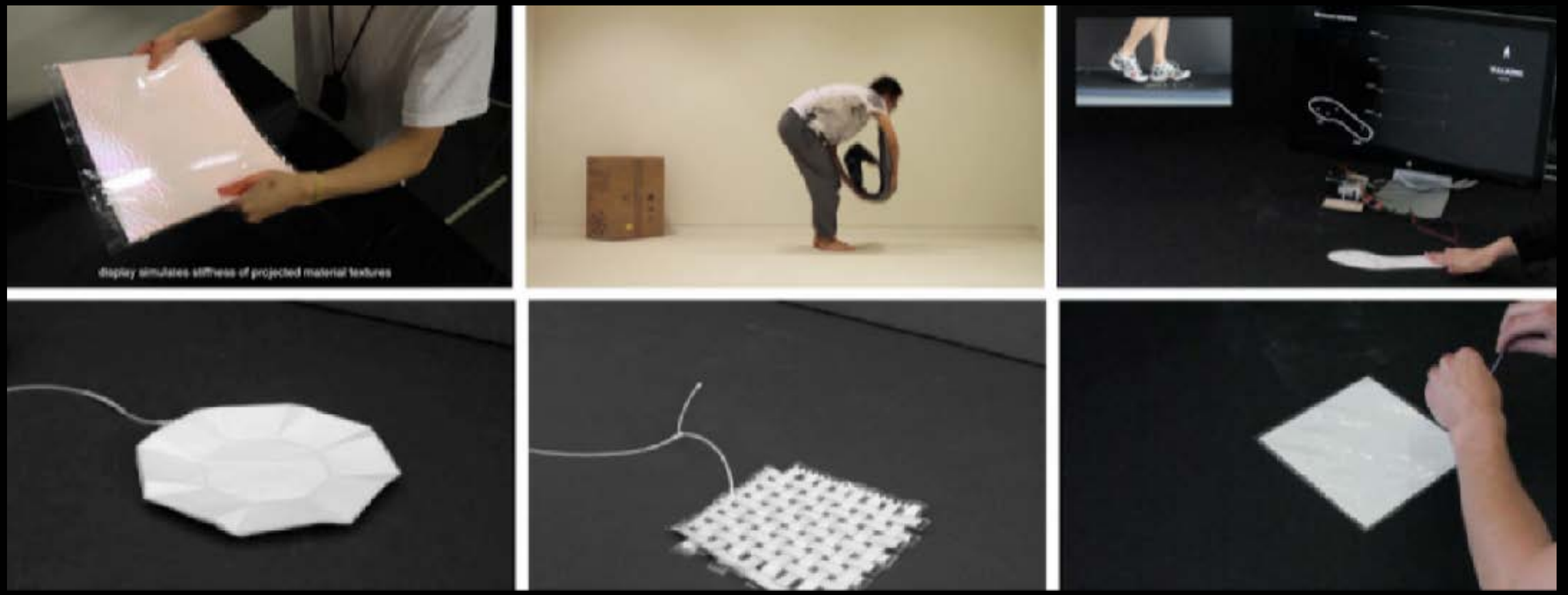
MIT Media Lab

jamSheets (TEI 2014)

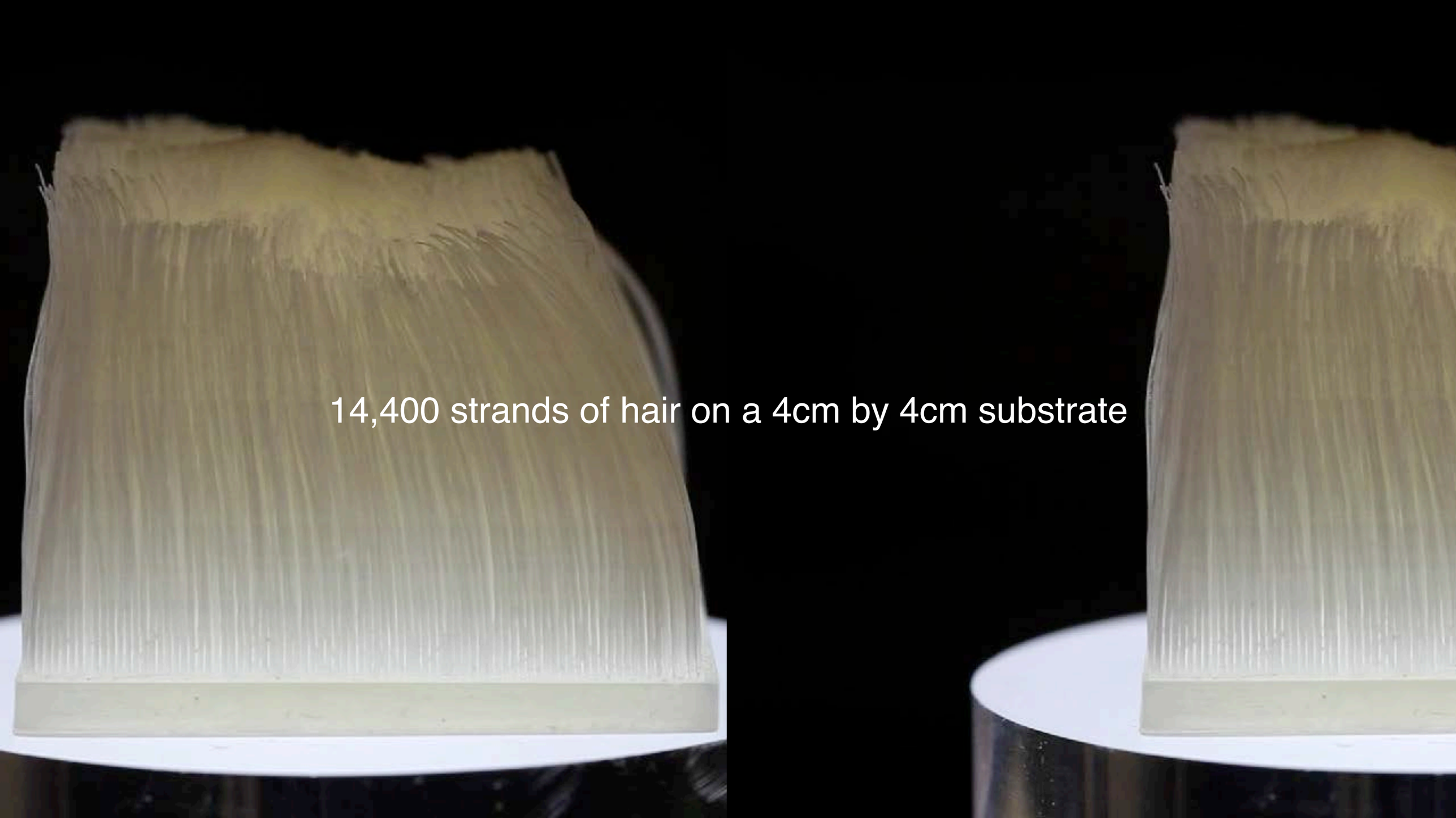


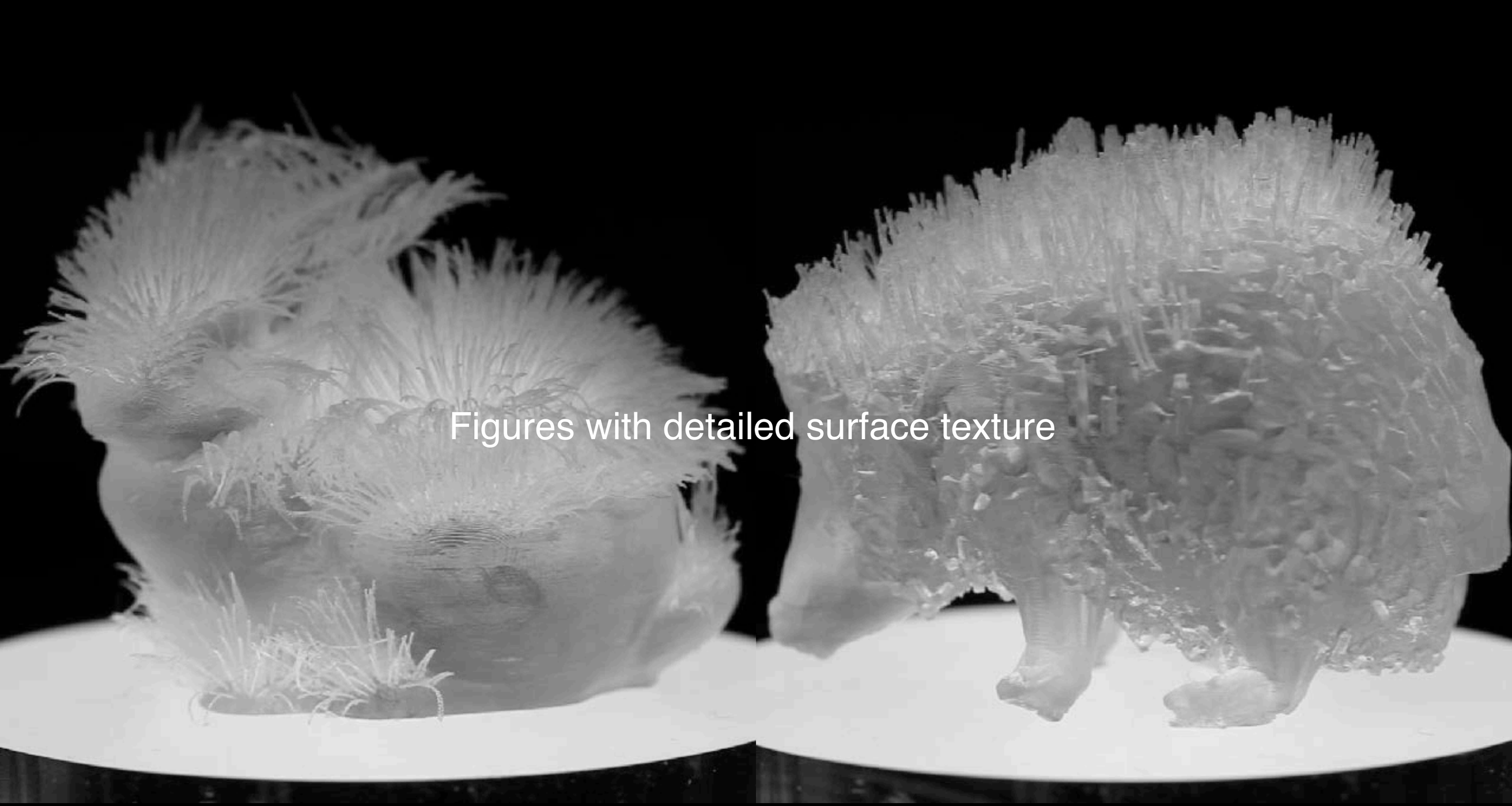
Hiroshi Ishii
Tangible Media Group
MIT Media Lab

Cilllia - 3D Printed Functional Hair Structure

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

Cilllia 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.

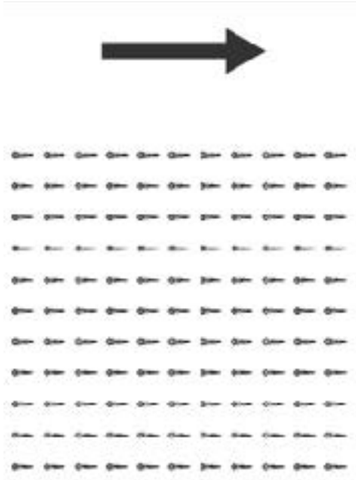

14,400 strands of hair on a 4cm by 4cm substrate

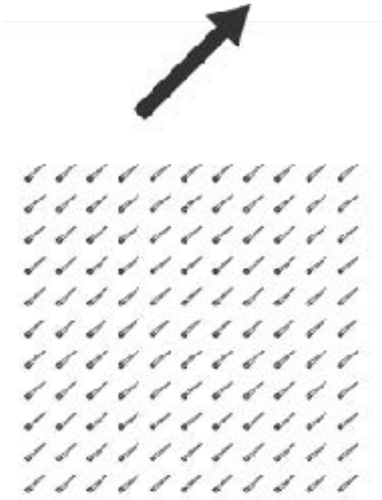

Figures with detailed surface texture

surface with mechanical adhesion

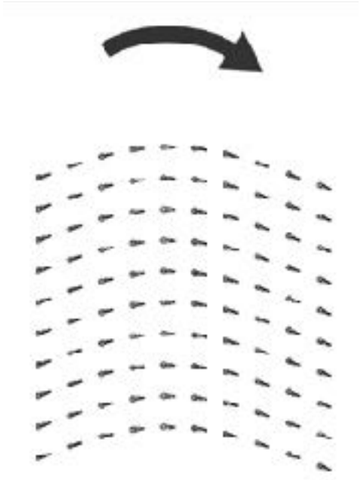
Moving Direction Control

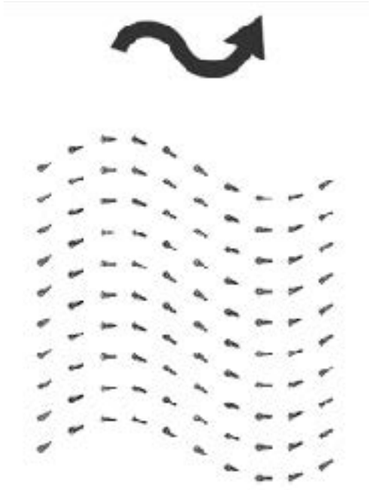
Linear

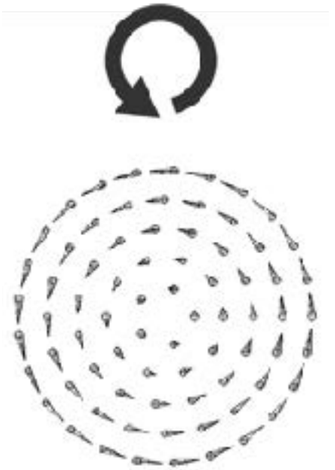


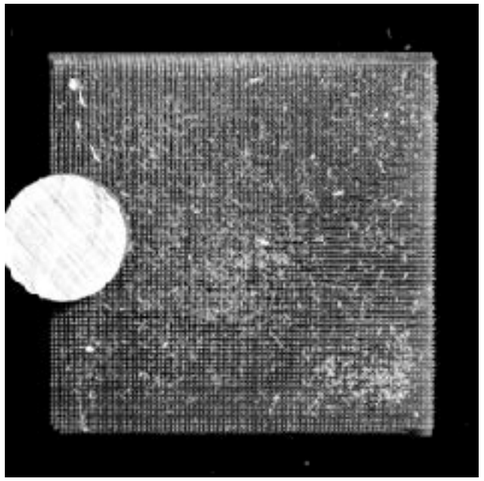


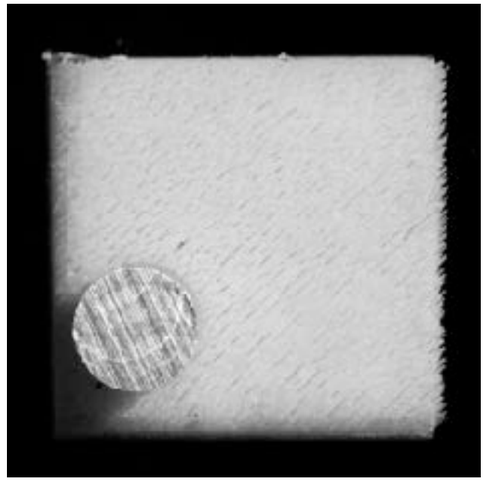
Curved

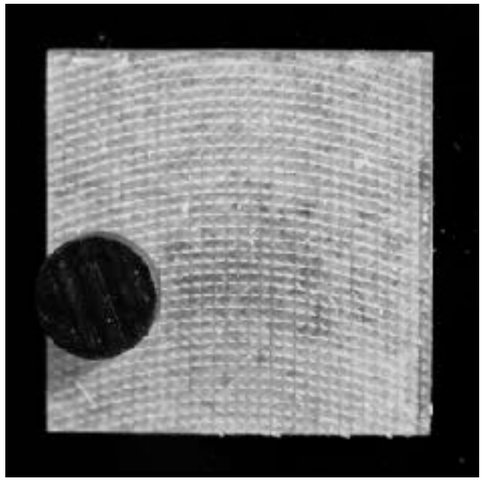


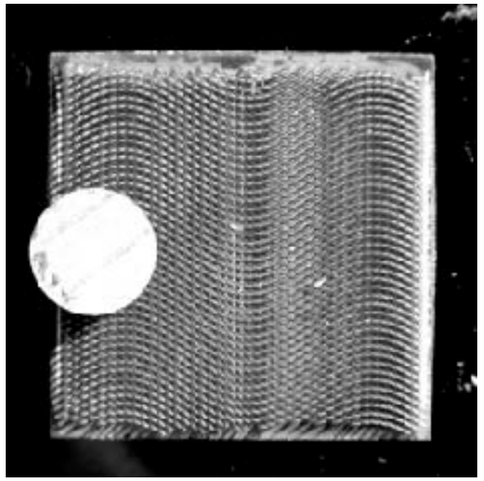


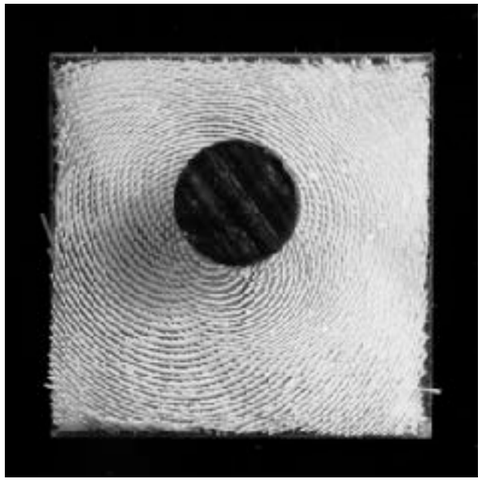


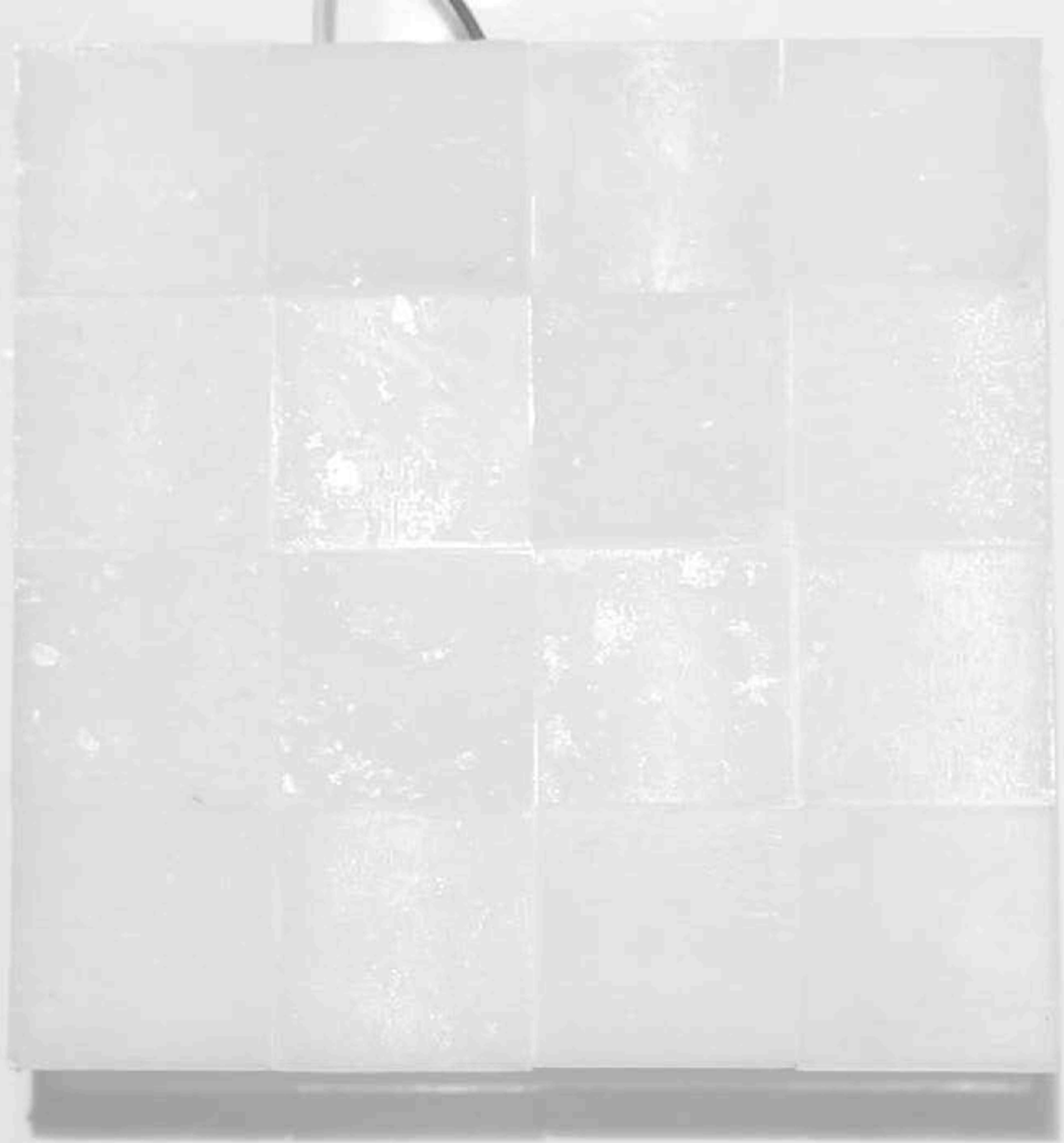






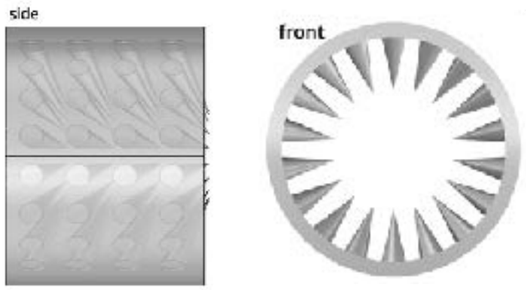




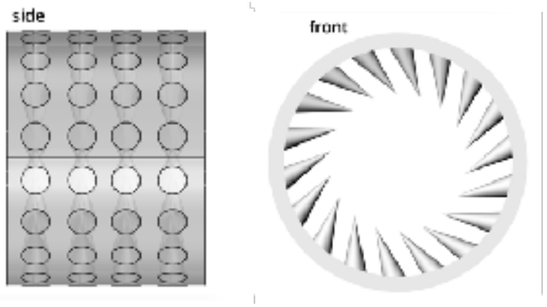


Printed figures with encoded movement

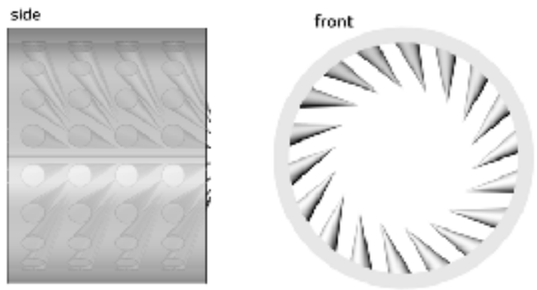
Linear

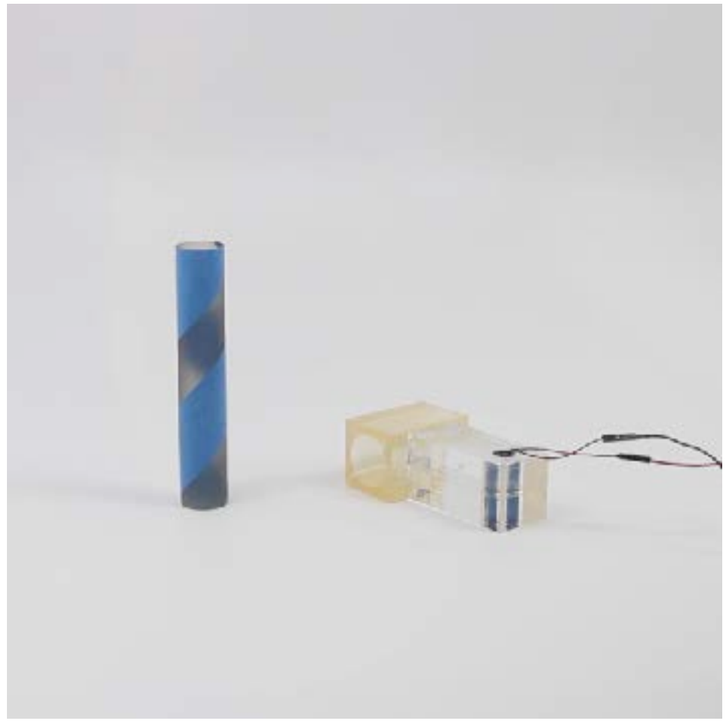


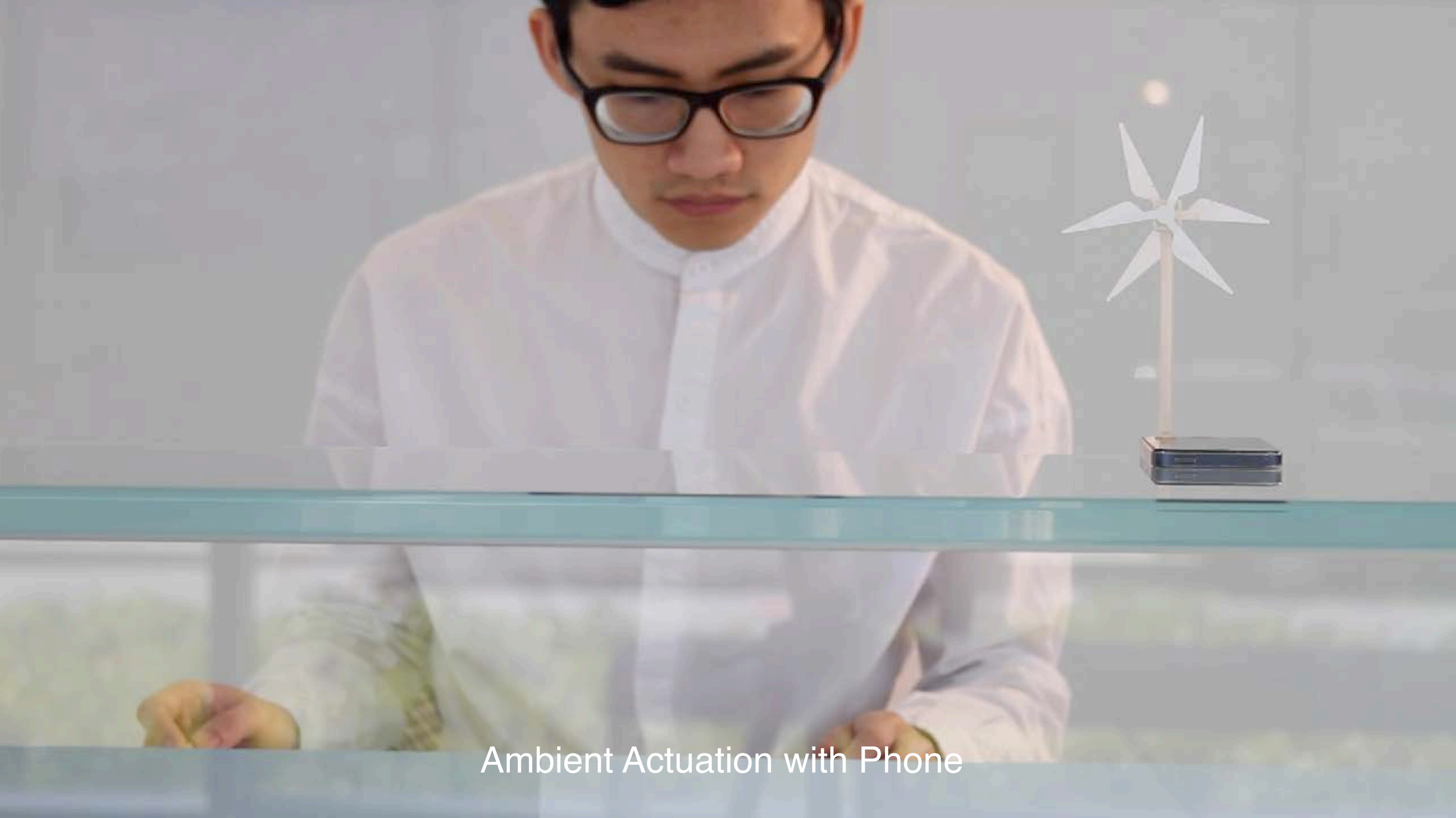
Rotary



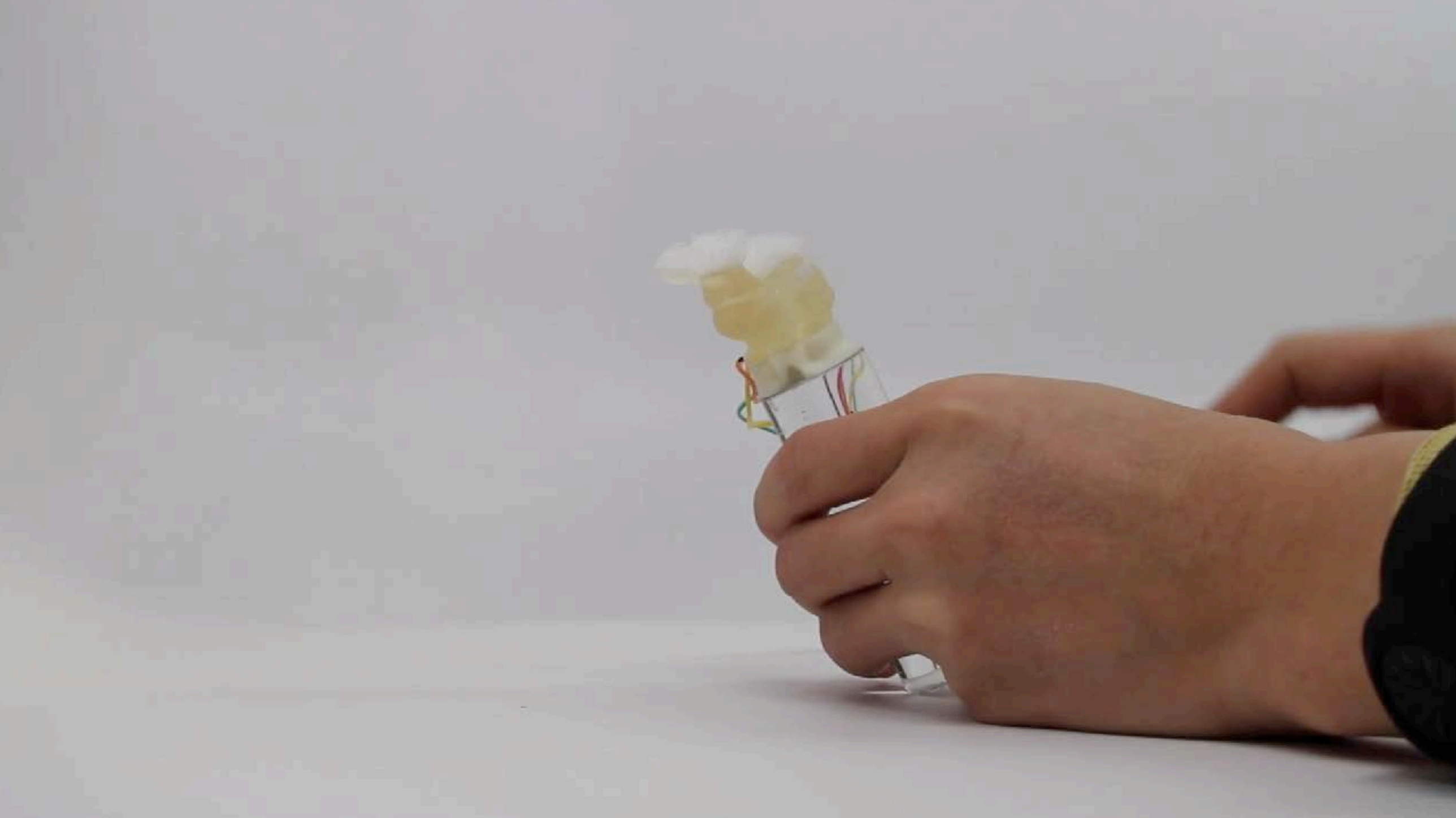
Combined



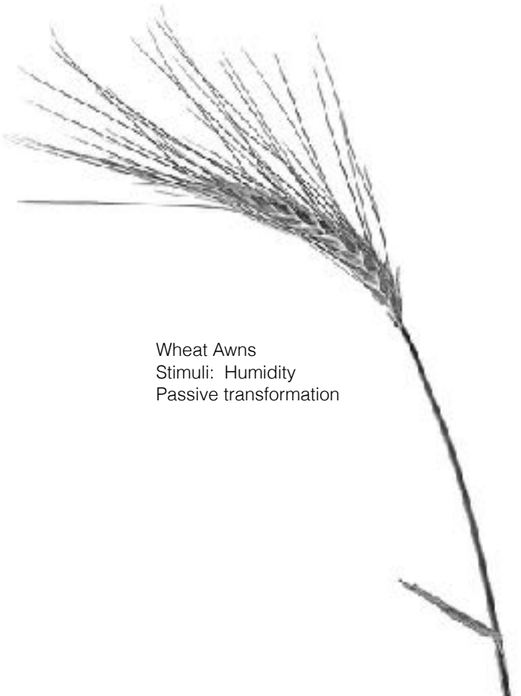




Ambient Actuation with Phone



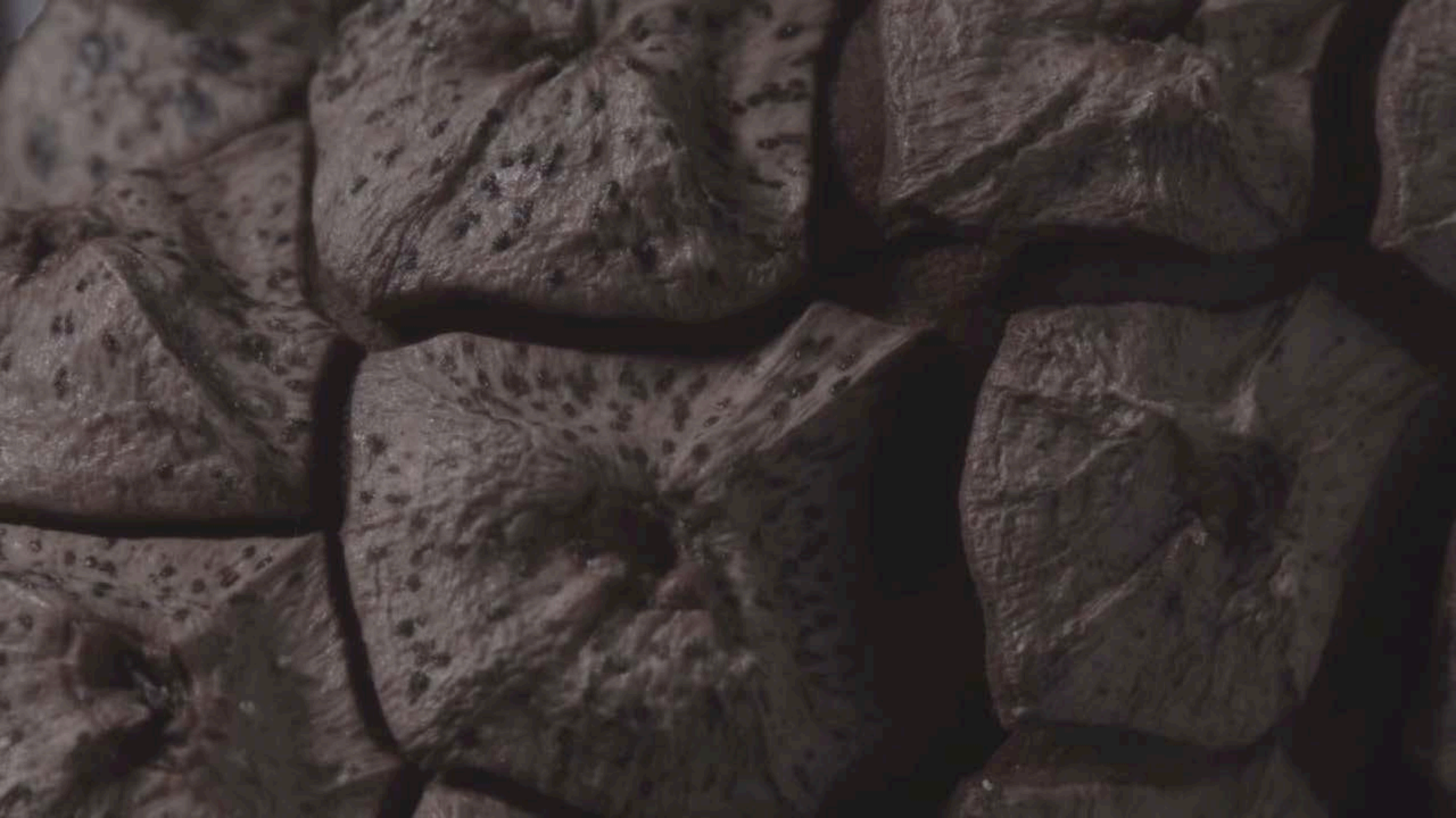
Mimosa
Active Transformation

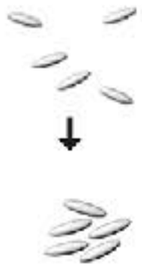
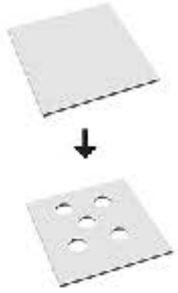
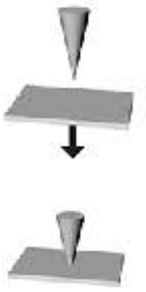
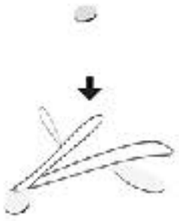
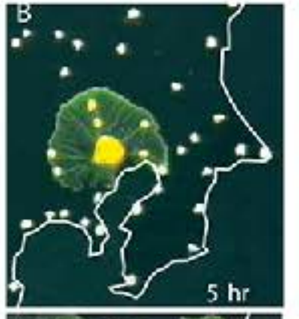
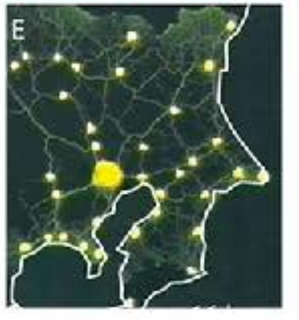


Wheat Awns
Stimuli: Humidity
Passive transformation

Venus flytrap leaf
Stimuli: active transformation

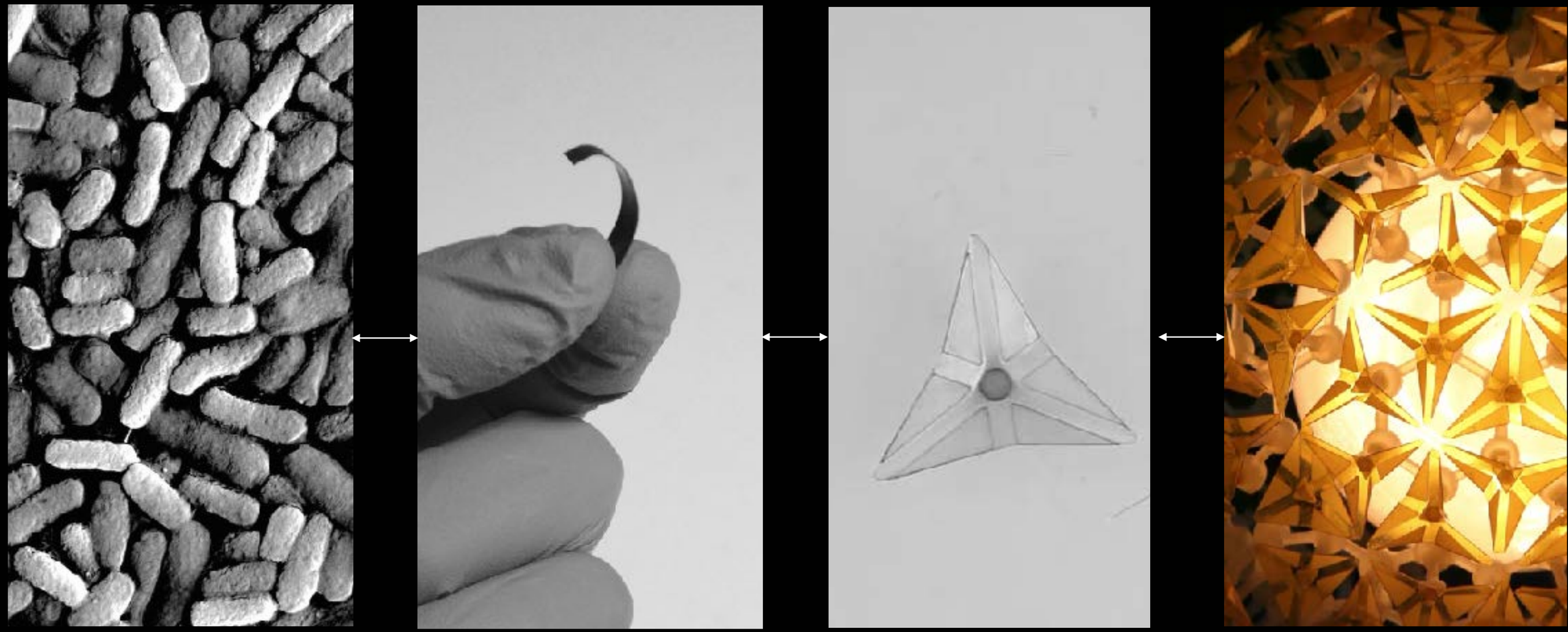
Sunflowers
Stimuli: Light
Active transformation



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


“Bio is the new Digital”
Nicholas Negroponte 2015

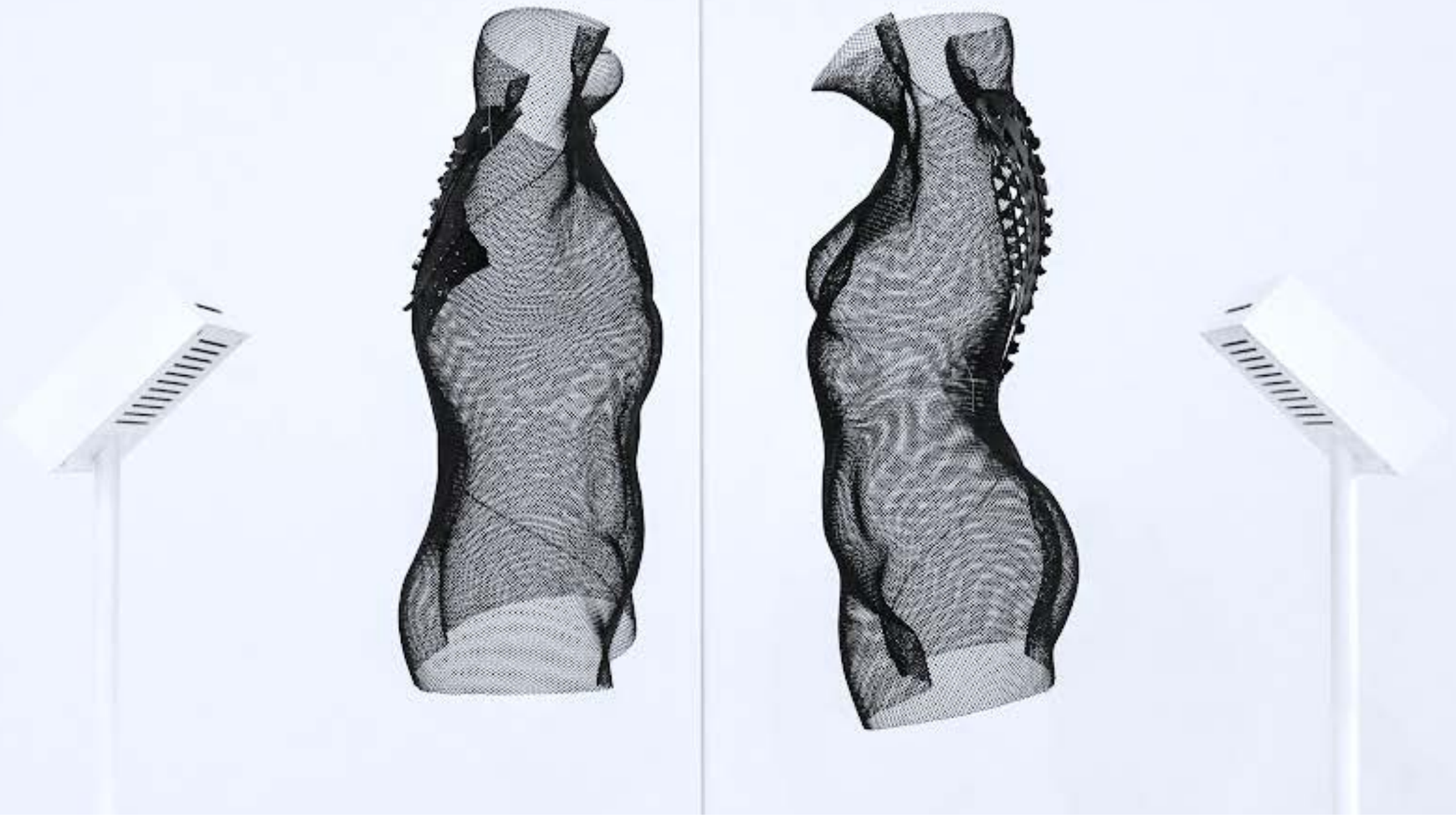
BioLogic



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

Hiroshi Ishii
Tangible Media Group
MIT Media Lab

“Bio is the new Interface”



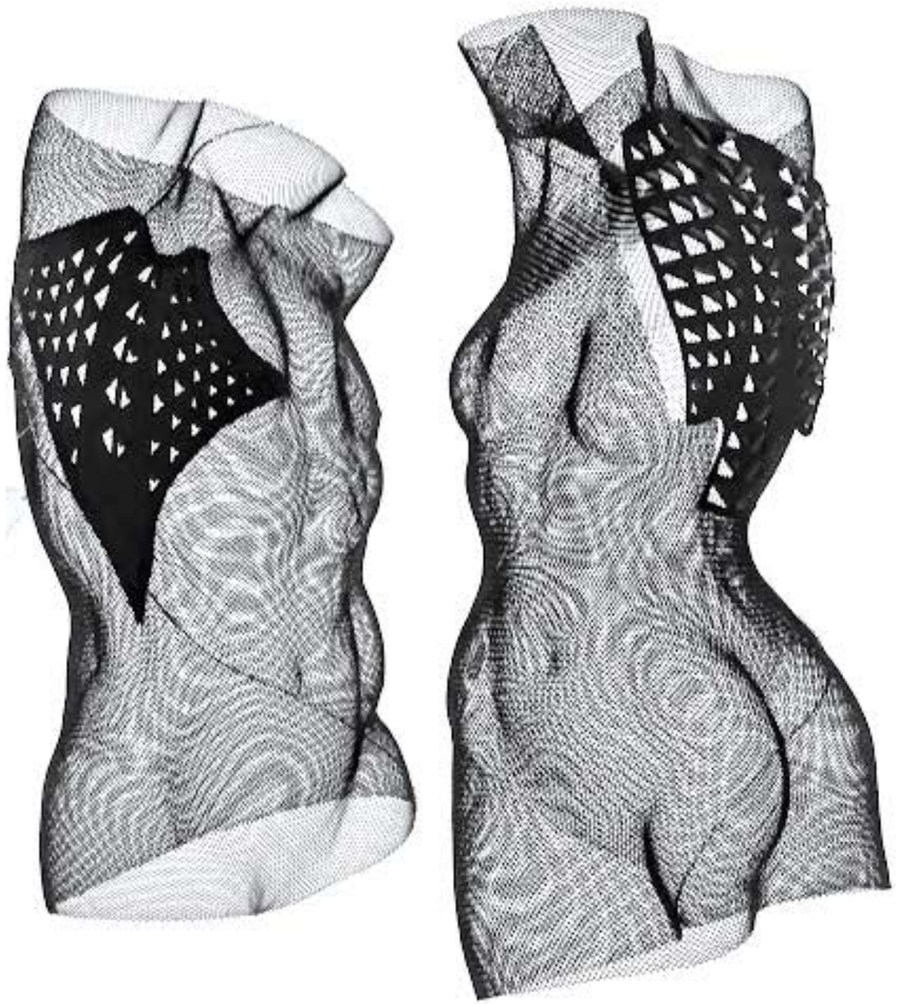
Hiroshi Ishii
MIT Media Lab

BIOLOGIC

TANGIBLE MEDIA GROUP, MIT MEDIA LAB

“Bio is the new Interface”

Tangible Media Group



bioLogic Exhibit at
MIT Media Lab E14 lobby

Hiroshi Ishii
MIT Media Lab

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

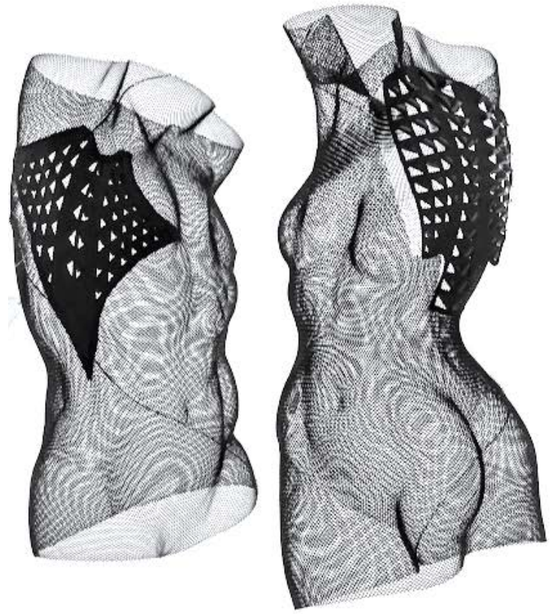
Platinum

Wearable

Gold

Fashion

Silver



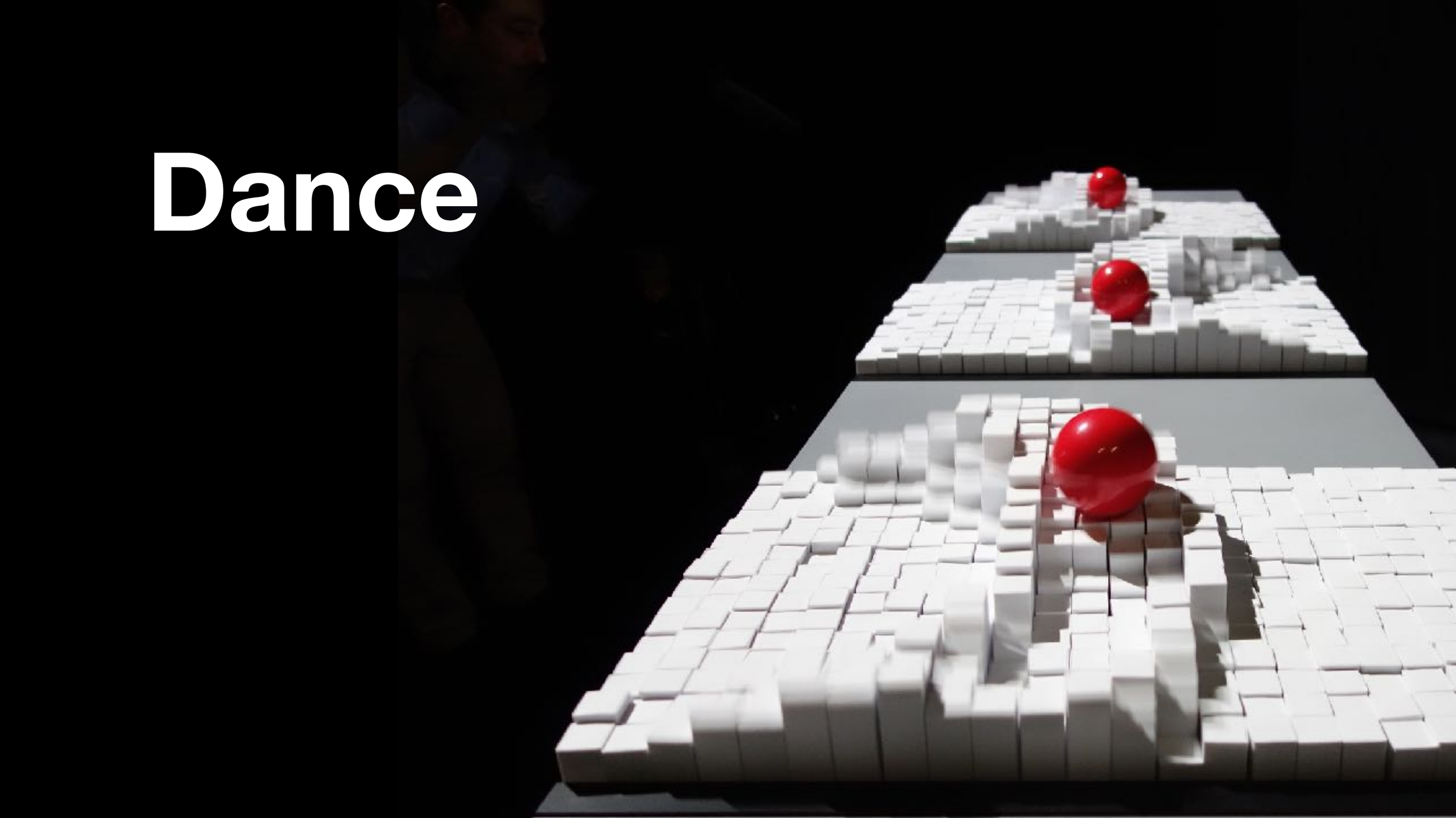
from build

Man-Made

to grow

Nature-Derived

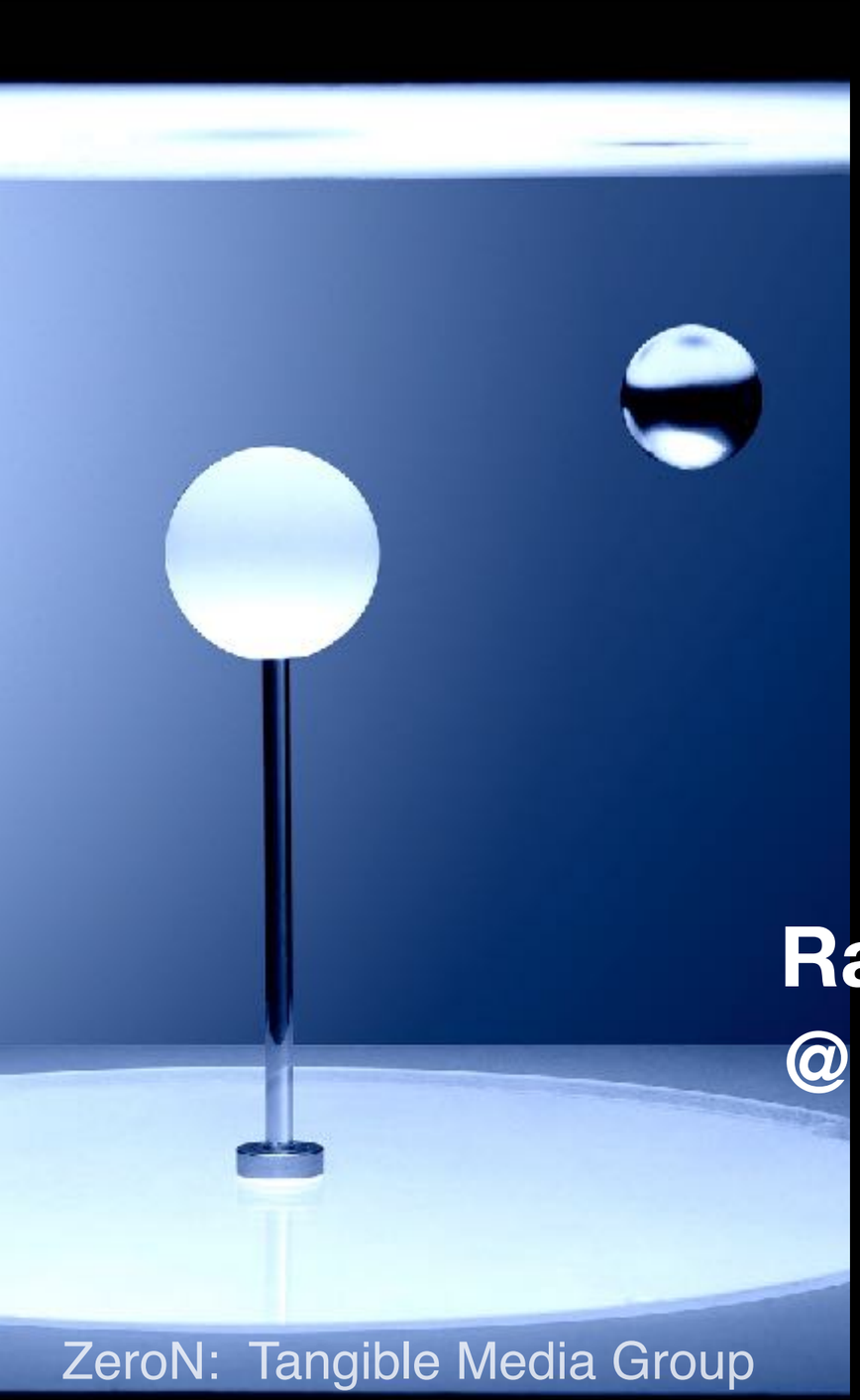
Dance




Levitate

ZeroN

Jinha Lee, MIT Media Lab
Rehmi Post, MIT Center for Bits and Atoms
Hiroshi Ishii, MIT Media Lab



ZeroN: Tangible Media Group

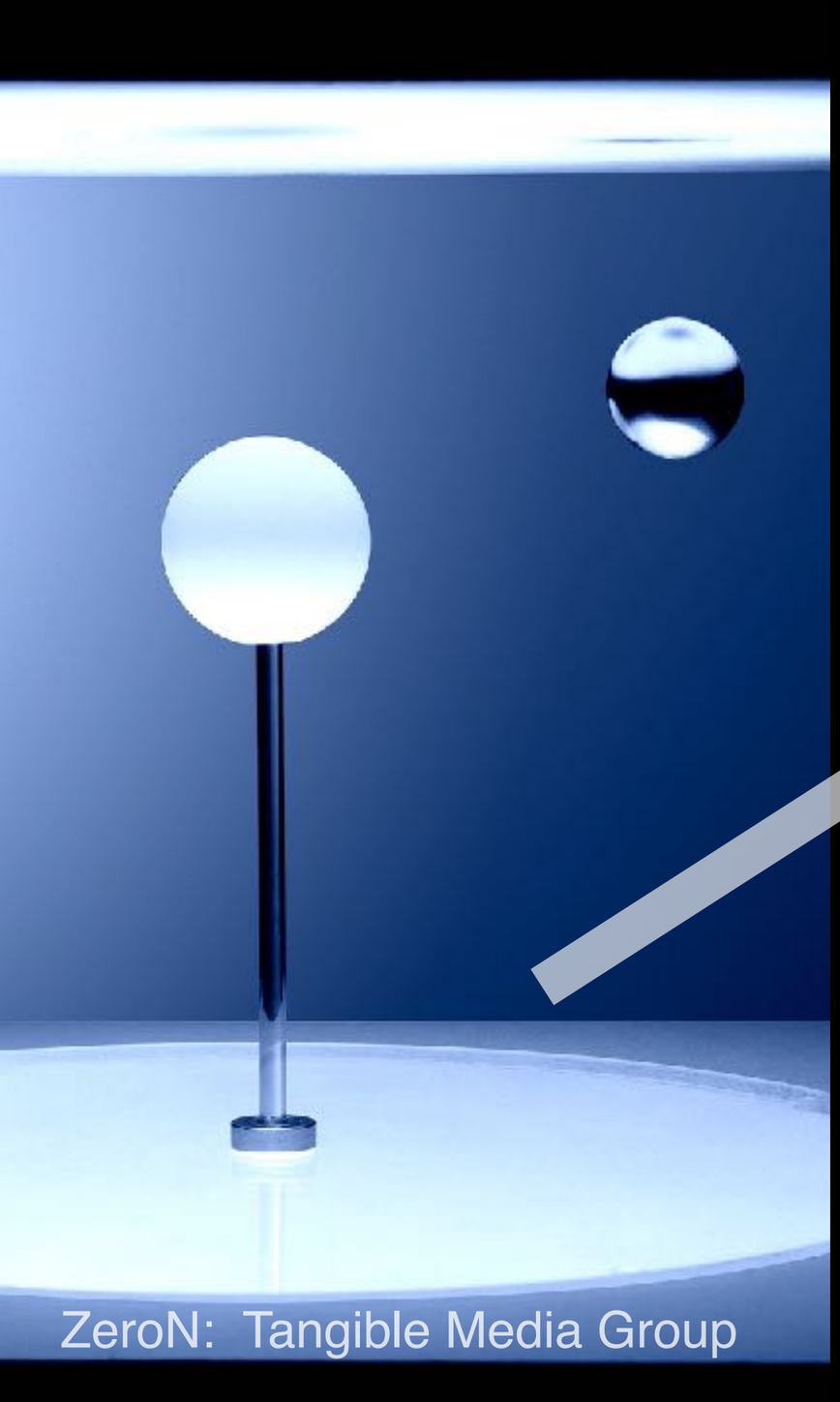
Infinite Cube

ART+COM

Radical Atoms Exhibition @ Ars Electronica Center

100 Drones
Ars Electronica Futurelab

Levitate



ZeroN: Tangible Media Group

Infinite Cube

ART+COM

100 Drones
Ars Electronica Futurelab

Defy Gravity

ZeroN: Tangible Media Group

Infinite Cube

ART+COM

100 Drones
Ars Electronica Future Lab

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.

Photo courtesy of Nobukazu Kuriki

Envision

Photo courtesy of Nobukazu Kuriki

Photo courtesy of Nobukazu Kuriki


Envision
Embody
Inspire
Art & Philosophy
Design & Technology
Art & Aesthetics
Photo courtesy of Nobukazu Kuriki

https://www.flickr.com/photos/79203622@N02/9734698717/

http://blog.corsidigrafica.info/wp-content/uploads/2014/06/eye-movement.jpg

Earthbound Observers

Hawaii - Mauna Kea - Milky Way Overhead

Earthbound Observers

http://www.nwicon.com/hawaii-mauna-kia-milkyway-over-observatories.htm

NASA Deployed the Hubble Space Telescope in 1990

Unconstrained Perspective

http://commons.wikimedia.org/wiki/File:Hubble_01.jpg

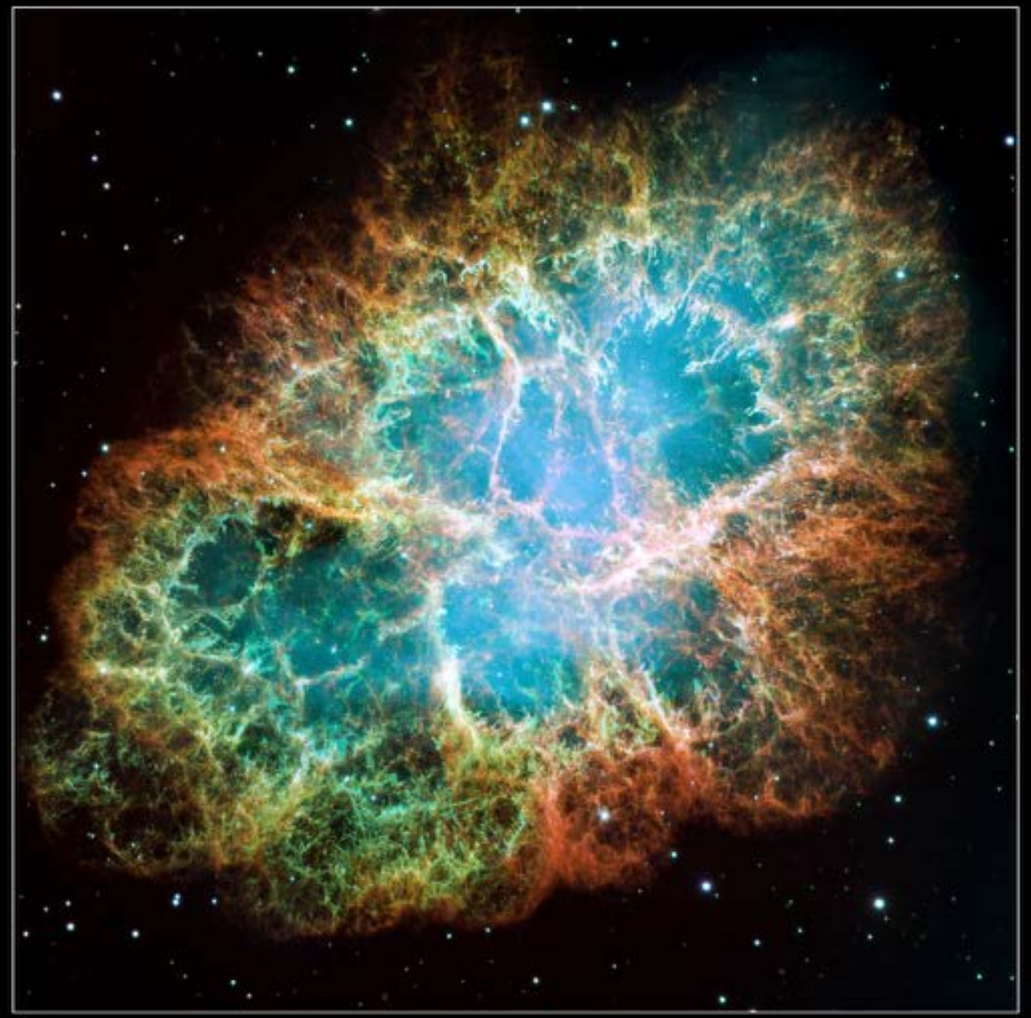
Perspective of Hubble Space Telescope

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

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

NASA, ESA, and M. Livio and the Hubble 20th Anniversary Team (STScI) STScI-PRC10-13a

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



Crab Nebula • M1
Hubble Space Telescope • WFPC2

NASA, ESA, and J. Hester (Arizona State University) STScI-PRC05-37

Voyager 1 Deployed in 1977

Unconstrained Perspective

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

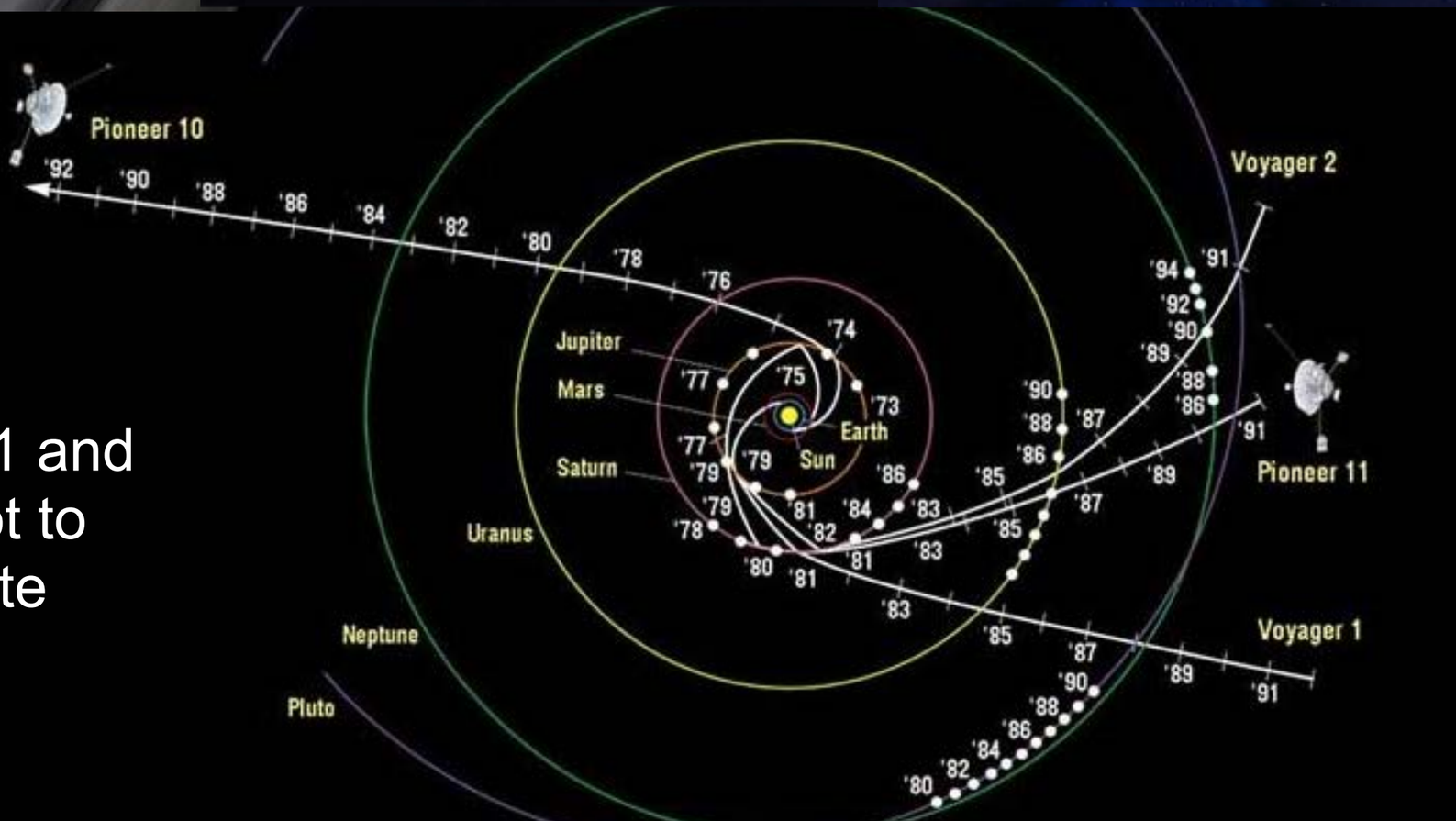
Pioneer 11 (1973~)
http://www.nasa.gov/

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

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

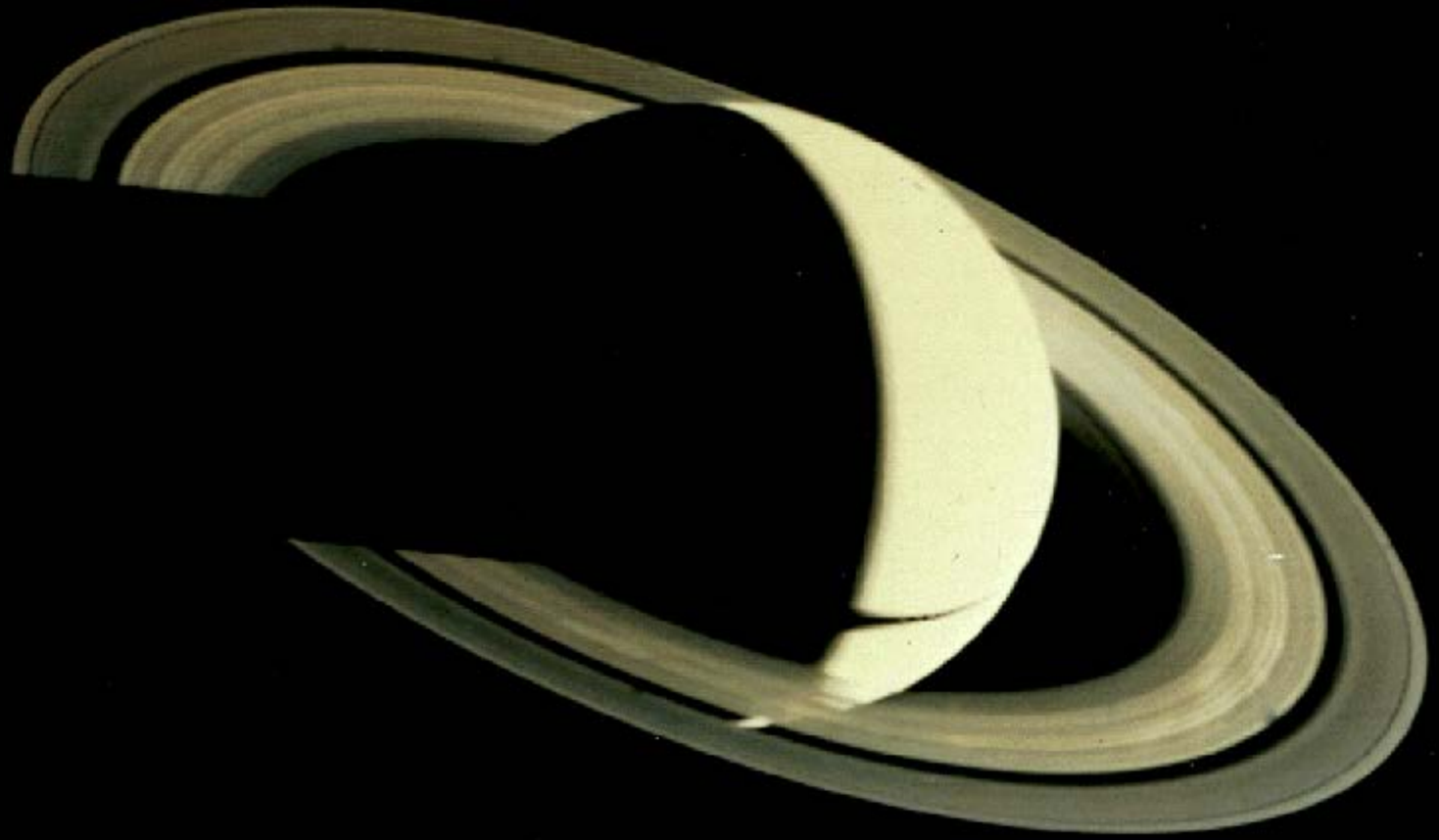
Gravitational Slingshot

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

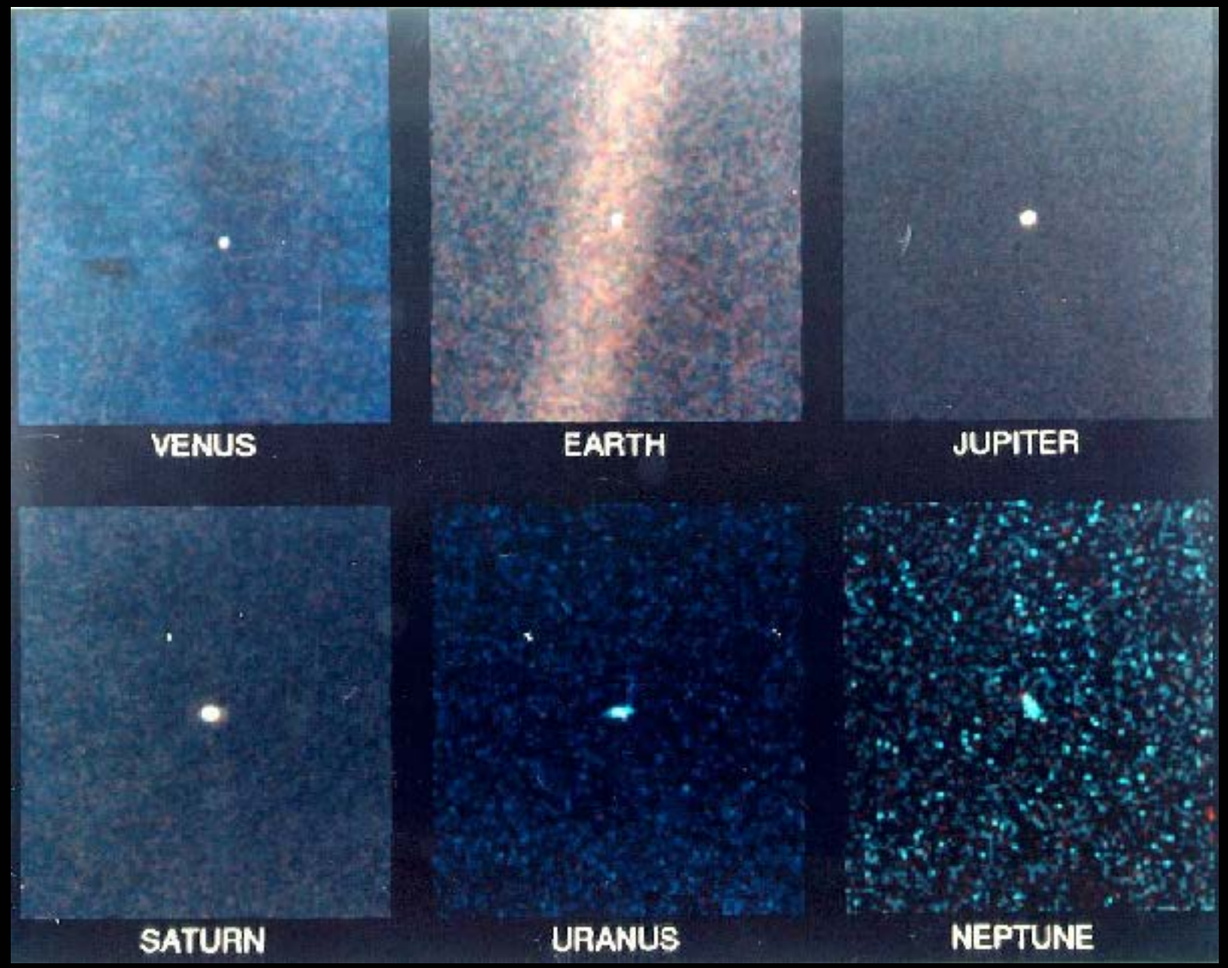
Unconstrained Perspective



https://en.wikipedia.org/wiki/Voyager_1#/media/File:Crescent_Saturn_as_seen_from_Voyager_1.jpg

Planets from the Voyager 1's Perspective

Unconstrained Perspective



People could only see the world from their own perspective

uncyclopedia.wikia.com/wiki/File:Earth.jpg

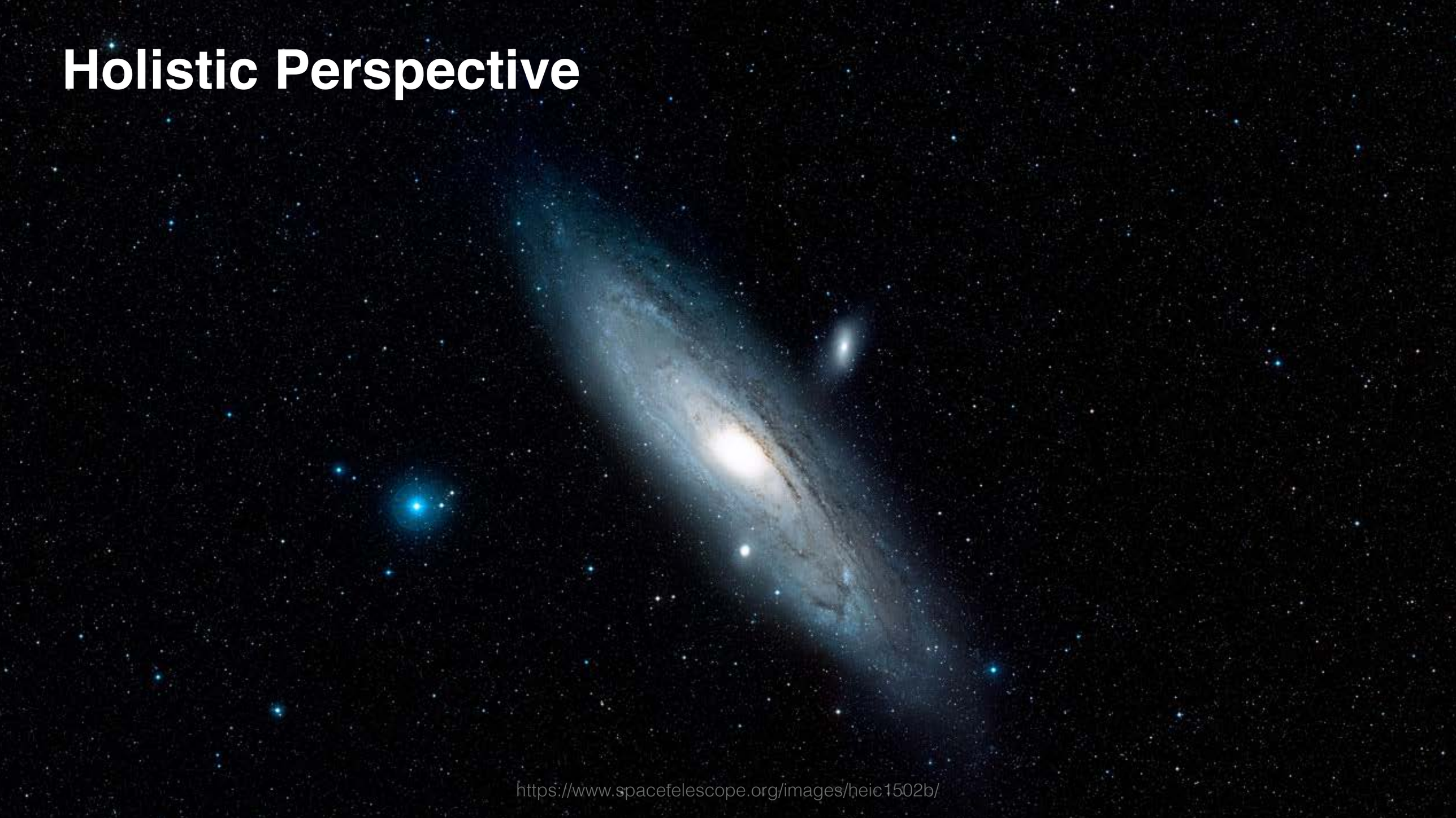
Towards Holistic Worldview

Enhance

Expand

Escape

Holistic Perspective



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

Holistic Perspective & Heuristic Focus

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

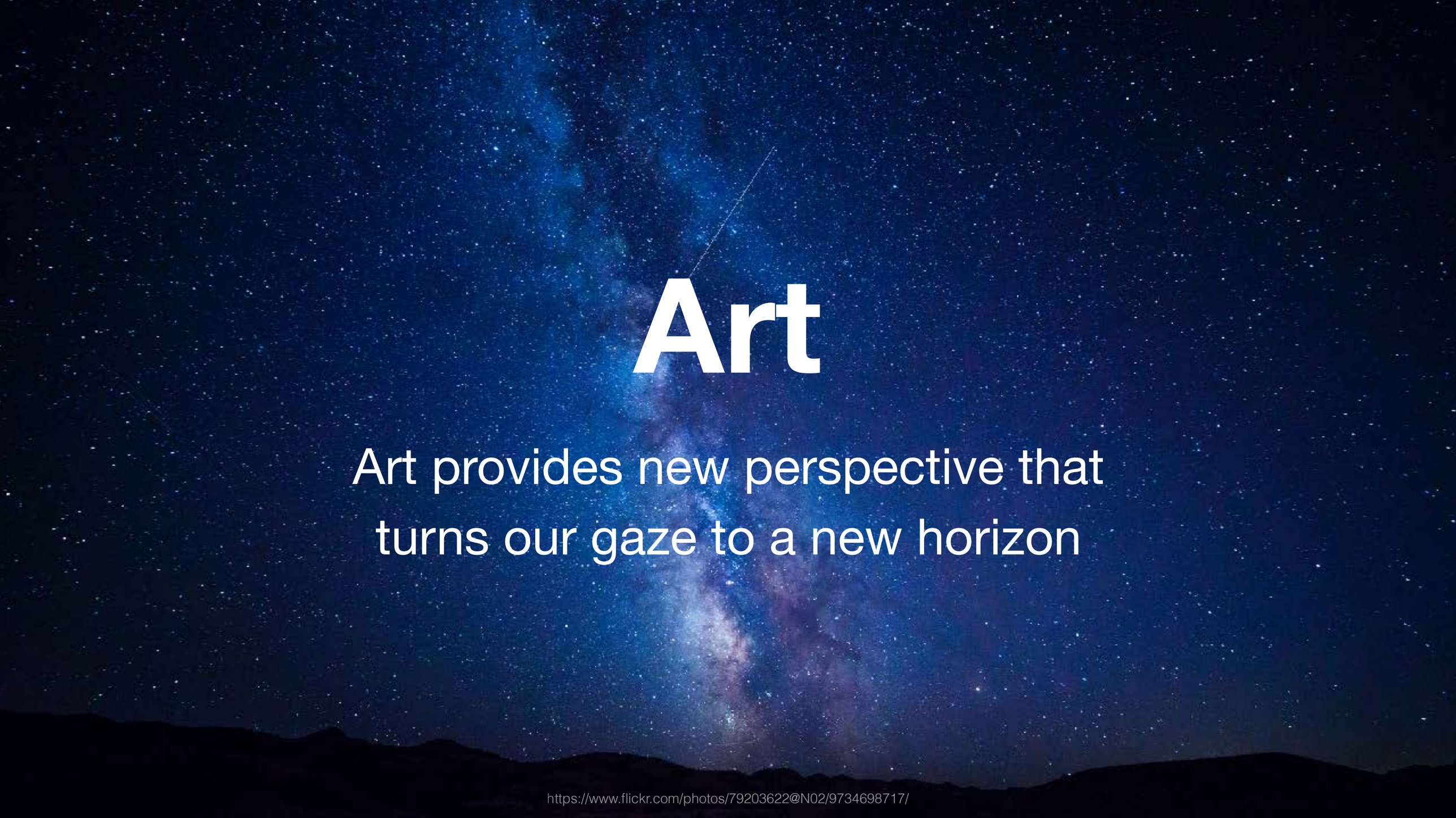
http://uncyclopedia.wikia.com/wiki/File:Earth.jpg

TRANS-Disciplinary

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

“auf-heben”

https://www.flickr.com/photos/79203622@N02/9734698717/



https://www.flickr.com/photos/79203622@N02/9734698717/


October 2015
MIT Media Lab 30th Anniversary
Tangible Media Group 20th Anniversary
GUI
TUI
RADICAL ATOMS
30
30

Thanks!

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MIT
Media
Lab

TRANSFORM

Beyond Pixels,
Towards Radical Atoms

January 27, 2017 in Tokyo

MIT Japan Conference

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