

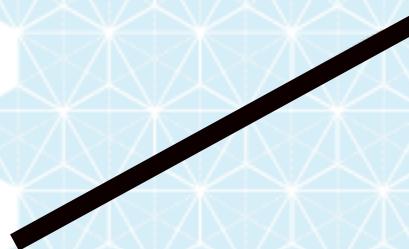
Matthew Gardiner

ORI* CODING FORMATTER

1. Program, Transform, Sense

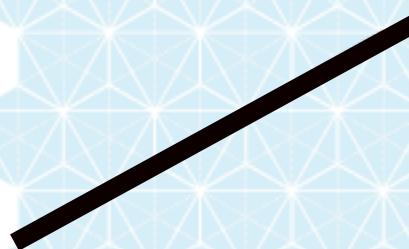
Matthew Gardiner

what is a fold? what is ori*



Mark Weiser

Ori
Ori + kami = origami
Ori + robot = oribo
Ori + * = folding anything



markkramer

Mark Krikorian

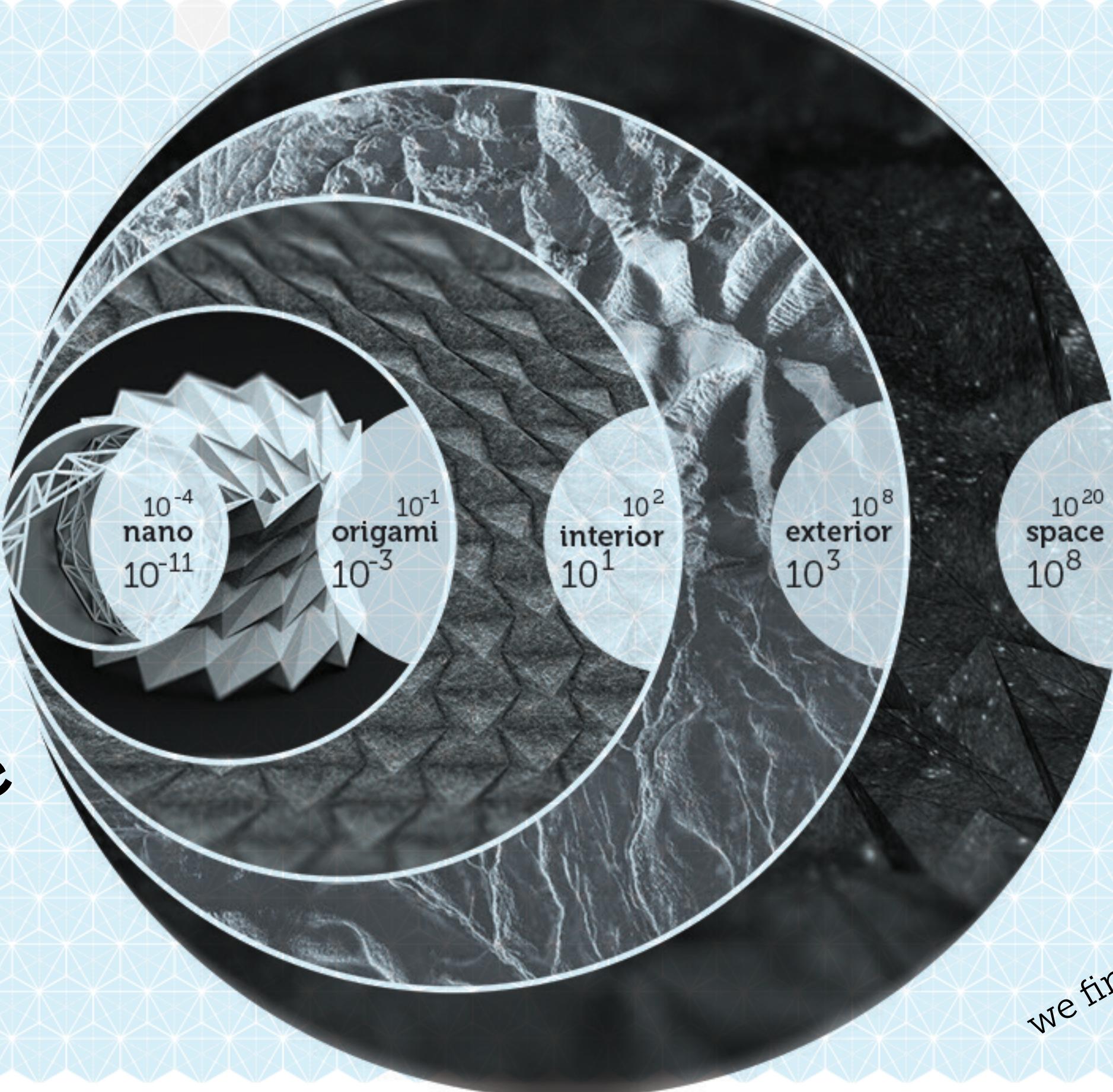
Nature of Folding

science
code
exterior
expand

contract
interior
matter
art

~~dark matter~~

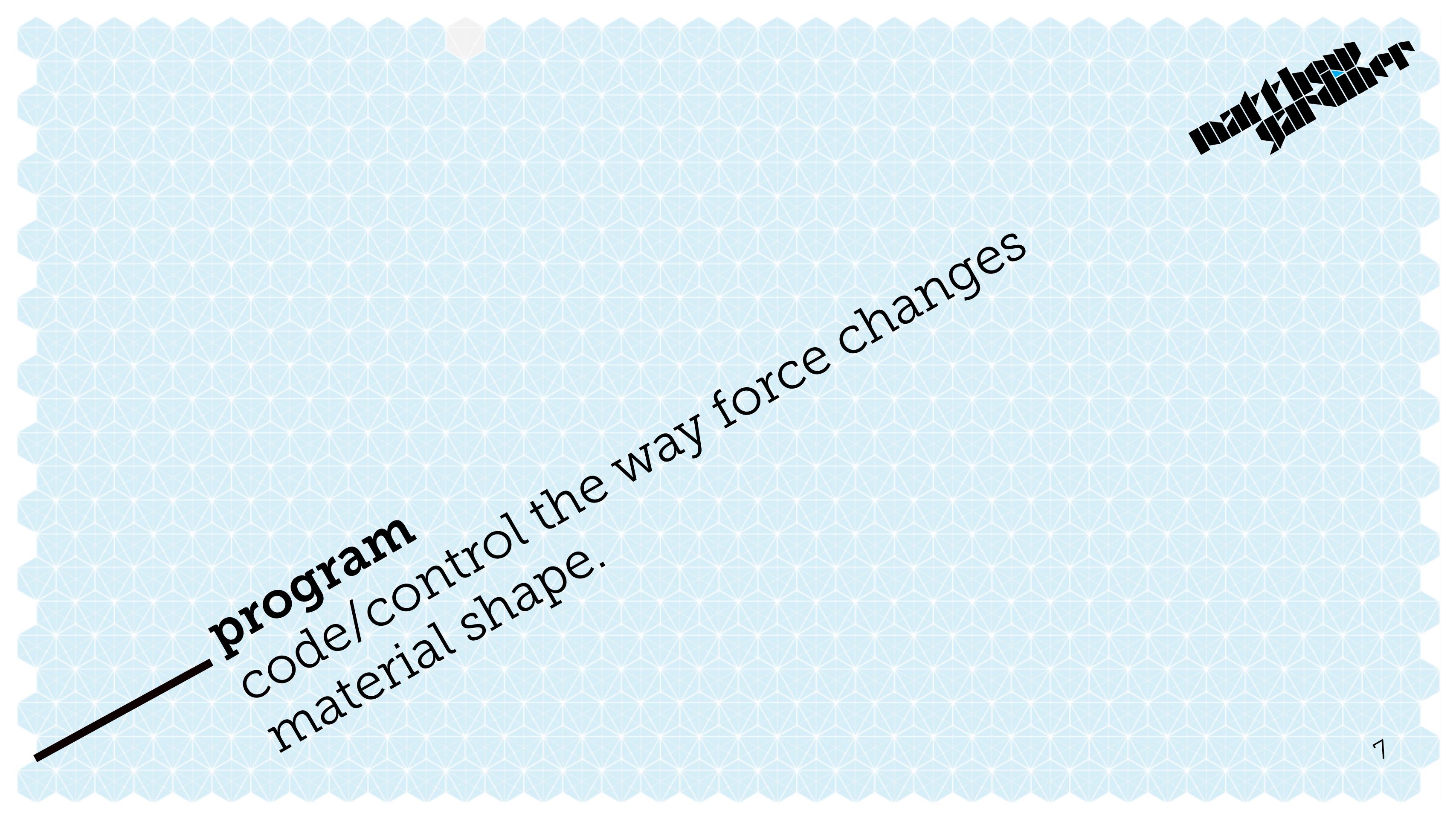
scale



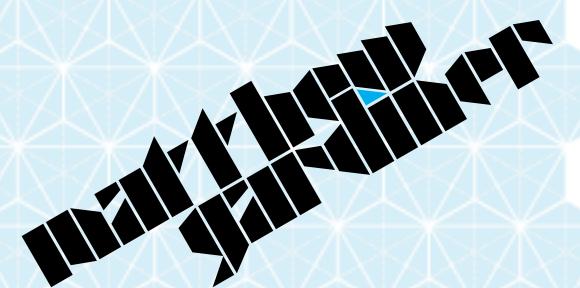
we find folds at every scale

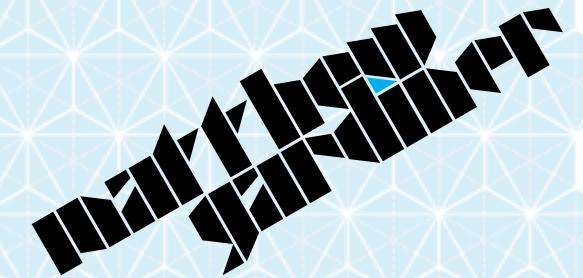
**what factors of folding do
we research?**

Mark Weitkamp

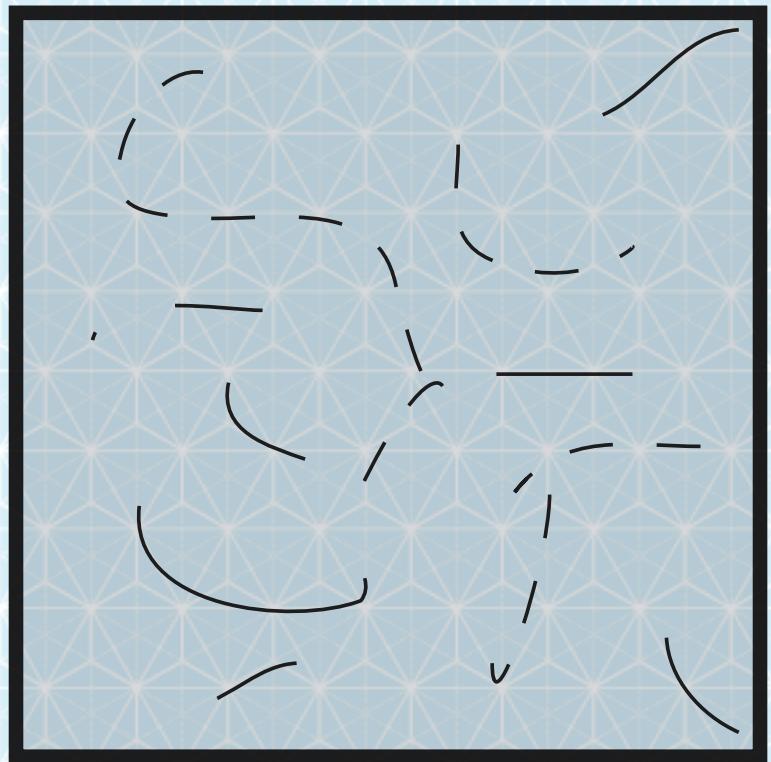


program
code/control the way force changes
material shape.



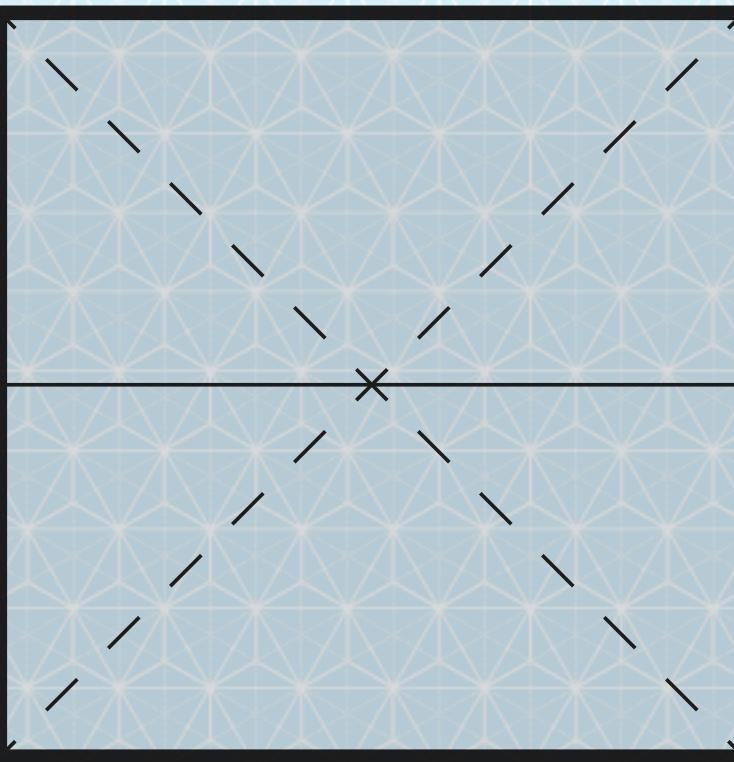


by chance



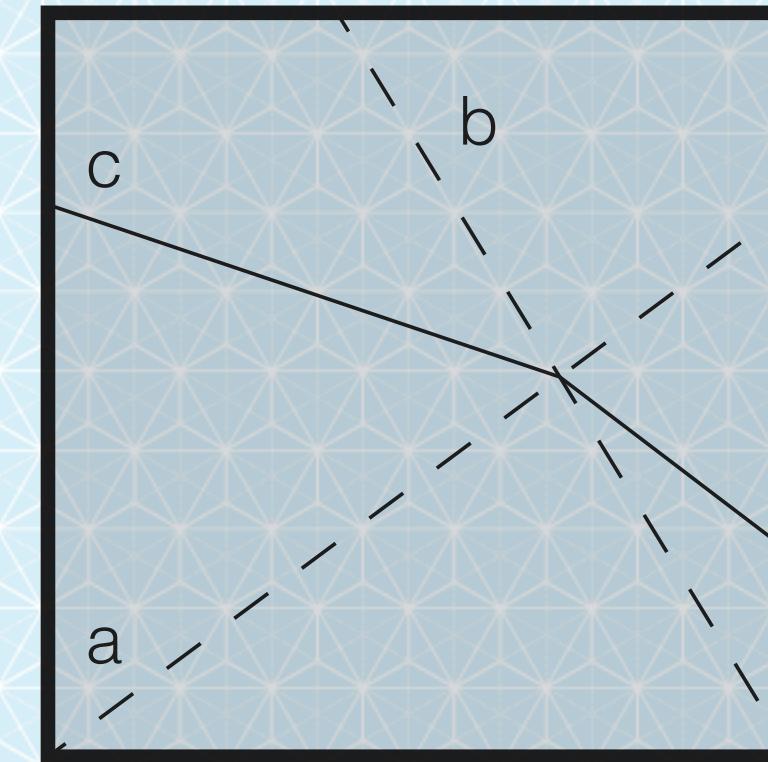
buckling
bifurcation

by hand

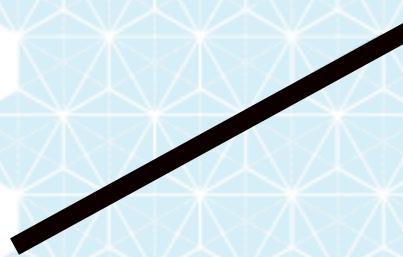


traditional
symmetry

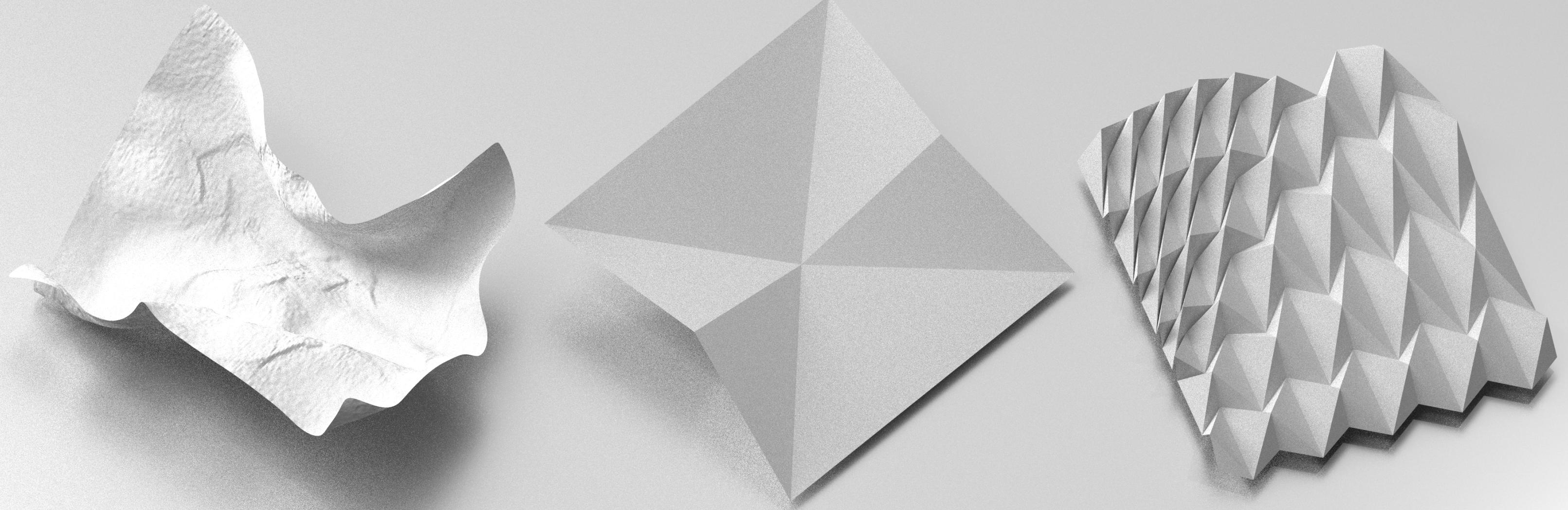
by code



algorithm
computation



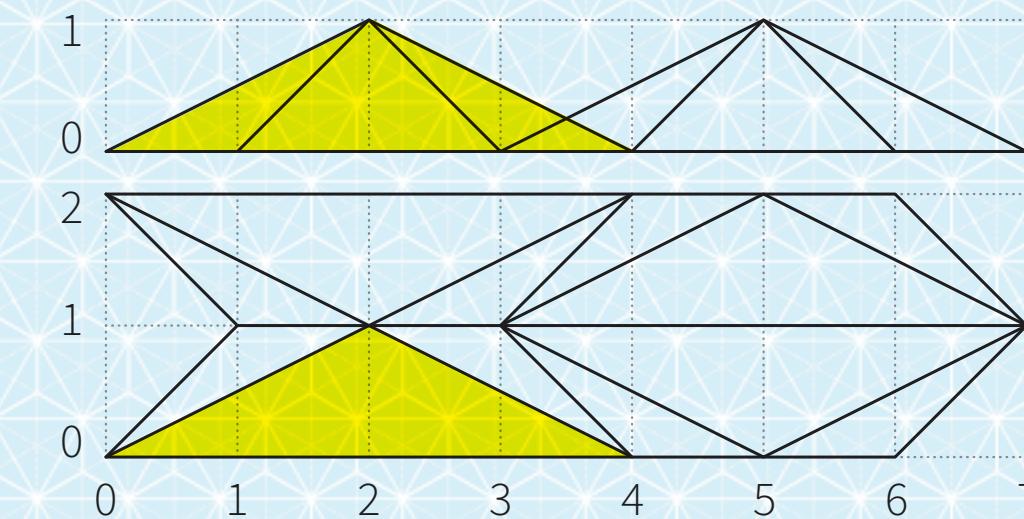
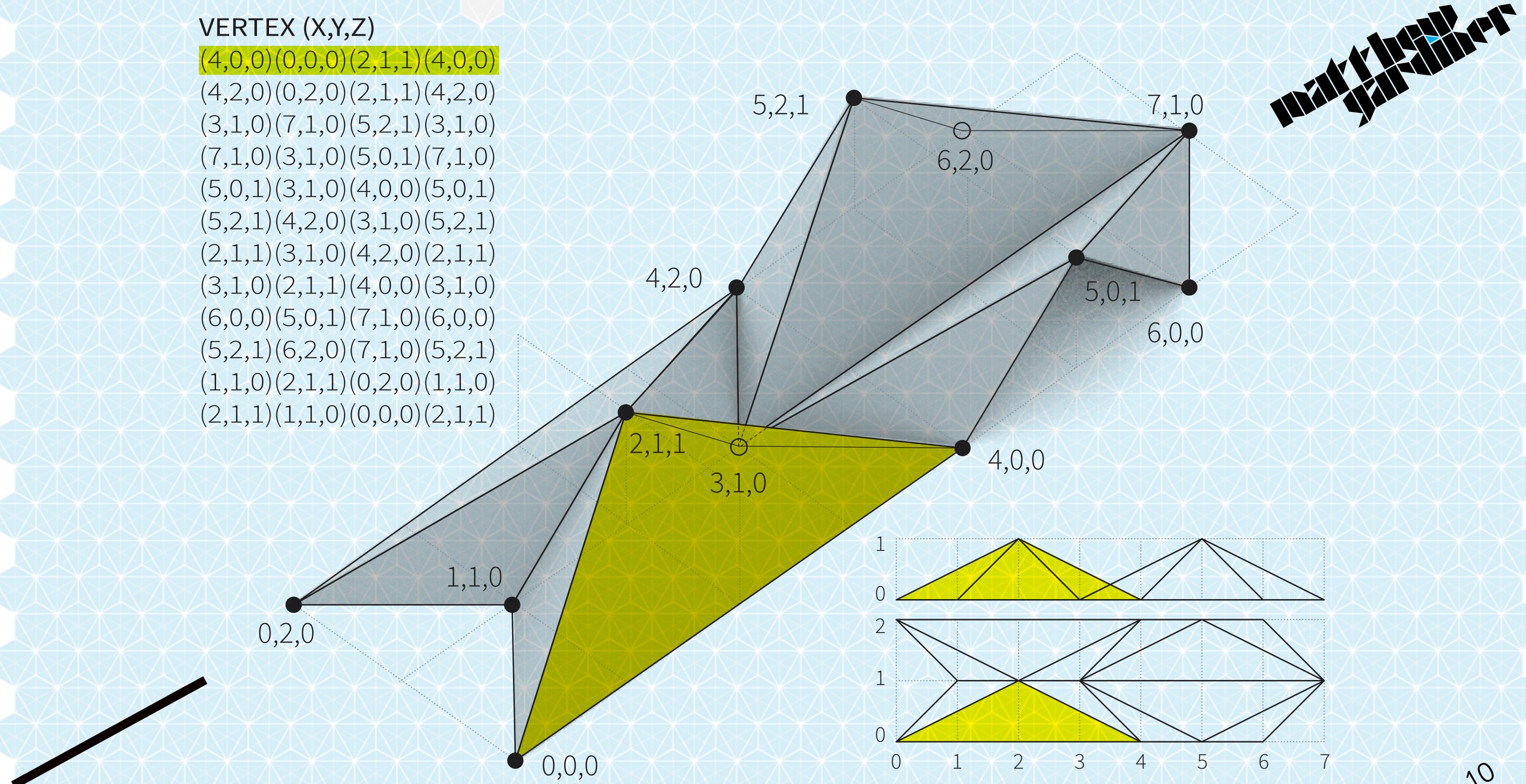
mark zuckerberg



—

VERTEX (X,Y,Z)

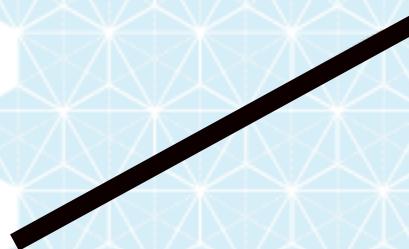
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(7,1,0)(3,1,0)(5,0,1)(7,1,0)
(5,0,1)(3,1,0)(4,0,0)(5,0,1)
(5,2,1)(4,2,0)(3,1,0)(5,2,1)
(2,1,1)(3,1,0)(4,2,0)(2,1,1)
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(5,2,1)(6,2,0)(7,1,0)(5,2,1)
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(2,1,1)(1,1,0)(0,0,0)(2,1,1)



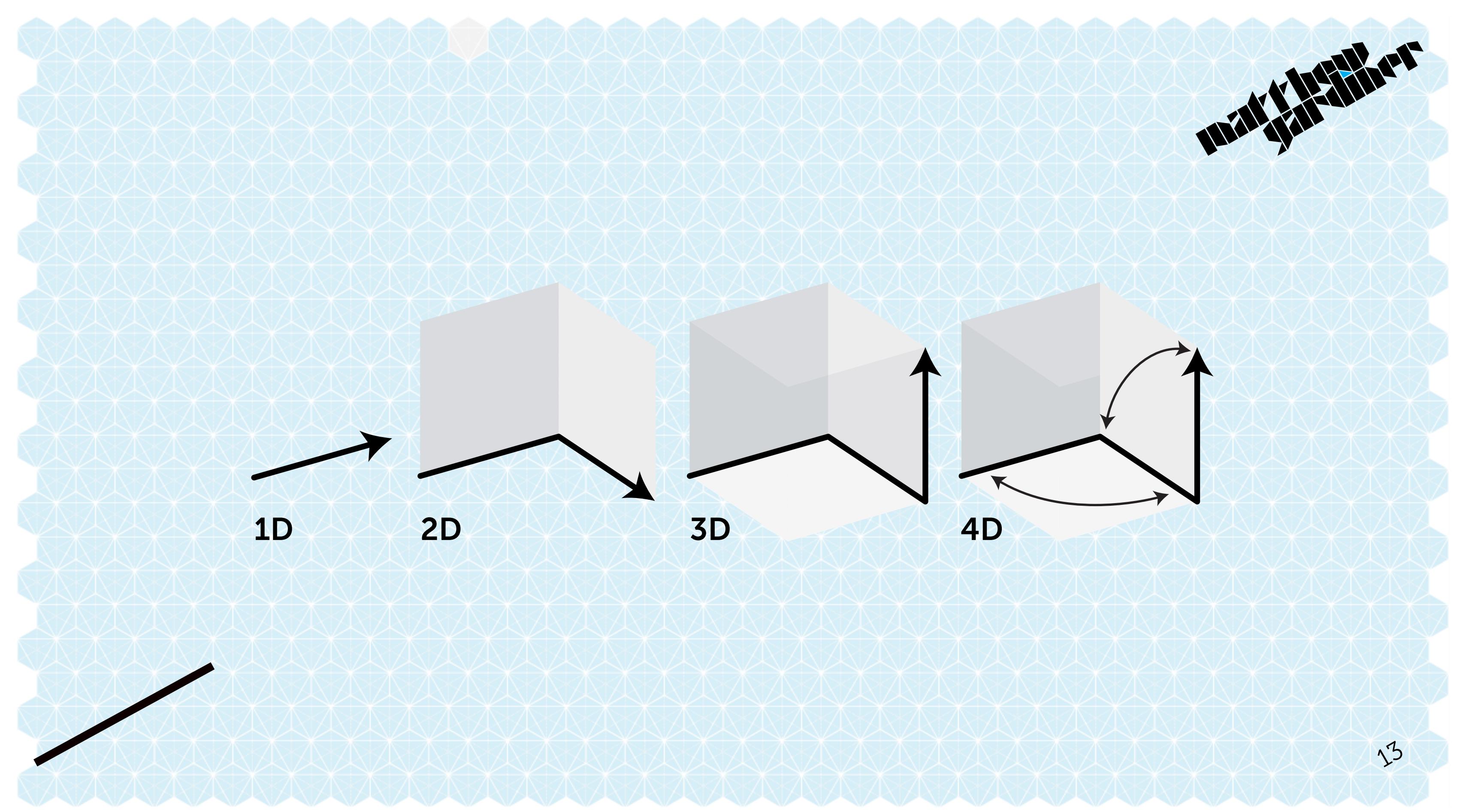
10

dark fiber

transform
to change dimensions
from 2D to 3D to 4D



Marken

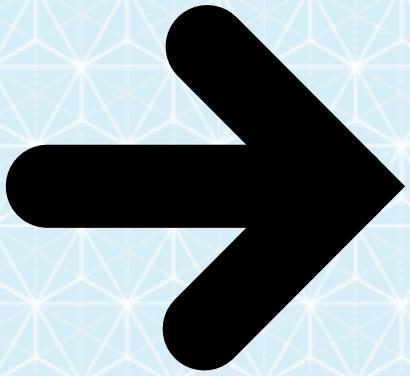
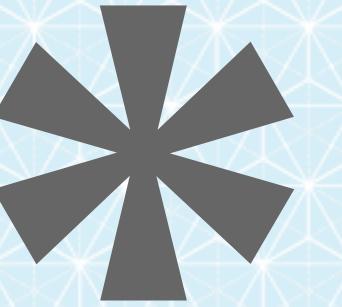


sense

expand the function of transformability
through computation & interactions

mark krikorian

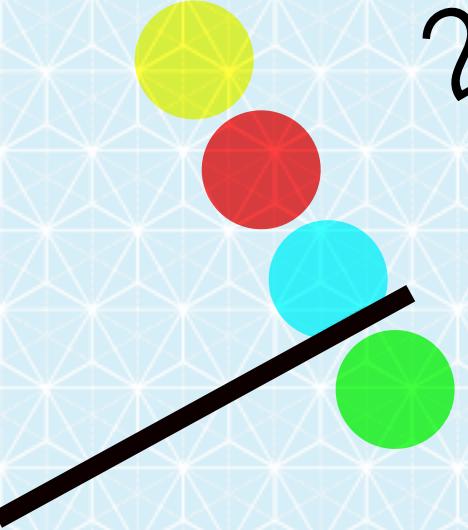
折り*



markbook

Oribotics as a case study:

1. Oribotics
2. Program-ability
3. Transform-ability
4. Sense-ability



Mark Weiser

1. Oribotics: A field of research concerned with the fabrication of fold programmed surfaces.

Oribotics

1.

Oribotics [laboratory]
2005, Melbourne

2005: low complexity (hand
made & designed), some
longevity issues, natural form.

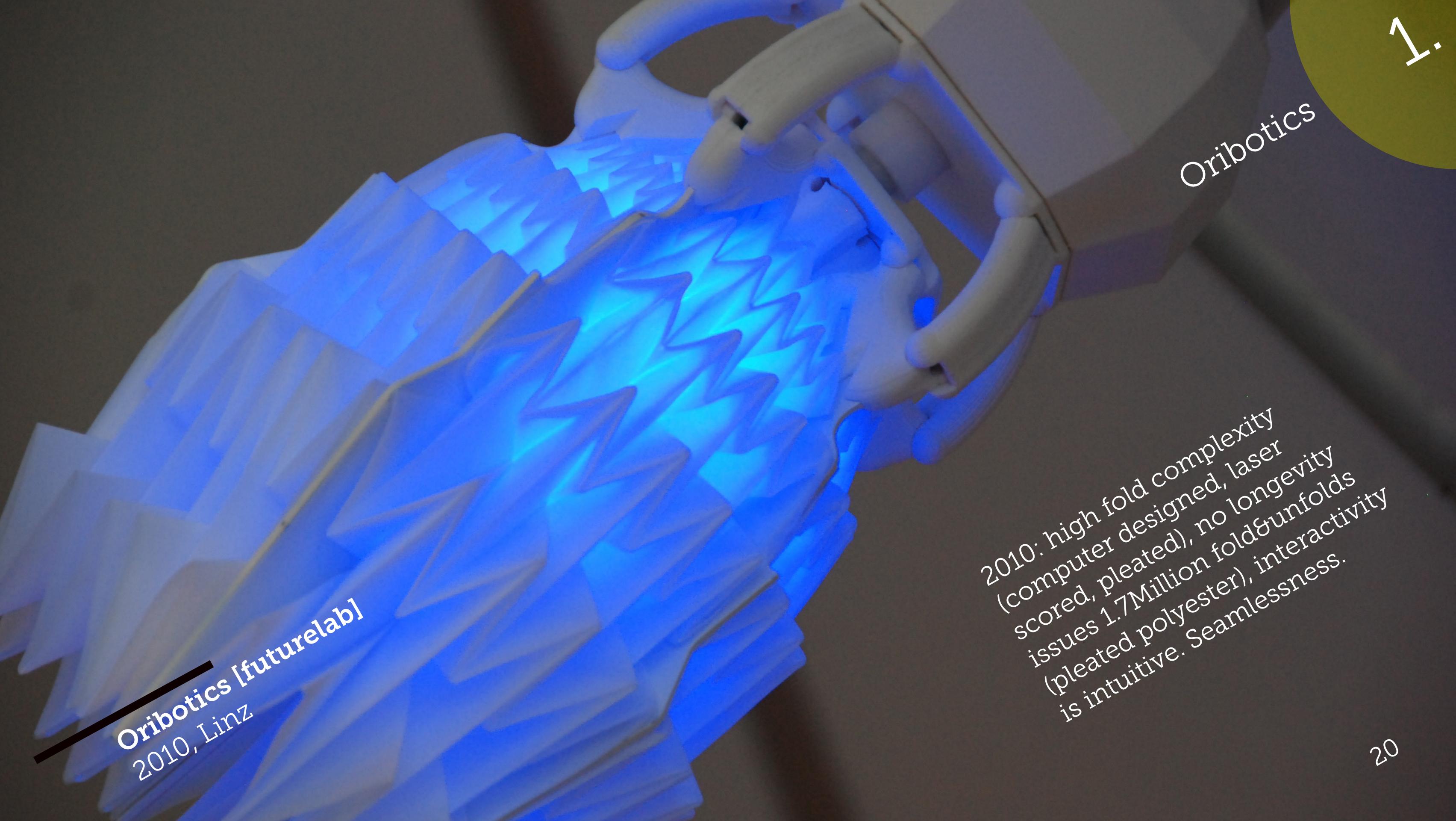
Oribotics

1.

2007: higher fold complexity
(computer designed, machine
scored), remaining longevity
issues (plastic paper), natural
form, matriability of paper
(crumples).

Oribotics [network]
2007, Melbourne

19



Oribotics [futurelab]
2010, Linz

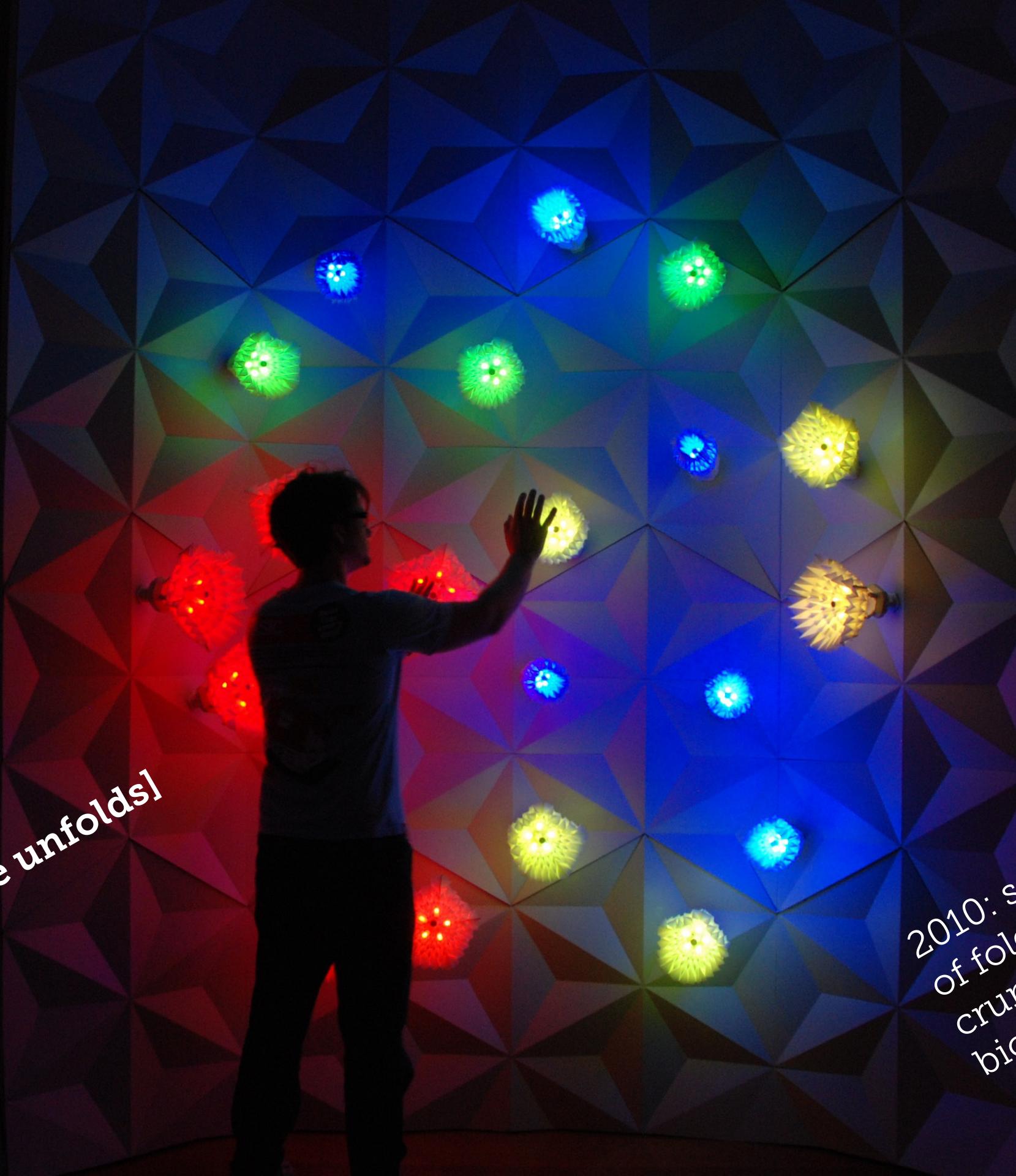
2010: high fold complexity
(computer designed, laser
scored, pleated), no longevity
issues 1.7Million fold&unfolds
(pleated polyester), interactivity
is intuitive. Seamlessness.

Oribotics

1.

Oribotics [the future unfolds]

2010, Melbourne



2010: seamless (interior scale of fold). Polyester does not crumple. Relationship to nature: biomimetic design.

Oribotics

1.



Oribotics [the future unfolds]
2010, Tokyo

2010: Relationship to nature:
biomimetic design, geometric
dome, environmental influence
on the viewers frame.

Oribotics

1.

22

More:
matthewgardiner.net
vimeo.com/matthewgardiner
facebook.com/oribotic

follow the research

→ Progress updates appearing regularly

Oribotics

1.

**ORI* CODING
FORMATTER**

Matthew Gardiner

2. Fold Mapping, Fold Printing

Matthew Gardiner

2. Fold Mapping

System for mapping a folded unit across a three-dimensional surface.

new geometries

- Complex Folding
- Relationship to Nature

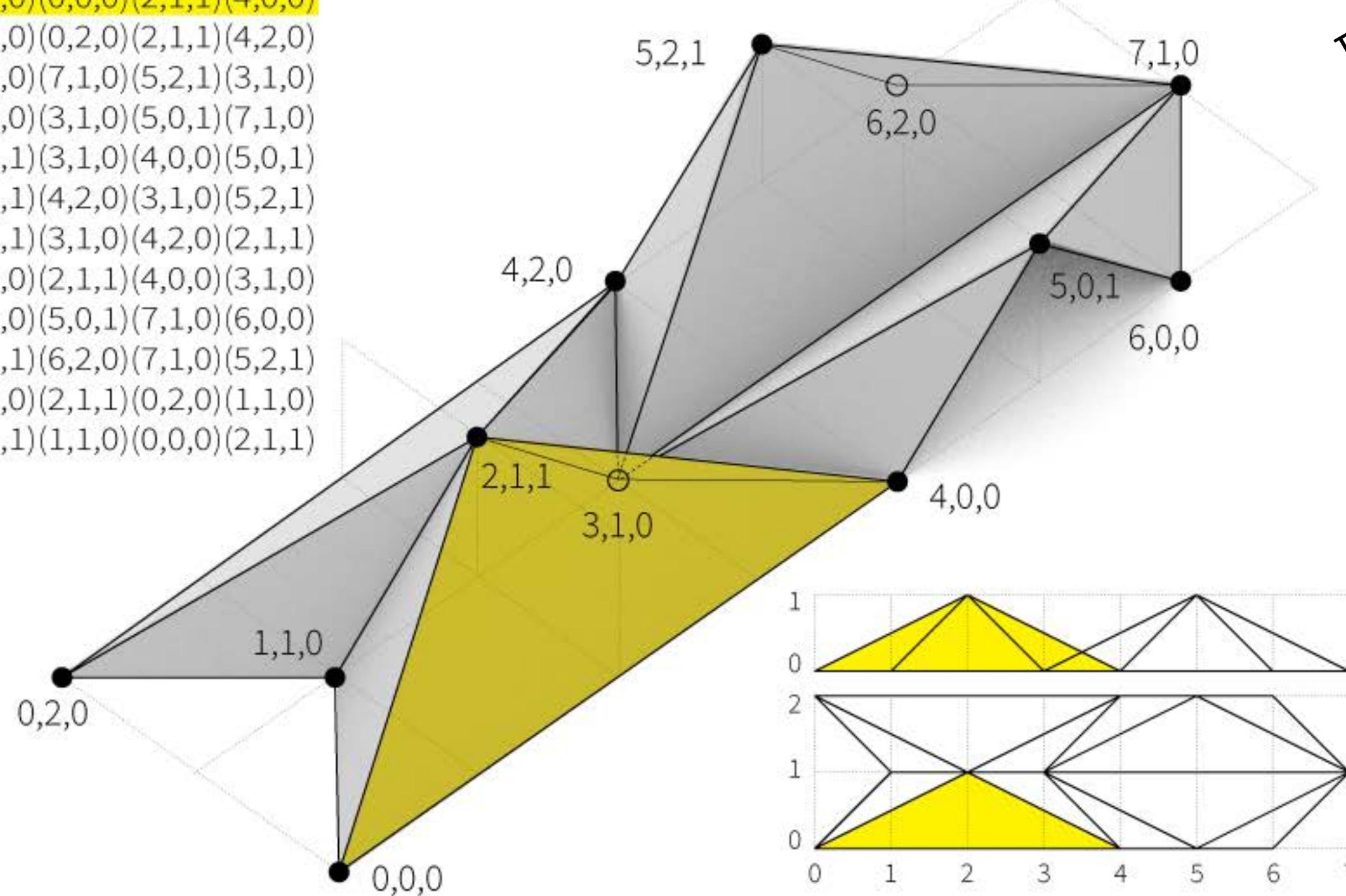
mark keller

New geometries require
new methods: Fold
Mapping is a unit based
method for algorithmically
generating folded surfaces.

Fold Mapping 2.

VERTEX (X,Y,Z)

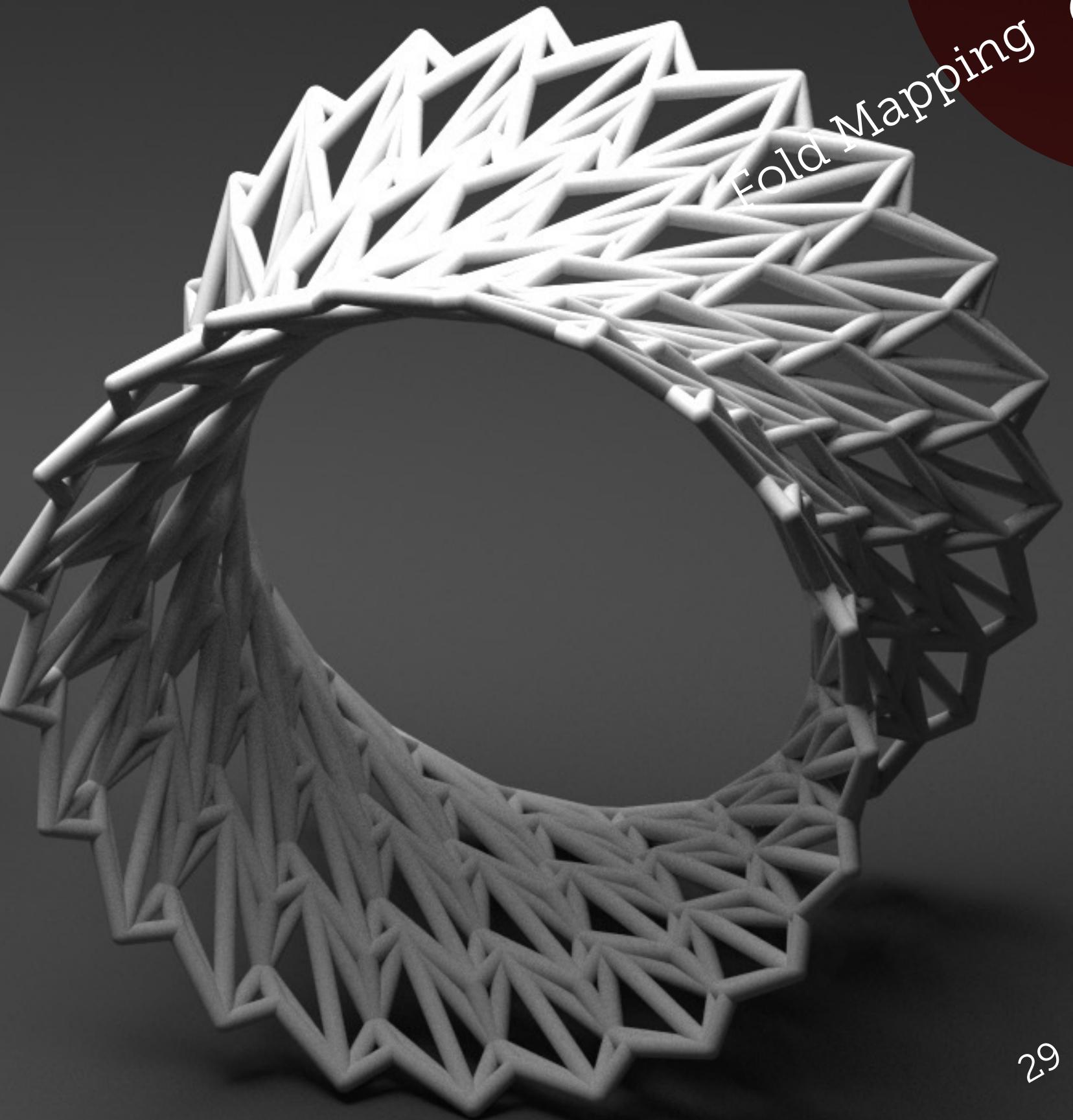
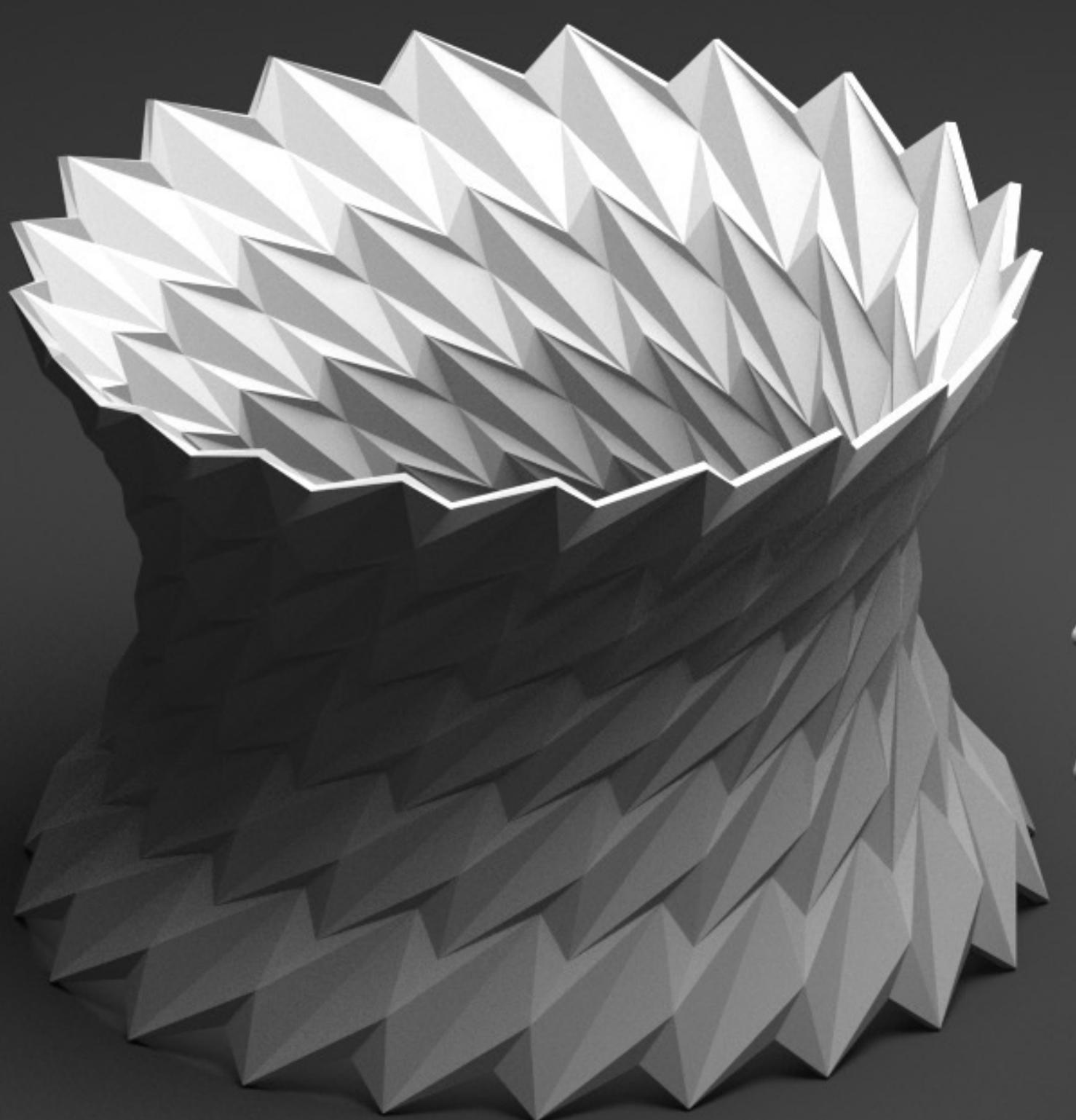
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 (7,1,0)(3,1,0)(5,0,1)(7,1,0)
 (5,0,1)(3,1,0)(4,0,0)(5,0,1)
 (5,2,1)(4,2,0)(3,1,0)(5,2,1)
 (2,1,1)(3,1,0)(4,2,0)(2,1,1)
 (3,1,0)(2,1,1)(4,0,0)(3,1,0)
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 (5,2,1)(6,2,0)(7,1,0)(5,2,1)
 (1,1,0)(2,1,1)(0,2,0)(1,1,0)
 (2,1,1)(1,1,0)(0,0,0)(2,1,1)



Fold Mapping

new geometries

- › Complex Folding
- › Relationship to Nature
- › The Fold, Fold/Unfold > Shape Change



Fold Mapping 2.

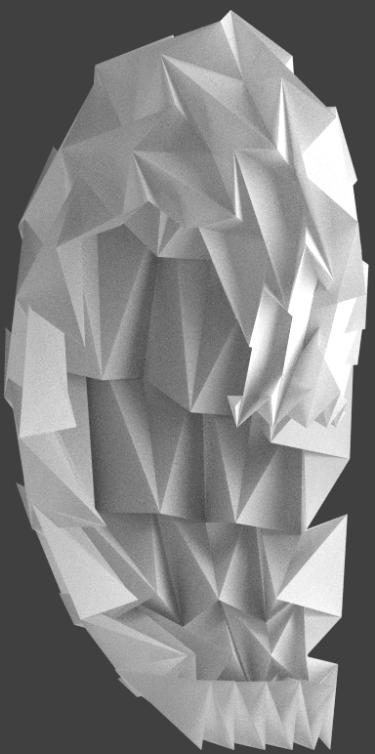
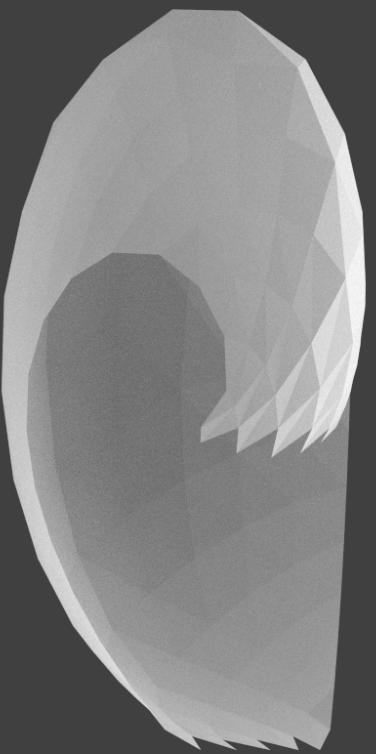
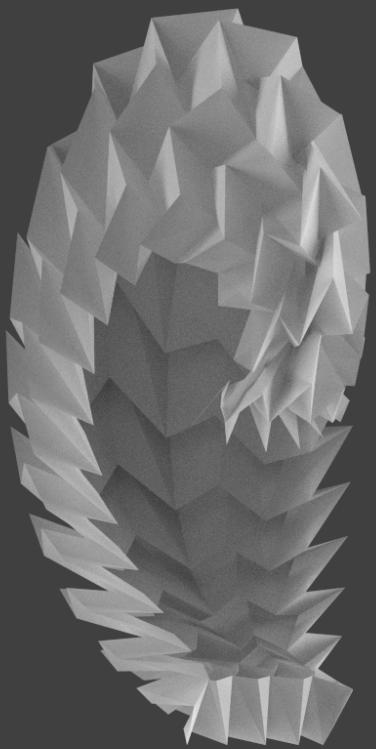
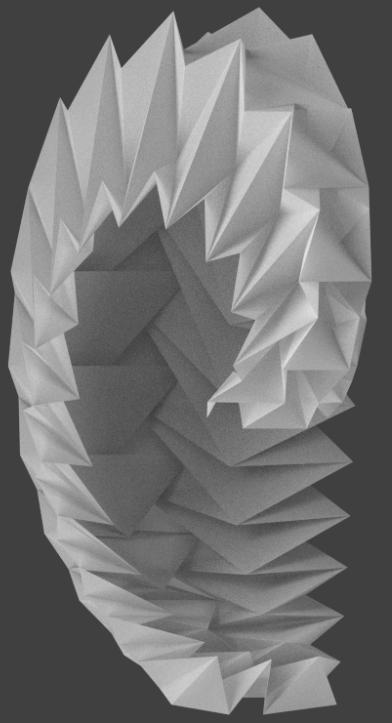
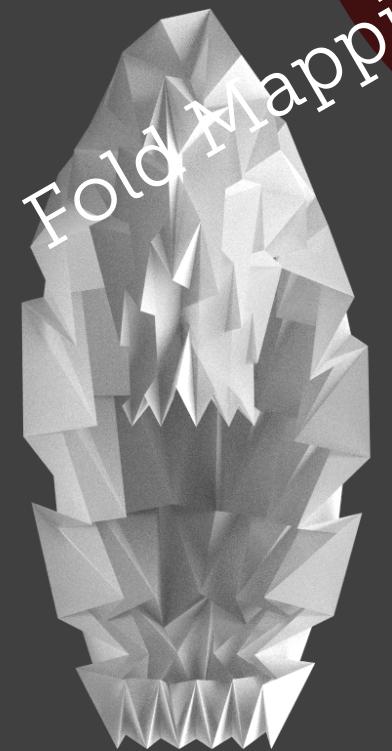
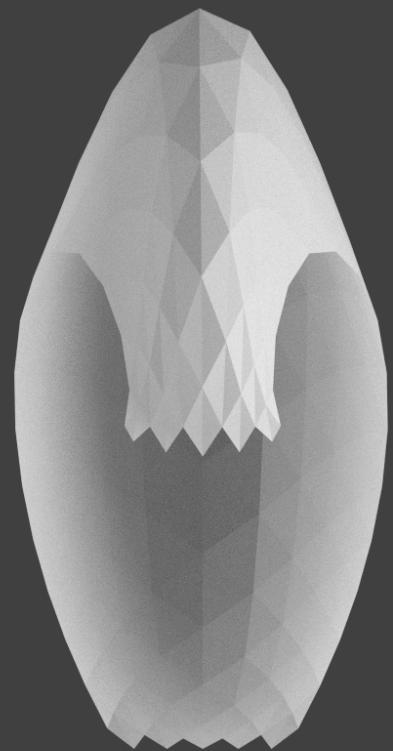
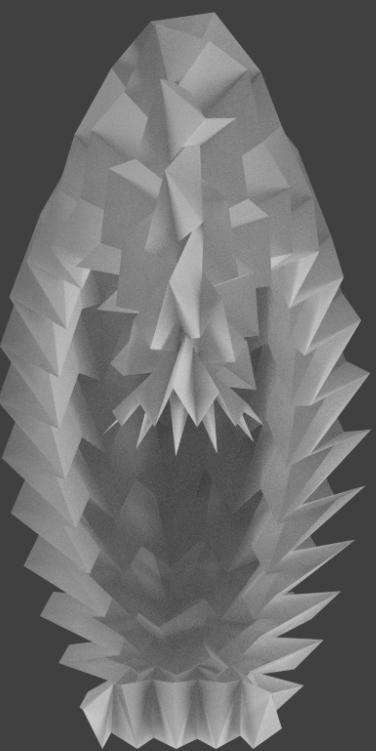
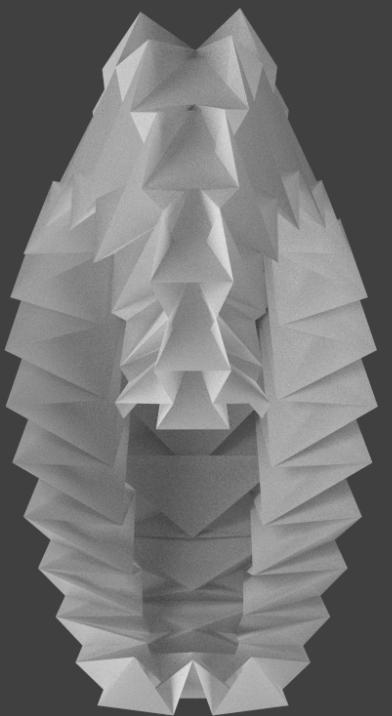
new geometries

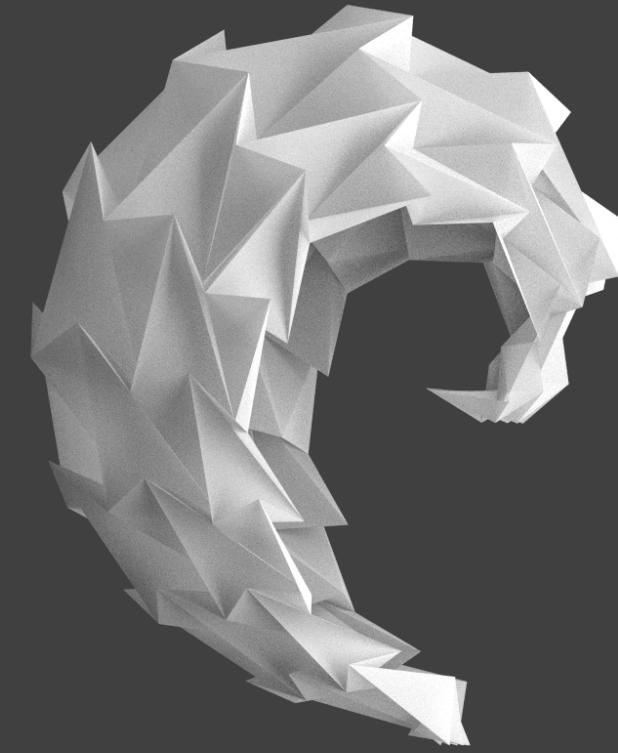
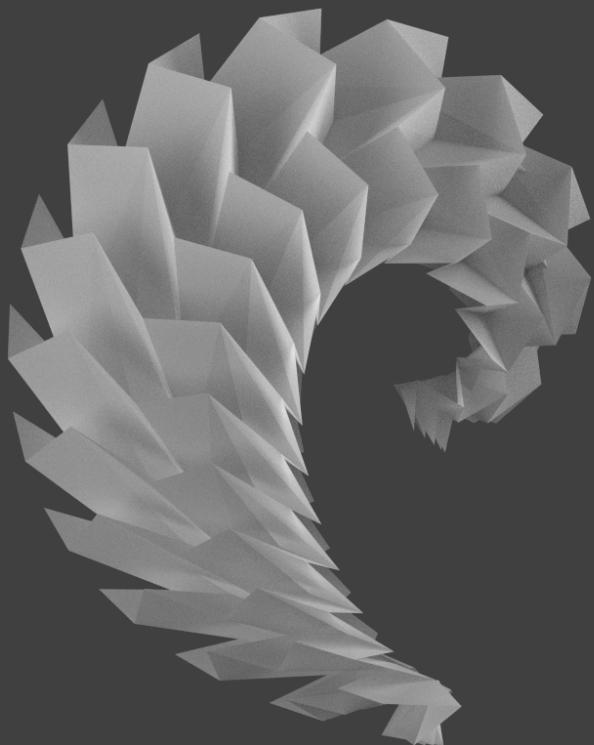
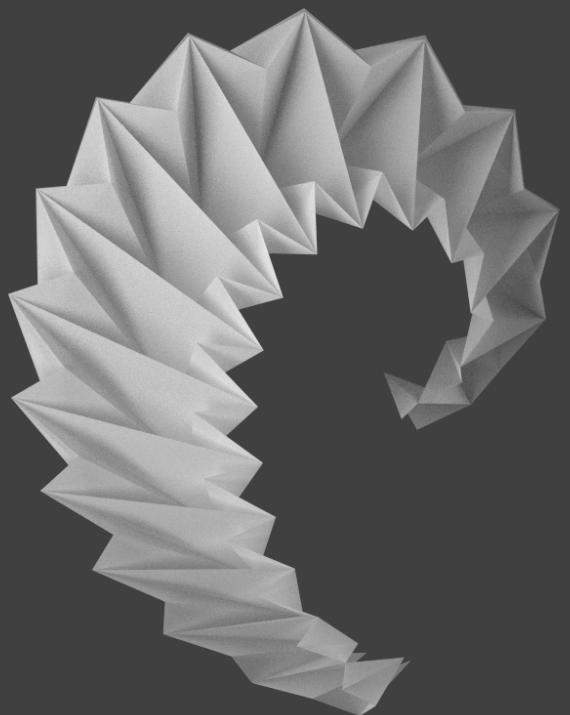
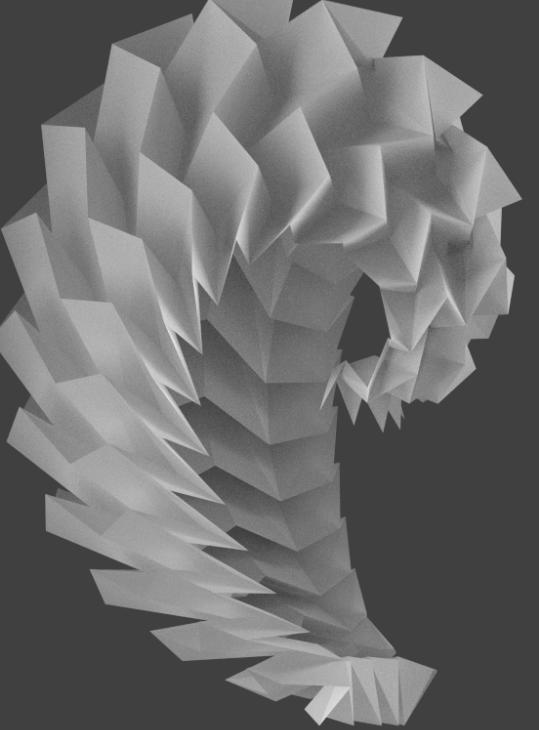
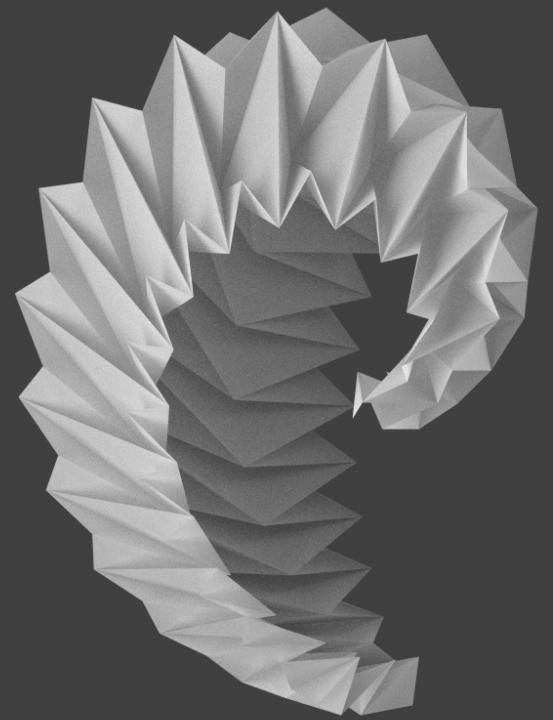
- › Complex Folding
- › Relationship to Nature
- › The Fold, Fold/Unfold

new geometries

- › Complex Folding
- › Relationship to Nature
- › The Fold, Fold/Unfold

Fold Mapping





Fold Mapping 2.

3. Fold Printing

The process of printing
a rigid fold pattern on a
flexible membrane.

new materials

- Longevity
- Matriability
- Complex foldability

markkister

New Material processes
enable rapid prototyping
and production of folded
surfaces.

new materials

- Longevity
- Matriability
- Complex foldability

Fold Printing

3.

BAO BAO // MIYAKE
Fabric/Mesh flexible
+ rigid bonded plastic



Fold Printing

3.



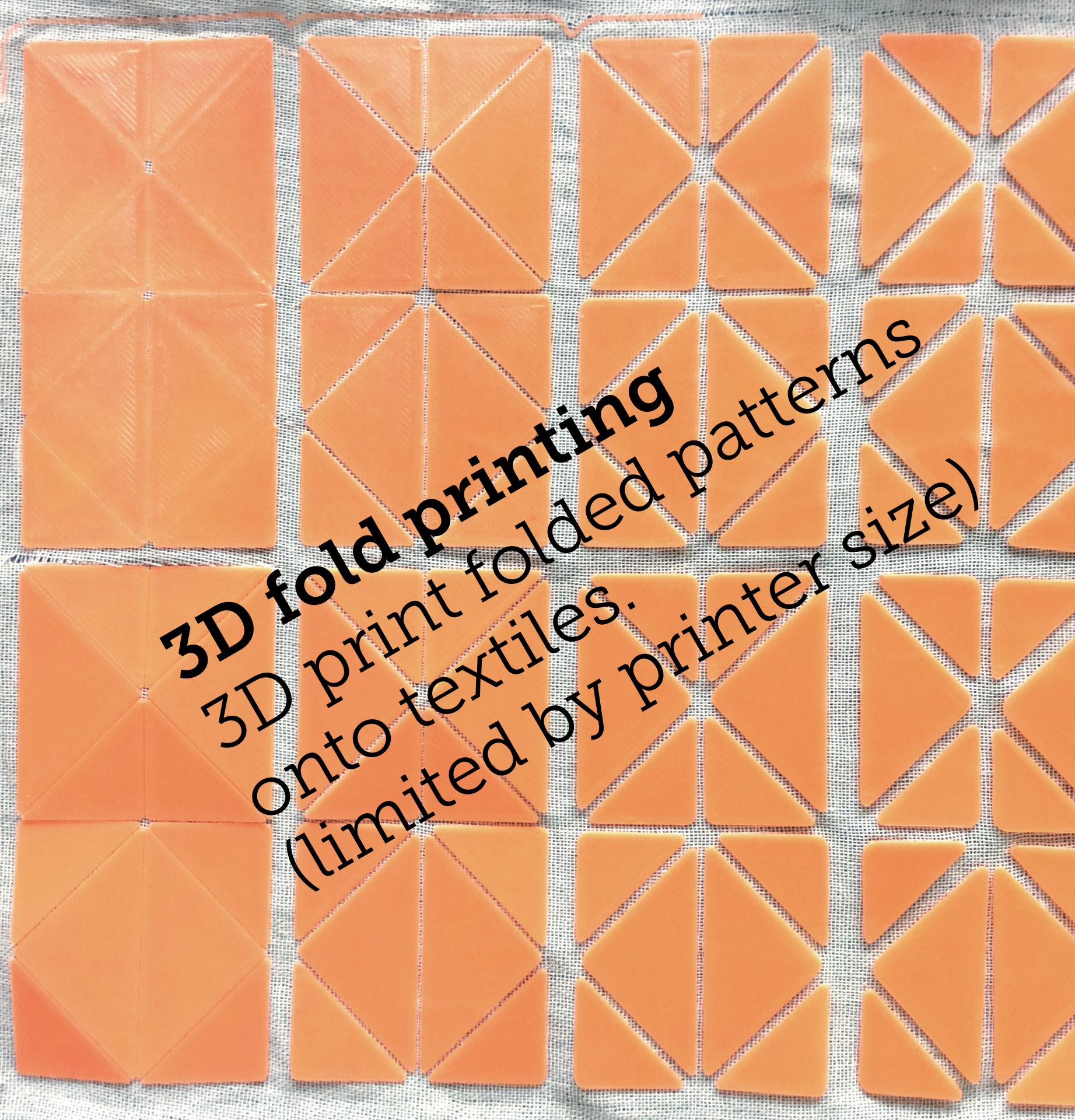
Textile electroplating
Wearable Metal Origami
Tine de Ruysser (PhD @ RCA)
Electroplated textiles (bespoke
process)

new materials

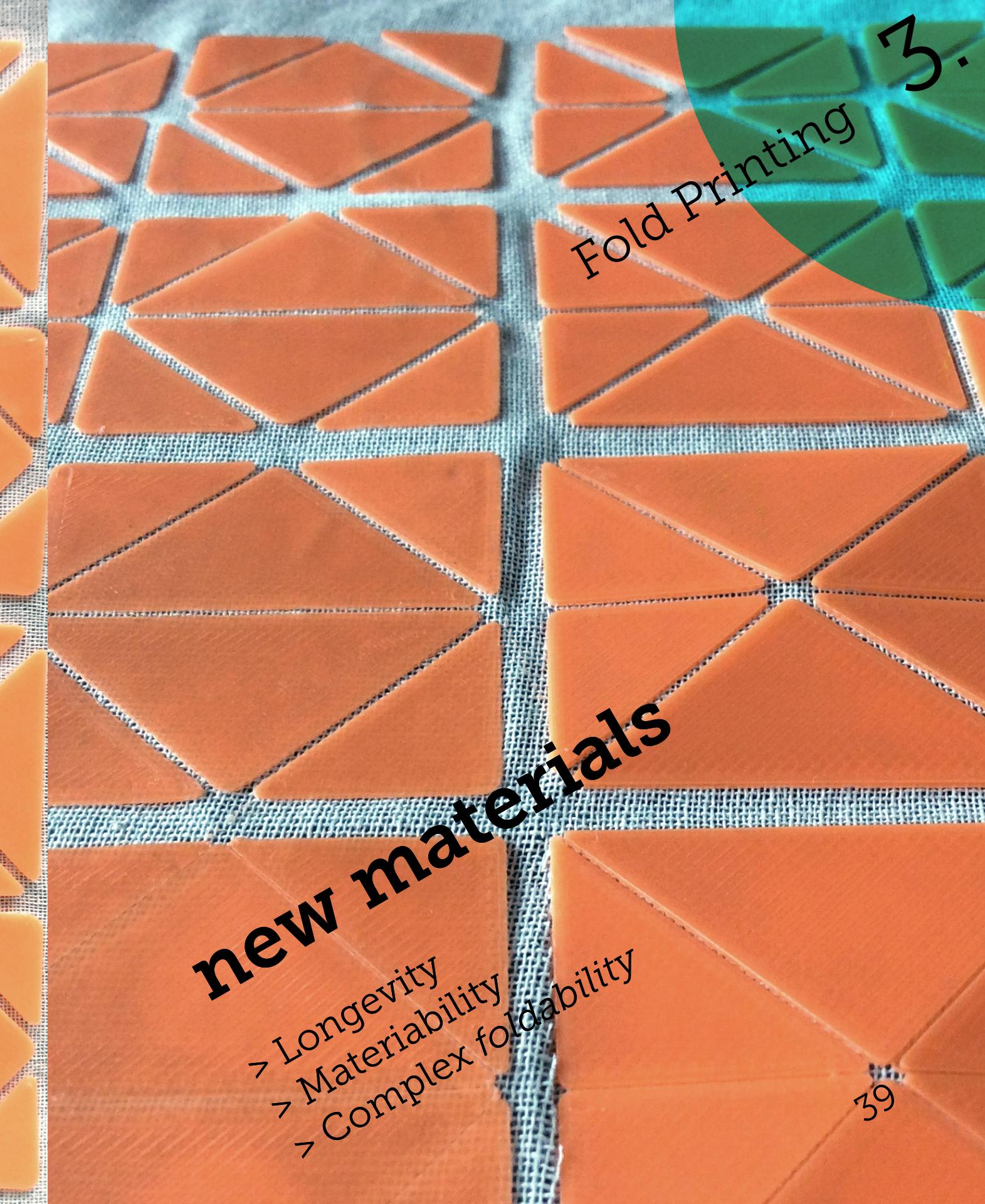
- › Longevity
- › Matriability
- › Complex foldability

Fold Printing

3.

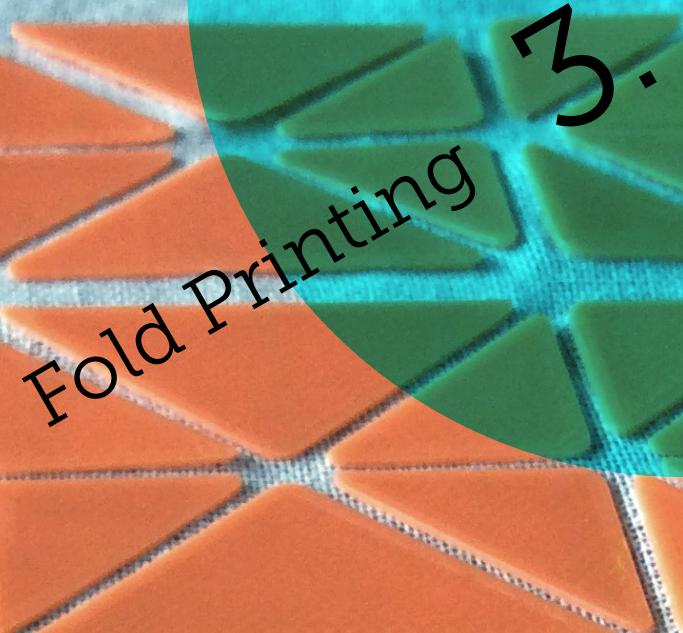


3D fold printing
3D print folded patterns
onto textiles.
(limited by printer size)



new materials

- › Longevity
- › Materiability
- › Complex foldability



Resin printing

'Screen printing' resins folded patterns onto textiles, especially non-woven textiles such as felt.
(limited by screen size)

new materials

- › Longevity
- › MATERIABILITY
- › Complex foldability

Fold Printing

4. Soft Robotics

Fabrication of Soft actuators
from composites of elastic
and non-elastic materials.

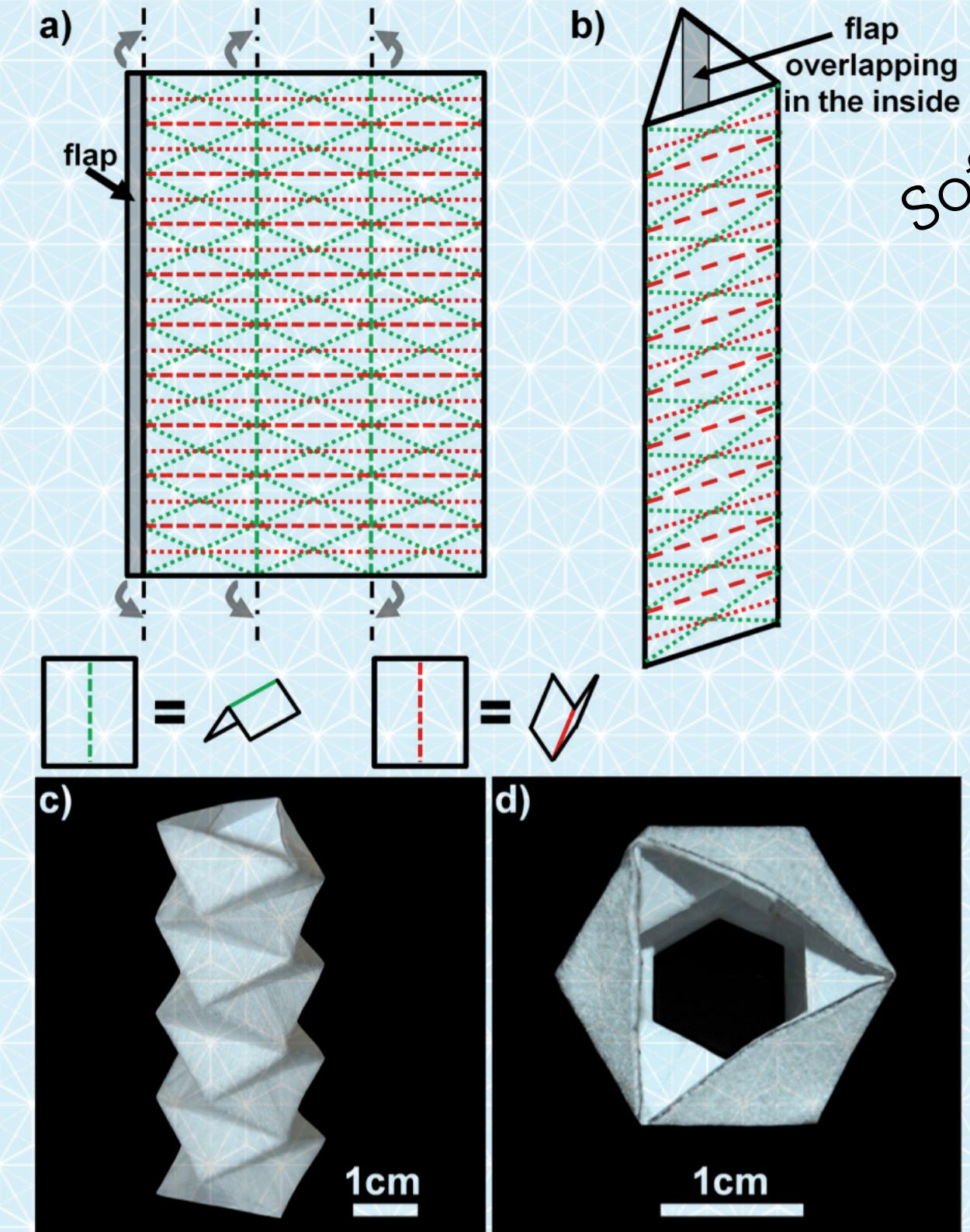
oribotic surfaces

- Time > Fold/Unfold
- Interactivity
- Seamlessness

Mark Weiser

Soft Robotics Elastomeric Origami

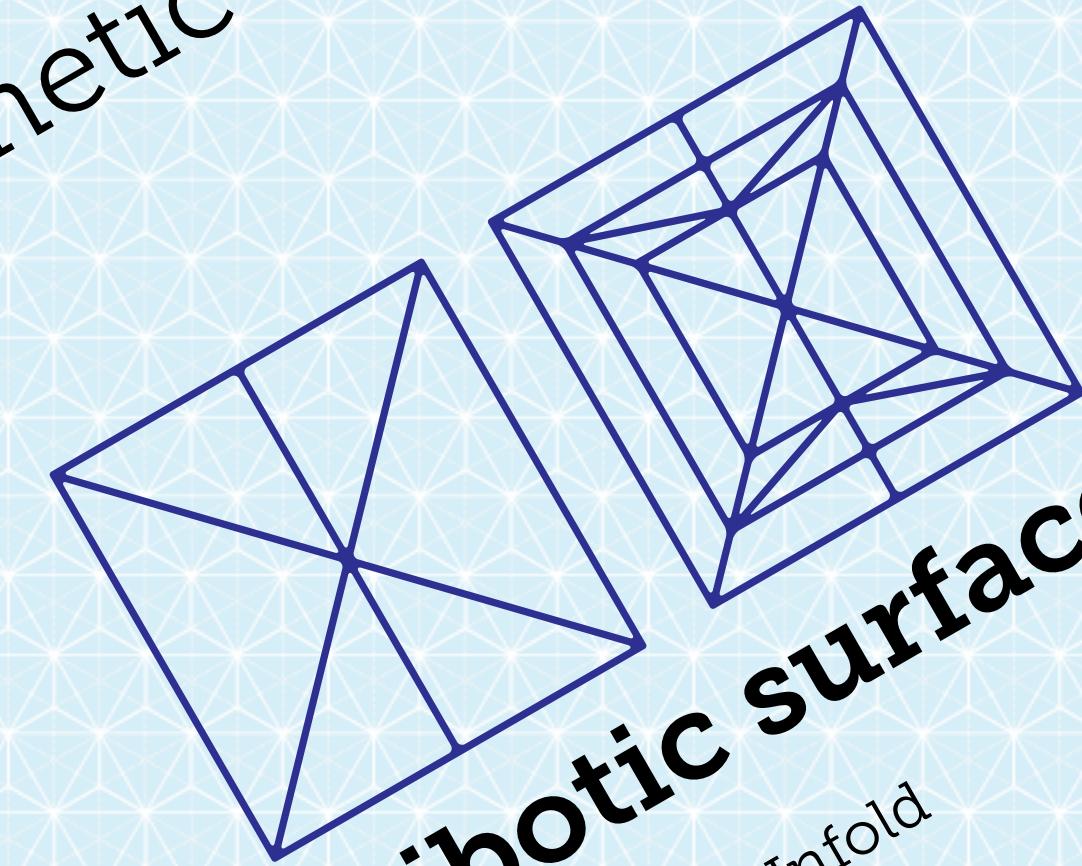
Martinez, R. V., Fish, C. R., Chen, X., & Whitesides, G. M. (2012). Elastomeric Origami: Programmable Paper-Elastomer Composites as Pneumatic Actuators. *Advanced Functional Materials*, 22(7), 1376–1384. doi:10.1002/adfm.201102978



4.
Soft Robotics

Pineapple muscle

Air-tight valve in the shape of the folded ananas-pattern, expansion and contraction is sympathetic to shape of folded pattern.

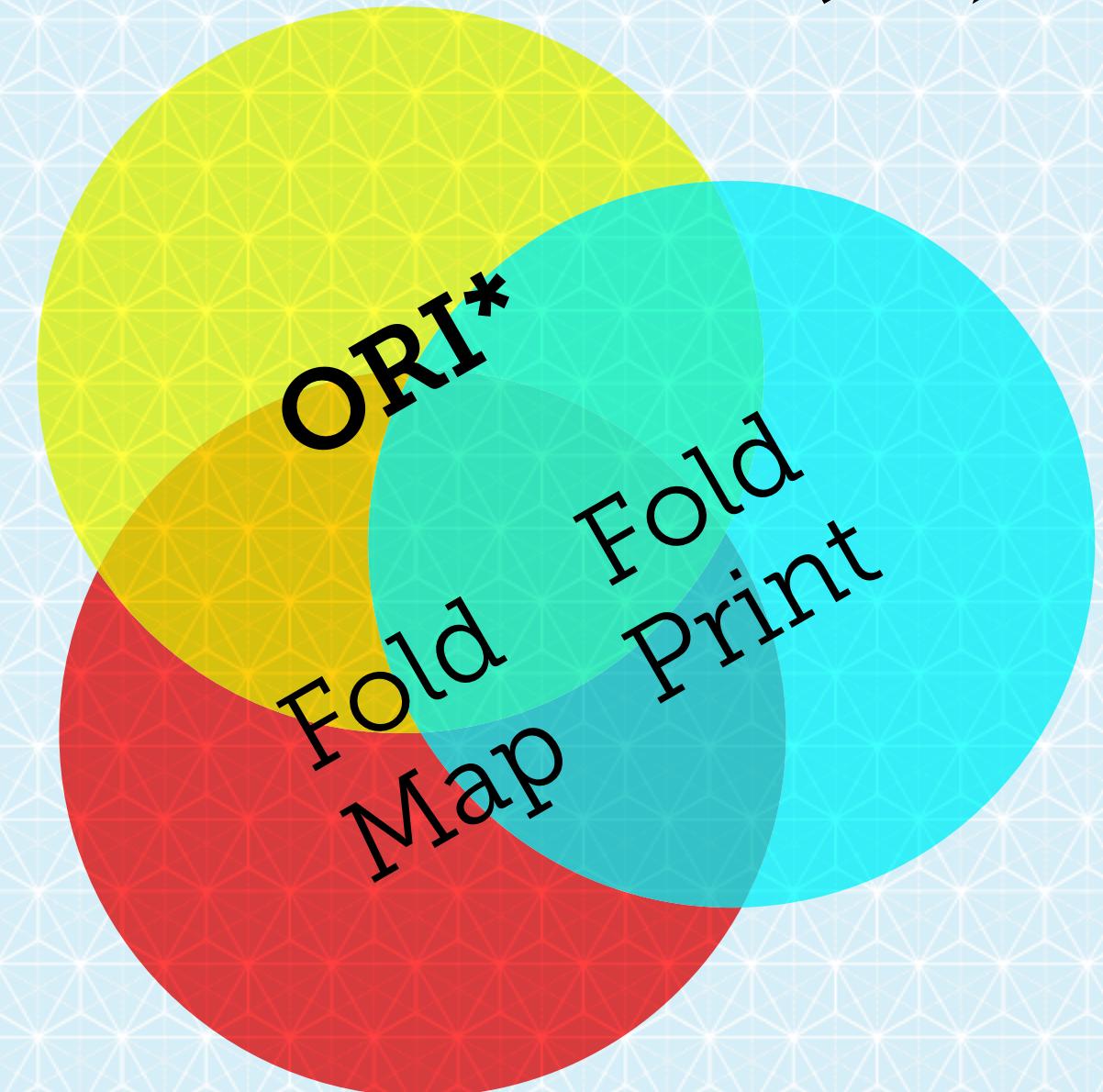
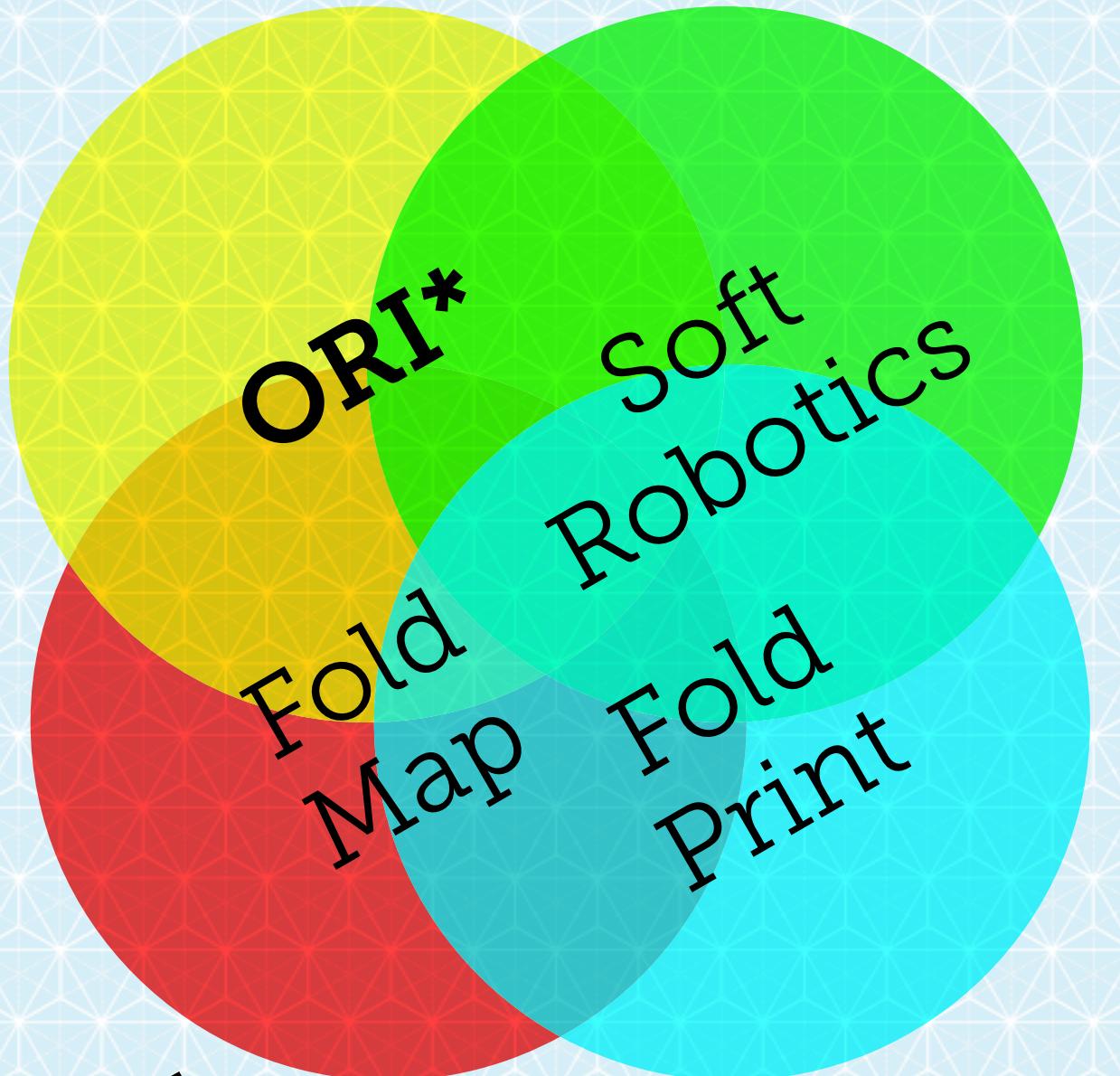


Oribotic surfaces

- Time > Fold/Unfold
- Interactivity
- Seamlessness

Soft Robotics

4.



Mark Weiser

