

DNHG LECTURE

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**Biomimicry: How nature
inspires design**





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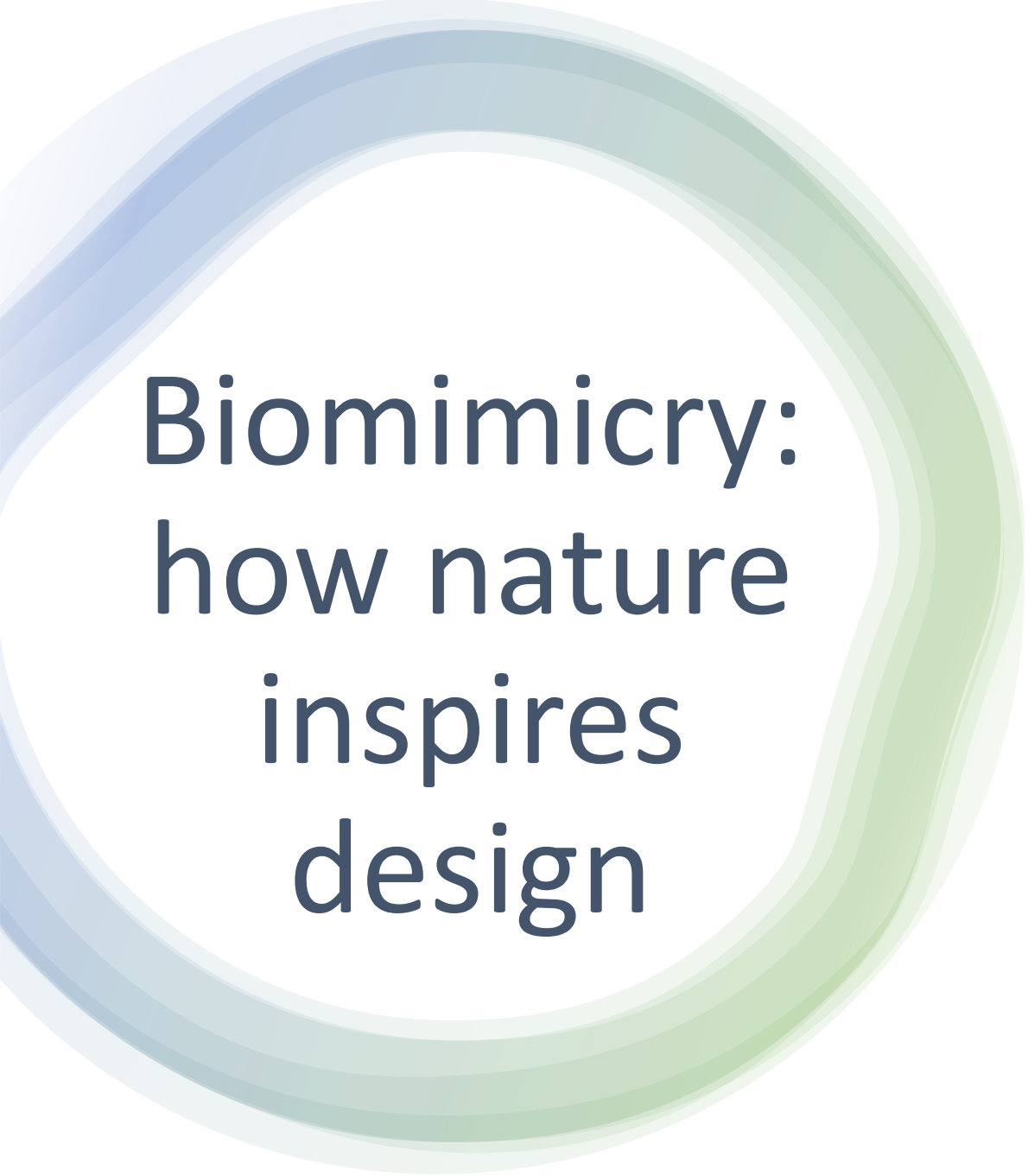
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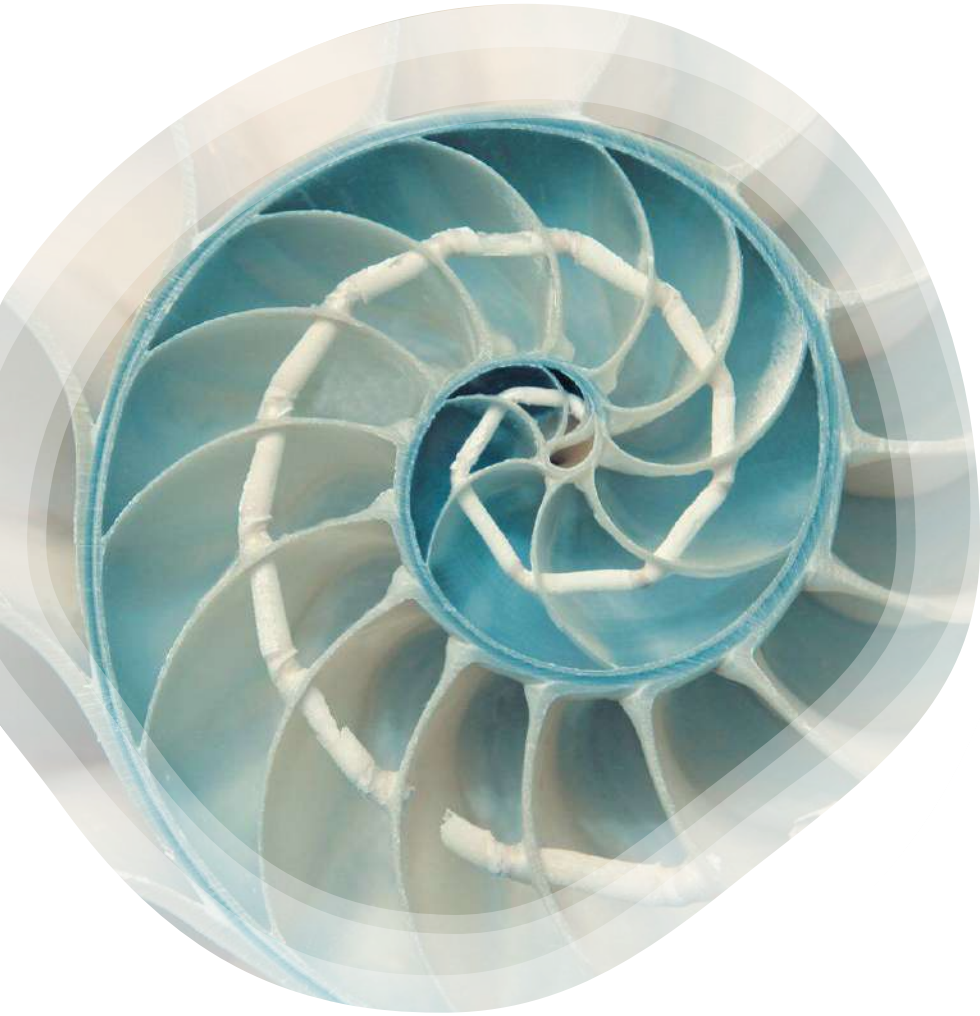
Q&A



Biomimicry: how nature inspires design

The terms 'biomimetics' and 'biomimicry' derive from the Ancient Greek words : **βίος** (**bios**), which means life; and **μίμησις** (**mīmēsis**), which means imitation, from μιμεῖσθαι (mīmeisthai), to imitate, from μῖμος (mimos), the actor

What is biomimicry?



Biomimicry is a practice that learns from and mimics the strategies found in nature to **solve human design challenges** — and **find hope** along the way.

- Biomimicry Institute

What is biomimicry?



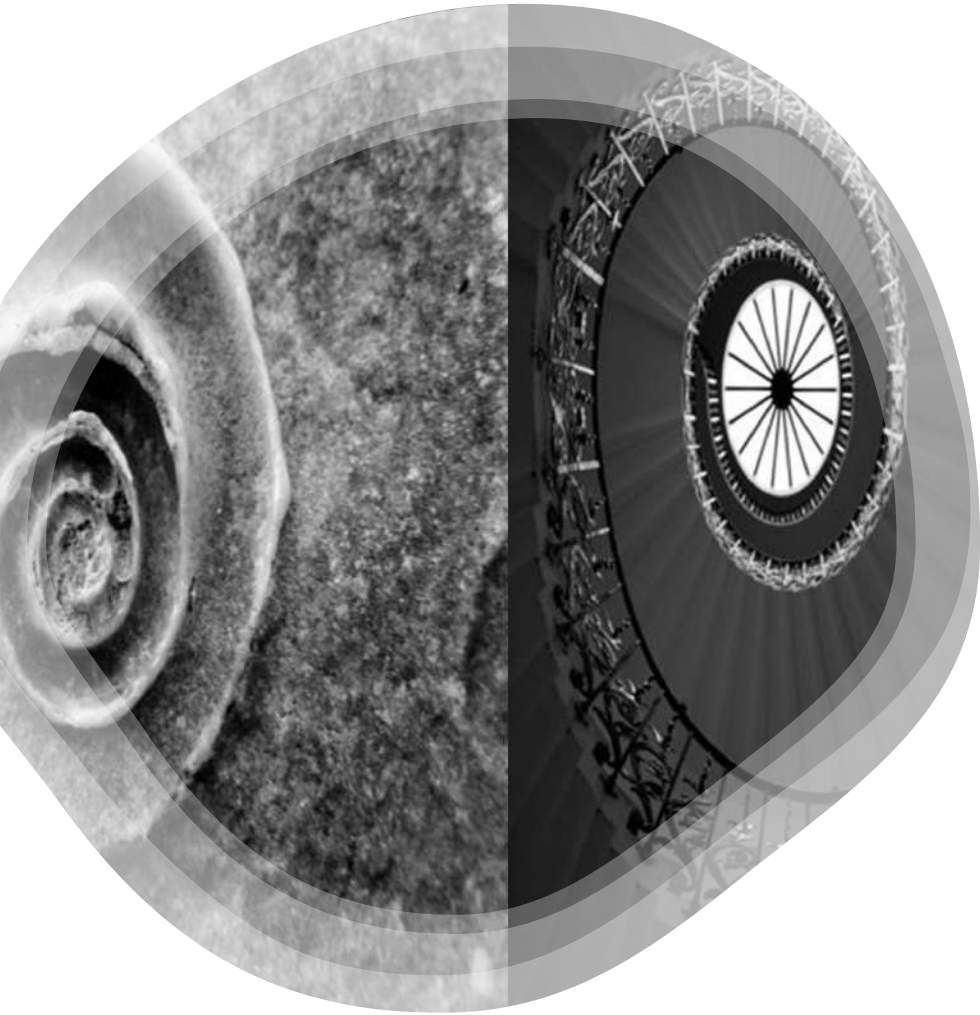
There are three types of biomimicry:

1. is copying **form** and **shape**;
2. is copying a **process**, like photosynthesis in a leaf;
3. is mimicking at an **ecosystem's level**, like building a nature-inspired city.

- Janine Banyus

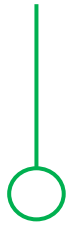
What is biomimicry?

Humans were always inspired by the
beauty of Nature in real life design and
architecture



When did it all start?

Egyptian
Pyramids



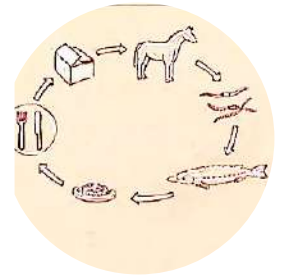
Icarus &
Daedalus



Velcro



Eastgate
Centre



2470 BC

2000 BC

1550 BC

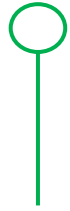
1500 AC

1955 AC

1990s AC

1996 AC

2000s AC



Chinese
Umbrella



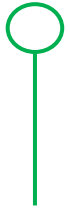
Leonardo Da Vinci
Flying Machines



Bullet Train



Circular
Economy



What have we learned?

While hunting in the Swiss Alps with his dog, George de Mestral noticed that **burrs in the woods stuck** onto his clothes and his dog's fur.

Burr is a seed from the Burdock plant that is covered in **tiny hooks**. These hooks make it easy to attach to an animal's fur, allowing the seed to travel long distances before **germinating**. This helps the plant to spread its seeds over a wider area.

Velcro® was inspired by these burr seeds and has one side made up of tiny hooks, while the other side is covered in tiny loops.

Product Design: Velcro



What have we learned?

Sofa So Good Janne Kyttanen is inspired by the Anatomy of Silkworm Cocoons and Spider Webs.

It is a very strong structure and at the same time very lightweight. It was 3D printed in 6000 layers of raisin material.

Interior Design: Sofa



What have we learned?

The tower's overall design was inspired by the geometries of a regional desert flower - Hymenocallis flower or 'Spider Lily', which is known for its long petals extending out from its centre - and the patterning systems embodied in Islamic architecture.

As the tower rises from a flat base, setbacks occur in an upward spiraling pattern, reducing the building's mass as it reaches skyward. At the pinnacle, the central core emerges at the top and culminates in a sculpted spire.

Architecture: Burj Khalifa



What have we learned?

'SolarLeaf' bio-reactive façade was
piloted in a residential block in
Hamburg in 2013 .

It generates **renewable energy**
from algal biomass and **solar**
thermal heat and offers **dynamic**
shading as more daylight available,
more algae grows, more shading
for the building.

Architecture: bio-reactive
façade





What have we learned?

‘AirBubble’ creates a purified microclimate for children to play in with the use of micro-algae. This playground needs two sources of power: **solar energy** and **kids’ play**: the inexhaustible and renewable fuels of the AirBubble that can be obtained effortlessly...

Architecture: Biotech
Playground

What have we learned?

Abalone Shell

Material: Nacre

Structure: Layer by layer

Stronger than High-tech Ceramics

3D printing

Additive printing

Harmful materials and glues?

Construction: 3D Printing





What have we learned?

We can learn from nature's 3D
printers since...

*"Nature uses life-friendly
chemistry, which is nontoxic and
water-based, and which does not
require high heat"*

- Janine Benyus



What have we learned?

Dubai Expo 2020 site – part of the Sustainability Pavilion – Terra – by Grimshaw Architects, there are eighteen, rotating Energy Trees that surround the Pavilion, which mimic the shape of the regional Ghaf Tree, and provide shading and generate electricity.

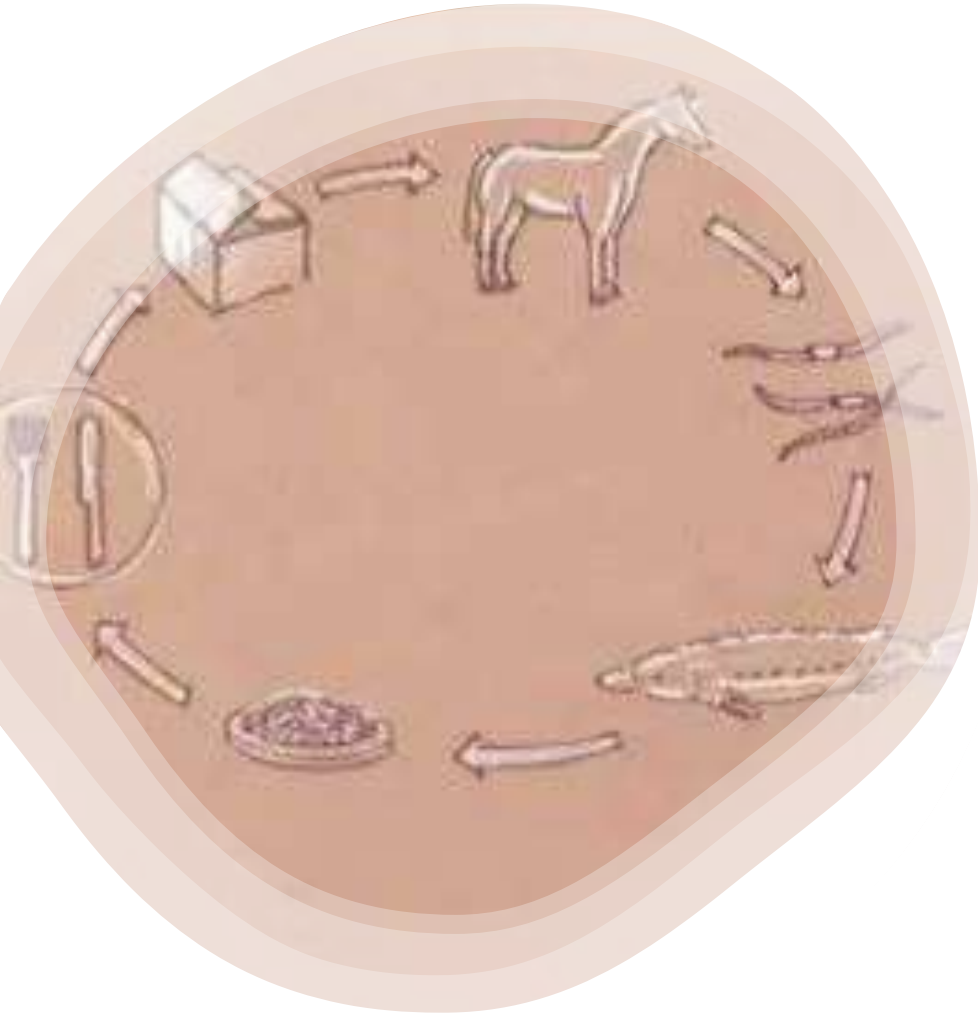
Installations: Energy Trees

What have we learned?

From Cardboard to Caviar project in
Yorkshire, UK:

Waste **cardboard** boxes from local
businesses are **shredded** and given to farms
and equestrian centers to be used as **horse
bedding**. When the stables are cleaned out,
the waste is fed to **worms** in a composting
pit. The fattened worms are fed to the
sturgeon which will produce **caviar**.

Circular Economy

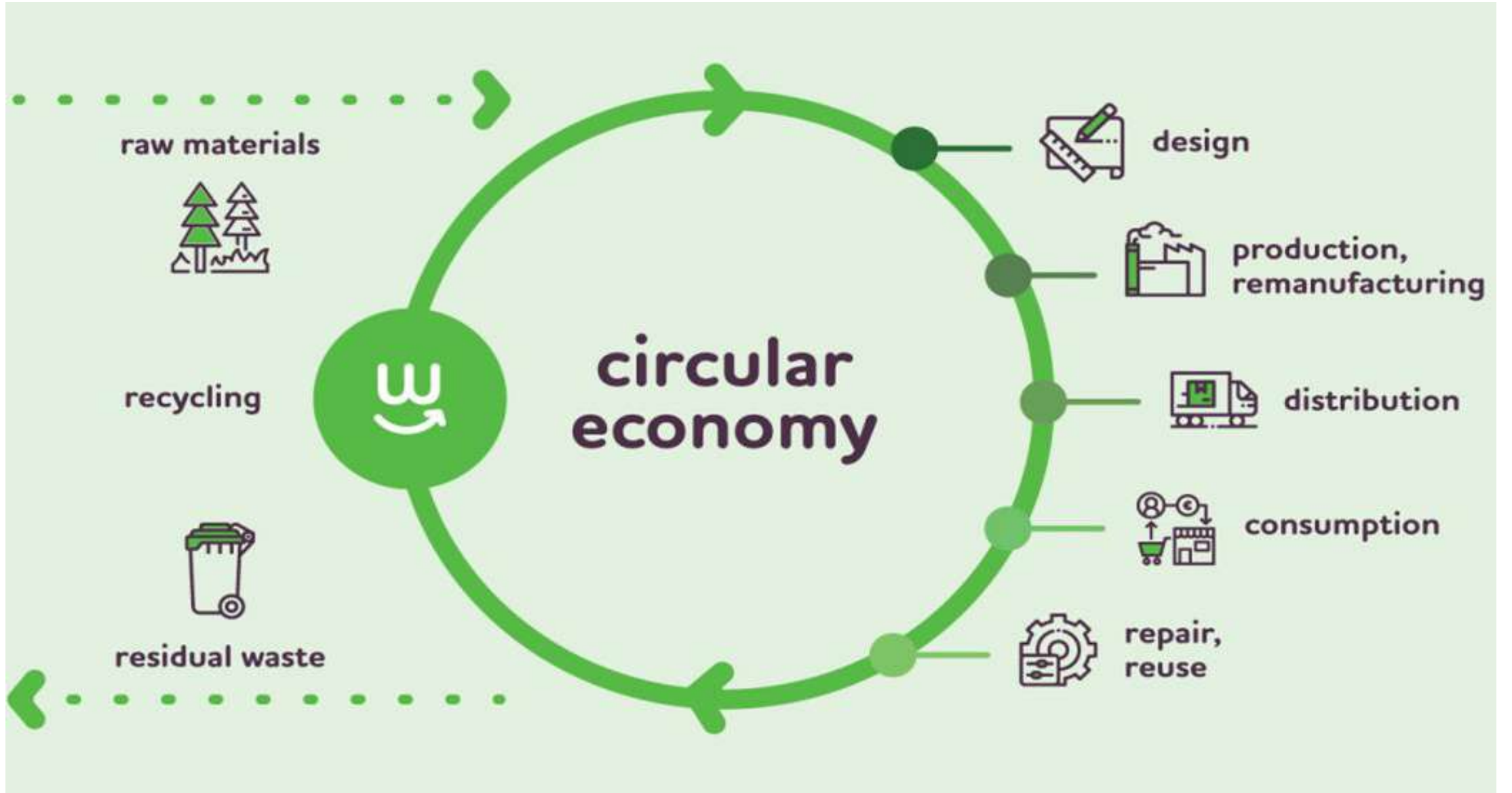




Circular economy and biomimicry

Circular economy is a **Biomimetic Framework** and process in systems design.

Nature is the system that already operates **without waste**, moves from linear economy to sustainable circular economy.



Circular Economy

German Company Loffler

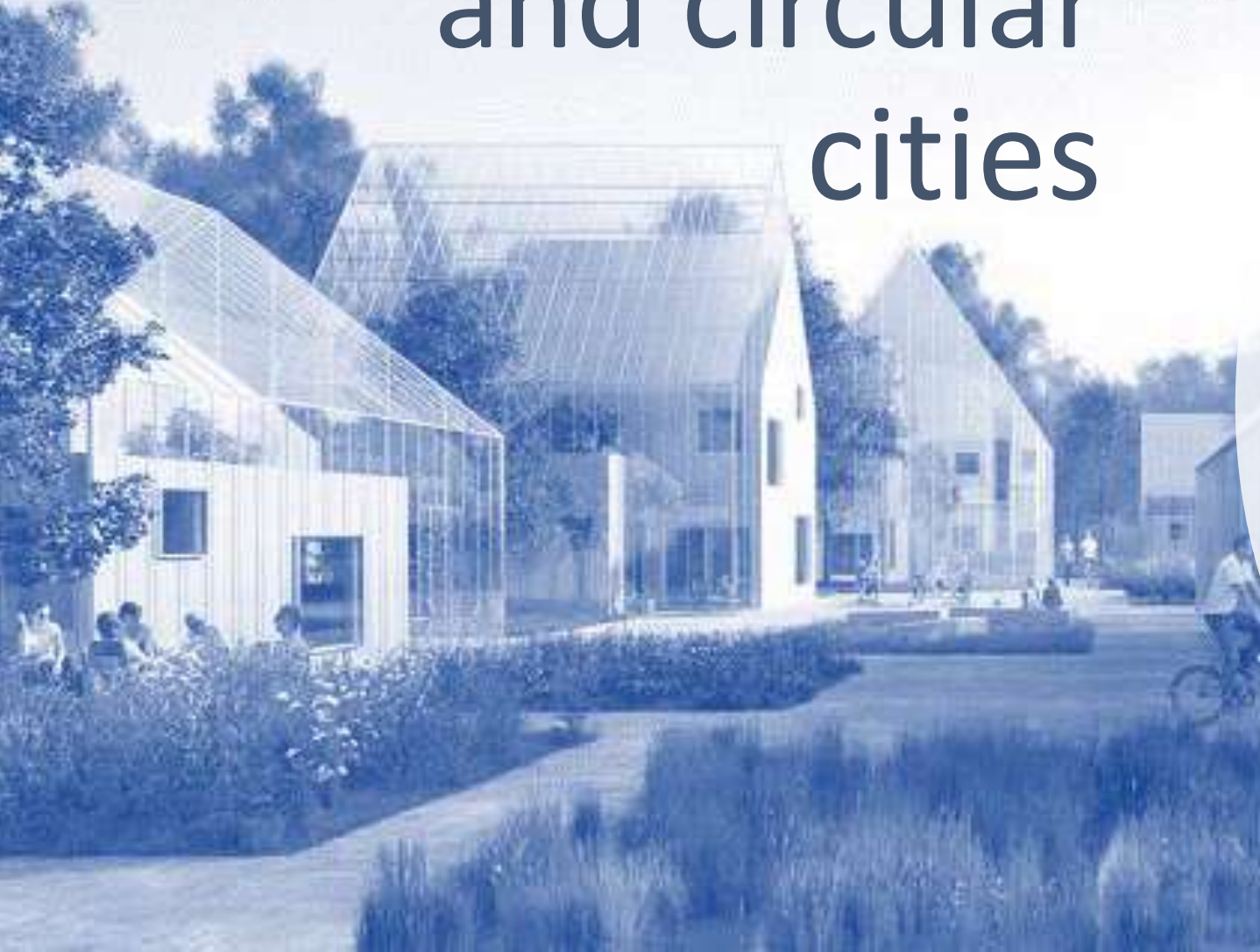


IKEA second life



Examples

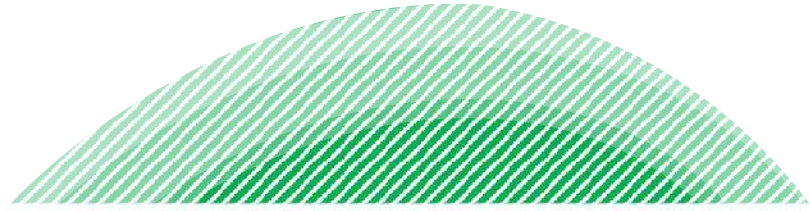
Regenvillages and circular cities



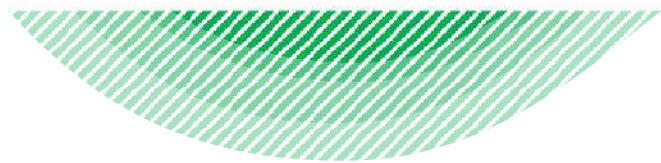
Other
initiatives to
get involved

BIOMIMICRY
FOR HUMANITY





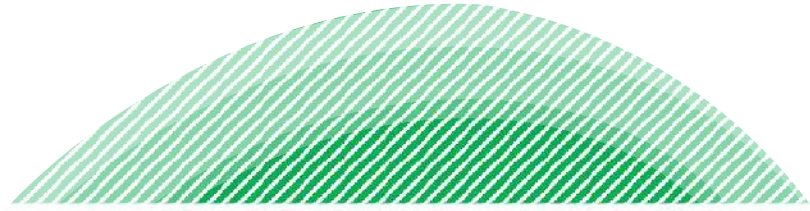
BIOMIMICRY
FOR HUMANITY



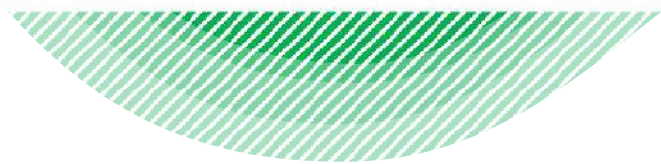
Other Initiatives

Biomimicry for Humanity is a global movement for a better world, close to Biomimicry Greece Research and Innovation.

With Biomimicry we have the opportunity to reimagine humanity and our planet and find solutions to global challenges.



BIOMIMICRY
FOR HUMANITY



Other Initiatives

We want to make global projects and inspire more people through our manifesto.

Every species on the planet has value and has a reason to exist.

We must use compassion and empathy to all species.

Biomimicry teach people to design with a new mindfulness and responsibility to the future. Biomimicry analyzes nature's best ideas and strategies in order to find solutions in human problems.

Nature is intelligent for more than 3.8 billion years so we do need to become our mentor.

USEFUL LINKS

Biomimicry Guild: www.biomimicryguild.com

Institute: www.biomimicryinstitute.org

Biomimicry Newsletter: <http://biomimicry.typepad.com/newsletter>

The Center for Ecoliteracy: www.ecoliteracy.org

www.asknature.org <http://www.biomimicry.info/reviewoftheliterature>

<http://www.biomimicry.info/examples>

Places to intervene in a system - Meadows (whole earth catalog 1997)

<http://www.wholeearth.com/issue/2091/article/27/places.to.intervene.in.a.system>

<http://bioinspired.sinet.ca/content/resources?page=8>

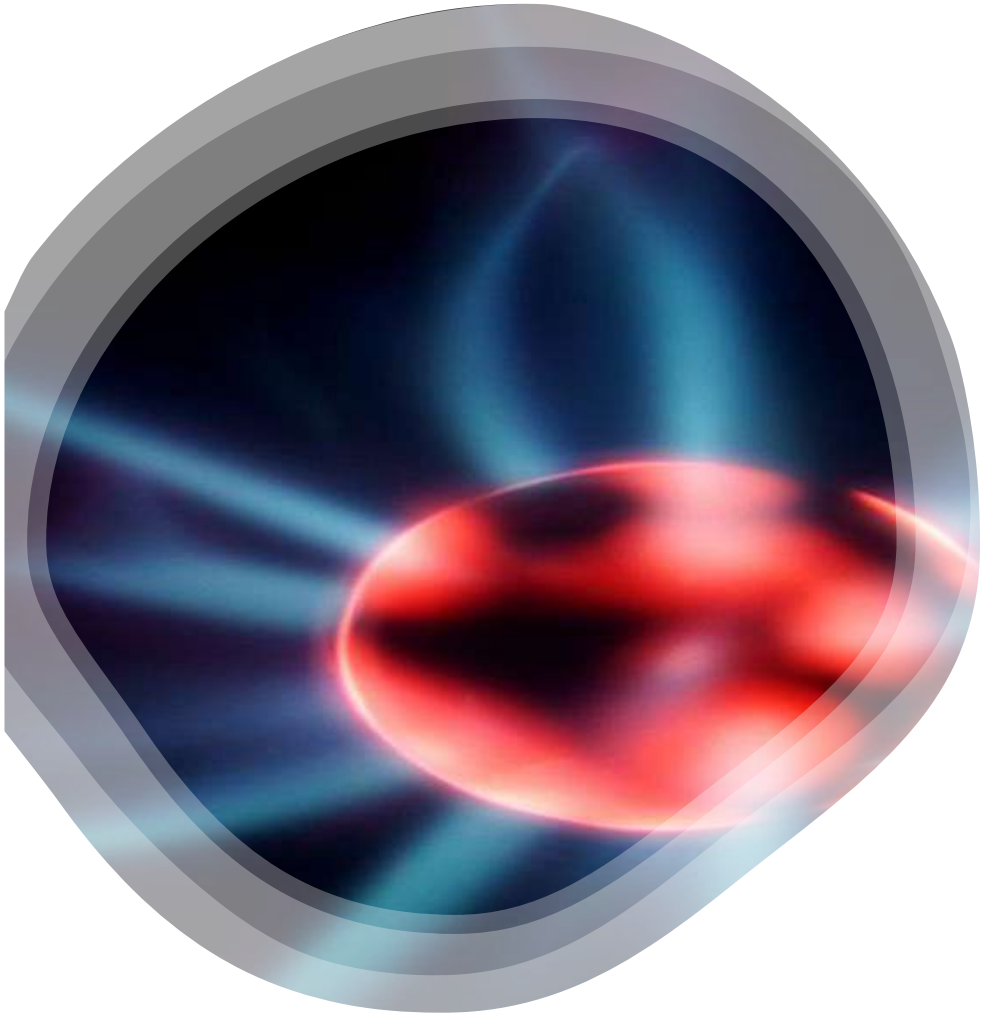
<http://www.cbid.gatech.edu/resourcespage.html>

Biomimicry Greece <http://www.pechakucha.org/cities/heraklion/presentations/biomimicry-greece>



Q + A

GENIUS
NATURE
DESIGN EDUCATION
INTELLIGENT



THANK YOU!!!

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