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Systemic Design Labs (SDL): Incubating systemic design skills through experiential didactics and nature-based creativity

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Systemic Design Labs (SDL): Incubating systemic design skills through experiential didactics and nature-based creativity

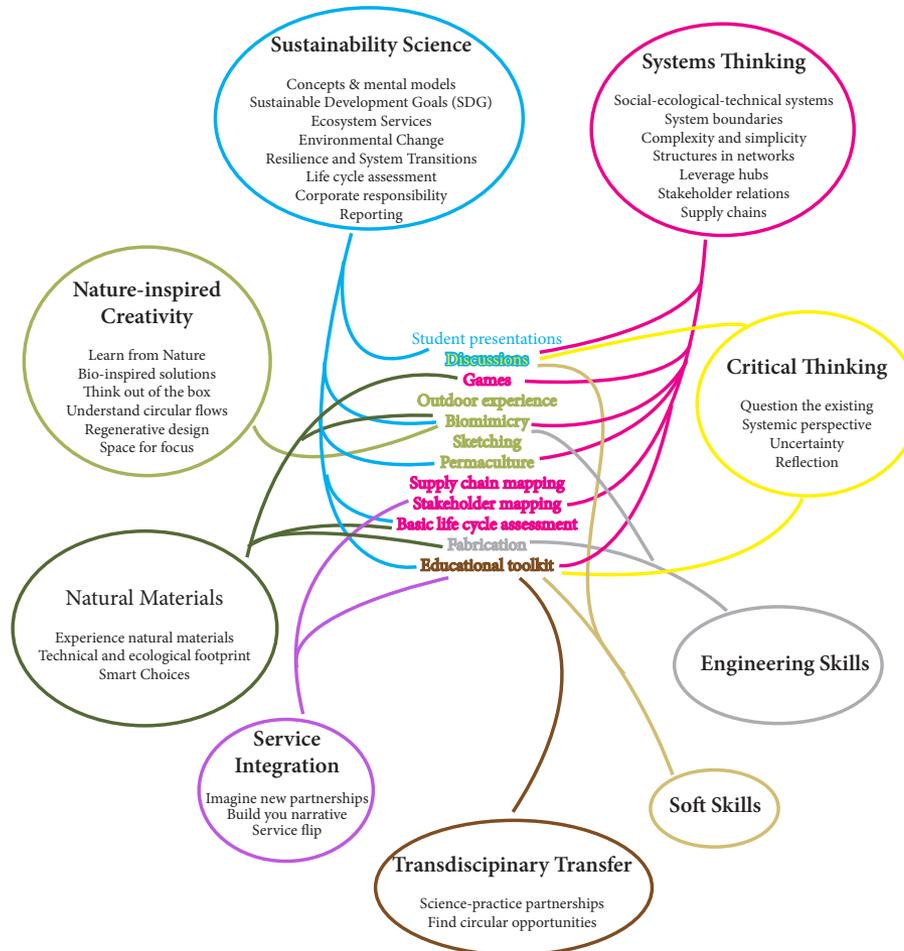
RSD7, Torino

Dr. Tobias Luthe



Systemic Design Labs – goals and learning content

empower students to become change agents for sustainability



Design brief:

Develop an educational Snowshoe Kit

- Build a prototype of an educational snowshoe building kit
- Re-think the functions of a snowshoe: bring kids to snow AND educate about sustainability the experiential way
- Demonstrate systemic design, cradle-to-cradle, upcycling
- Make systemic design experiential for users of the kit
- Partners will co-develop the didactic concept
- The kit will be produced and distributed to schools and outdoor shops

From Vision to Transformation

The Resilience of Snow Sports - Mapping and understanding the system behind

FdSnow 51

Von der Vision zur Transformation – zukunftsfähiger Skisport

Zur Resilienz des Schneesports

Themenbereich: Skihistoriographie/Biografien

Tobias Luthé

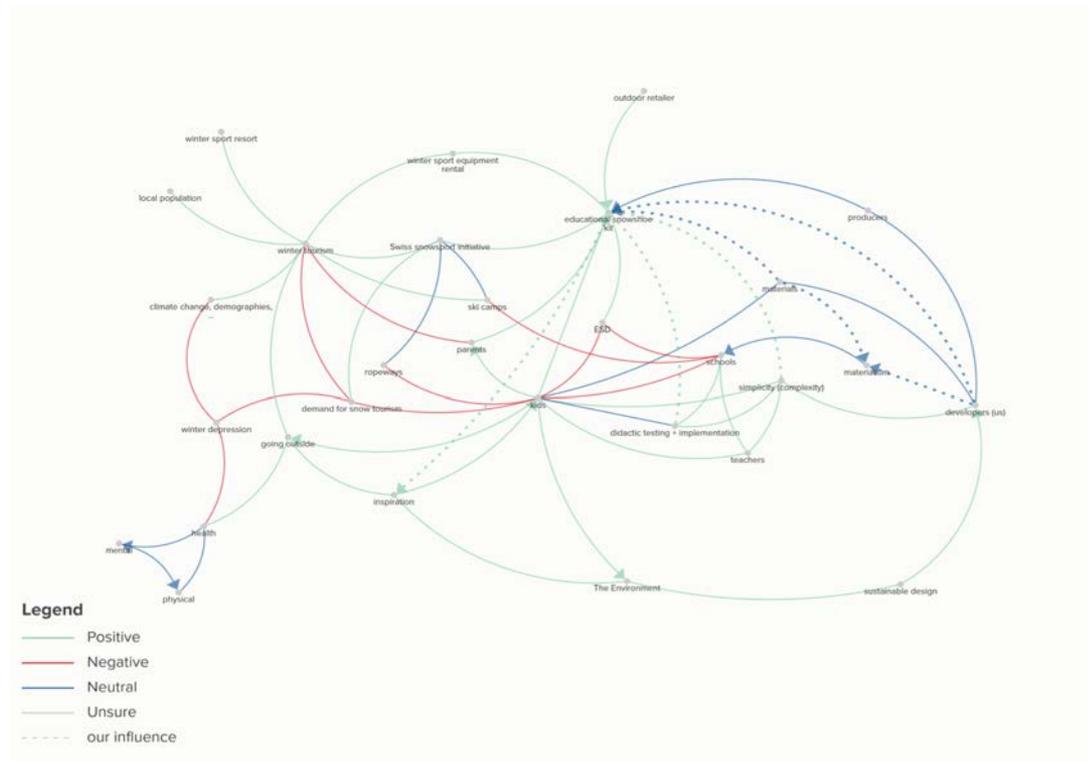
Zusammenfassung: Schneesport ist eine Faszination, der diejenigen erliegen, die das einzigartige, mehrdimensionale Gelingen im Schnee erleben dürfen. Mehrere Tausend Jahre Skitradition führten zu einer Massenindustrie des Wintertourismus, deren Höhepunkt mit dem exponentiellen Bau von Skigebieten in den 1980er Jahren bis zur Jahrtausendwende erreicht war. Der Schneesport diversifizierte sich; viele Wellentäler und –berge der Krisen und folgenden Innovation wurden durchlaufen. Aktuell befindet sich der Schneesport in seiner wohl größten Krise: Klima, gesellschaftliche Werte und Demografie ändern sich rapide, nicht zu Gunsten des Schneesports. Wie resilient, wie anpassungs- und innovationsfähig ist der Schneesport? Welche Vision der Transformation in Richtung einer nachhaltigen Resilienz können wir designen? Nach einer theoretischen Diskussion des Resilienzverständnisses am Beispiel des Schneesports präsentiert dieser Artikel ein konzeptuelles Modell von Nachhaltigkeit, welches uns helfen soll, visionäre, erstrebenswerte Visionen eines nachhaltig-resilienten Schneesports zu entwickeln. Konkrete Handlungsempfehlungen werden dargeboten. Der Artikel schließt mit der zentralen Forderung nach einer systemischen Herangehensweise und der Erkenntnis, dass eine substantielle Transformation mit einer Überprüfung unserer Wertevorstellung und Konsumerwartungen einen bedeutenden Anteil an einem zukunftsfähigen Schneesport besitzen.

Abstract: The Resilience of Snow Sports: From Vision to Transformation Snow sports are a fascination that succumbs to those who have already experienced the unique, multi-dimensional pleasure of gliding in snow. Several thousand years of ski tradition have led to a mass winter tourism industry that peaked with the exponential construction of ski resorts between the 1980s and the millennium change. Snow sports became more diversified over time; they went through many wavy developments of crises and subsequent innovation. At current, snow sports are experiencing their biggest crisis: climate, social values and demographics are changing rapidly, not in favour for snow sports. How resilient, how adaptive and innovative is the snow sports sector? What kind of vision for the transformation towards a sustainable, resilient snow sports model can we design? Following a theoretical discussion of resilience illustrated on the example of snow sports, this article presents a conceptual model of sustainability that aims to help us develop visionary, worthwhile visions of a more sustainable, resilient snow sports sector. Concrete recommendations for action are presented. The article concludes with the need for a systemic approach to solving a complex problem, being aware that a substantial transformation requires the review of our value perception and consumer expectations as significant contributors to resilient snow sports.

1. Faszination Schnee und Bewegung im Wandel

Eines sei vorweg genommen: Schneesport ist ein komplexes System, das von

natürlichen Gelände, die Fragilität des Schneekristalls in all seiner Vielfalt an Ausführungen, die Spuren die wir hinterlassen, die wie eine Handschrift von unserem ganz persönlichen Erleben, Geschichte



SDL course plan

learning competence fields, activities and output

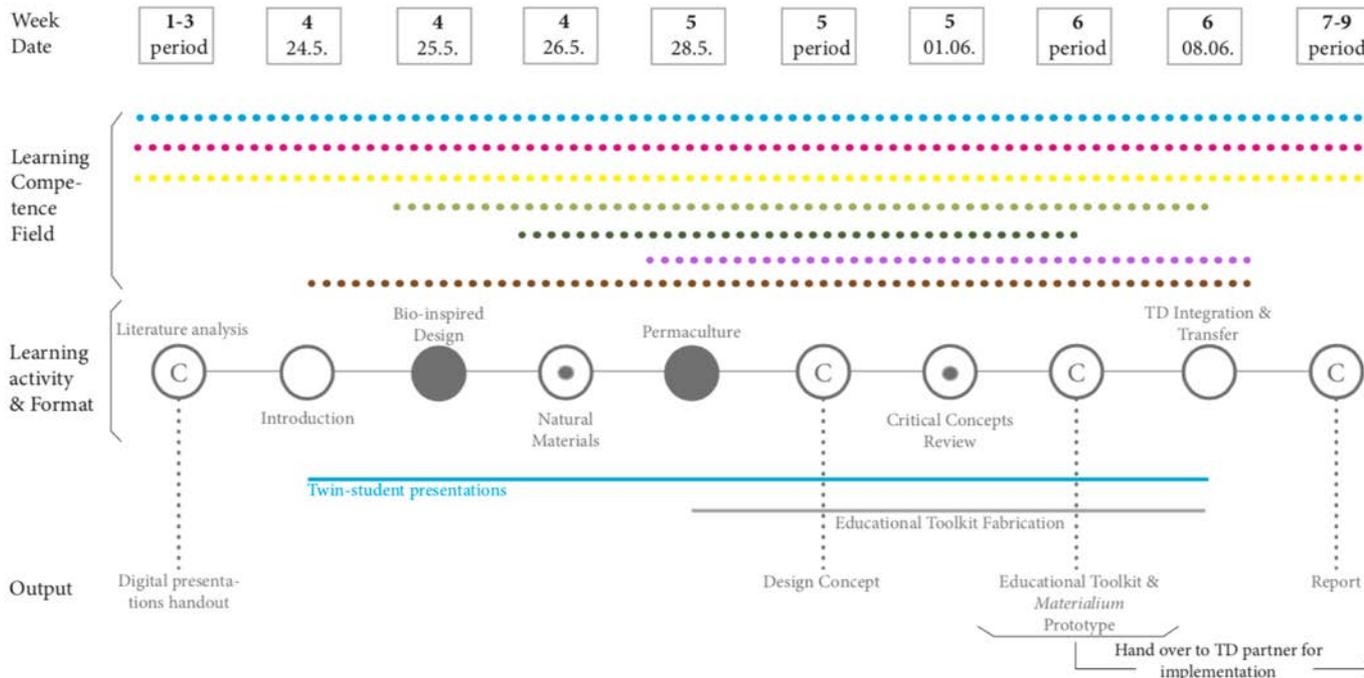
Systemic Design Labs (SDL)

Figure 1. Basic 1st year curriculum overview & quick facts

Type Modular block course in Systemic Design for Sustainability
Target MSc/PhD engineering + interdisciplinary students (>50)
Duration 9 weeks total with 80h coaching and 58h intense contact time
Repetition Annual in spring term for two years - extension planned
Didactics Outdoor experience, nature-inspired innovation, fabrication
Outreach Educational toolkit with increased public outreach

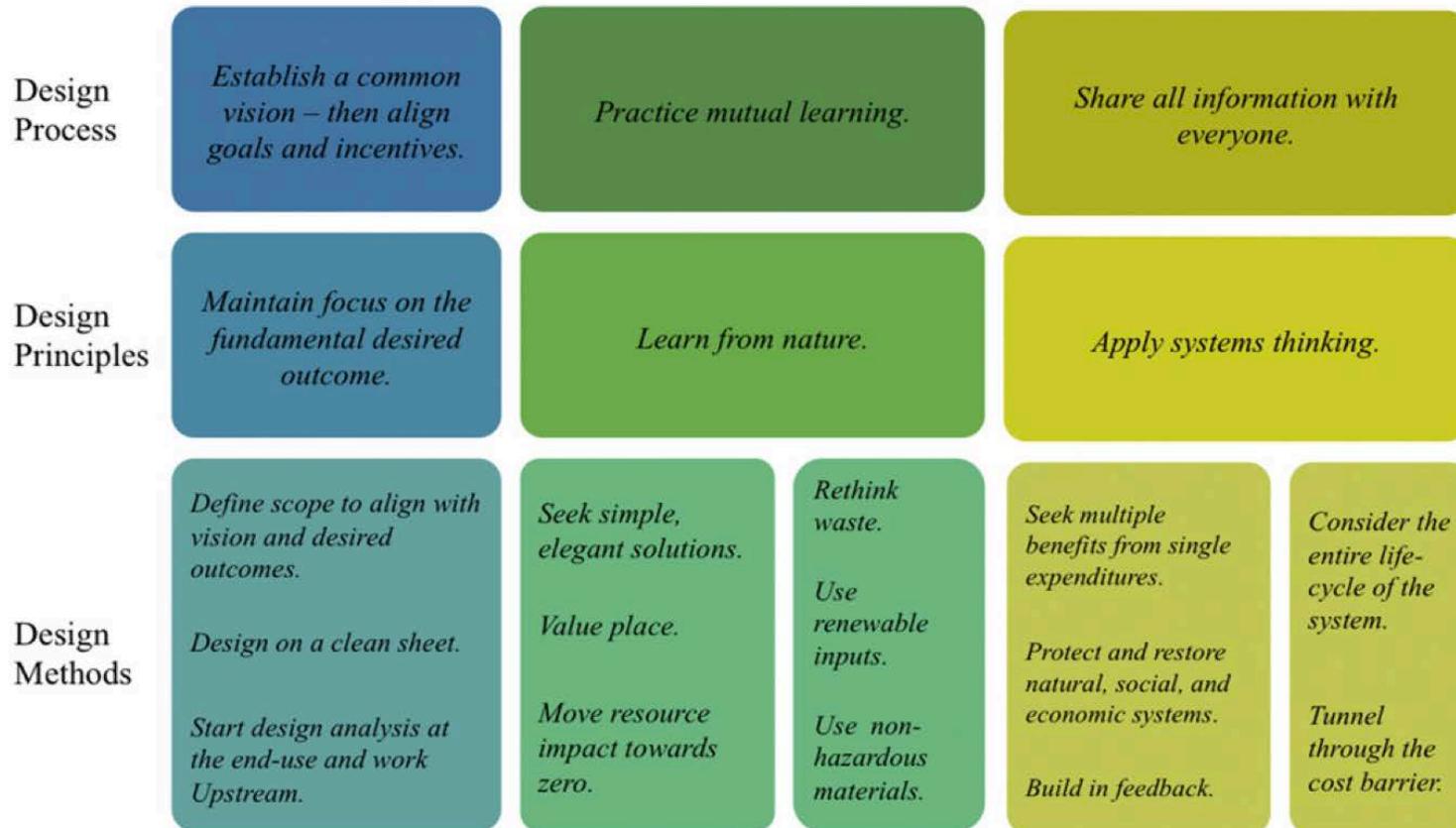
Learning Competence Fields
 Sustainability Science
 Systems Thinking
 Nature-Inspired Creativity
 Natural Materials
 Critical Thinking
 Service Integration
 Transdisciplinary Transfer

Format
 (C) Coached & independent assignments
 (O) In-class lecture/discussion
 (W) Outdoor workshop
 (C) Combined outdoor/indoor activity



Systemic Design Theory

Whole-Systems Design



(Blizzard and Klotz, 2012)

Systemic Design Principles (MonViso Institute)



Be systemic

Everything is connected - think and design systemic to take more effective action in tackling wicked sustainability challenges.



Think big & act direct

Our challenges are globally connected but require direct, local action. Walk the talk.



Find Leverage

Action is urgently needed - being efficient is good but not enough. Go for what is most effective, having most leverage.



Use low tech & high brain

Use low tech, simplified, passive and mechanic solutions where possible, for less embodied energy and easy maintenance.



Learn from Nature

Nature offers genius design solutions with billions of years in evolution, functioning in closed systems, where no waste exists.



Respect local knowledge

Often, local people know their terrain and can tell us solutions that work, if we listen carefully.



Re-fuse, Re-use, Re-cycle

Less is more. Let's re-think consumption and work towards zero emissions and zero waste.



Design with carbon

Products and Services designed to minimize carbon flows over entire life cycles may well be the most effective tools to slow down climate change.



Transfer knowledge and build capacity

Share trusted knowledge and valuable experience to involve, stimulate and engage others to support the sustainability transition



Be transparent

Facts are facts, there is no alternative truth to the current state of knowledge. Show your data and carefully interpret it.



Have fun do good

Follow your instinct and enjoy contributing to a net-positive impact.

Circular Design Guide

<https://www.circulardesignguide.com/methods>

Methods

We've lined up a number of activities to help you understand, define, make, and release circular innovations. Dive in wherever makes most sense for you and your team.

Don't worry about getting it all right on your first go. The more you prototype and learn, the greater your positive impact on the system.

HELP TO GET STARTED

Search methods



UNDERSTAND



Understand Circular Flows

UNDERSTAND



Regenerative Thinking

UNDERSTAND



Service Flip

UNDERSTAND



UNDERSTAND



UNDERSTAND



Learn from Nature

Ask "how might nature solve this problem?" for your design challenge. Learn how biological systems can help inspire new solutions for your product or service that are inherently more circular and holistic.

STEPS

- 1 Start by writing down your design challenge.
- 2 Identify the function that your product or service is trying to solve. Just write down the function, don't try to solve it quite yet (e.g.: "My product needs to keep food safe in transit" or "My product needs to keep people warm").
- 3 Take one function and brainstorm all the ways that *nature might solve this problem*. Try to brainstorm as many ideas as you can think of (in the case of keeping food safe, you might say things like, "Peels that biodegrade," "Keeping fruit in trees until it's ready to be picked," or "Shells to protect nuts"). You can use [Ask Nature](#) as a resource for this.
- 4 When you feel like you've come up with an exhaustive list, take one example and see if you can use it to create guidelines for your own product or service. (Keeping with the packaging example, you might list things like, "The packaging biodegrades after use" or "The packaging is highly durable," etc.)

Bio-inspired design, Biomimicry, Nature's creativity

Go outside, re-connect, discover, identify and observe three systems in nature that have elements, interconnection, and function.

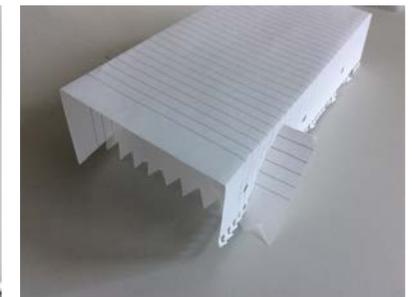
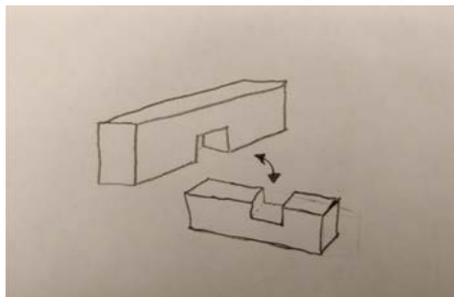
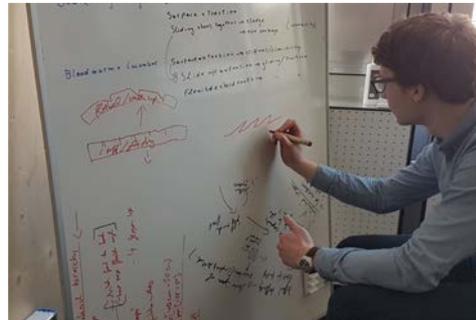
- Record in your journal the components of the three systems
- Describe and present them to the group.
- Why did you choose these systems?
- Now observe the same or three other systems, looking specifically for potential solutions of the identified functions for our design challenge (snowshoes): extended surface, traction/grip, fixation
- Use the Brainstorm map AND the concept board card to record ideas for addressing the three main functions

Pick a place for discussion

- Share the insights of the systems you observed
- What are the interconnections in these systems?
- How would changing one part affect the rest?
- How do they relate to the functions we were looking for in the snowshoe project?

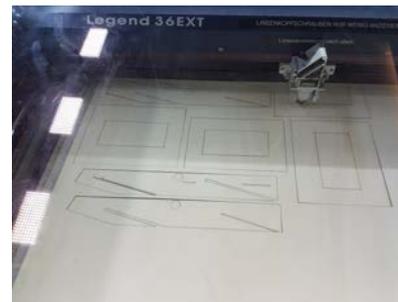
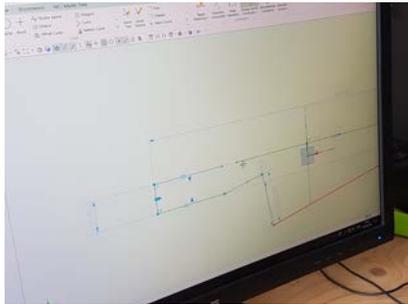
Design thinking and doing

Inspired by nature



Engineering and Prototyping

CAD, Laminating, Lasercutting, 3D Printing, Handtools,...



The Snowshoe Toolkit Prototype

3D printed bio-plastics, Paulownia-Flax composite, upcycled waste, Pinatex

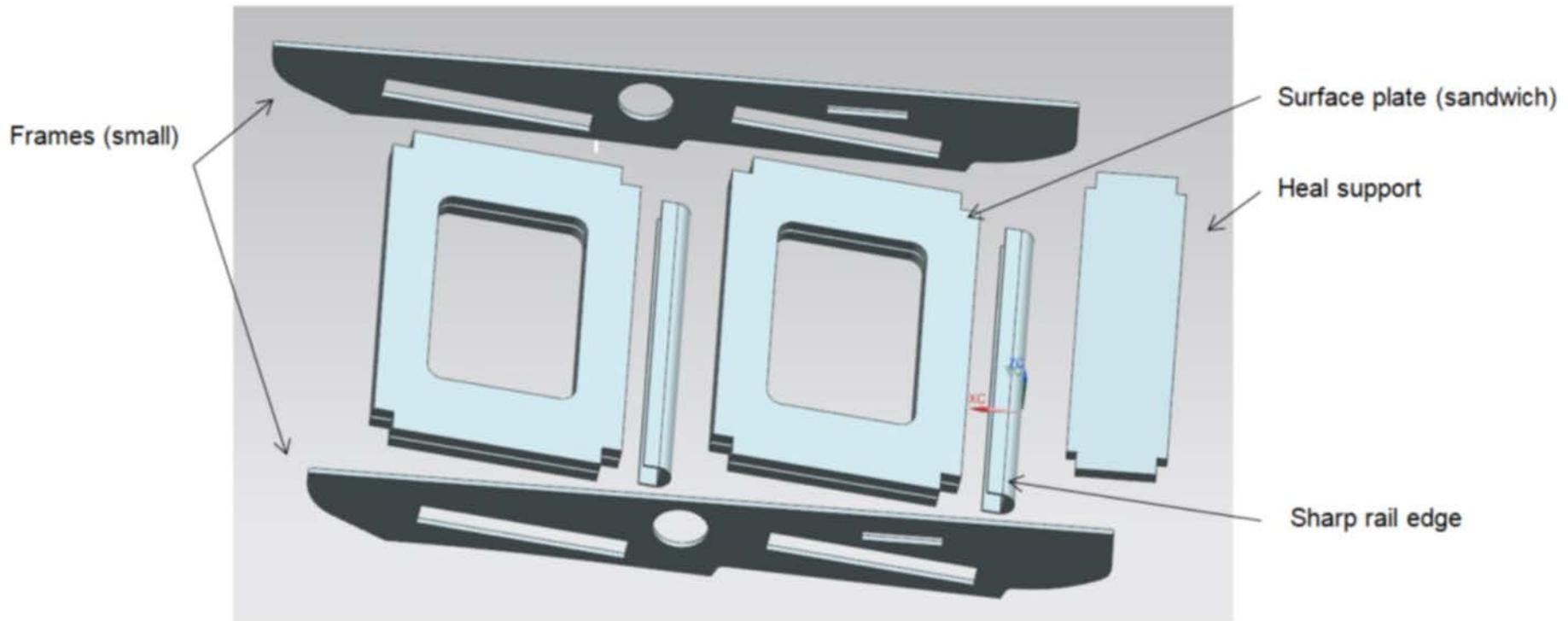


Figure 13: Exploded view of the snowshoe in CAD (only provided parts are visible).

The Snowshoe Toolkit Prototype

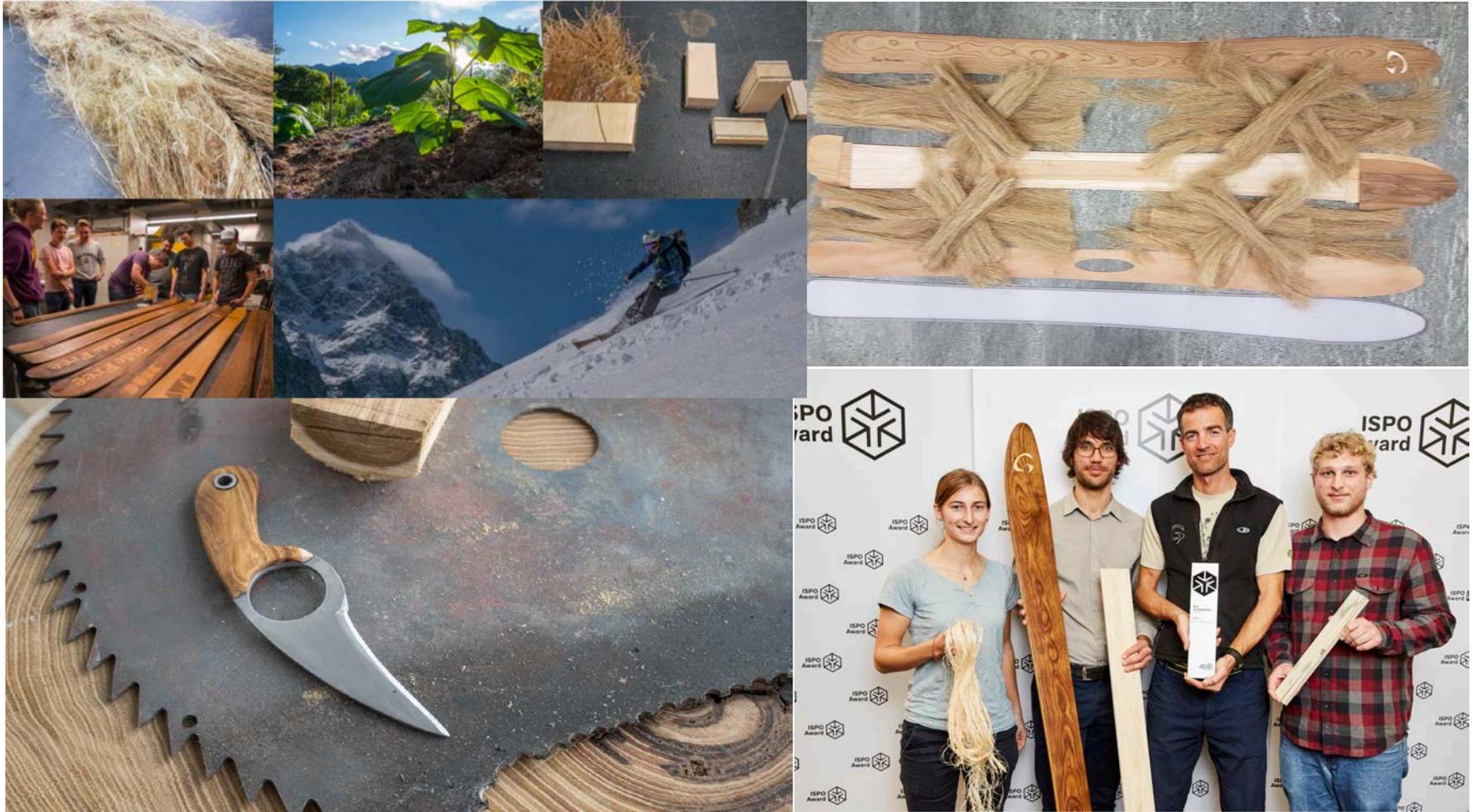
3D printed bio-plastics, Paulownia-Flax composite, upcycled waste, Pinatex



Student work by Paco Bos, Nik Zielonka, & Joel Zürcher

Further SDL design products

Skis, Kite- and Longboards, Knives, Surfboards, Backpacks...



SDL aims: integrate systemic thinking and doing for sustainability in current (engineering design) education and practice.

1. **sensitize** students for the potential to developing sustainable solutions for **pressing societal problems**.
2. **engage** students in **systems thinking** by mapping an engineering design challenge within its greater societal and service context, working interdisciplinary.
3. **spur ecological design thinking** and creativity by experiencing nature's design solutions outdoors, practicing the art and science of **bio-inspired** design.
4. **teach** life cycle analysis and **circular design** by working with natural materials, expanding from the current engineering focus on high tech materials and metals.
5. **advocate critical thinking** for sustainability by letting students design and fabricate an educational (snowshoe) building toolkit, based on established systemic design principles.
6. **transfer** the practically derived skills to a complex real-world application of a transdisciplinary (TD) partnership,
7. **maximise outreach** by spreading the educational toolkits, by offering modular course concepts to partners, and by publishing course movie.