

New Business Models for a Sustainable Semiconductor Industry

How can circularity, performance and ecosystem business models create resilience and recurring value?

Prof. Dr. Henning Breuer (UXBerlin & Media University Berlin)



How can we uncover new sources of value? *By moving from technical sustainability measures to sustainable business models.*

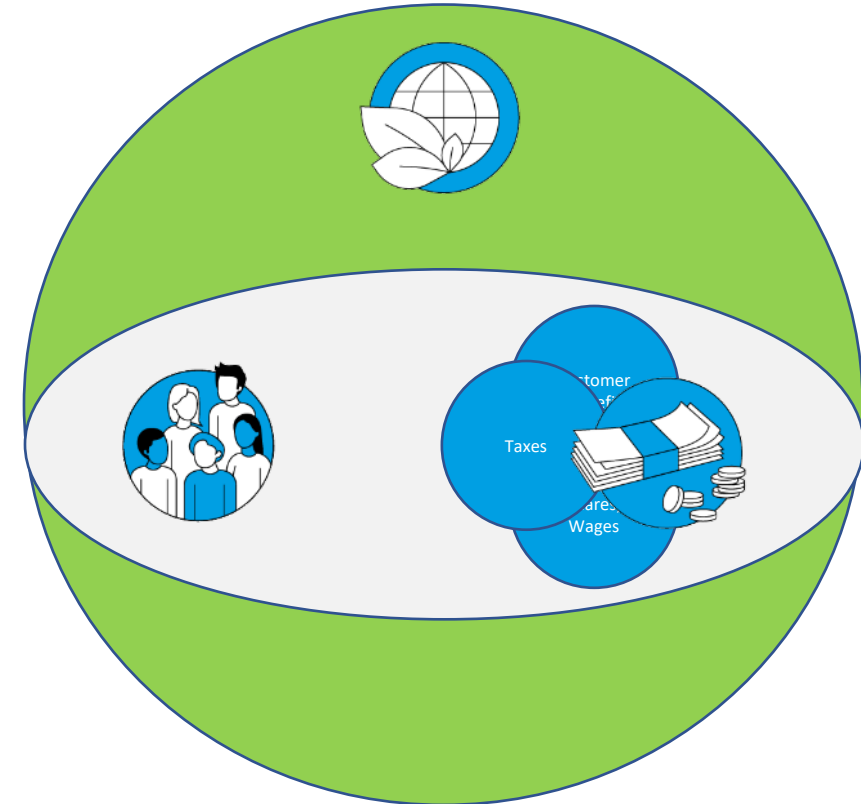
- The semiconductor industry made major advances in:
 - energy and water efficiency
 - reuse and recycling
 - equipment lifetime extension
- Going beyond the existing operating models we ask:
How to make sustainability part of how value is created, delivered, and captured?



Sustainable Business Models *build on a multidimensional understanding of value creation.*

- The traditional understanding of value creation in economic terms is being extended.
- Sustainable business models create value in three dimensions:
 - **social** – capable communities and workforces, secure access to critical technologies
 - **ecological** – less resource use, emissions and hazardous outputs; restored ecosystems
 - **economic** – customer performance, returns to stakeholders, productivity and resilience

But how to design sustainable business models, in which these forms of value reinforce one another?



Sustainable Business Model Design *turn recurring sustainability challenges into reusable strategies for business model innovation.*



50 reusable solutions *to recurring sustainability challenges are organized into 11 groups.*

1 Pricing & Revenue

2 Financing

3 Ecodesign

4 Closing-the-Loop

5 Supply Chain

6 Giving

7 Access Provision

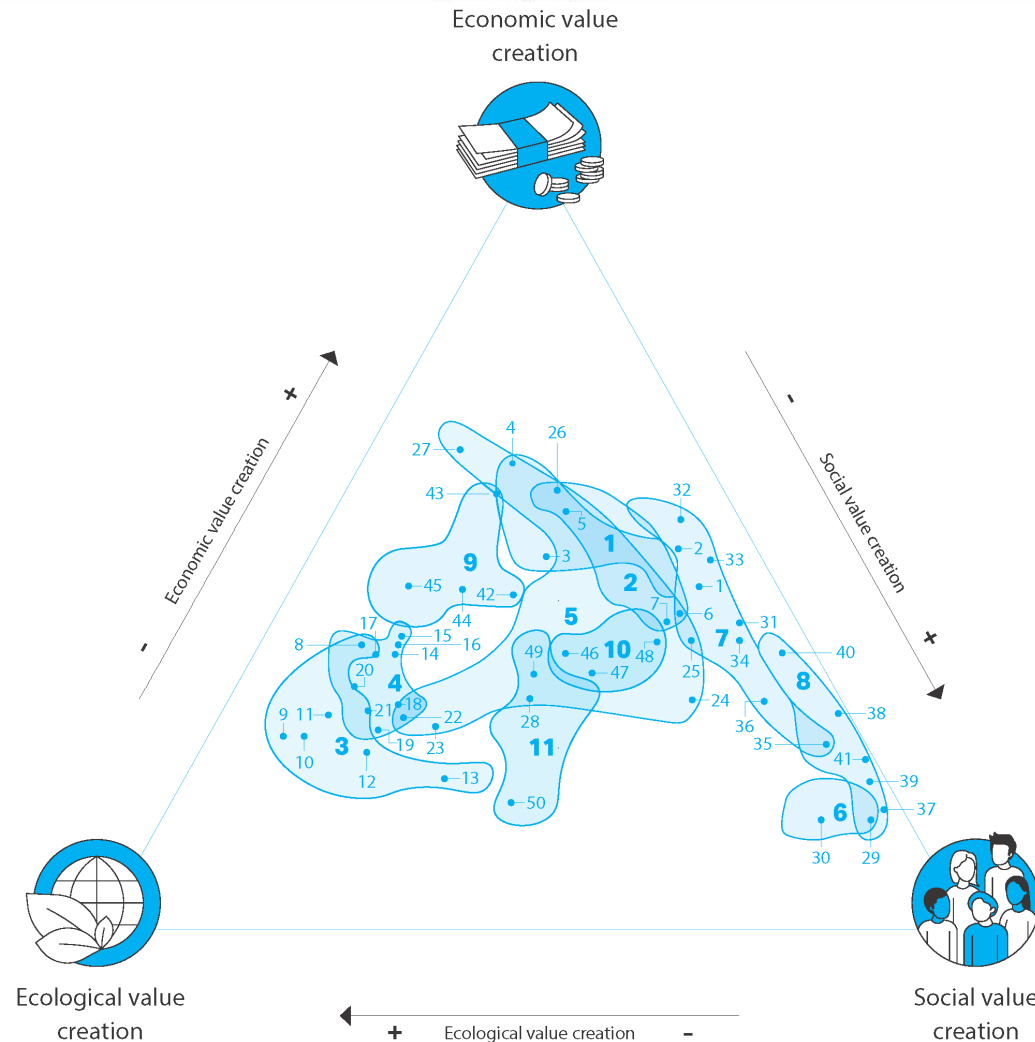
8 Social Mission

9 Service & Performance

10 Ecosystem

11 Demand Shaping

*They provide a
shared language,
and a repository
for recombination.*



*For example, **Result-Oriented Services** belong to the service and performance patterns.*

SERVICE & PERFORMANCE

Result-Oriented Service

SOLUTION: Instead of selling products, sell functions (e.g., copying), results (copied pages) and performance (fast copying).

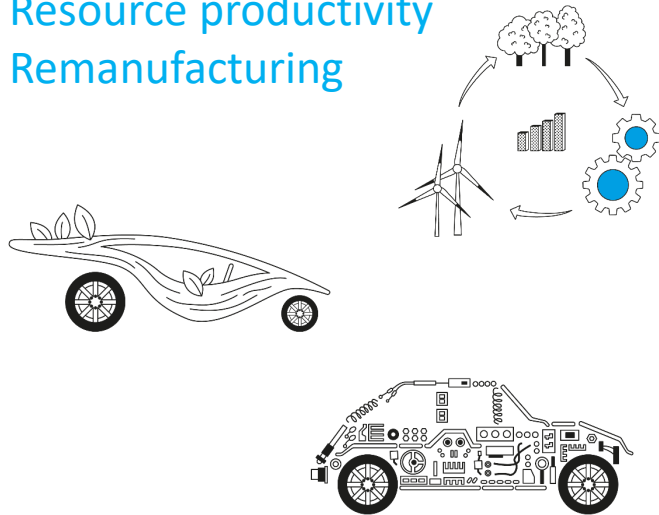
EXAMPLE: With Philips' Pay per Lux clients pay for lighting performance, not technical systems. This makes it attractive for Philips to sell integrated systems with features which provide considerable cost and energy savings.

In the semiconductor industry, *pattern combinations* open three horizons – ranging from operational improvement to ecosystem redesign.

1

Optimize what exists

Sustainable product design
Resource productivity
Remanufacturing



Reduce cost and impact

2

Redefine value and revenue

Result-oriented services
Waste exchange
Pay for success

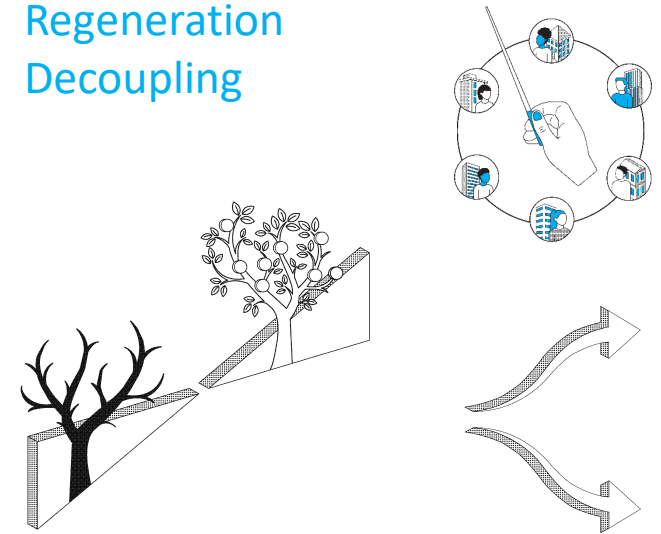


Generate recurring value

3

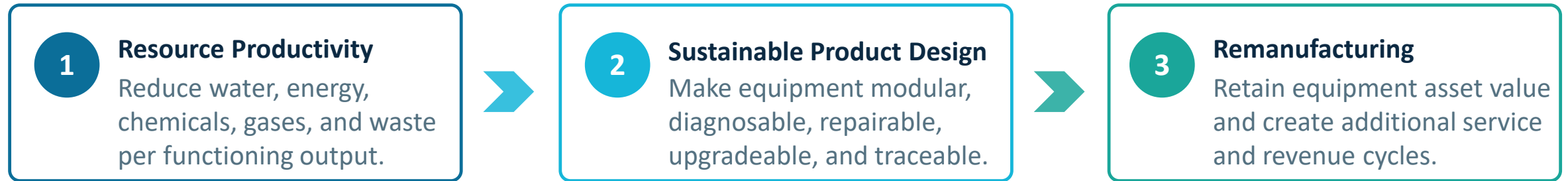
Build the next ecosystem

Ecosystem orchestrator
Regeneration
Decoupling



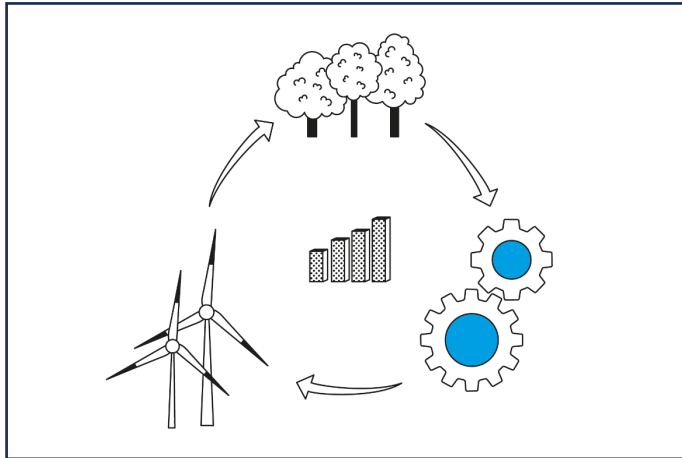
Reshape industrial systems

Combine the first horizons' patterns to create integrated business models e.g. keeping assets, materials, and performance in circulation.

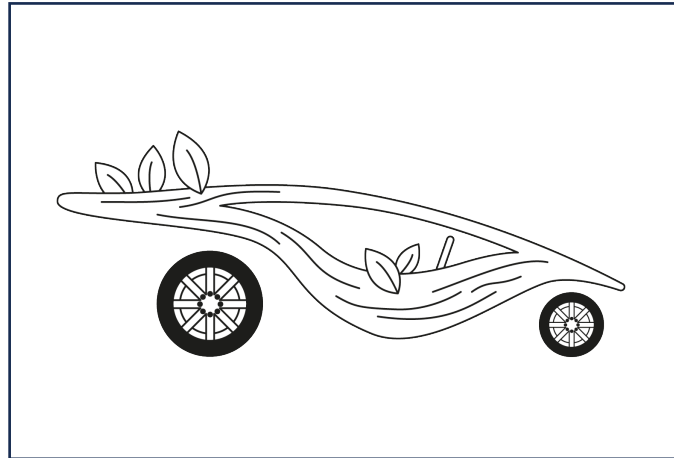


SHIFT

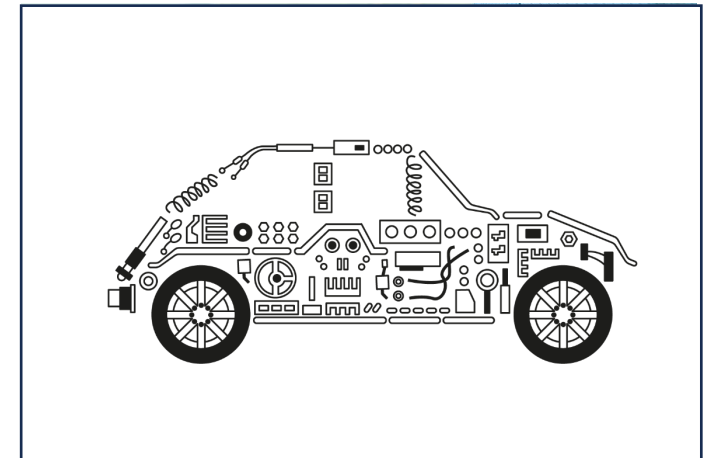
Shift from selling a physical asset once to managing its performance and value throughout its lifecycle.



[TSMC](#)'s first private water reclamation plant



[ASML](#)'s modular design and component commonality



[ASML](#)'s one original quality level for upgrades

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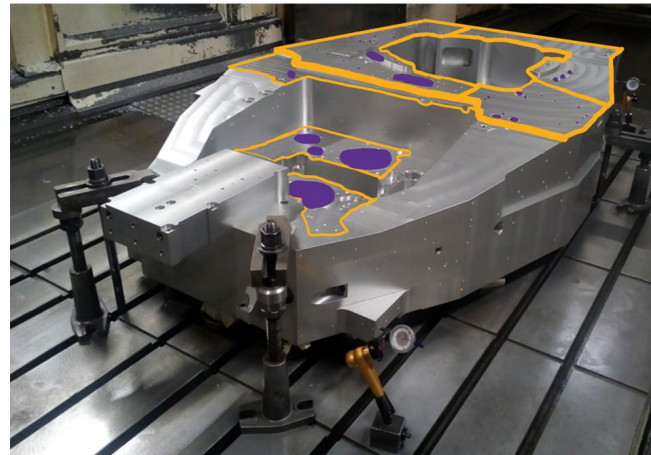


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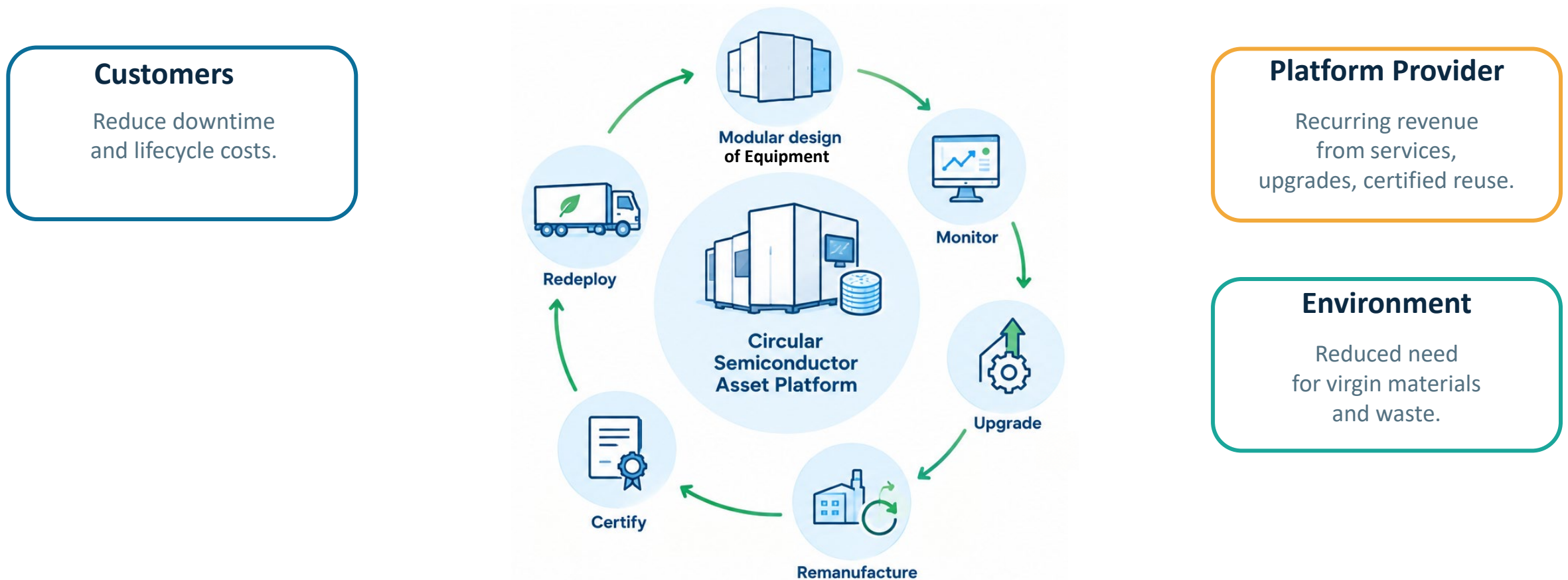


[ASML](#)'s modular design and component commonality



[ASML](#)'s one original quality level for upgrades

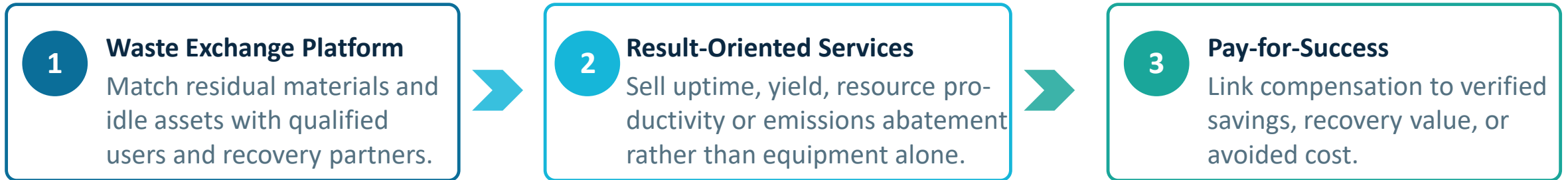
Combine the first horizons' patterns to create integrated business models such as a Circular Semiconductor Asset Platform.



SHIFT

Sell continuously improving equipment performance, not repeated replacement of complete machines.

Combine the second horizons' patterns to create integrated business models e.g. making circular and environmental performance investable.

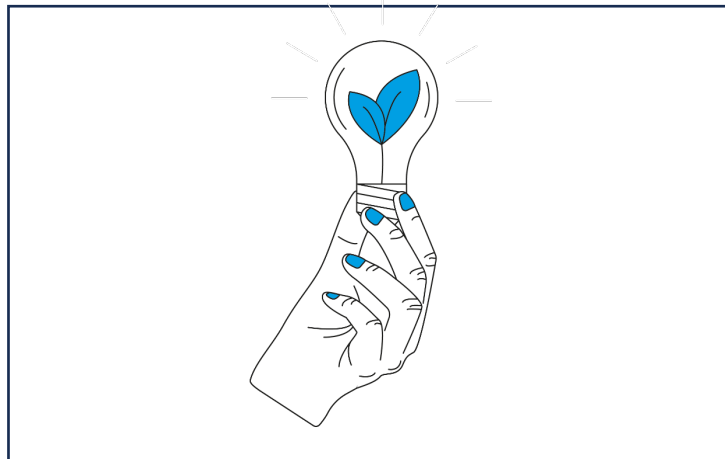


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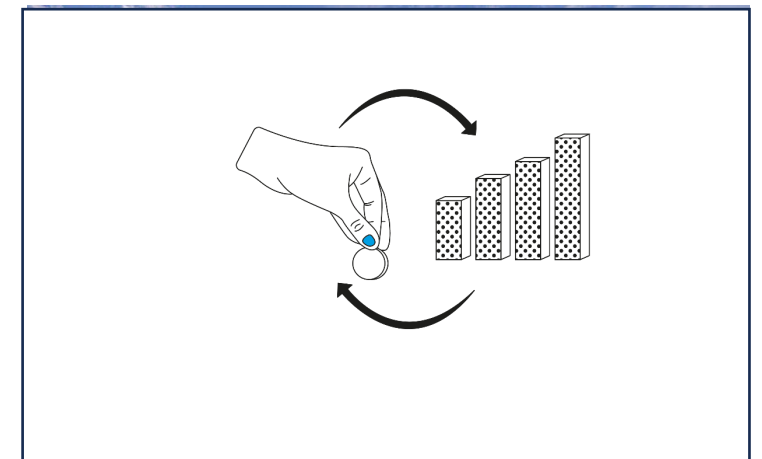
Turn verified operational outcomes into a revenue logic, and sustainability into a performance business.



Digital Product Passports / EU project [CIRPASS](#)

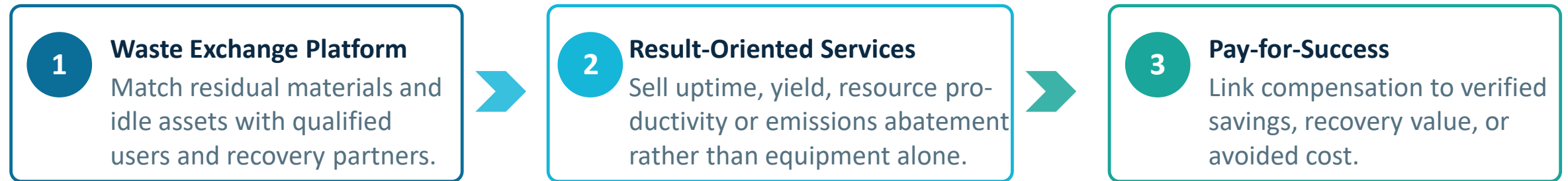


[Merck's](#) MEGASYS service (2026), [Accenture \(2022\)](#)

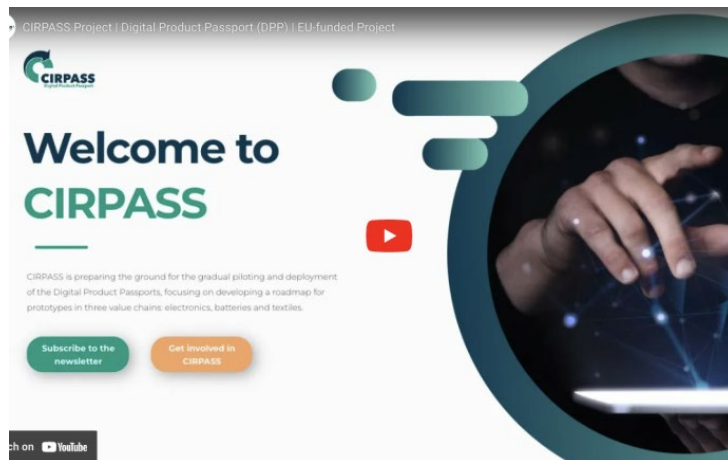


[UMC's](#) Circular Economy & Recycling Innovation

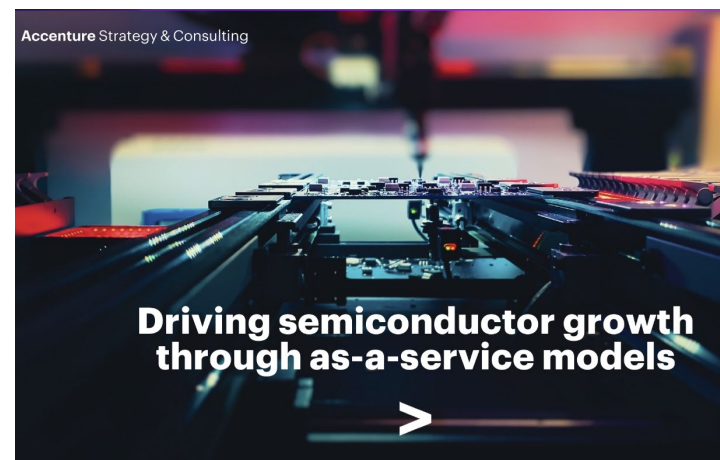
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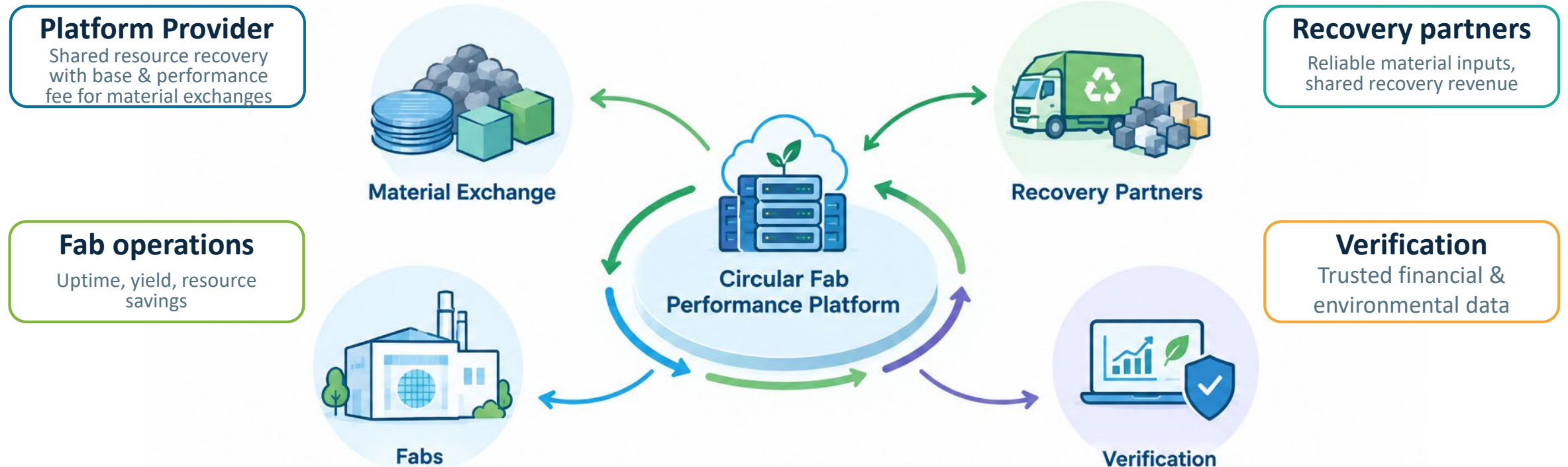


[Merck's](#) MEGASYS service (2026), [Accenture \(2022\)](#)



[UMC's](#) Circular Economy & Recycling Innovation

Combine the second horizons' patterns to create integrated business models such as a Circular Fab Performance Platform.



SHIFT

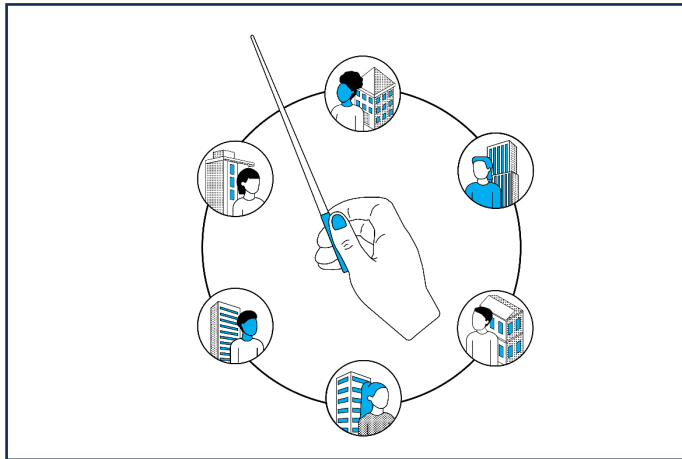
Coordinate material exchange, performance services, and verified outcomes.

Combine the third horizons' patterns to create integrated business models e.g. redesigning the ecosystem.

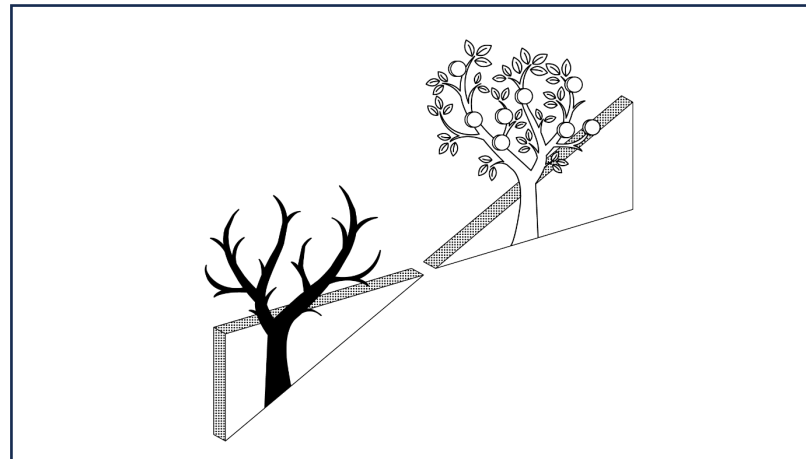


SHIFT

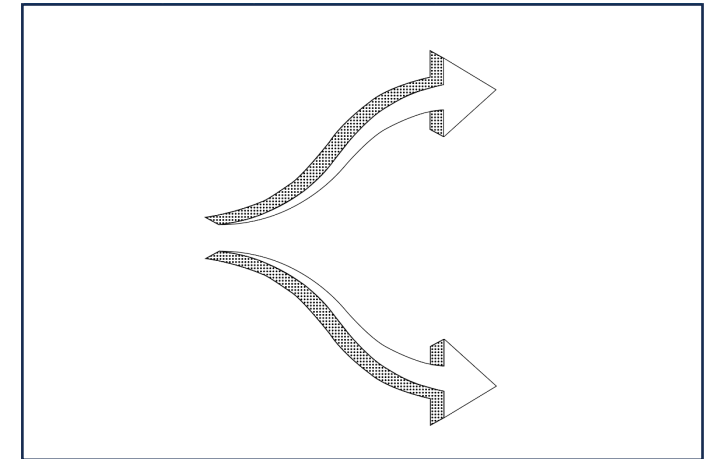
Leverage ecosystems to solve lifecycle transparency, circular flows, and regional resource constraints.



EU semiconductor industry [ecosystem tracker](#)



[Intel](#) Water Conservation and Restoration Program



[ASML](#)'s Installed Base Management

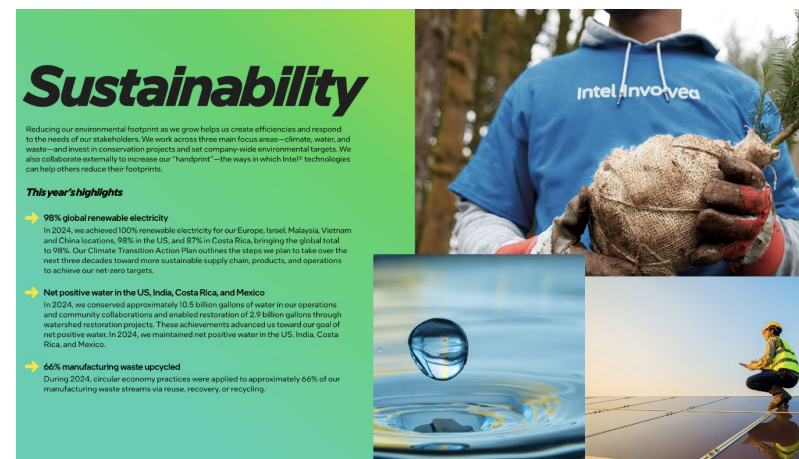
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Leverage ecosystems to solve lifecycle transparency, circular flows, and regional resource constraints.



EU semiconductor industry [ecosystem tracker](#)



[Intel's](#) Water Conservation and Restoration Program



[ASML's](#) Installed (Lithography) Base Management

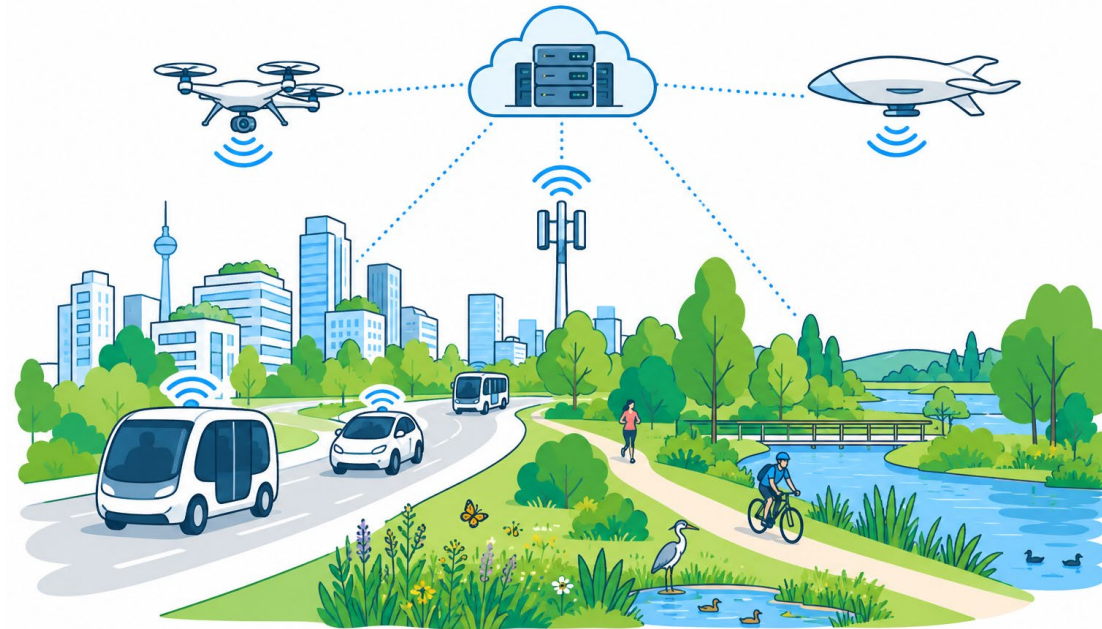
Combine the third horizons' patterns to envision future business models such as a Regenerative Compute Commons (RCC).

Customers

A regional automotive consortium buys AI-processing capacity for autonomous-driving.

Shared Assets Platform

Increase utilization of capital-intensive assets reduce duplicated infrastructure & costs.



Trusted governance

Use interoperable data, transparent commitments, and enforceable rules for shared investments.

Regional resilience

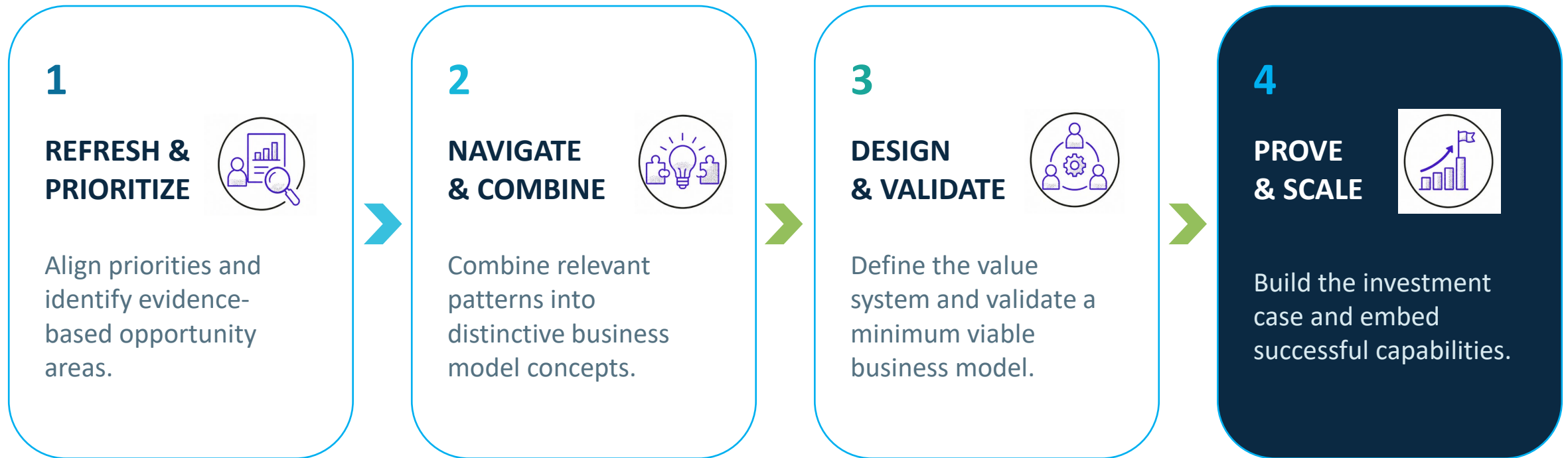
Equitable access and redirection of productivity gains to water and renewable energy systems.

Shared Compute

The RCC delivers AI outcomes for autonomous driving from shared semiconductor assets, software upgrades, recovered resources and manufacturing capacity – and reinvests part of the revenue in the region's ecological and social systems.

SHIFT Link computing outcomes and commercial success to measurable environmental regeneration.

Treat business model innovation as a disciplined portfolio of experiments.



Three questions *help to identify your first business model experiment.*

01 **Where are we still rewarding volume when we want performance?**

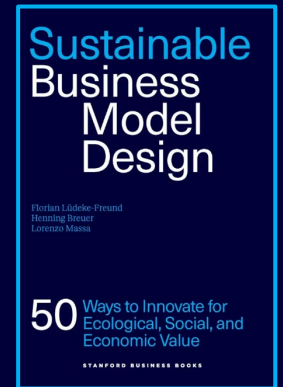
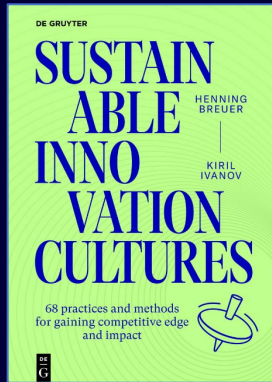
02 **Which asset, material flow, or outcome could become a recurring-value business?**

03 **Which partners must share data, risk, and rewards to make the business model viable?**

FROM SUSTAINABLE OPERATIONS

to sustainable value creation

Which business models will your organization explore?



Thank you



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