

CIRCULAR ECONOMY BUSINESS MODELS FOR THE MANUFACTURING INDUSTRY

**Launch event
19.9.2019**

SITRA



Technology Industries
of Finland

accenture
High performance. Delivered.

AGENDA

The agenda of the event follows the structure of the new Circular Economy Playbook.

13:30

Why circular economy?

14:00

What opportunities exist?

15:05

Break

15:25

Which capabilities are required?

15:45

Which technologies can support?

16:00

How to design the transformation journey?



#kasvuakiertotaloudesta

SITRA



Technology Industries
of Finland

accenture
High performance. Delivered.

Today marks the publication of the **Circular Economy Playbook and tools** and we aim to inspire business action

Introduce concepts and tools that can help companies pursue circular opportunities



Inspire business action

Get inspired and learn from the journeys of leading companies

KONECRANES®

NOKIA



PIIROINEN



AGILER

BUSINESS FINLAND



AGENDA

The agenda of the event follows the structure of the new **Circular Economy Playbook**.

1 Why circular economy?

13:30

Greetings from the state

- Anne-Mari Virolainen, Minister of Foreign Trade and Development

13:45

From linear to circular: Why should the manufacturing industry change?

- Mikko Kosonen, Sitra
- Jaakko Hirvola, Technology Industries



#kasvuakiertotaloudesta

SITRA



Technology Industries
of Finland

accenture
High performance. Delivered.

Greetings from the state



Anne-Mari Virolainen
Minister of Foreign Trade and Development

From linear to circular: Why should the manufacturing industry change?



Mikko Kosonen
President
Sitra



Jaakko Hirvola
CEO
Technology Industries



Circular Economy as a driver of competitiveness

Mikko Kosonen, President, Sitra

SITRA



Economic Sociology and Political Economy community

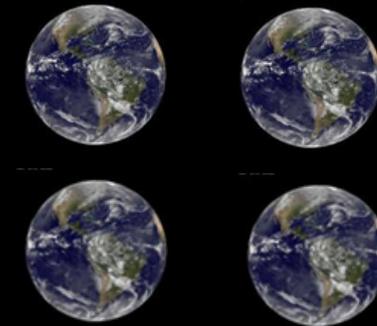
WWW.MAXGUSTAFSON.COM

How many globes would we need with our current consumption?

2017



2050



The World is full of inefficiencies, yet the demand for raw materials is increasing globally

Why do we throw away about 80 % of consumer products and their materials?

On average, materials in Europe are used **only once.**

10-15 % of building materials goes to waste during construction.

The average occupancy rate of cars is about **8 %**

31 % of produced food goes to waste in value chain. In Finland it makes **300-400 million kilos** per year.

Offices' occupancy rate is about **40 %**

The global demand for raw materials will increase during the next 20 years

Farmland, over **+ 200 %**

Water **+ 137 %**

Steel **+ 57 %**

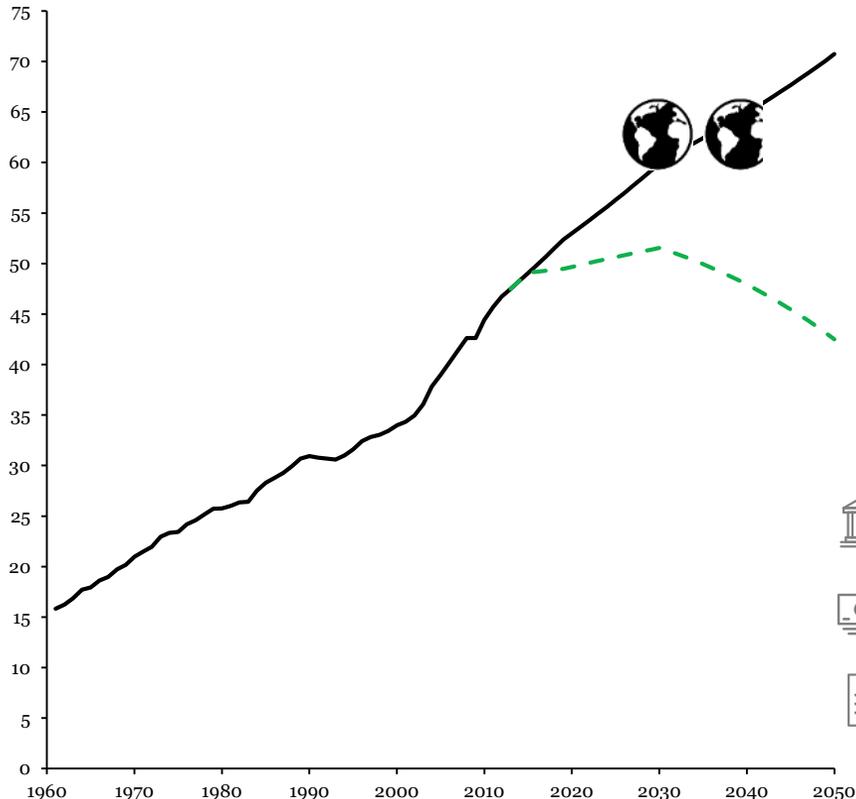
Energy **+ 32 %**

Our overuse of natural resources drives regulators, investors and companies towards sustainability



Development of resource demand¹

Billion tonnes



New consumption pattern needed



Gap in supply is driving changing market conditions



Regulatory pressure is increasing



Investments are shifting towards responsible businesses



Businesses raise supplier requirements

In 2015, the UN general Assembly, representing 193 countries, set the Sustainable development goals. Goal 12 aims, amongst others, at decoupling economic growth from natural resource use



BlackRock CEO Larry Fink asks companies to make positive contribution to society²



Companies request suppliers to disclose sustainability performance – 27% of CDP supply chain programme members, representing \$2.7 tn in procurement spend, have supplier carbon emission targets³

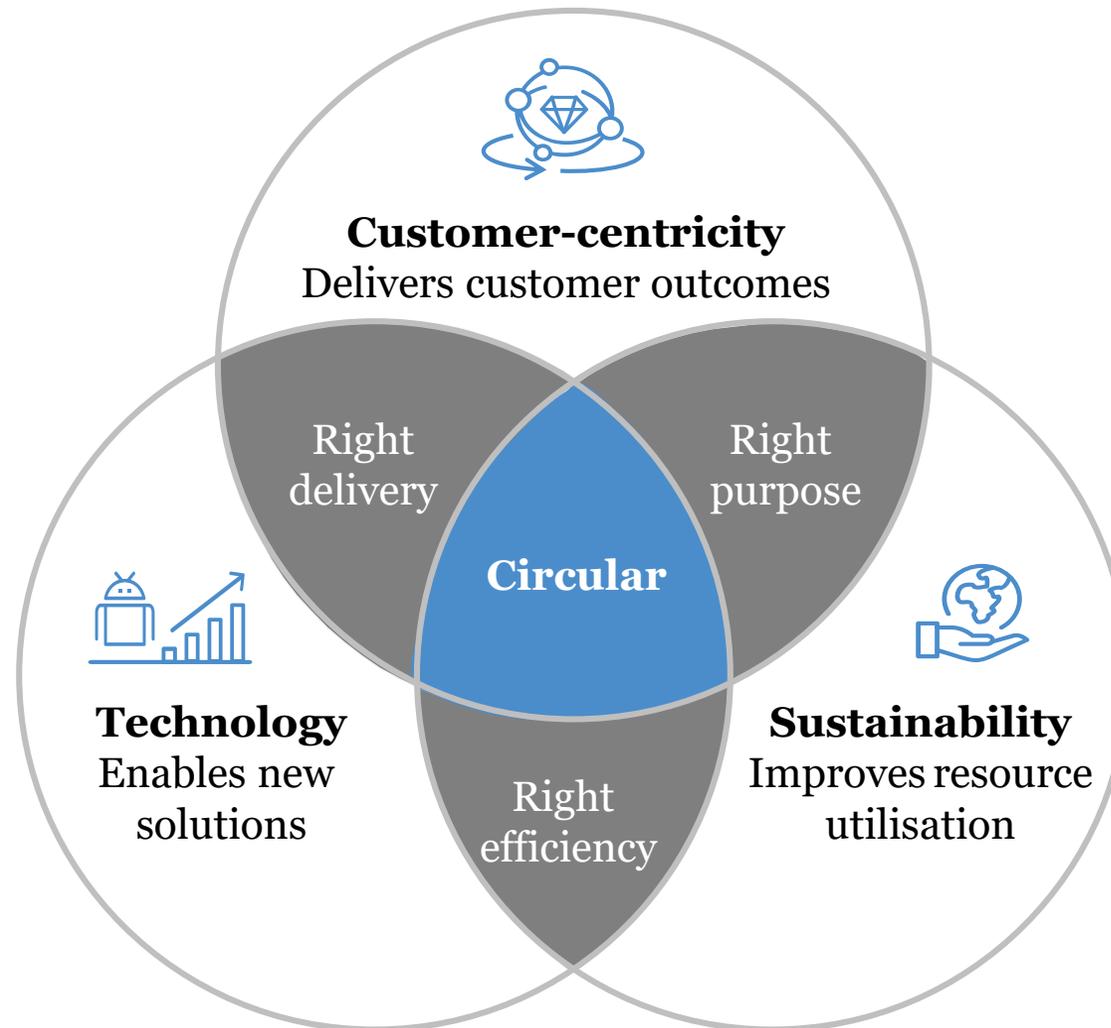


Sources: 1: Accenture 2: CNN, 3: CDP

#kasvuakiertotaloudesta @SitraKosonen @SitraFund

SITRA

Three drivers underpin the shift towards circular

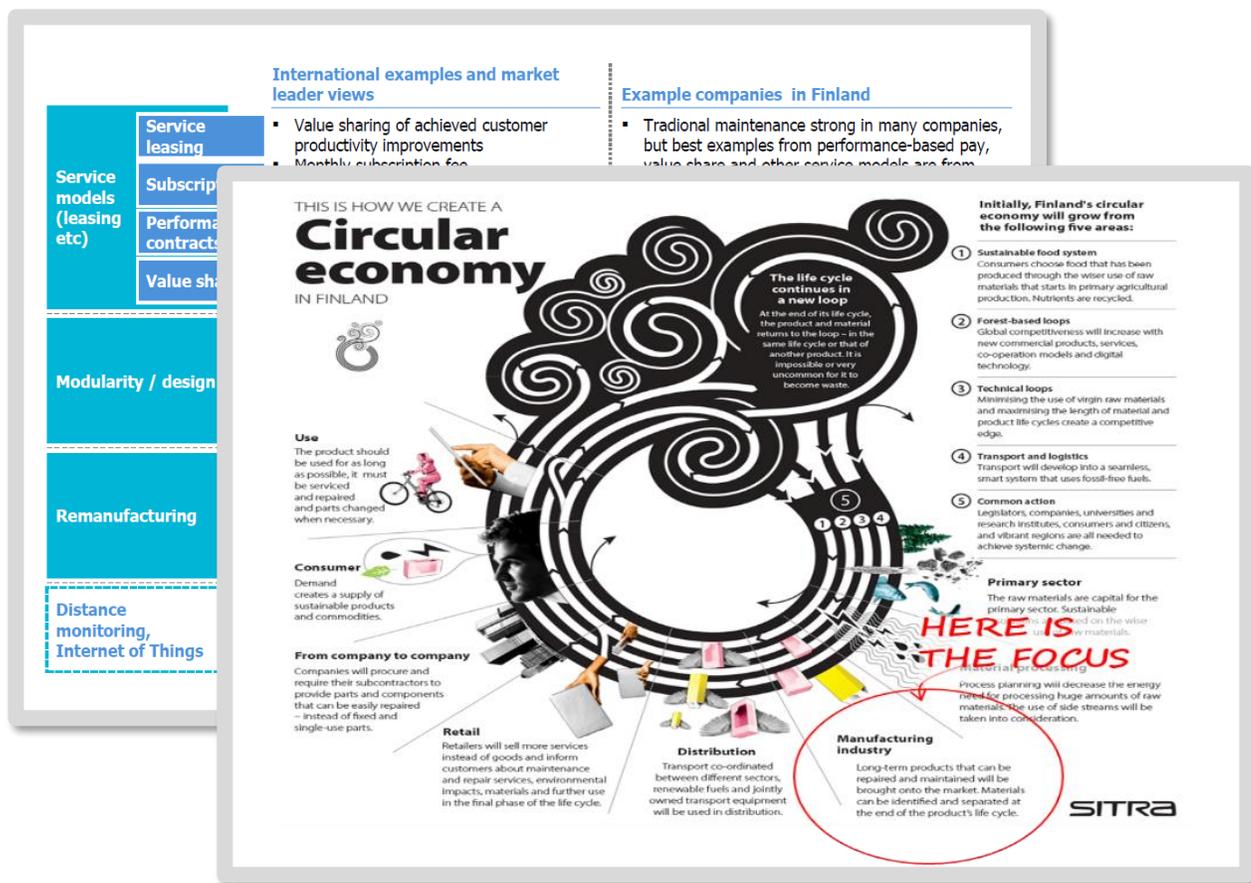


Source: Accenture

 #kasvuakiertotaloudesta @SitraKosonen @SitraFund

SITRA

The programme builds on previous Sitra work - Circular Economy report (2014) and Roadmap to Finland (2016)



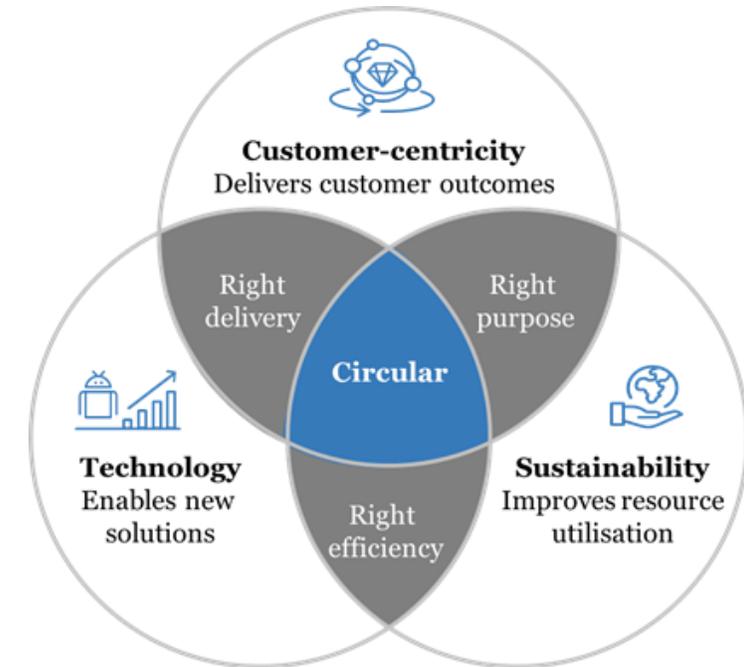
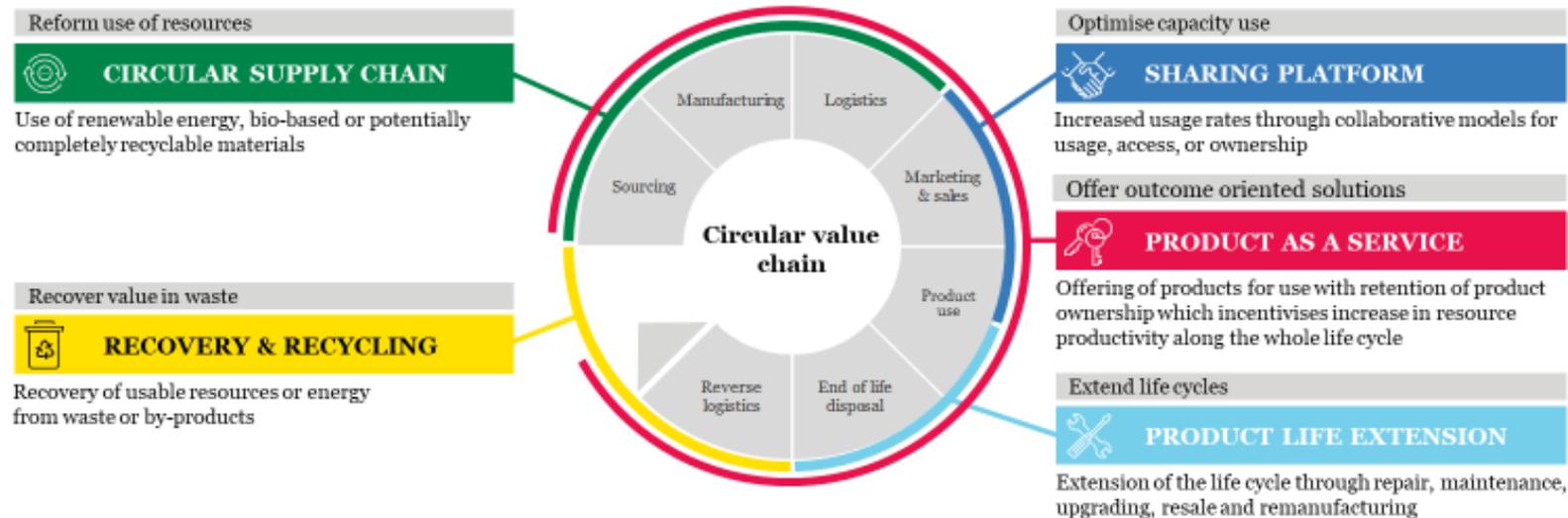
Key take-aways of Industries

- 1 Need for taking the next step and realize **concrete business opportunities**
- 2 Most unexploited opportunities remain within **new business and service models**



The programme has guided 50 companies to assess circular business cases and pilot projects

Five business models reduce the inefficiencies and create value for companies



Source: Accenture, Appendix 2 for more details

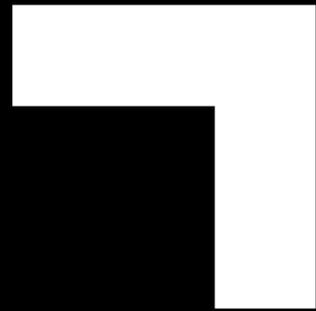
**HYVÄÄ
HUOMISTA,
SUOMI!**



sitra.fi | seuraavaera.fi

@sitrafund      

SITRA



Teknologiaateollisuus

AGENDA

The agenda of the event follows the structure of the new **Circular Economy Playbook**.

2 What opportunities exist?

14:00 Accelerating sustainable growth with circular business models

- Jyri Arponen, Sitra
- Laura Juvonen, Technology Industries
- Pekka Vanne, Accenture

14:15 Circular business models: 4 cases

- Pia Tanskanen, Nokia
- Matias Impivaara, Beneq
- Pasi Aaltonen, Piironen
- Nathalie Clément & Satu Kaivonen, Konecranes



#kasvuakiertotaloudesta

SITRA



Technology Industries
of Finland

accenture
High performance. Delivered.

Accelerating sustainable growth with circular business models



Jyri Arponen
Senior Lead
Circular Economy
Sitra



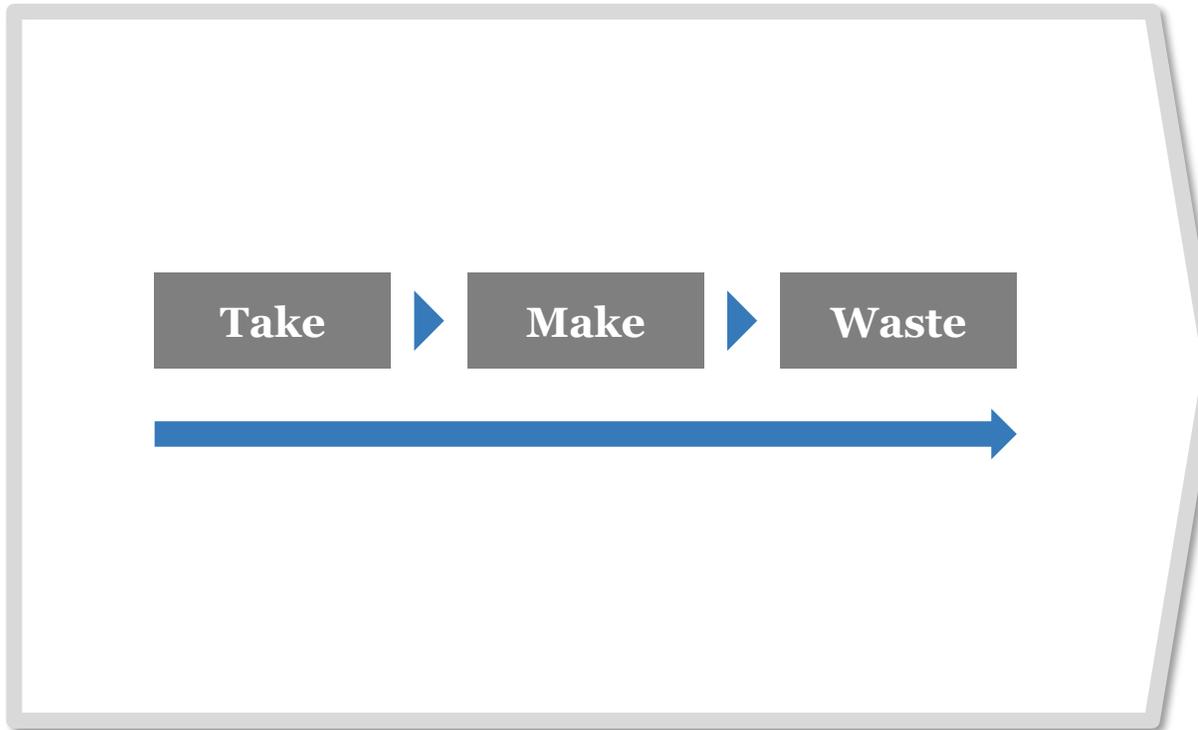
Laura Juvonen
Executive Director
Growth and renewal
Technology Industries



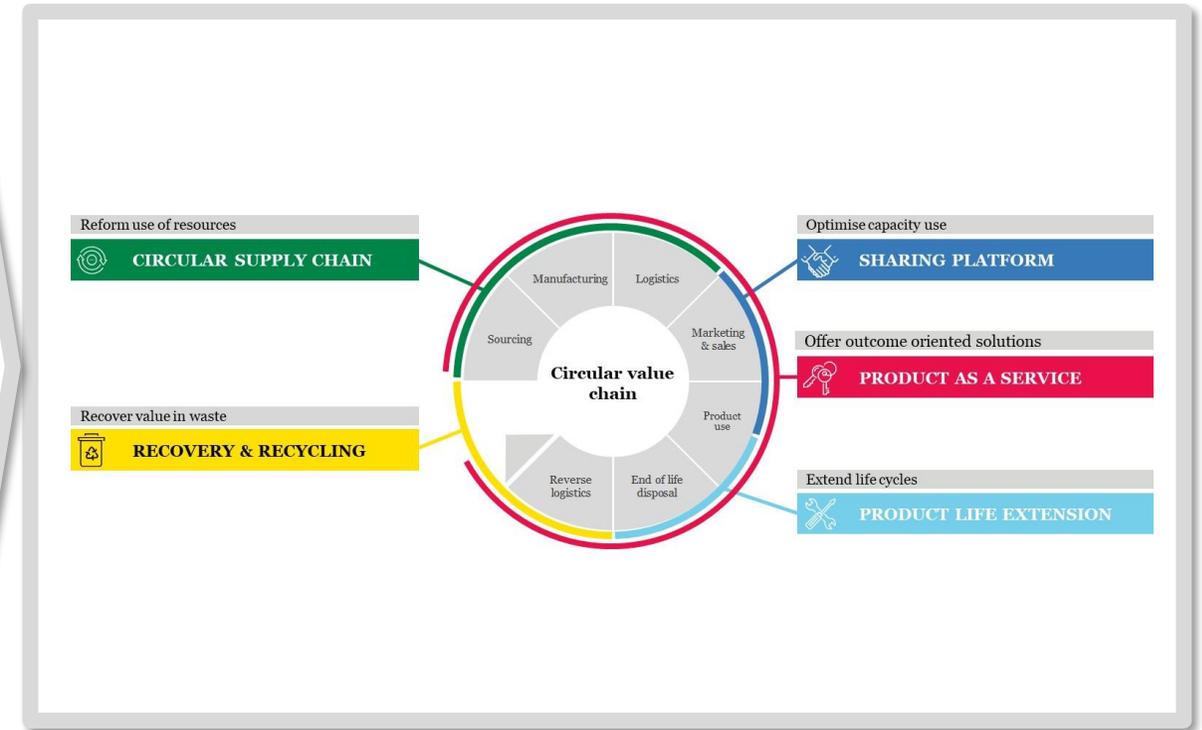
Pekka Vanne
Managing Director
Accenture Strategy

The programme was initiated to drive a shift from linear to circular business models in the manufacturing industry

From Linear...



...to Circular

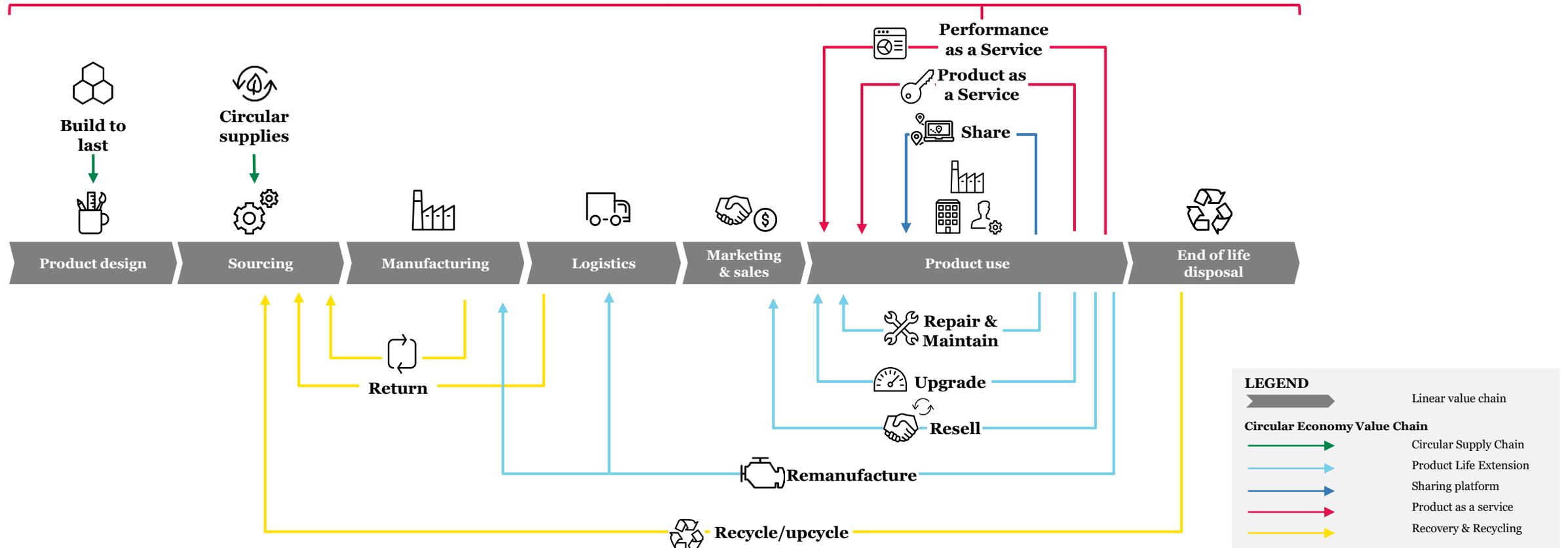


Focusing on the change to **customer-centricity** and **digitally enabled** business models

Circular business models open up the value chain for new collaborations and services enabling bottom line impact

Circular sub-models

As a Service models are mostly concerned with the operation phase, but span across the value chain



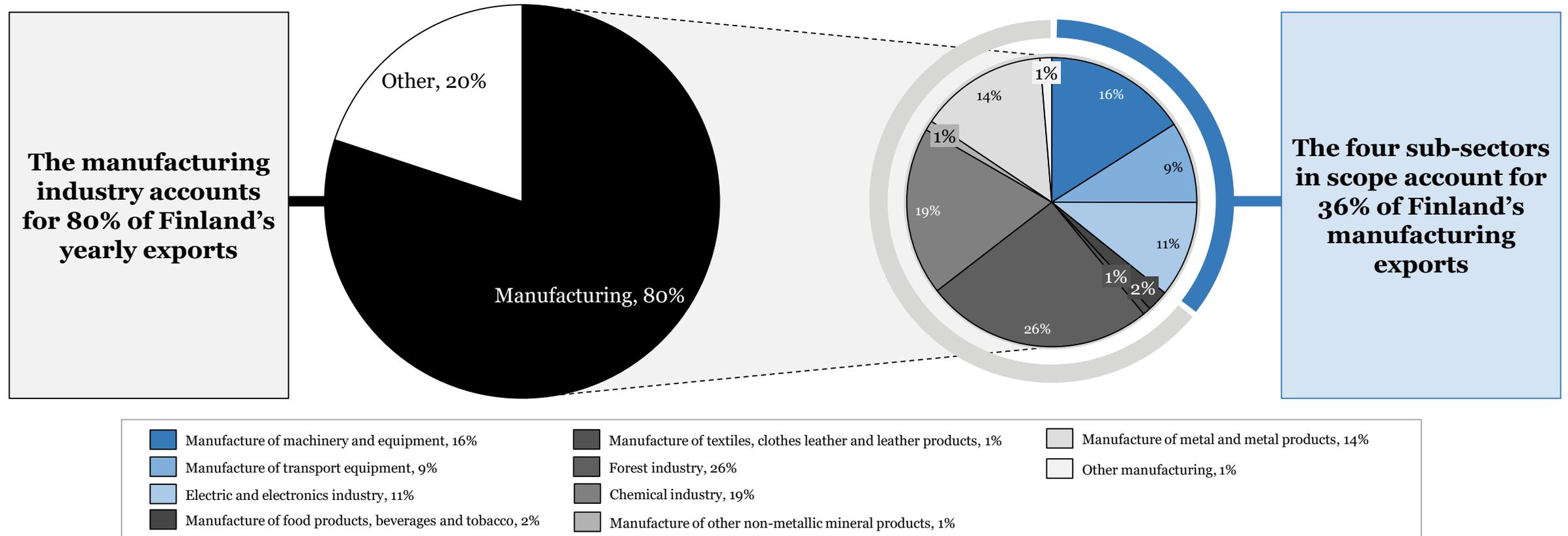
Source: Accenture



Targeting the manufacturing industry – a backbone of the Finnish economy, accounting for 80% of all exports

Finnish exports by industries, 2017

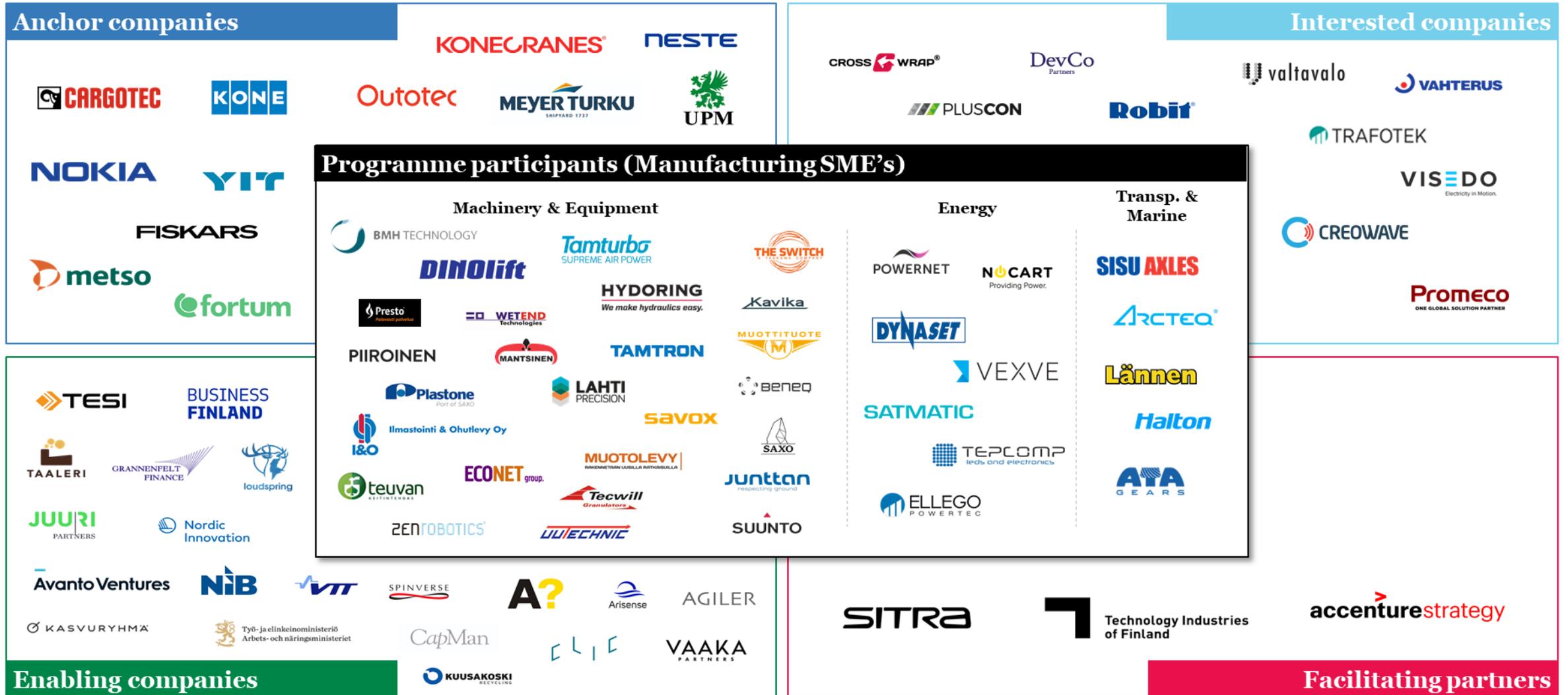
■ In scope ■ Out of scope



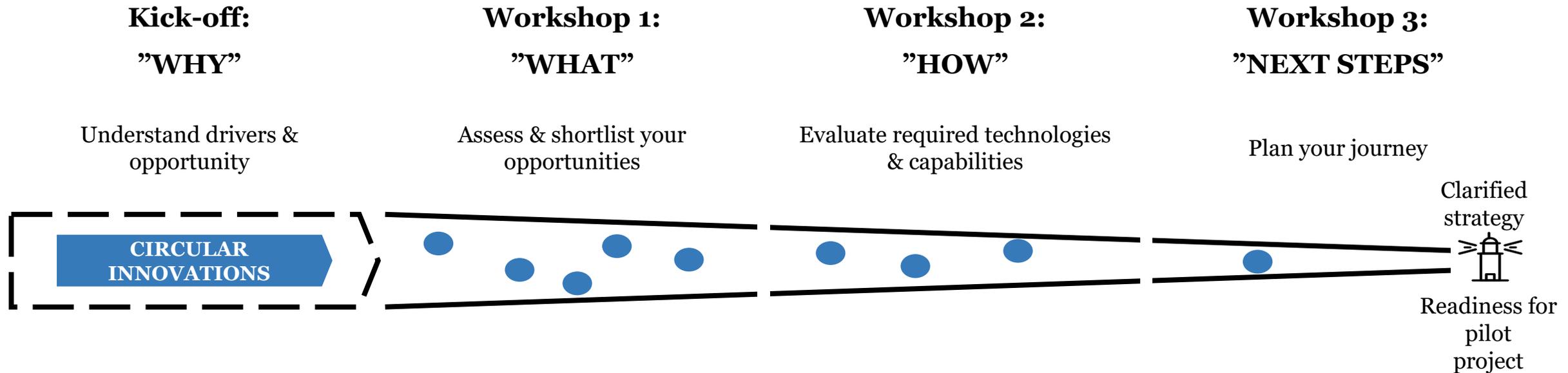
Source: Finnish Customs

Overall, the programme engaged a large group of players in the Finnish manufacturing ecosystem

NON-EXHAUSTIVE



The programme has guided companies to assess circular opportunities and identify pilot projects



Expected outcome:

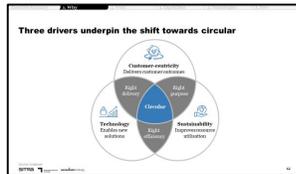
Clarified strategy and defined company specific pilot project

As an outcome of the programme, a Circular Economy Playbook and tools will be launched today

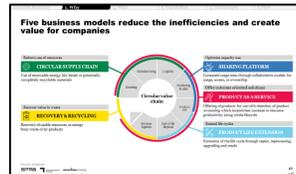
The playbook consists of 6 chapters with circular economy concepts, best practices and tools to guide your business to identify and define your circular economy opportunity and develop a plan to realize circular advantage

PLAYBOOK CHAPTERS

1. Why circular economy?



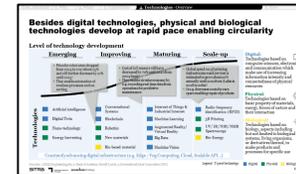
2. What opportunities exist?



3. Which capabilities are required?



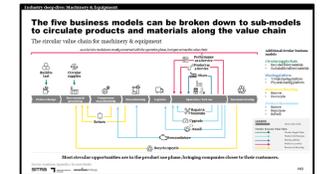
4. Which technologies can support?



5. How to design the transformation journey?



6. Industry deep dives



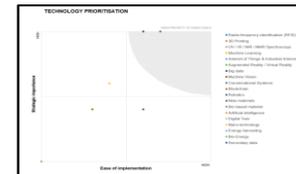
EXAMPLE TOOLS¹

Value case tool

Business model development toolkit

Capability maturity assessment

Technology maturity assessment



Roadmap development

Business model canvas



¹ Additional tools available in the playbook

Circular business models



Jyri Arponen
Senior Lead
Circular Economy
Sitra



Pekka Vanne
Managing Director
Accenture Strategy

Circular economy is about turning inefficiencies in linear value chains into business value

Inefficiencies of linear value chains



UNSUSTAINABLE MATERIALS

Material and energy that cannot be continually regenerated

UNDERUTILISED CAPACITIES

Underutilised or unused products and assets

PREMATURE PRODUCT LIVES

Products are not used to fullest possible working life

WASTED END-OF-LIFE VALUE

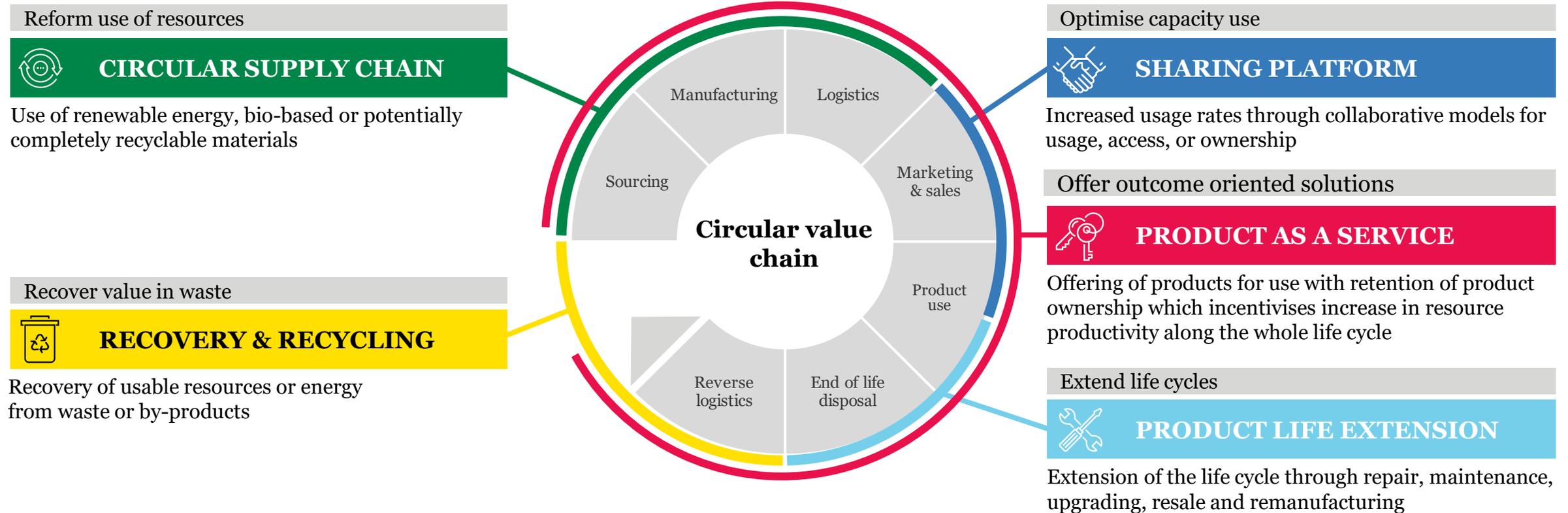
Valuable components, materials and energy is not recovered at disposal

UNEXPLOITED CUSTOMER ENGAGEMENTS

Sales organisation focus on selling functionality of product rather than the customer problem

Five circular business models reduce inefficiencies in the linear model and create value for companies

Five circular business models

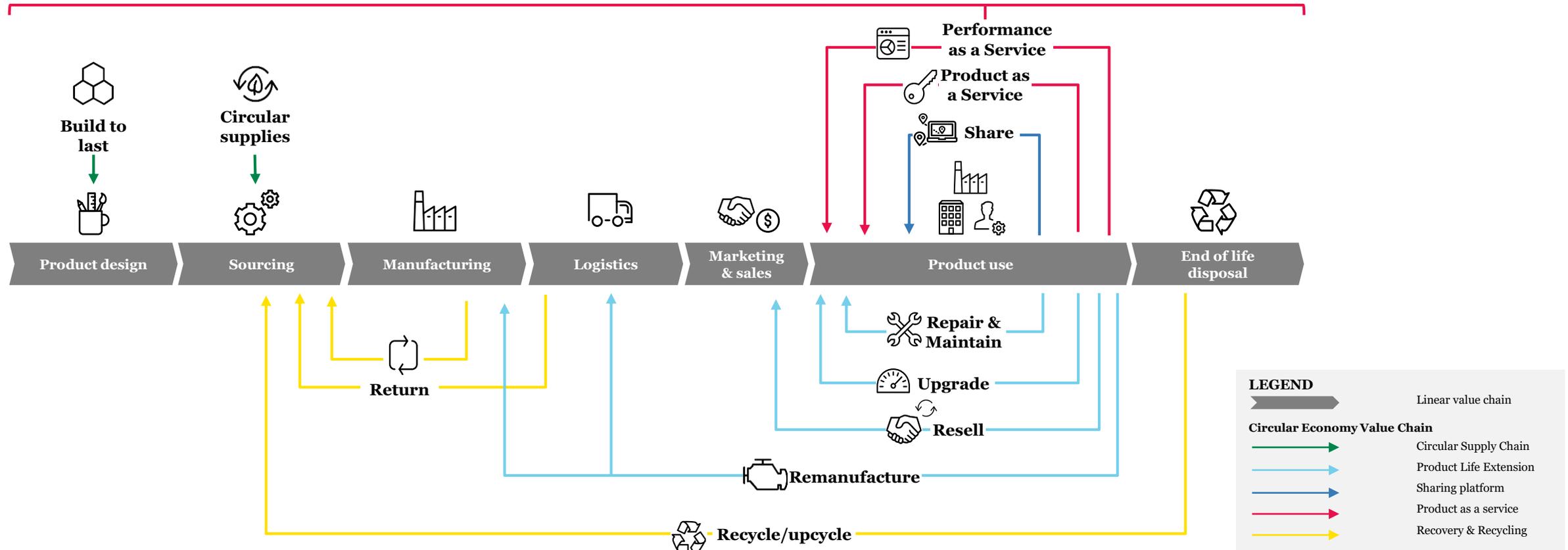


Source: Accenture

Business model specific sub-models modify different steps of the value chain to make it circular

Circular sub-models

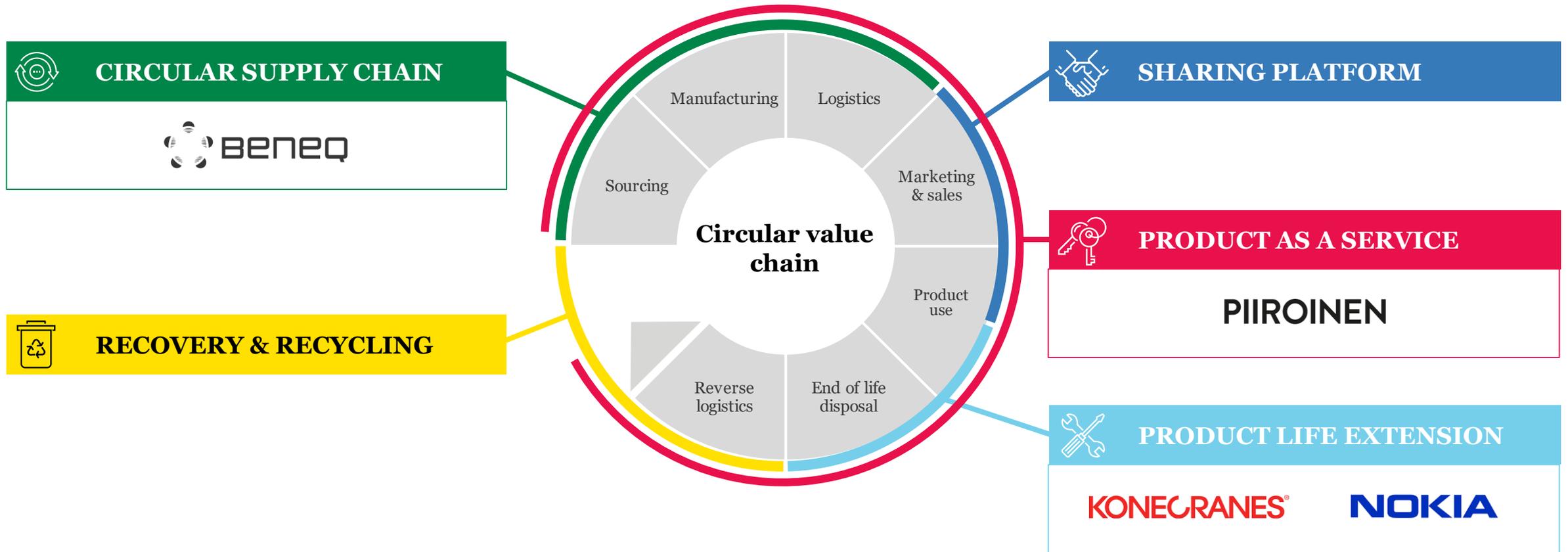
As a Service models are mostly concerned with the operation phase, but span across the value chain



Source: Accenture

Next, we will hear four circular business model examples from participating SMEs and anchor companies

Circular business model examples



Source: Accenture

Circular strategy and programs at Nokia



Pia Tanskanen
Head of Environment
Nokia

Environmental management : efficiencies

Minimizing our footprint

Ensure our own operations are eco-efficient

Support a more eco-efficient supply chain

Supplier requirements
Audits & assessments
Capability building
Training & awareness
Carbon disclosure

Raw materials, components, products & services

Our operations, logistics and installation



End of product life



Product use

Minimize our energy use, emissions, waste, and water use

Optimize packaging
Reduce transportation via air

Maximizing our handprint

Helping customers deal with increased data traffic in a sustainable way

Helping other industries to reduce their energy use and emissions

Refurbish and recycle old telecoms equipment

Lifetime extension & refurbishment of our customers' old telecom equipment.
Material recycling

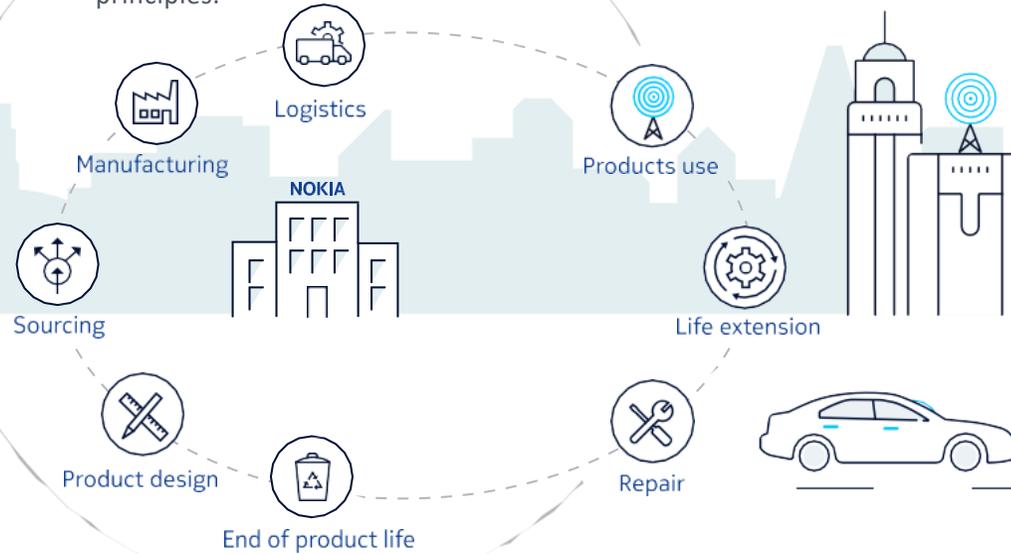
Create products that are energy and material efficient

Product-level impact

We up-grade, repair, reuse and recycle our products

Operational impact

We run our operations and develop our products using circular-economy principles.



Societal impact

Digitalization of products and services supporting sharing economy



Operations

Office waste, packaging waste, product design

143 kg

waste per
employee

3700 tons

of packaging
reused

70%

less material
mobile network
product 2/3/4G

Products

Up-grade, repair, reuse, recycle

Zero

touch update for
networks

68 000

units reused, 2600
tons recycled

99%

materials utilized
at the product end
of life

Society

Digitalization enables optimization of the
global resource use

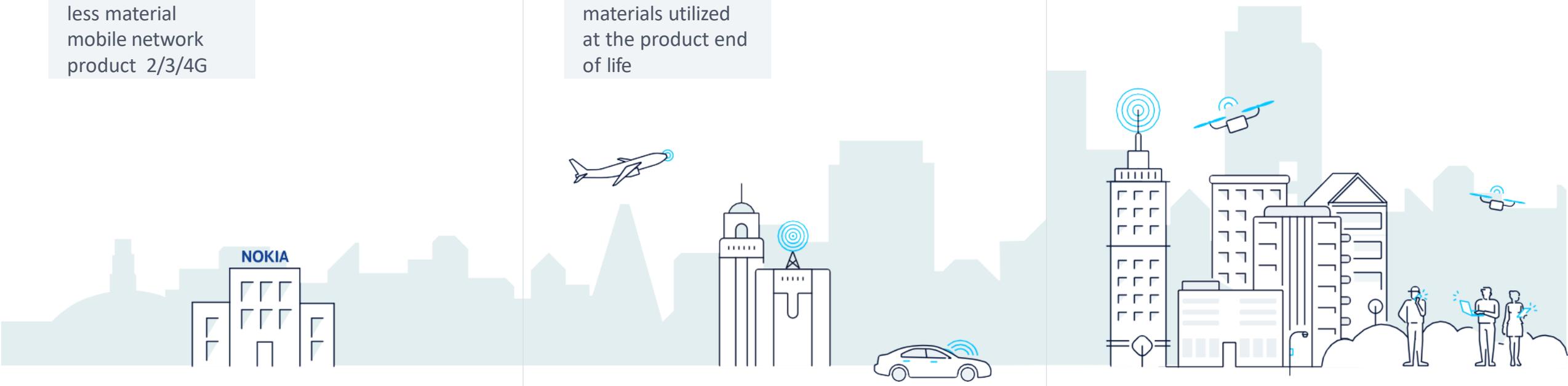
91%

global circularity
gap

Share

to avoid waste

NOKIA



NOKIA

Circular Supply Chain



Matias Impivaara

Vice President, Business Growth and Development

Beneq



Circular Economy at Beneq Thin Film Solutions

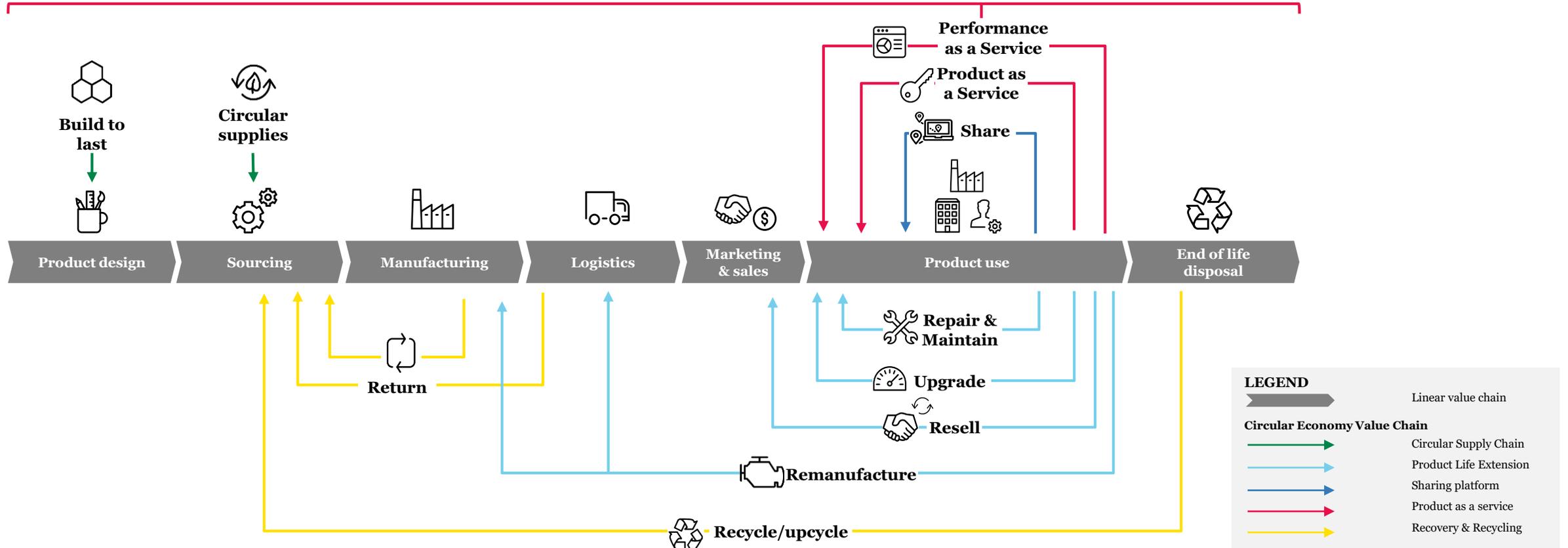
Kiertotalouden liiketoimintamallit valmistavassa teollisuudessa
19.9.2018

MATIAS IMPIVAARA
VP, Business Growth and Development



The Framework

As a Service models are mostly concerned with the operation phase, but span across the value chain



Source: Accenture

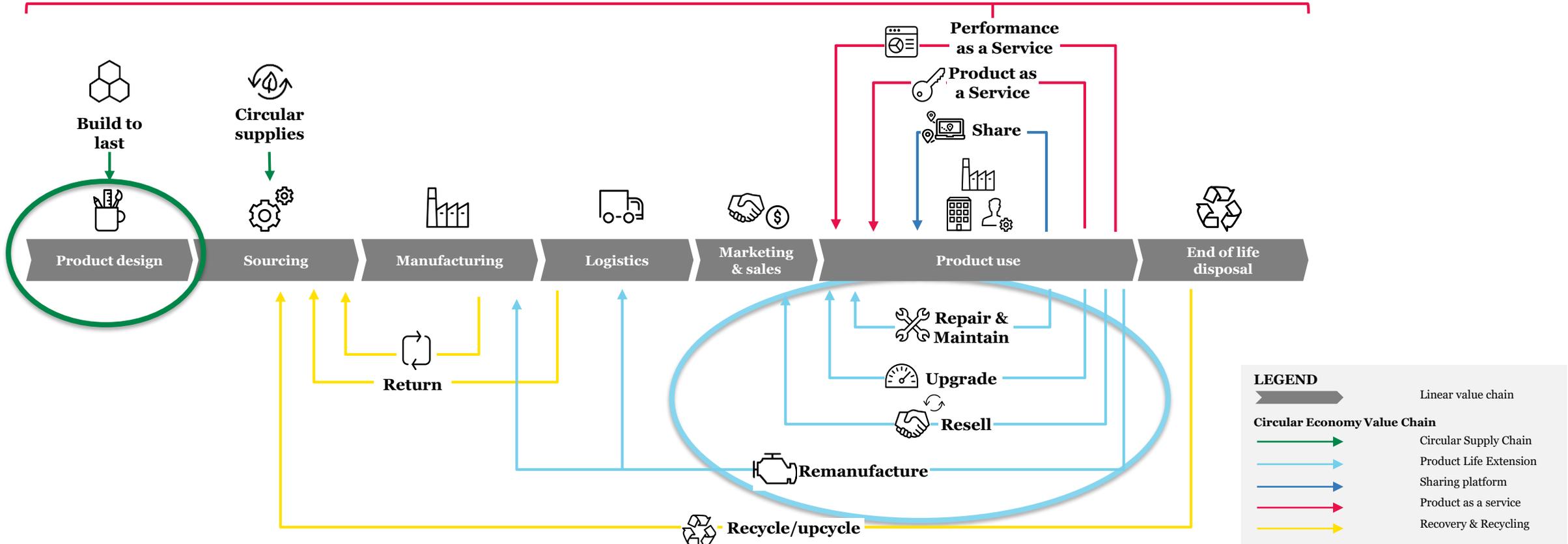
Potential Circular Economy Projects



- Improving product architecture to support easier upgrades and recycling
- Expanding product lifecycle with improved maintenance programs
- Developing take-back programs and pre-owned equipment offering
- Offering a sharing platform for equipment customers
- Expanding Beneq Coating Services globally
- Investigating new business options for preventive maintenance
- Developing business models based on equipment usage

The Framework

As a Service models are mostly concerned with the operation phase, but span across the value chain



Source: Accenture

Example 1: Modular Product Architecture



Beneq C2 – Industrial ALD Equipment
for More than Moore semiconductor markets

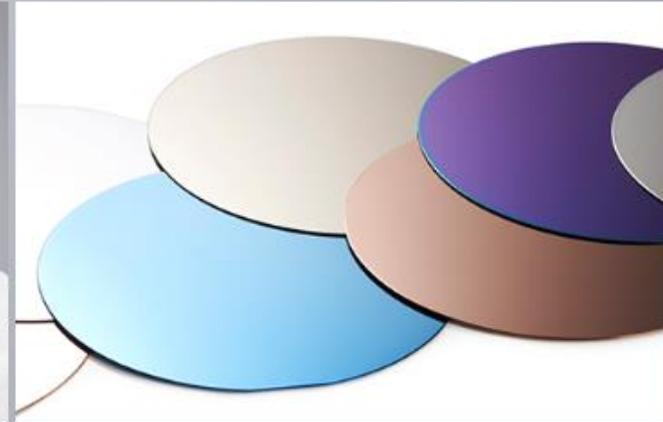


Example 2: Lifecycle Services

LIFECYCLE SERVICES



INTRODUCTION



SUPPORT SERVICES



TRAINING PROGRAMS



MAINTENANCE PLANS



Beneq® is a leading supplier of production and research equipment for atomic layer deposition (ALD), a provider of thin film coating services, and the world's premier manufacturer of thin film electroluminescent (TFEL and TASEL) displays.

www.beneq.com | www.lumineq.com
Tel. +358 9 7599 530
info@beneq.com | lumineq@beneq.com
firstname.lastname@beneq.com

Product as a Service



Pasi Aaltonen
Vice President, COO
Piiroinen

PIIROINEN

1949 est.

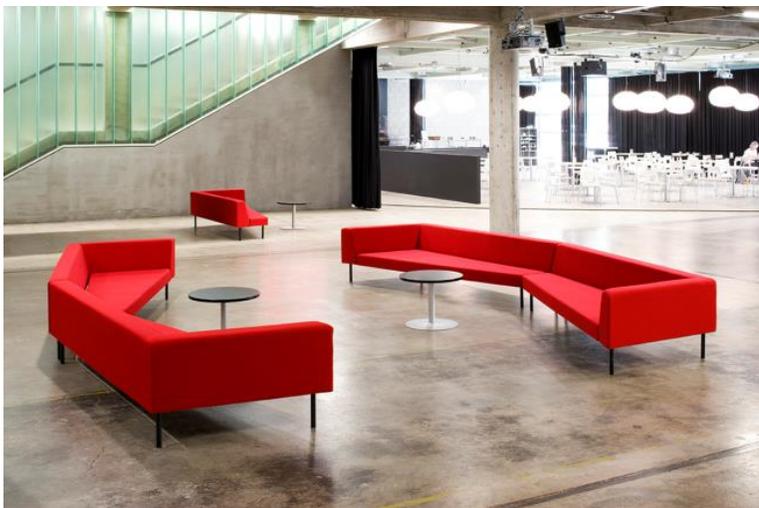
FURNITURE AND SEATING SYSTEMS - CIRCULAR ECONOMY

Made in Salo



PIIROINEN FURNITURES FOR PUBLIC SPACES

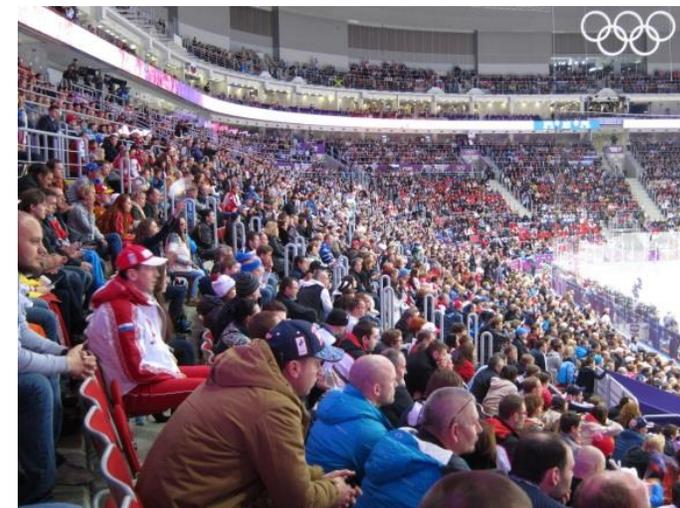
Chairs, sofas, tables, etc.



Auditoriums



Sport seating



Circular economy

Are we already environmentally friendly?

- In production; wastewater treatment plant and reuse of water, heating with woodpellets made of waste materials and environmental legislation in Finland
- In product design easy repair / modification / reuse is noticed

But after delivery we practically do nothing. Furnitures are made for long life time.

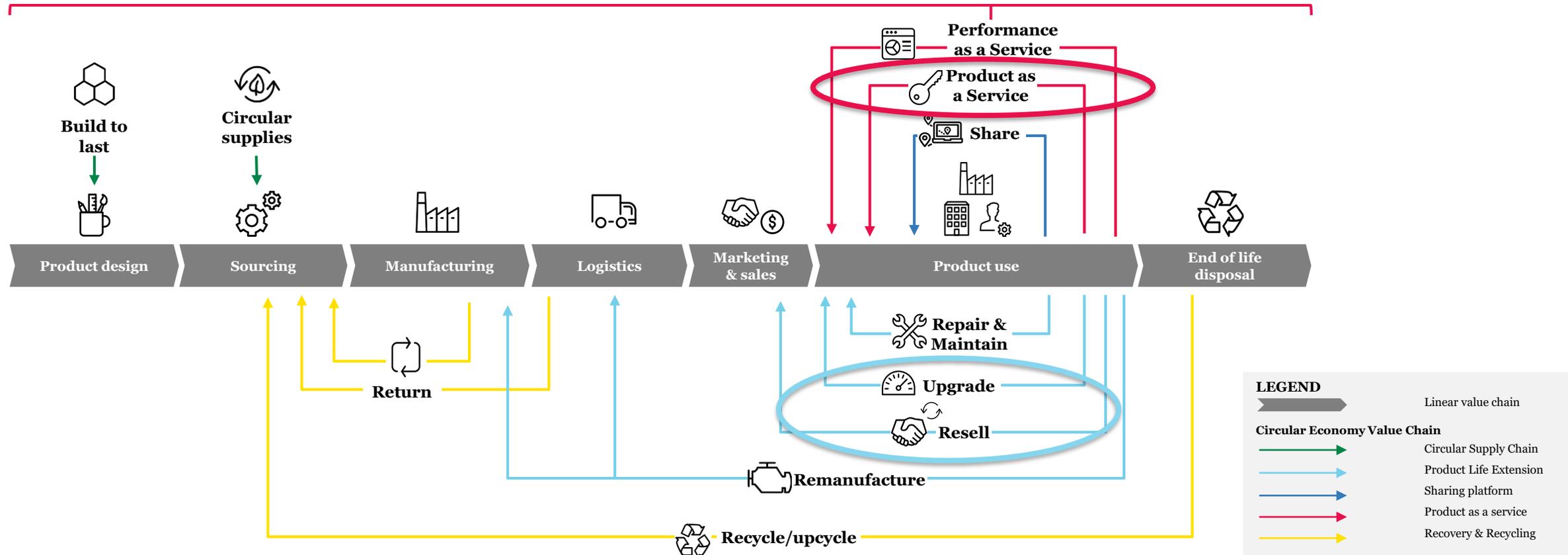
Is this business opportunity?



In Sitra workshops, we studied different business model alternatives

- Upgrading of furniture, actively offer upgrading services
- Resell of used and model furniture
- Product as service

As a Service models are mostly concerned with the operation phase, but span across the value chain





OPTION

Design Antti Kotilainen





Huisartsenpost Rijnmond, Rotterdam, The Netherlands

Case: Product as service

Good example is meeting room furniture

- Typically high end products, good looking and not cheap
- Customers hesitate to invest in meeting rooms due to costs
- Upgrading is done with very long time interval and is not following changes in needs
- Startup companies don't invest in meeting rooms, but still they have most important meetings ever

We can offer financing with banks.

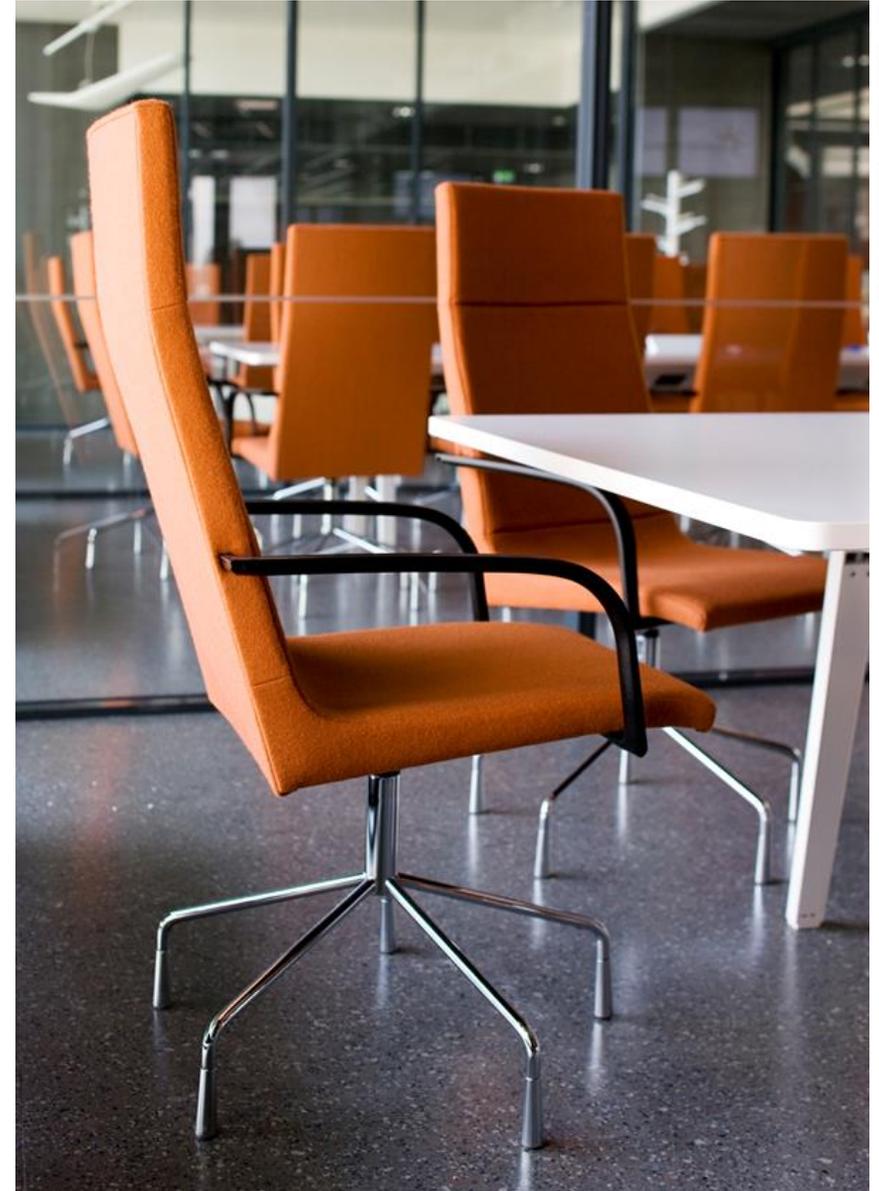
We can arrange upgrading and re-use of furniture.

Customer needs complete meeting room, not only furniture

-> we teamed up with three other companies and will make sample meeting room for hotel chain

To operate furniture, we need some simple way

-> we are going to open webshop



Lifecycle Care



Nathalie Clément
Director, Corporate
Responsibility
Konecranes



Satu Kaivonen
Environmental
Specialist
Konecranes

Kiertotalousmallit huoltotoiminnassa

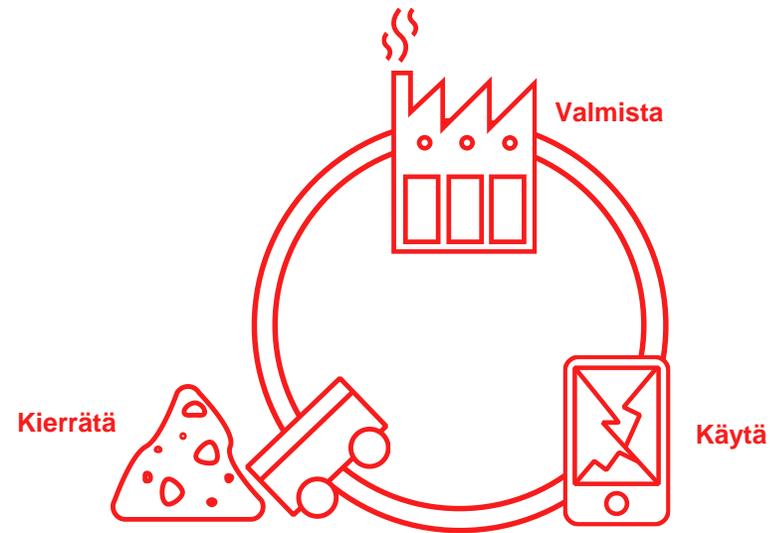
Tarkastelussa:
Lifecycle care-konsepti

19.9.2018 / NATHALIE CLÉMENT, SATU KAIVONEN

KONECRANES[®]
Lifting Businesses™



Kiertotalous pyrkii
irrottamaan arvonaluonnin luonnonvarojen käytöstä
ja kasvattamaan **olemassa olevien tuotteiden**
elinkaaren aikaista arvoa



Markkinoiden imu

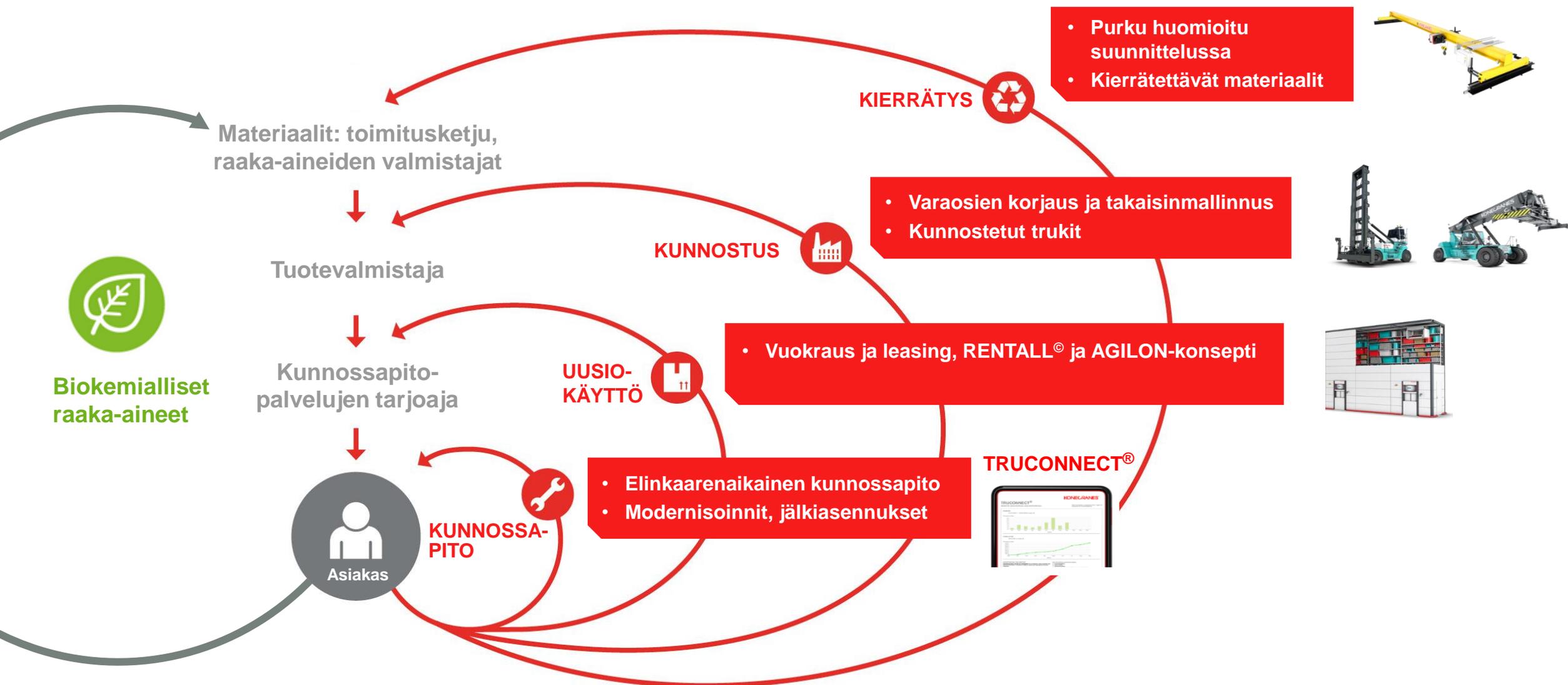
- Digitalisaatio
- Vähähiilisten tuotteiden kysyntä
- Kasvava kiinnostus vuokrapalveluita kohtaan
- Tuote Palveluna
- Resurssiniukkuus, hintojen nousu
- Käytettyjen tuotteiden markkinoiden kasvu
- Päästöraportointi



Taloudellinen ohjaus

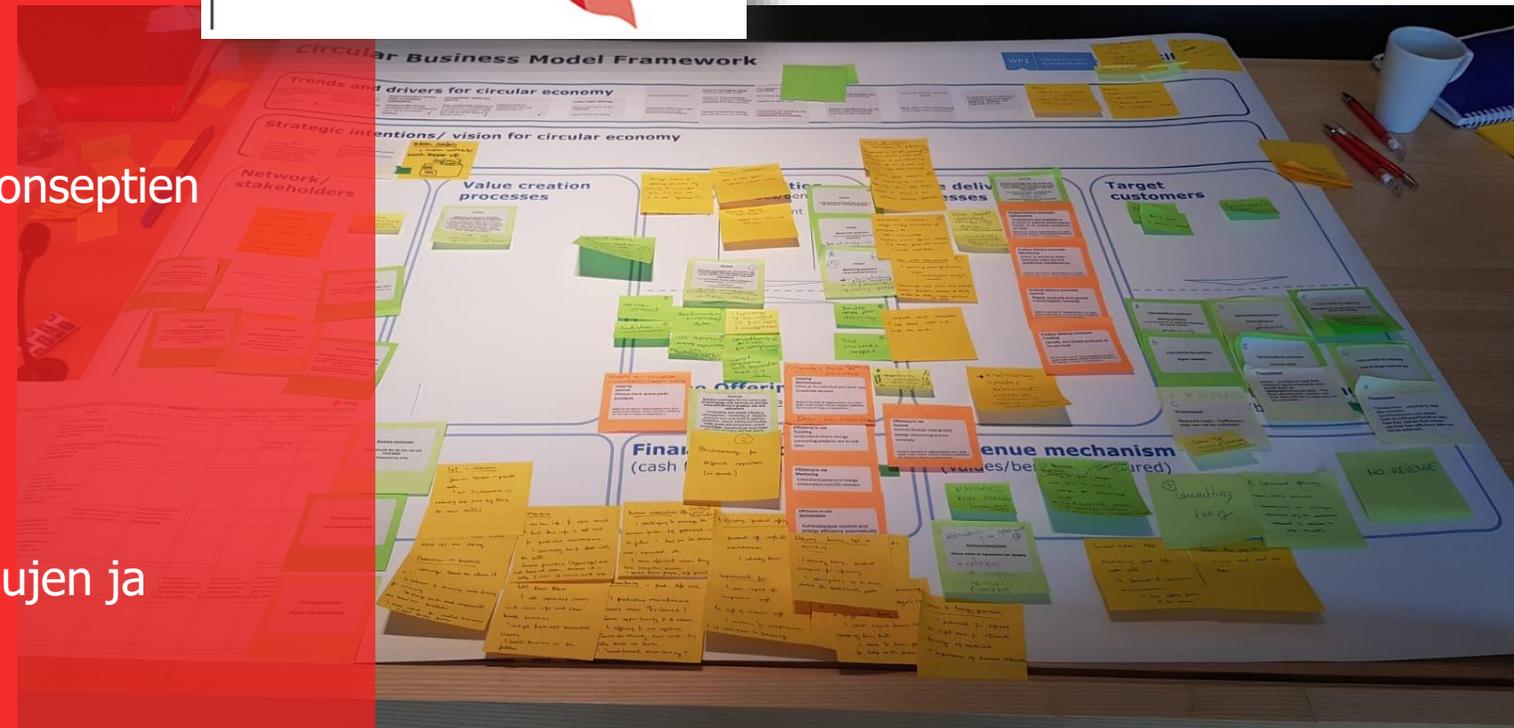
- Lainsäädäntö
 - Ecodesign direktiivi
 - Euroopan komission kiertotalouspaketti
- Uudet verotusmallit
 - Kustannusten nousu materiaali-intensiivisillä aloilla
 - Alempi arvonlisävero työvoimaintensiivisillä aloilla → taloudellinen kannustin

Kiertotalouden keskiössä



Kasvua kiertotaloudella CIRCit hanke 2018-2019

- Kiertotaloutta edistävien työkalujen ja konseptien kehitystä Pohjoismaiden kiertotalousasiantuntijoiden johdolla
- Hankkeen ainoa suomalainen yritys
- Pilottina liiketoimintamallien, IoT ratkaisujen ja kestäväen liiketoiminnan mittaroinnissa





Tuotteen elinkaaren
pidentäminen Lifecycle
care konseptin kautta

Kunnossapidon evoluutio

REAKTIIVINEN



ENNAKOIVA



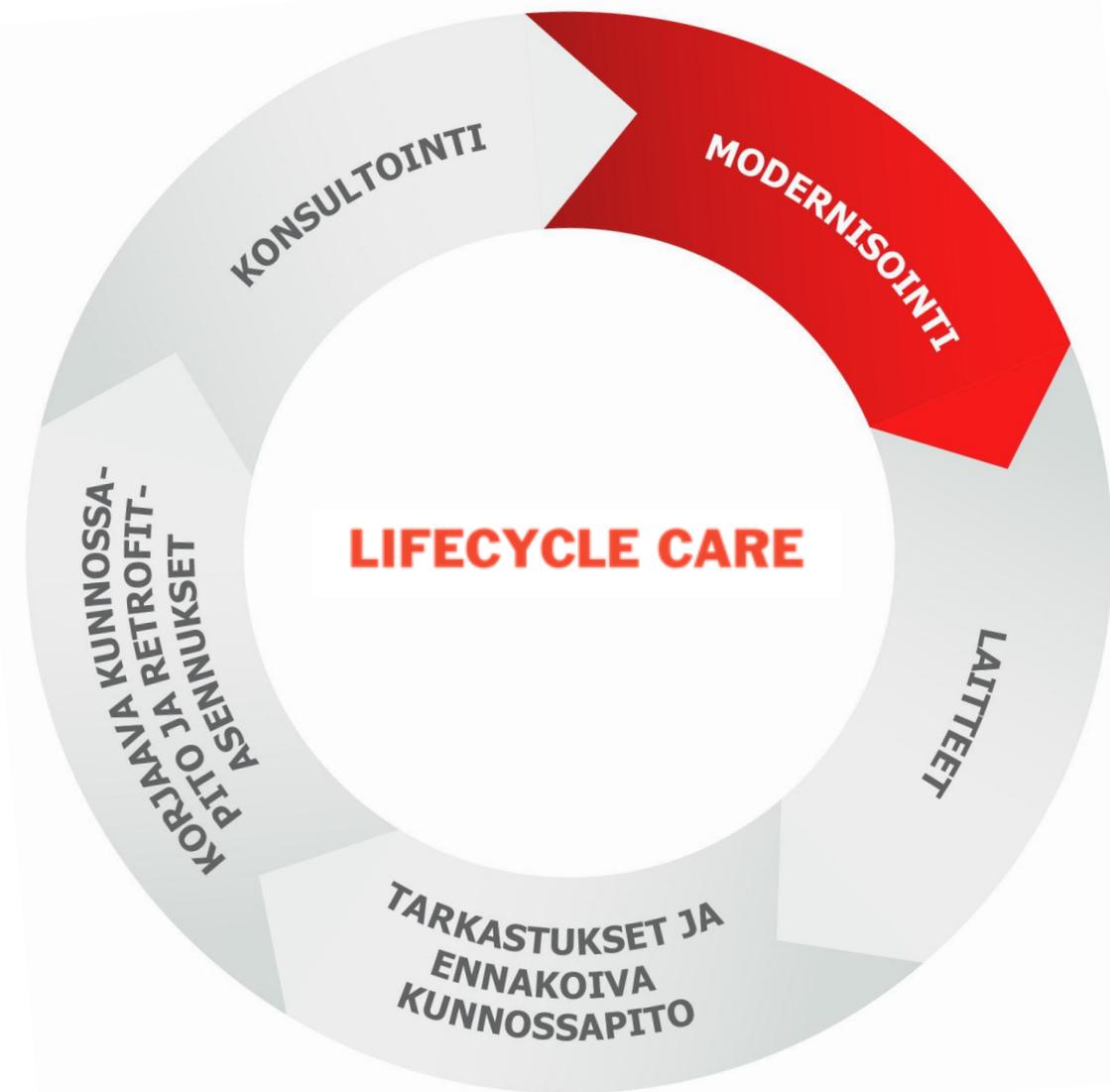
REAALIAIKAINEN



YHDISTÄMÄLLÄ IHMISET, KONEET JA
KERÄTTÄVÄ DATA, SAAVUTETAAN

KOKO ELINKAAREN KATTAVA, REAALIAIKAINEN HUOLENPITO

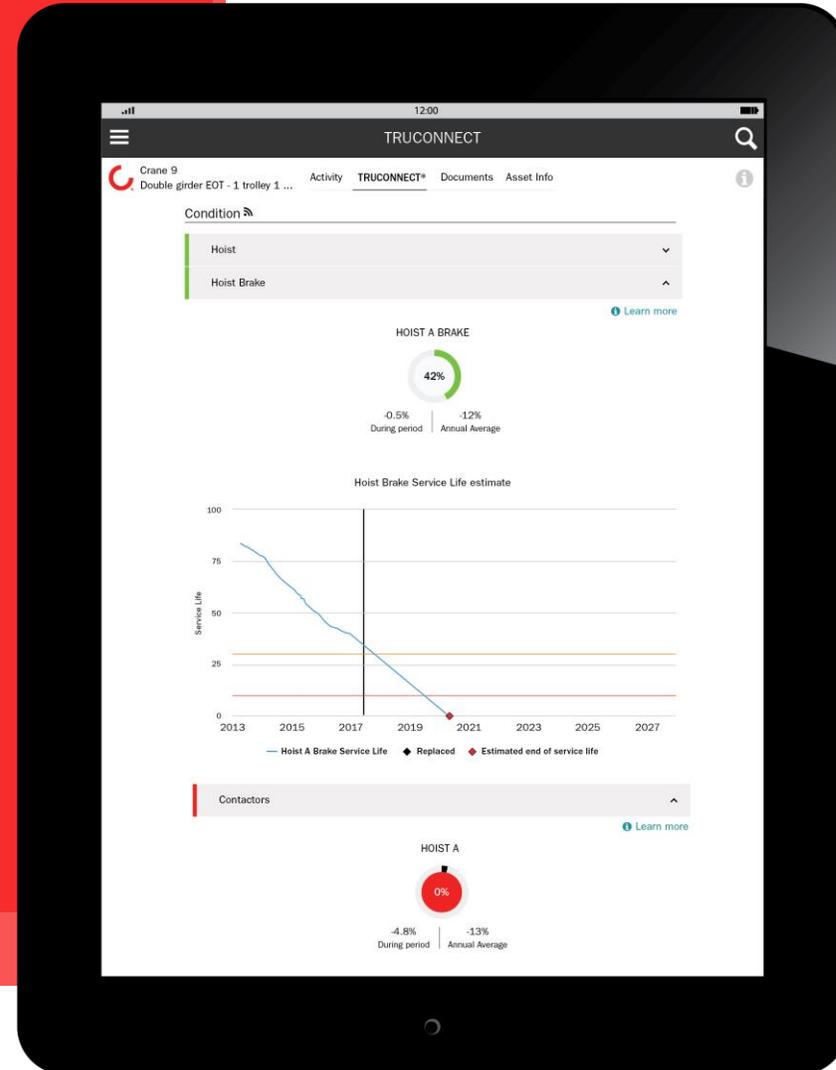
<p>OLE YHTEYDESSÄ</p> <p>Mobiiliyhteyksiä käyttävät huoltoteknikot, TRUCONNECT- etävalvonta</p>	<p>HANKI TIETOA</p> <p>yourKONECRANES.com Poikkeamat, toistuvat tapahumat, trendit</p>	<p>OPTIMOI</p> <p>Käytön ja kunnossapidon optimointi</p>
--	---	---

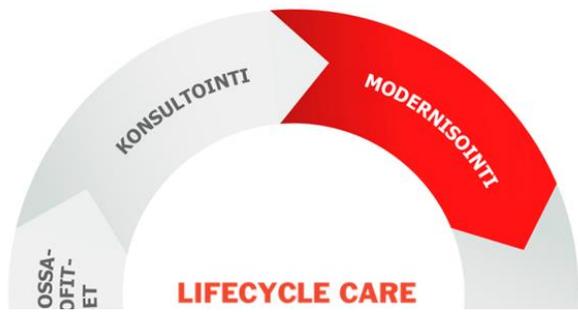


Digitalisaatio kiertotalousratkaisujen tukena

Sensoreiden yleistymisen ja teollinen internet ja edistävät kiertotalouteen siirtymistä.

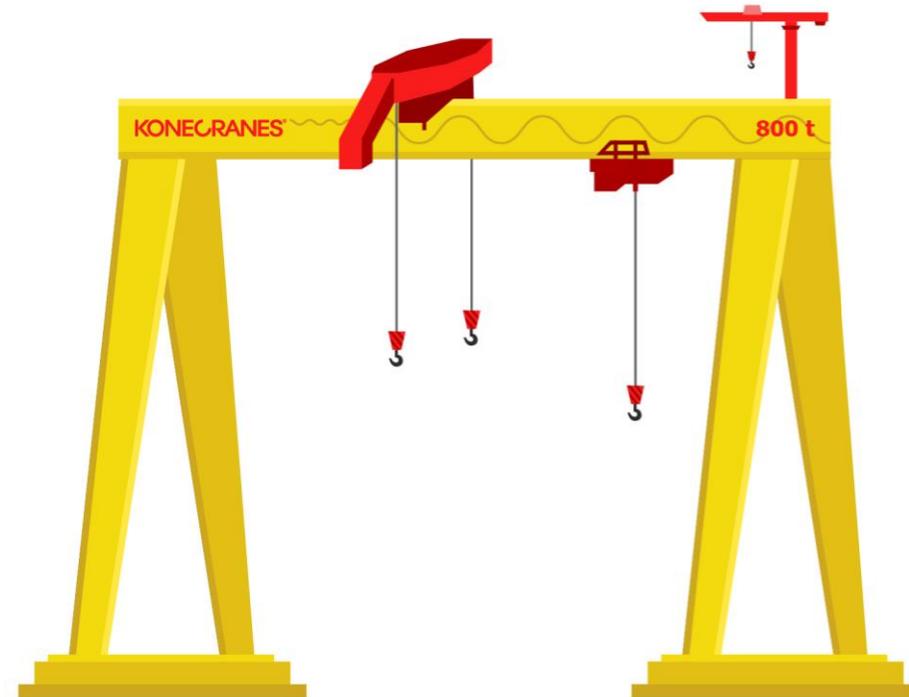
- Koneoppiminen
- Optimointi
- Ennakoiva analytiikka
- Lisätty todellisuus
- Big data
- Pilvipalvelut
- Virtuaalitodellisuus





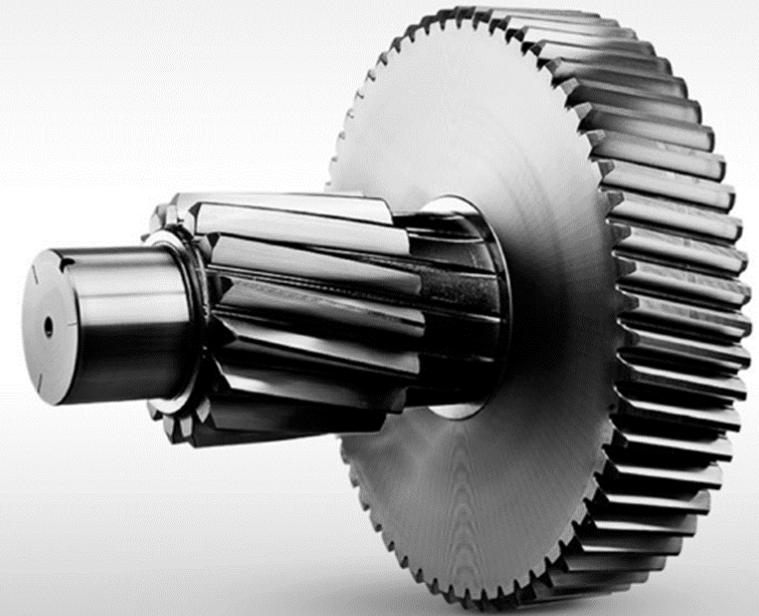
Modernisoinnilla elinkaarelle pituutta

- Useamman kerran elinkaaren aikana
- Teräsrakenteen hyödyntäminen
- Kuluneet osat vaihdetaan
- Teknologia päivitetään
- Merkittävät ympäristösäästöt raaka-aineissa sekä välillisesti energian ja päästöjen osalta



Modernisoinnin hyödyt

- Pidentää taloudellista käyttöikää ~30 vuodesta jopa 10-15 vuotta
- Investointina uutta laitetta edullisempi, laite ei ole poissa tuotantokäytöstä
- Säästää raaka-aineessa, tuotannon ympäristövaikutuksissa ja kuljetuksissa
- Lisää käytön turvallisuutta, nopeutta, tuottavuutta, luotettavuutta sekä käytettävyyttä. Energiatehokkuutta voidaan myös parantaa
- Varautuminen tulevaisuuden tarpeisiin (tuottavuuden kasvattaminen, uuden teknologian vaatimukset)
- Vähentää huollon tarvetta sekä ennakoimattomien häiriöiden ja seisokkien vaaraa
- Varaosien saatavuuden turvaaminen



Kiertotalous vie kohti palveluita

- TRUCONNECT etävalvonta mahdollistaa vikojen huollon etänä
- Modernisoinnit, asennuspäivitykset
- Moottoreiden ja varaosien kunnostustoiminta ja takaisinmallinnus
- Varaosasaatavuus ja varaosavalmistus
- RENTALL-konsepti
- Erikoishuollot ja konsultaatiot





**NOT JUST LIFTING
THINGS, BUT ENTIRE
BUSINESSES**

AGENDA

The agenda of the event follows the structure of the new **Circular Economy Playbook**.

3 Which capabilities are required?

- 15:25 Steps for a successful transition and capabilities needed to achieve circular advantages
- Cédric Vatier, Accenture



#kasvuakiertotaloudesta

SITRA



Technology Industries
of Finland

accenture
High performance. Delivered.

Steps for a successful transition and capabilities needed to achieve circular advantages



Cédric Vatier

Managing Director, Global Lead, Industrial & Travel
Accenture Strategy

LESSONS LEARNT



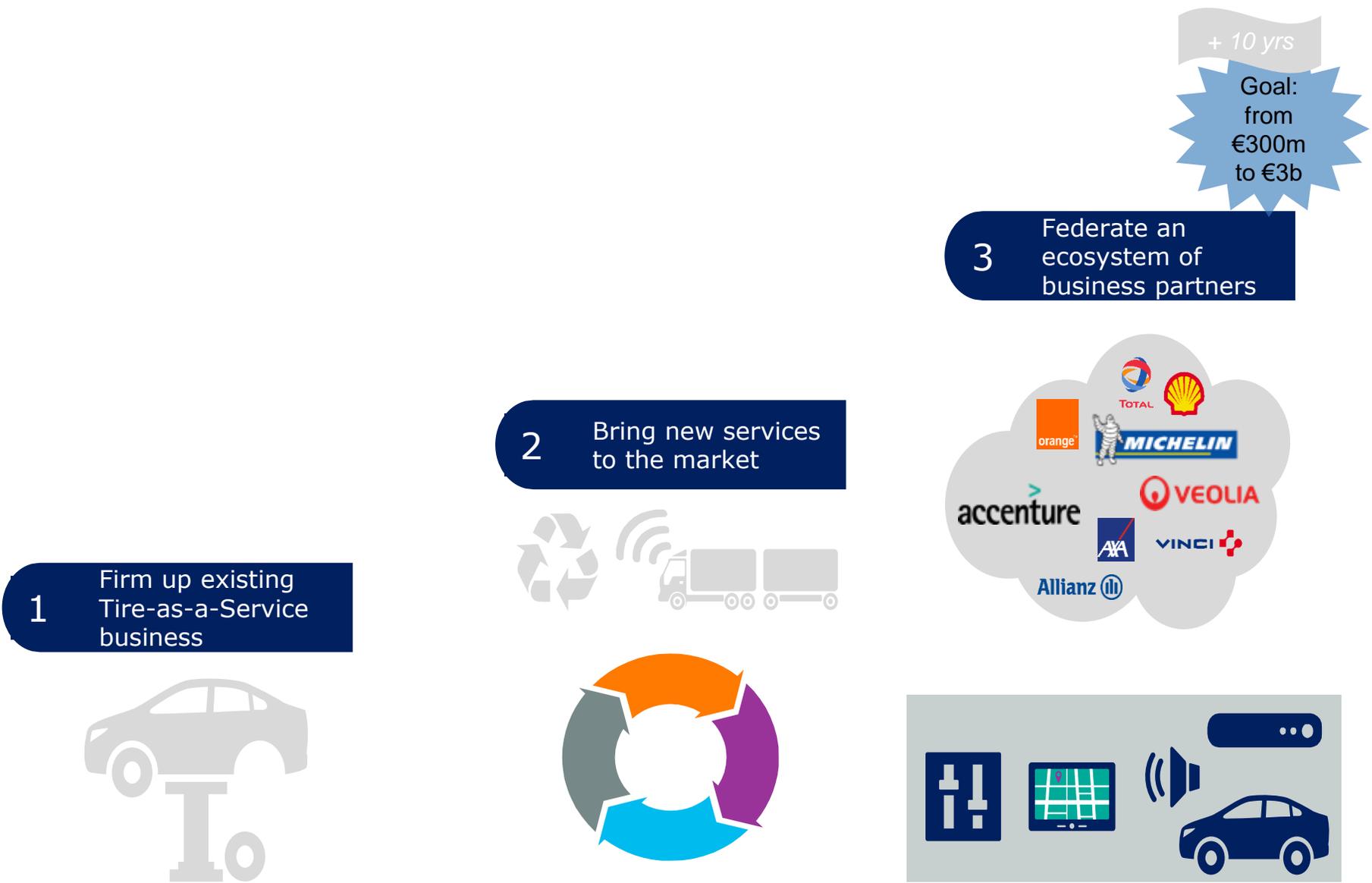
CHANGING THE GAME REQUIRES NEW CAPABILITIES – WHICH IS FREQUENTLY UNDERESTIMATED



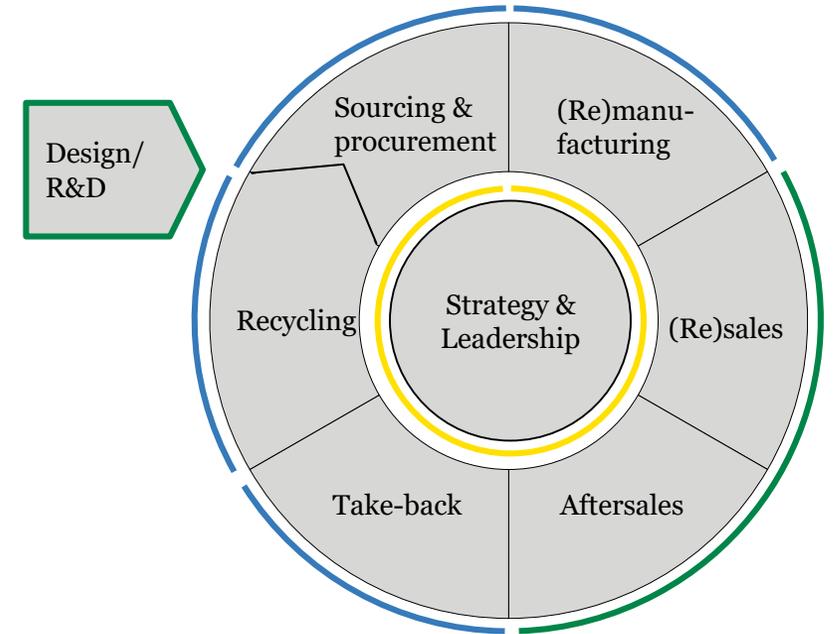
	 TRADITIONAL INNOVATION	 CIRCULAR ECONOMY INNOVATION
--	---	--

 WHAT?	<ul style="list-style-type: none"> Understand Customer usage and expected Product Attributes 	<ul style="list-style-type: none"> Design and live Customer Experience / Journey
 HOW?	<ul style="list-style-type: none"> Leverage traditional and robust processes 	<ul style="list-style-type: none"> Perform iterative design and prototyping (to test, fail, learn and rebound quickly)
 WHO?	<ul style="list-style-type: none"> Leverage companies distinctive forces and expertise around Product / Service 	<ul style="list-style-type: none"> Manage an open ecosystem and perform open innovation – acquiring / partnering with new talents
 CORE SKILLS	<ul style="list-style-type: none"> Traditional Product / Service know-how is “at the heart” 	<ul style="list-style-type: none"> Design Thinking and Big Data / Analytics are the heart
 MOTIVATION	<ul style="list-style-type: none"> Perform Innovation cycle in Years 	<ul style="list-style-type: none"> Perform Innovation cycle in Weeks / Months

A “STEP-BY-STEP” APPROACH

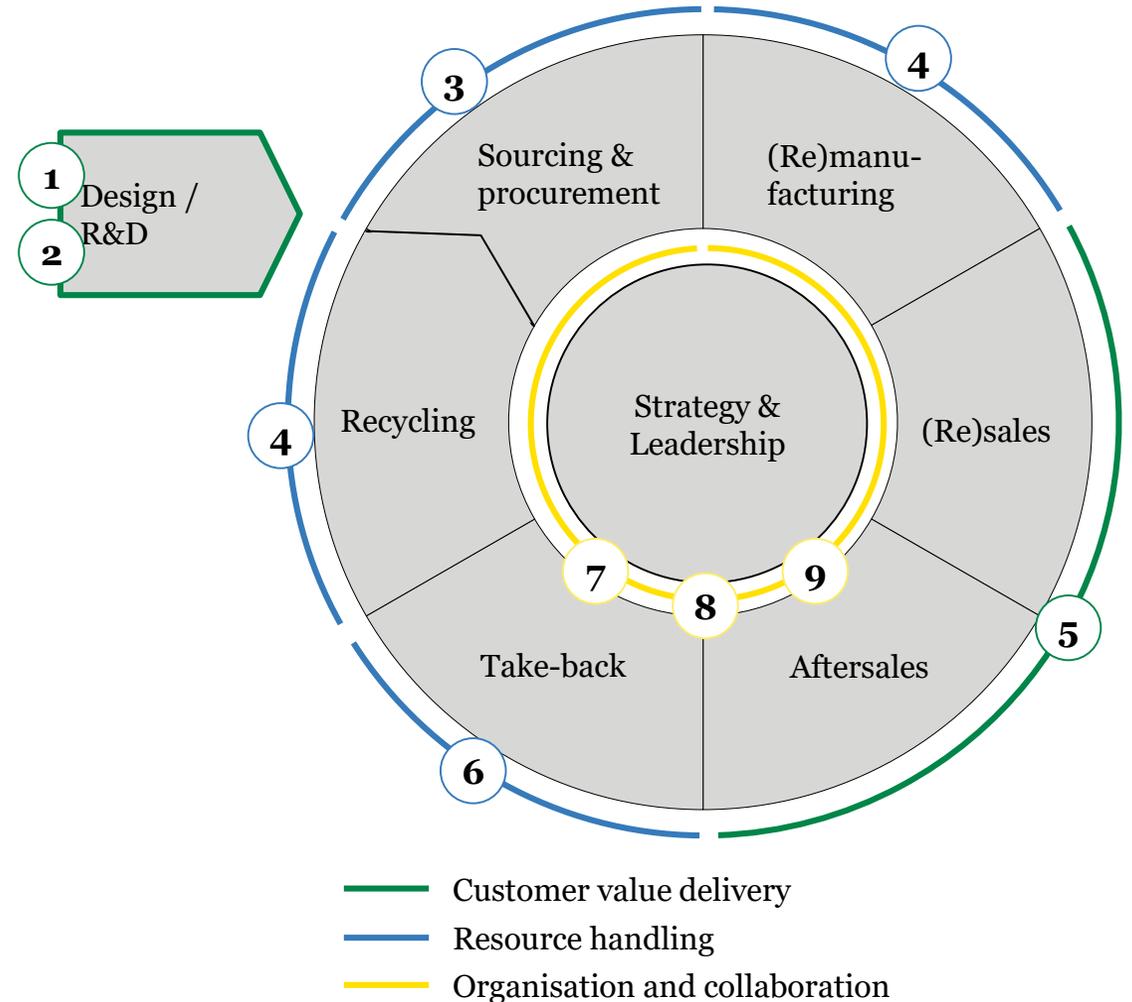


3 KEY AREAS OF DEVELOPMENT, TO MOVE FROM LINEAR TO CIRCULAR ECONOMY



NINE REQUIRED “CIRCULAR” CAPABILITIES

- 1 Design solutions to deliver customer outcomes
- 2 Design products for circularity
- 3 Source recycled or recyclable material
- 4 Produce, remanufacture and recycle products
- 5 Sell outcomes and lifecycle services
- 6 Take back products at end-of-life
- 7 Deploy technologies and data for delivering outcomes
- 8 Orchestrate ecosystem of partners
- 9 Transform culture and steering



Source: Accenture

EXAMPLES OF MARKET PRACTICES

A



Customer value delivery – *customer engagement beyond point of sale, smart product design and insight*

Patagonia - “Worn Wear”, a secondary marketplace for used Patagonia products.



Caterpillar designs parts for manufacturing



Fairphone modular smart phone



EXAMPLES OF MARKET PRACTICES

B



Resource handling –
*improved management
of resources to
maximise return on
embedded value
throughout supply
chain*

Apple, using robotics and AI to create recycling robots, Liam and Daisy



Nike, collecting waste from existing process to maximise resource efficiency and create value



Excess Materials Exchange, tech enabled marketplace for secondary raw materials



EXAMPLES OF MARKET PRACTICES

C



Organisation and collaboration – holistic, cross functional business transformation

Philips, move from Products to Services

PHILIPS

IKEA embedding circular economy holistically into its business



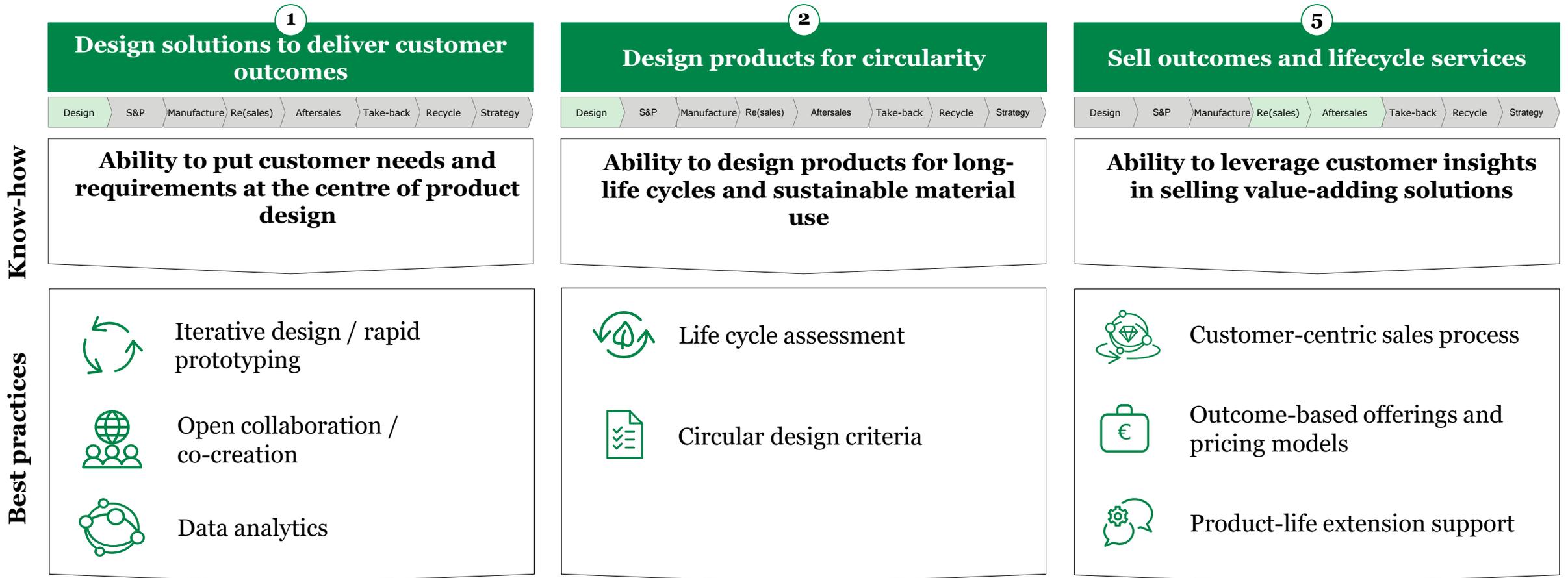
Danone embracing circular economy in its organisational structure



Customer-centric design enables additional sales throughout the product lifecycle

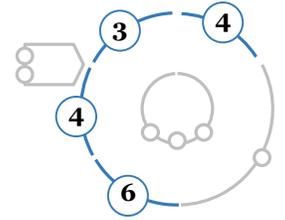


A) Customer value delivery



Improved customer-centricity through more frequent interaction and more customised solutions

Appropriate resource handling ensures that materials and products are kept in a closed cycle

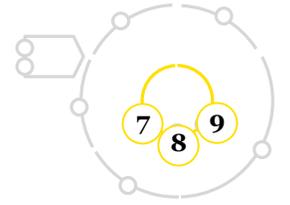


B) Resource handling

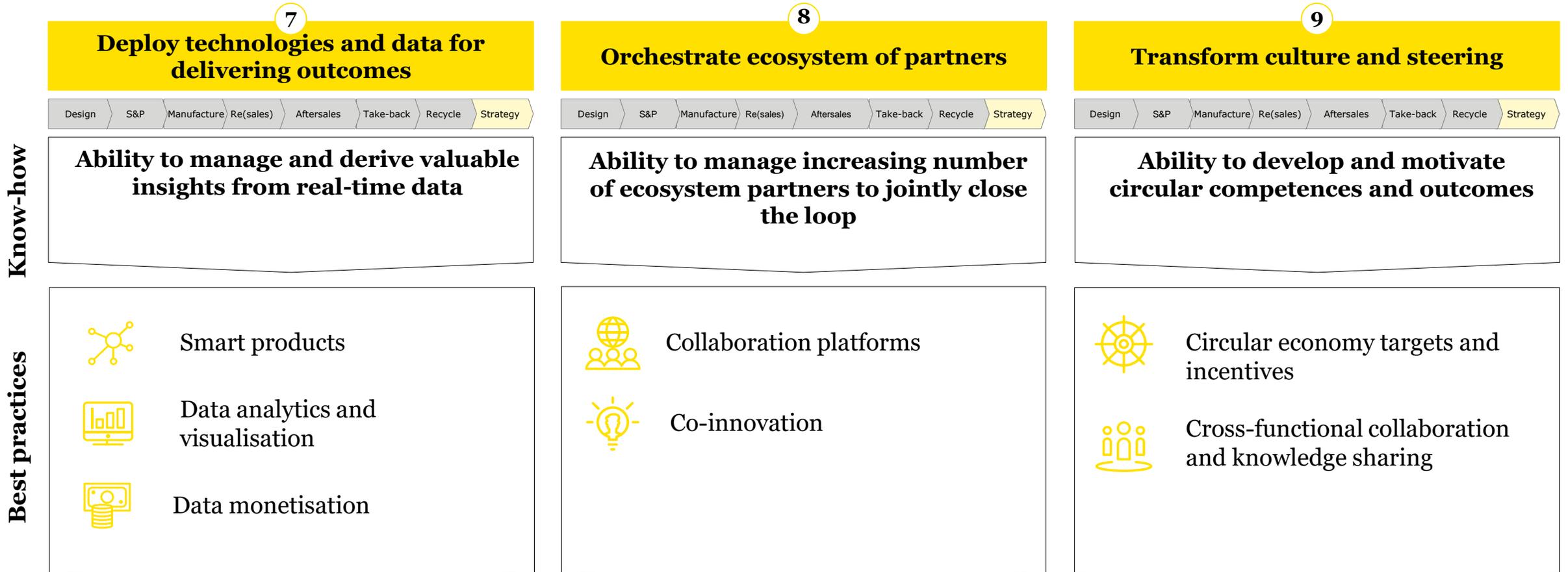
	3	4	6
	Source recycled or recyclable material	Produce, remanufacture and recycle products	Take back products at end-of-life
	Design S&P Manufacture Re(sales) Aftersales Take-back Recycle Strategy	Design S&P Manufacture Re(sales) Aftersales Take-back Recycle Strategy	Design S&P Manufacture Re(sales) Aftersales Take-back Recycle Strategy
Know-how	Ability to specify and source materials that can easily be regenerated and recycled	Ability to handle waste in production, incl. material flows and remanufacturing	Ability to establish return systems that ease and facilitate disposal of products end-of-life
Best practices	<ul style="list-style-type: none"> Circular resource marketplace Industrial symbiosis Supplier code of conduct 	<ul style="list-style-type: none"> Material flow management Digital production Remanufacturing, reprocessing and recycling 	<ul style="list-style-type: none"> Reverse logistics network Condition tracking and monitoring Return incentives

Improved management of resources to maximize returns on embedded values across product-life cycle

Technology, partners and leadership play a key role in the circular transformation



C) Organisation and collaboration



Successful transformation through full utilisation of internal and external strengths and resources

AGENDA

The agenda of the event follows the structure of the new **Circular Economy Playbook**.

4 Which technologies can support?

- 15:45 **The benefits of digitalisation and enabling technologies in circular economy**
- Jarkko Miettinen, Agiler
 - Samuli Strömberg, Arisense



#kasvuakiertotaloudesta

SITRA



Technology Industries
of Finland

accenture
High performance. Delivered.

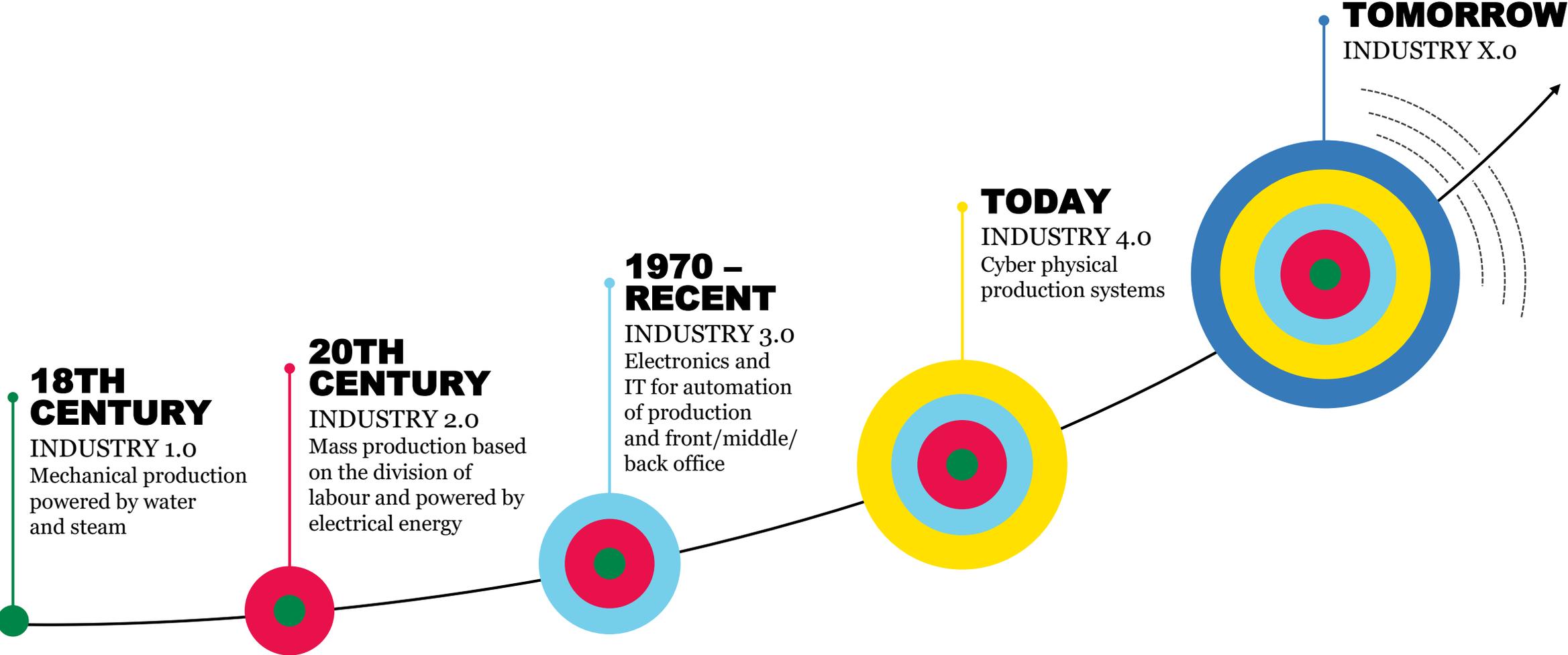
Technologies supporting circularity



Ville Mickelsson

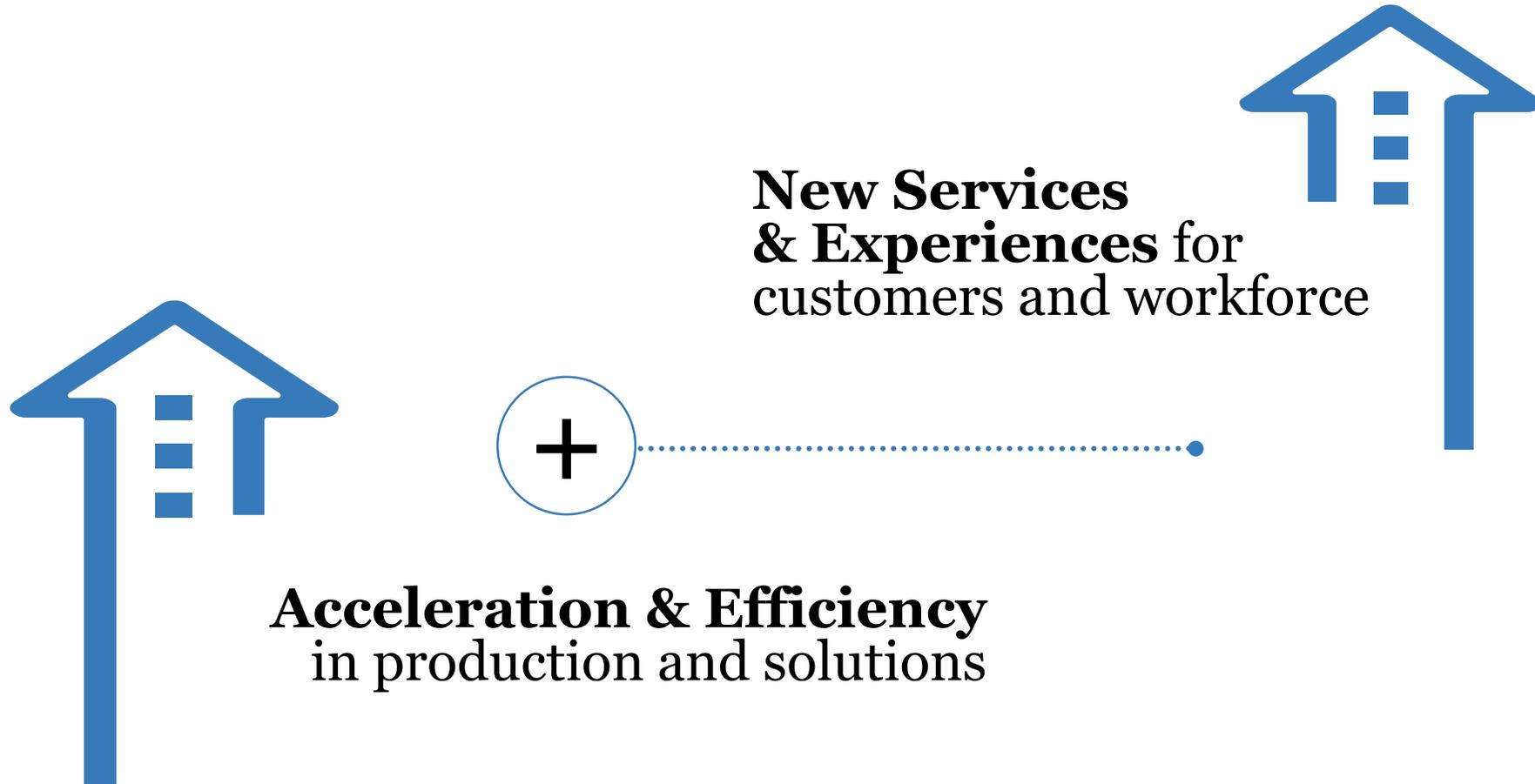
Director, Industry X.o Nordic Lead
Accenture

The increasing speed of technology development forms the term Industry X.0, referring to technologies used tomorrow



Source: Adapted from earlier Accenture publications

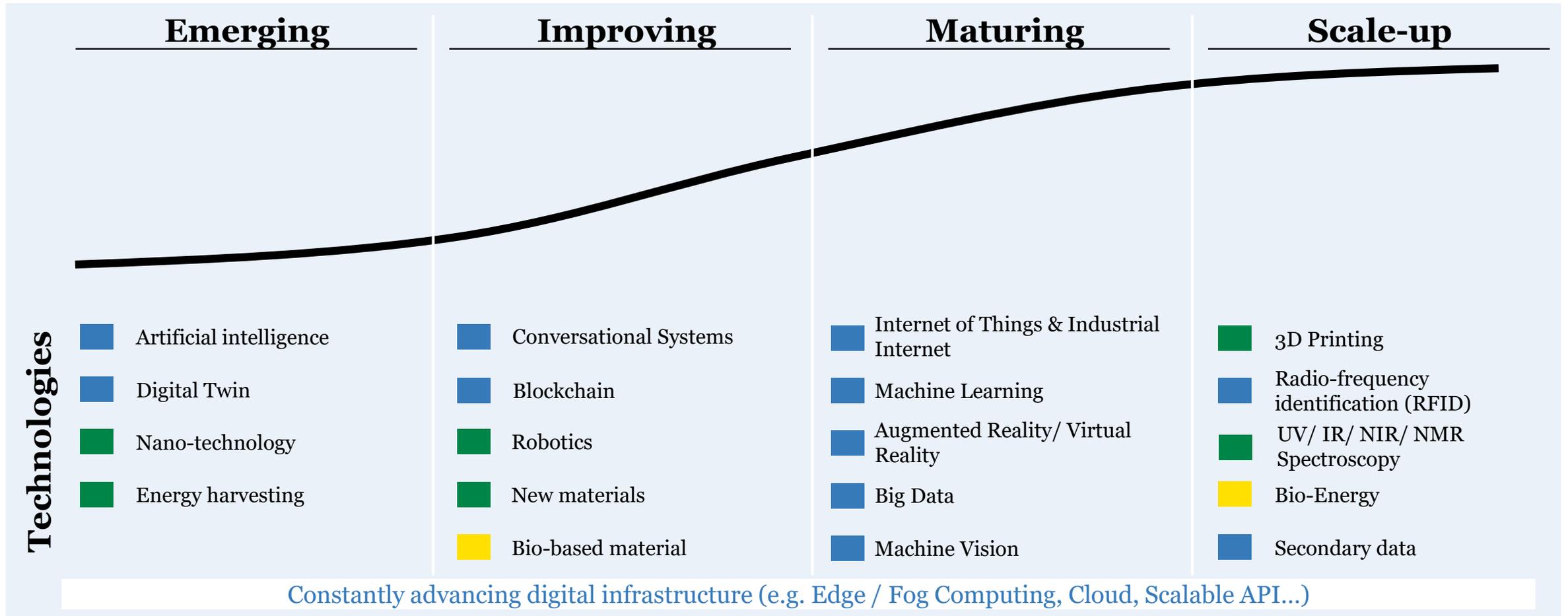
Changes through Industry X.0 deliver tangible outcomes for companies



Source: Accenture,

Technologies are developing at a rapid pace, enabling companies to deliver on circular economy objectives

Enabling technologies



Legend: Type of technology ■ Digital ■ Physical ■ Biological

The benefits of digitalisation and enabling technologies in circular economy



Jarkko Miettinen
Co-founder & CEO
Agiler



Samuli Strömberg
Arisense



The benefits of digitalization and enabling technologies in circular economy

Lifecycle is the new origin

In the traditional linear lifecycle model main thing was to have proof of origin.

- The requirements for product related information were driven by regulatory and security topics.
- Sales income were created mainly by selling the physical product once from one player to the other.



Kuva. ABB

Circular economy creates new paradigms.

- The new origin is created when product is sold to a new use or to be used as new.
- This maximises the current value according to the circular economy principles.
- Value maximisation highlights the significance of service sales.

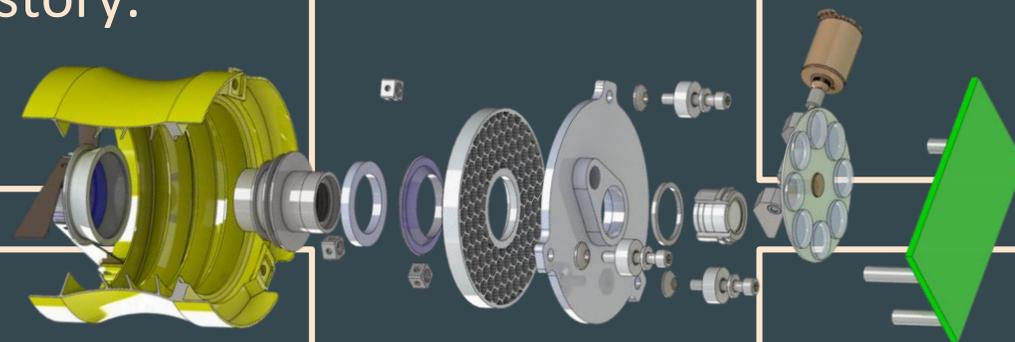
The benefits of digitalization in circular economy

Creation of added value from services is not possible without reliable lifecycle history.

Sharing of the key lifecycle information enables value maximisation.

Enabling resource efficiency and waste minimization through digital identification technologies.

Intangible and invisible value components will be important sources for competitive edge.

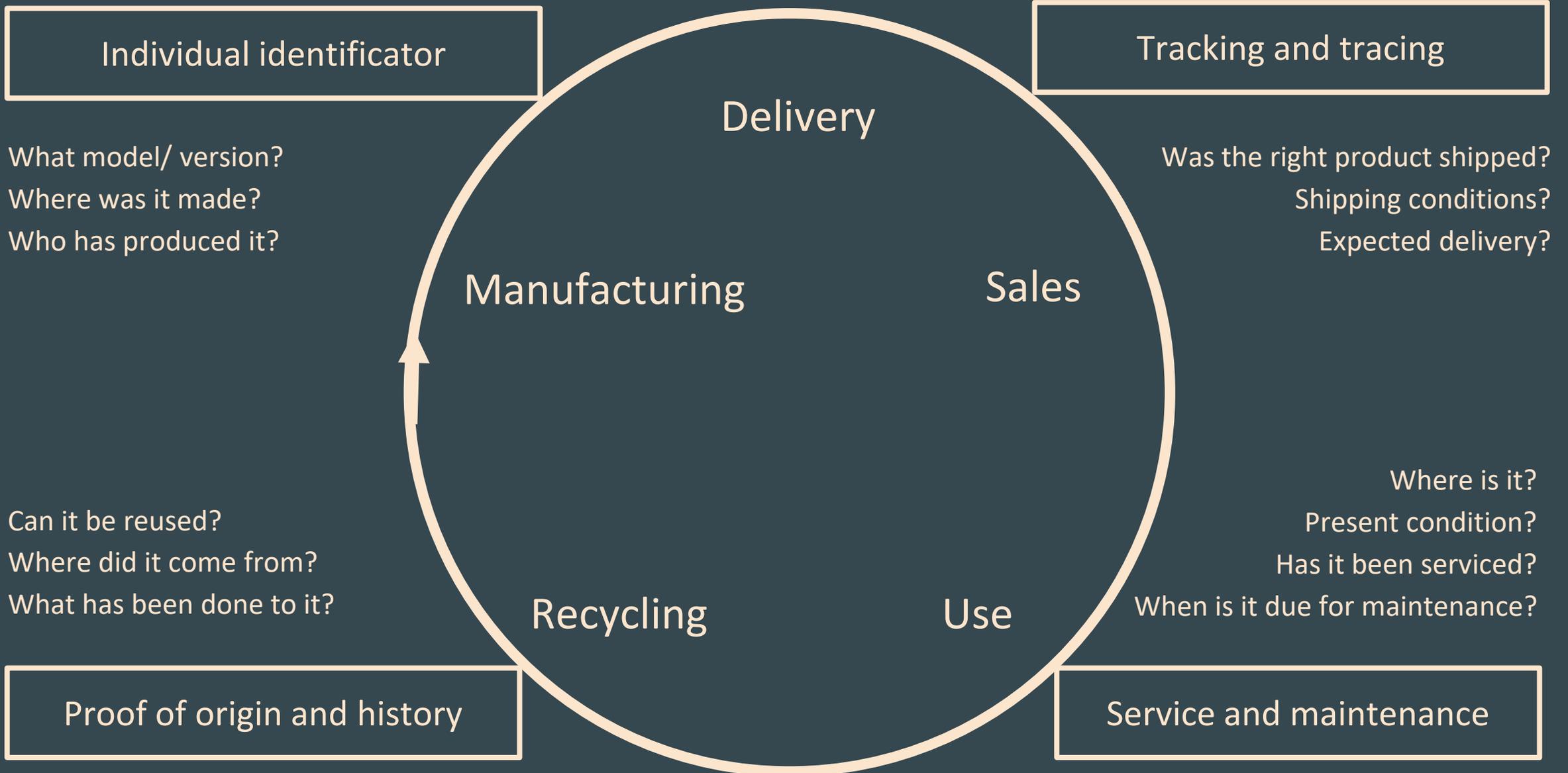


Product: Filter
Type:A1
Version:2A6F8
Mfg-date:20150201
MRO date:20180919

Tag ID:EF014798710937209
Sensor1: OK
Sensor2: OK



The benefits of digitalization in circular economy



IoT technologies in promoting circular economy

- Aerospace industry is a good example where IoT (Internet of Things) technologies are successfully used. Products are platforms for value adding services.



An aircraft turbine manufacturer sells flight hours instead of hardware

- Rolls-Royce - “power by the hour”
 - Interests are to maximise product usage
 - Accurate information of conditions are needed
 - Preemptive maintenance is done from this knowledge.
- Service model created new markets (low-fare airlines).
 - Maintenance operations enables the new business model.
 - Unavailable flight hours are directly lost business.
 - Parts and tools are being tracked with RFID technologies to ensure high performance.

IoT technologies in promoting circular economy



RFID reader

- can be integrated to tools and devices
- NFC / UHF RFID / active technologies

Example case

- rechargeable battery is marked with a RFID tag.
- RFID reader is embedded to a tool
 - ensures that battery is genuine
 - records use history.
- Origin and history of the battery goes with it to recycling and reuse.

RFID tag

- global standards ensures operability.
- radio frequency based identification.
- memory up to several kilobytes.
- no power source needed (passive type).
- Costs in few euros or even less.

IoT technologies in promoting circular economy

MROHistorian App

AT&T 10:49 AM 73%

MRO Historian

Hello rail idle
Zeti Reader

Choose a record to view

Truck/Bogie
CAGE Code 11111, Part Number T475978, Serial Number 371

- Birth Record
- Current Record
- Repair on 4/1/2017
- Functional check on 8/30/2017
- Modify on 10/5/2017
- Maintenance on 10/10/2017
- Modify on 10/11/2017
- Functional check on 10/11/2017

ADD RECORD ANALYTICS



TEGO

Welcome back, Transit MRO

Assets By Type - All Times

HVAC controller (25) Panel (11) Truck/Bogie (8) Motorman Seat (13)



Assets By LatestRecord

Records



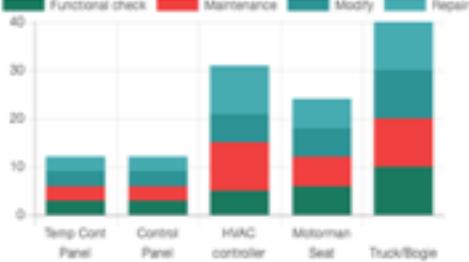
Breakdown of MRO Activities

Functional check (27) Maintenance (32) Modify (26) Repair (22)



MRO Activity / Product Name

Functional check Maintenance Modify Repair



Our Services

- Over 20 years of experience in business development and IoT technologies.
- We create sustainable growth by combining circular economy principles with latest IoT technologies.
- Design services of wireless identification solutions.
- Co-creation of IoT enabled products and services with our Industrial clients.



Samuli Strömberg
Arisense Oy
samuli.stromberg@arisense.com



Jarkko Miettinen
Agiler Oy
jarkko.miettinen@agiler.net

AGENDA

The agenda of the event follows the structure of the new **Circular Economy Playbook**.

 [#kasvuakiertotaloudesta](https://twitter.com/kasvuakiertotaloudesta)

SITRA

 Technology Industries
of Finland

 **accenture**
High performance. Delivered.

5 How to design the transformation journey?

16:00 Funding solutions for new business models
• Eeva Grannenfelt, Grannenfelt Finance

16:15 Innovation funding for pilot projects and international growth
• Jarmo Heinonen, Business Finland

16:30 Circular Economy Playbook for the Manufacturing industry
• Jyri Arponen, Sitra
• Laura Juvonen, Technology Industries
• Pekka Vanne, Accenture

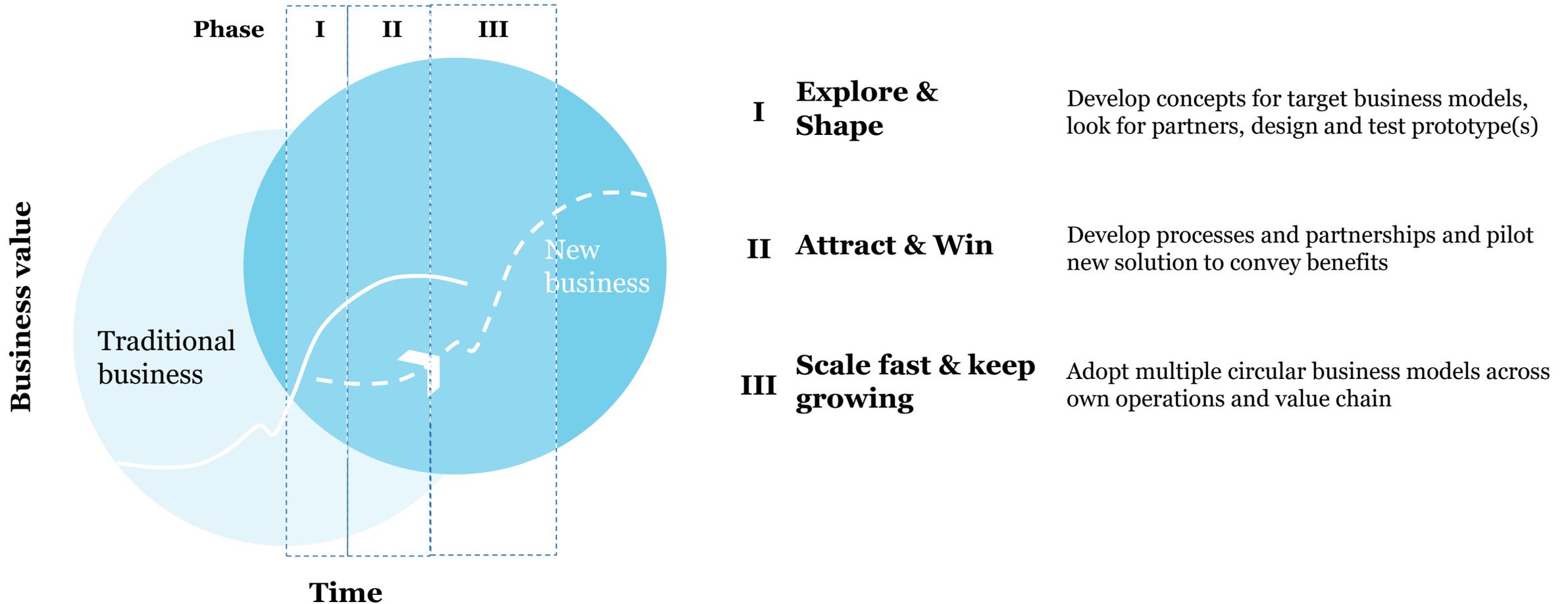
How to design the transformation journey?



Pekka Vanne
Managing Director
Accenture Strategy

The transition from the traditional to the new circular business model is gradual and has three phases

Transformation journey



Source: Accenture

During the transformation journey, companies typically face barriers – upfront consideration makes the journey easier

Typical barriers to achieve circular advantage

Internal



Barriers related to required changes in **value, mindset and behaviour** of organisations to enable **cross-functional** collaboration and **customer-centricity**

External



Barriers related to required **partnerships** to leverage the full circular potential of value chains and to shape the **framework conditions**



Barriers related to the different **funding requirements, risk** and **return structures** of circular business models that lead to challenges in **securing funding**

Funding solutions for new business models



Eeva Grannenfelt
Partner
Grannenfelt Finance



Funding solutions for new business models

Eeva Grannenfelt

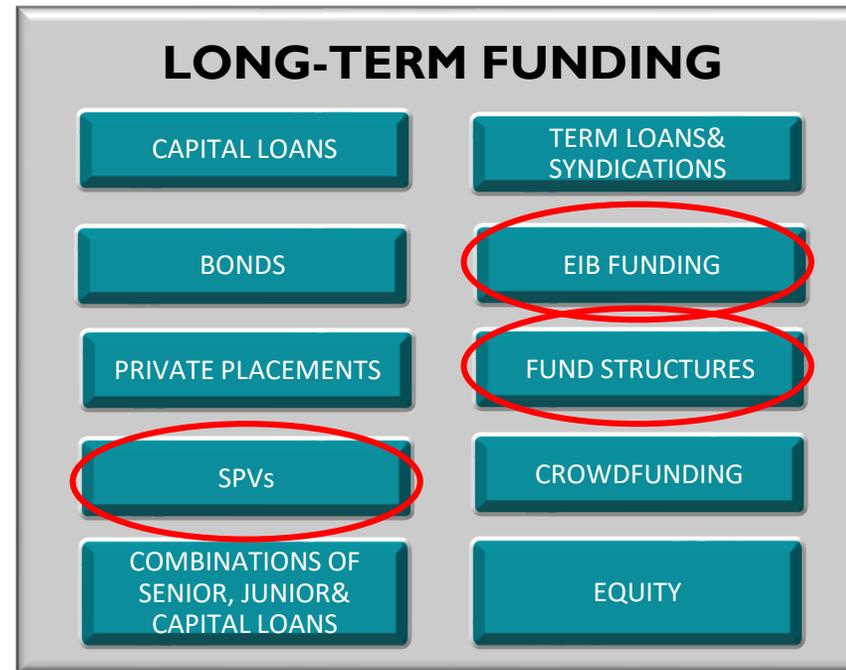
19.9.2018



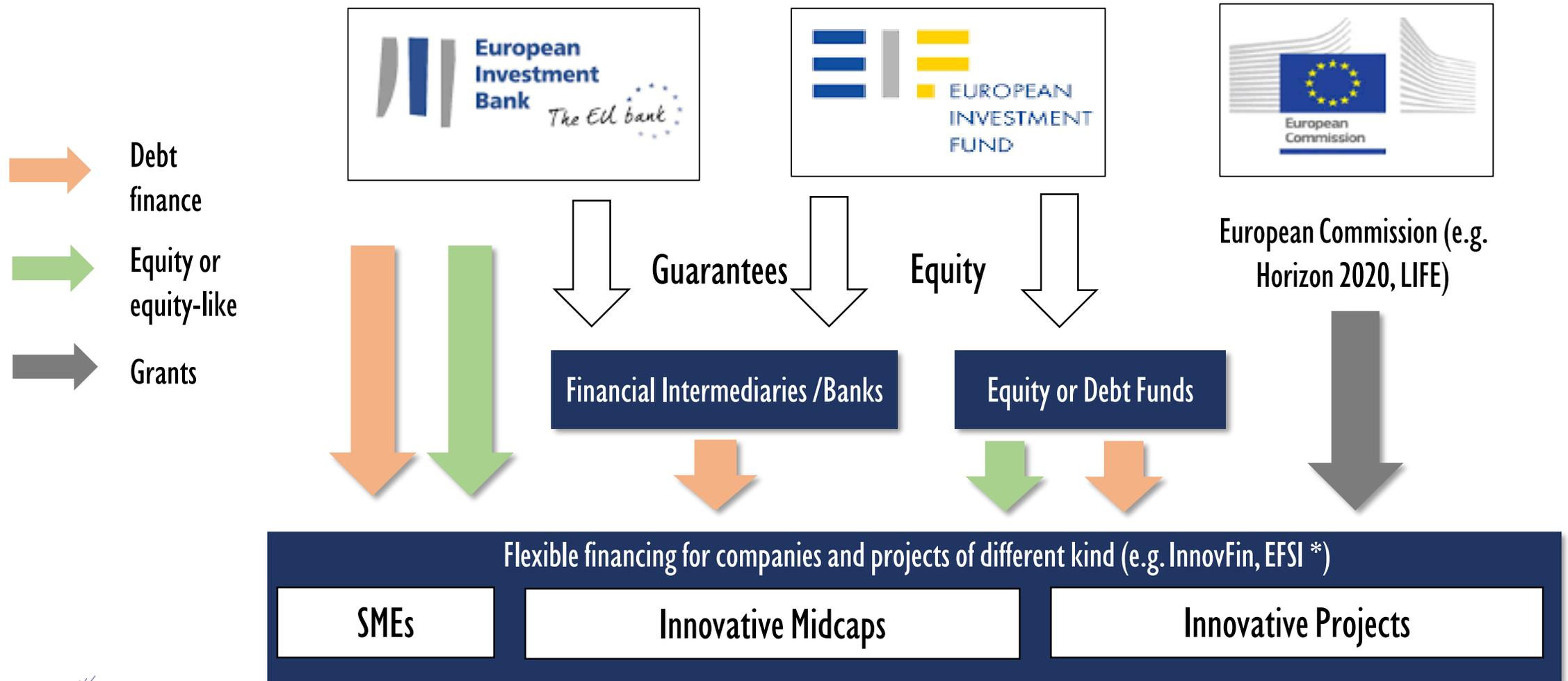
Complementing funding solutions for companies in Finland



Funding instruments that optimise your business model & your customers' needs

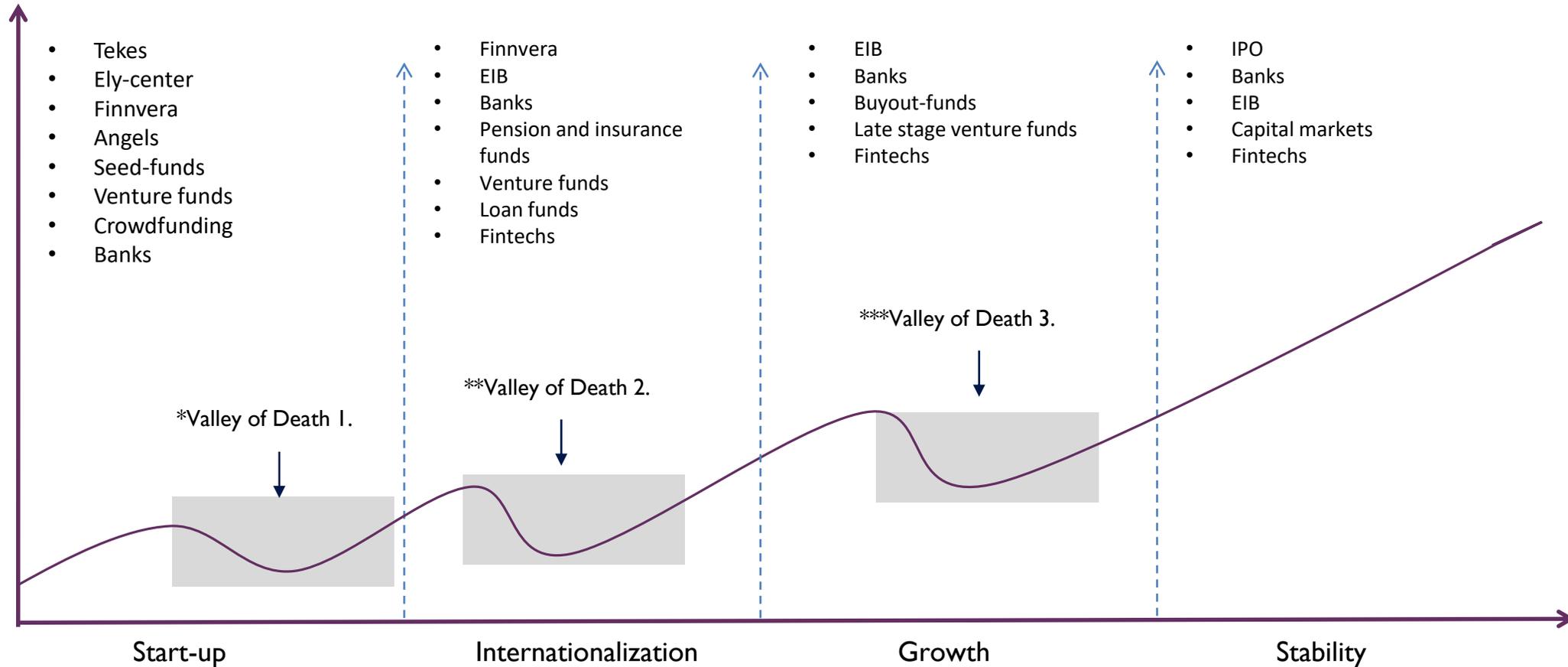


EU financing: Various programmes, and many administering entities



* InnovFin and Horizon2020 are two EU-level programmes with broad industry coverage and a focus on improving access to finance for SMEs and innovative projects.

Funding options through the company life cycle



New business models: Pay-per-use vs. Asset ownership

BALANCE SHEET

LEASING

FUNDS

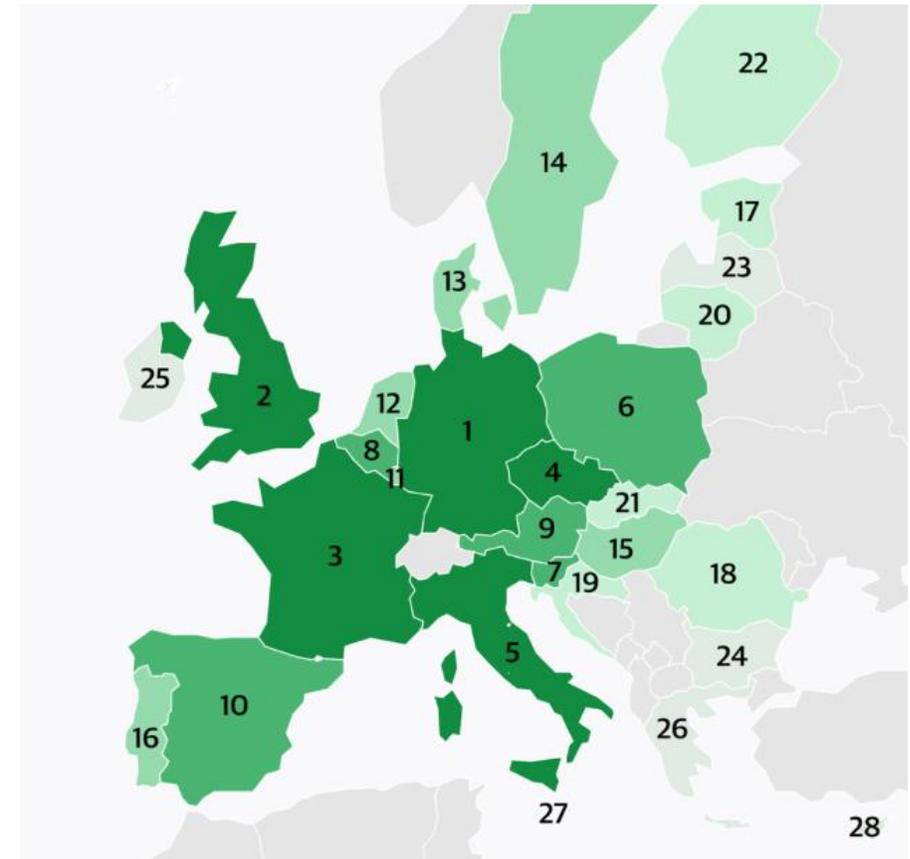
Current Public Funding Instruments Targeting the Circular Economy

- Finnish:
 - YM (kiertotaloustuki), TEM (energiatuki), Sitra & Business Finland (kiertotalousprojektit)
- EU Grants, e.g. Horizon 2020.
 - EUR < 3m grants for individual companies or consortia available regularly (4/year).
 - Larger consortia applications based on specific thematic deadlines. Available 2018-2020.
- EU financing:
 - A privately managed **Circular Bioeconomy** fund to be launched in early 2019
 - EIB quasi-equity financing and senior loans targeting e.g:
 - **Growth Financing**: For innovative and high-growth (potential) companies
 - **Energy Demonstration Projects**: energy transition, generation, system or storage projects
 - **Corporate RDI and Project loans**: targeting e.g. water, waste, energy, the environment.
 - **Agriculture and Bio-economy**: companies or projects in primary production and up/downstream manufacturing making large capex and RDI investments (min EUR 50m)

The Circular Economy revolutionises business models, service and financing solutions

The Circular Economy goes beyond traditional material efficiency and recycling. It structurally challenges the product life-cycle and strengthens cooperation in the cross-sectorial ecosystem.

- Politico (June 2018) ranked the performance of EU-28 on the key EU performance indicators:
 - how much **garbage** is produced,
 - how much **food waste** is produced,
 - how much of that **waste is recycled**,
 - how much of that recycled material is **actually reused**,
 - the volume of **recyclable materials traded**,
 - how many **patents** are filed having to do with the circular economy, and
 - how many **jobs** are created in “circular economy sectors” (e.g. and maintenance).
- Momentum is building for public & private investment in the Finnish circular sectors. Forerunners will reap the benefits.



Grannenfelt Finance

Grannenfelt Finance snapshot

Grannenfelt Finance

- Independent financing specialist
- Advisor on structuring and implementing financial transactions with minimal dilution:
 - ✓ We are independent of any finance providers and use all available funding instruments
 - ✓ We customize and combine the best possible structures for our customers' needs
- Customers include private and listed small and medium-sized companies
- We have close relationship with debt and equity providers in the Nordics
- 30+ completed transactions and over 150M€ of funds raised since 2016
- Currently 9 investment professionals based in Helsinki, with international experience from various sectors and stages of financing (growth to IPO)

Services

Equity

Private placements

- Growth capital
- Venture capital
- Business angels, Family offices
- Institutional investors

Mezzanine

- Capital loans
- Hybrid loans
- Convertible loans

Debt

Short-term debt

- Leasing
- Export finance
- Receivable financing
- Revolving credit/overdraft
- Guarantees

Long-term debt

- Bank loan
- Corporate bonds
- Juniorloans
- Venture debt
- Loan funds

Grannenfelt Finance: Key Figures



150M€ of closed transaction
since 2016



More than 30
completed funding
transactions,
60+ client projects
and 300+ companies
screened



Leading
EU funding advisor
in the Nordic area



Nine investment professionals



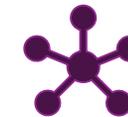
#1 Financing advisor in Finland
focusing only on
financing transactions



Over 100 years of
aggregate financing
experience



Independent
advisor



Close relationship & syndication opportunities
with Nordic Equity
and Debt providers

Transactions

 Heeros Oyj August 2018	 Verto Analytics July 2018	 Efima Oyj June 2018	 SMARTCART Smartcart Oyj May 2018	 Zenrobotics Oyj April 2018
 Zenrobotics Oyj April 2018	Confidential April 2018	Confidential January 2018	 ProFarm Oyj December 2017	 Fingertip Oyj December 2017
 Somma Medical Oyj	 Giosg.com Oyj December 2017	 Connected Finland Oyj November 2017	Confidential Large Family Company October 2017	 Nosto Solution Oyj September 2017

Transactions

 <p>Solarigo Oy August 2018</p>	 <p>Verto Analytics July 2017 Debt Facility</p>	 <p>Onbone Oy July 2017</p>	 <p>Atrian Aurinko Oy June 2017</p>	<p>ZEELAND FAMILY</p> <p>Zeeland Family June 2017</p>
 <p>Yousician Oy June 2017</p>	 <p>MariaDB June 2017</p>	 <p>Connected Finland Oy February 2017</p>	 <p>David Health Solutions Oy January 2017</p>	 <p>Bonusway Oy January 2017</p>
 <p>David Health Solutions Oy November 2016</p>	 <p>Frosmo Oy July 2016</p>	 <p>Talentadore June 2016</p>	 <p>NewIcon April 2016</p>	

Team of nine experienced investment & corporate finance professionals



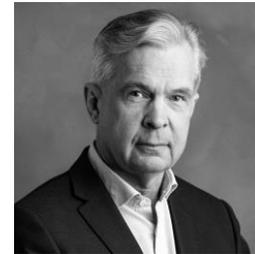
Eva Grannenfelt
Managing Partner

+358 50 5446 355
eva.grannenfelt@grannenfeltfinance.fi



Lasse Grannenfelt
Partner

+358 40 7178 572
lasse.grannenfelt@grannenfeltfinance.fi



Kjell Sundström
Partner

+358 40 5336 591
kjell.sundstrom@grannenfeltfinance.fi



Henry Kallio
Partner

+358 40 7721 166
henry.kallio@grannenfeltfinance.fi



Jaakko Salminen
Partner

+358 40 7613 775
jaakko.salminen@grannenfeltfinance.fi



Katrin Ahlbäck
Associate

+358 40 0803 939
katrin.ahlback@grannenfeltfinance.fi



Harri Rehnberg
Equity Transactions & IPO

+358 40 6574 957
harri.rehnberg@grannenfeltfinance.fi



Miikka Lievonen
Associate

+358 50 5545 844
miikka.lievonen@grannenfeltfinance.fi

Grannenfelt Finance Oy

Salomoninkatu 17 A, 3rd floor

00100 Helsinki

www.grannenfeltfinance.fi

Twitter: @GrannenfeltFIN

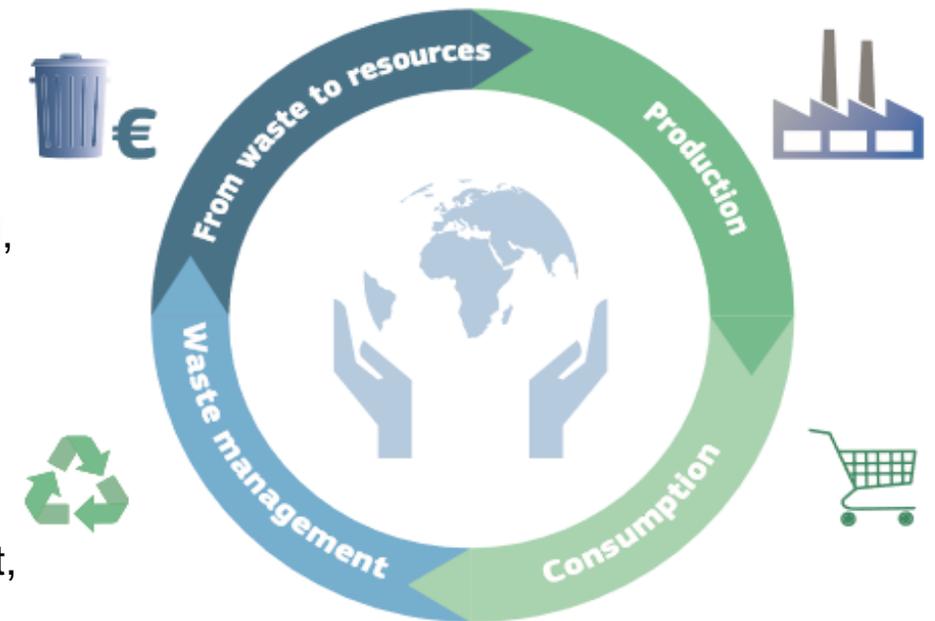
GRANNENFELT
FINANCE



EU's 2018 Circular Economy Package: Closing the loop of product lifecycles for economic and environmental benefits

- The Circular Economy Package is designed to
 - stimulate Europe's transition towards a circular economy,
 - boost global competitiveness,
 - foster sustainable economic growth and
 - generate new jobs.
- Key pillars of the Package:
 - Transform the way **plastics and plastics products** are designed, produced, used and recycled. By 2030, all plastics packaging should be recyclable.
 - Harmonise the **regulation on waste, products and chemicals**.
 - Making the use of 27 **critical raw materials more circular**.
 - Common **monitoring framework** at EU and national level, incl:
 - Materials use: Production, consumption, waste management, secondary raw materials, actual re-use volumes
 - Economic aspects: investments and jobs, innovation, funding and number of patents in circular fields etc

WHAT IS THE CIRCULAR ECONOMY?



The EU's monitoring framework as a roadmap for innovation & investment need

Circular economy monitoring framework

1 EU self-sufficiency for raw materials

The share of a selection of key materials (including critical raw materials) used in the EU that are produced within the EU

2 Green public procurement

The share of major public procurements in the EU that include environmental requirements

3a-c Waste generation

Generation of municipal waste per capita; total waste generation (excluding major mineral waste) per GDP unit and in relation to domestic material consumption

4 Food waste

Amount of food waste generated

7a-b Contribution of recycled materials to raw materials demand

Secondary raw materials' share of overall materials demand - for specific materials and for the whole economy

8 Trade in recyclable raw materials

Imports and exports of selected recyclable raw materials



5a-b Overall recycling rates

Recycling rate of municipal waste and of all waste except major mineral waste

6a-f Recycling rates for specific waste streams

Recycling rate of overall packaging waste, plastic packaging, wood packaging, waste electrical and electronic equipment, recycled biowaste per capita and recovery rate of construction and demolition waste

9a-c Private investments, jobs and gross value added

Private investments, number of persons employed and gross value added in the circular economy sectors

10 Patents

Number of patents related to waste management and recycling

Waste & recycling targets on municipal, national and EU levels

- Examples of key legislative proposals on waste and recycling targets:
 - A common EU target for recycling 65% of municipal waste by 2030;
 - A common EU target for recycling 75% of packaging waste by 2030;
 - A binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2030;
 - A ban on landfilling of separately collected waste;
 - Promotion of economic instruments to discourage landfilling ;
 - Simplified and improved definitions and harmonised calculation methods for recycling rates throughout the EU;
 - Concrete measures to promote re-use and stimulate industrial symbiosis - turning one industry's by-product into another industry's raw material;
 - Economic incentives for producers to put greener products on the market and support recovery and recycling schemes (eg for packaging, batteries, electric and electronic equipments, vehicles).

Innovation funding for pilot projects and international growth



Jarmo Heinonen
Senior Director, Cleantech
Business Finland

**BUSINESS
FINLAND**

INNOVATION FUNDING FOR PILOT PROJECTS AND INTERNATIONAL GROWTH

**JARMO HEINONEN
SENIOR DIRECTOR, CLEANTECH**

19.9.2018



Global growth

WHAT DO WE DO?

Boosting **innovations** and **exports**
Attracting **investments** and **visitors**



World class
ecosystems

OUR TOOLS

- Research and innovation funding
- Advise and coaching
- Networking
- Expertise and vision of our domestic and international network
- Themes and programs

Business Finland mandates

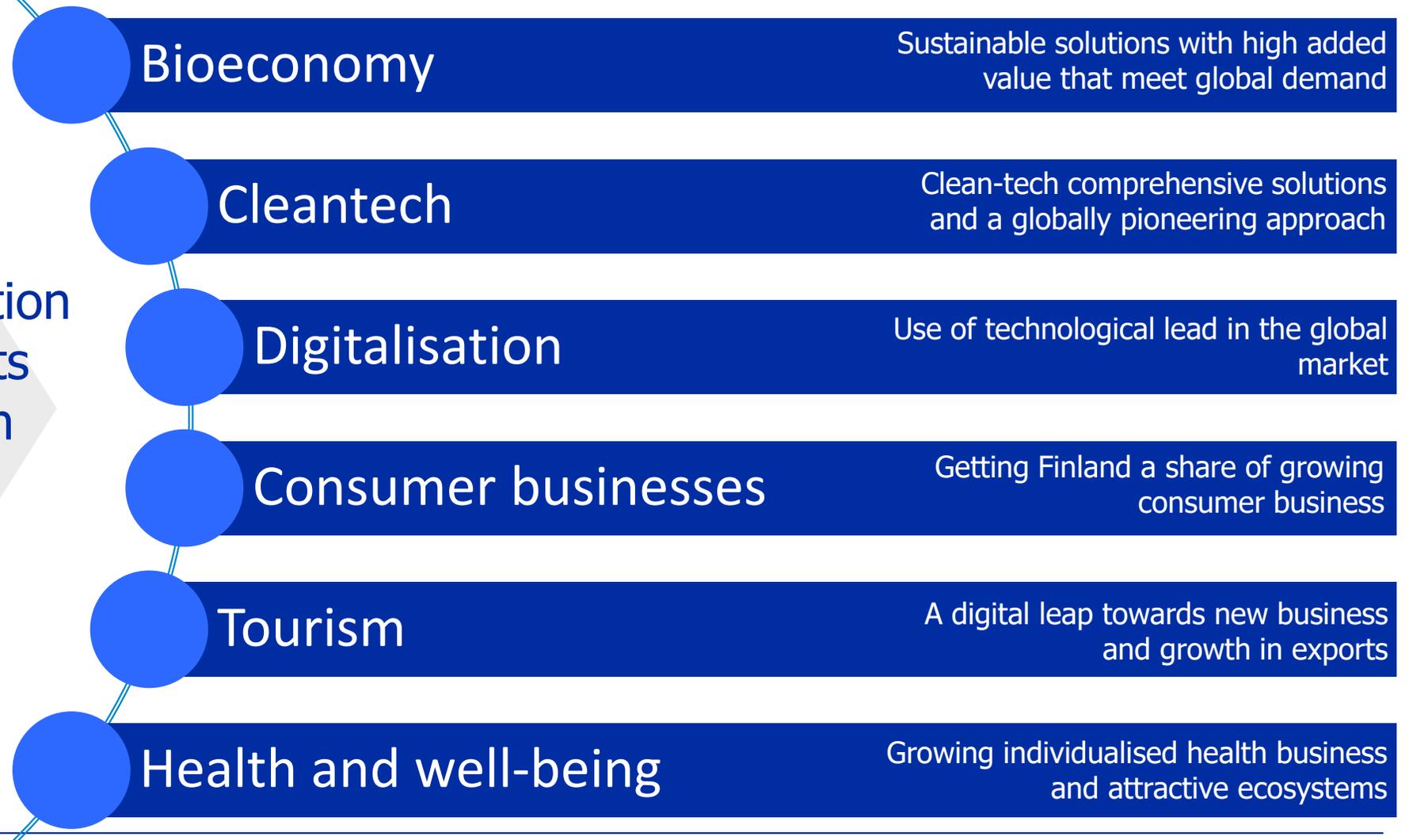


THEMES AND GOALS

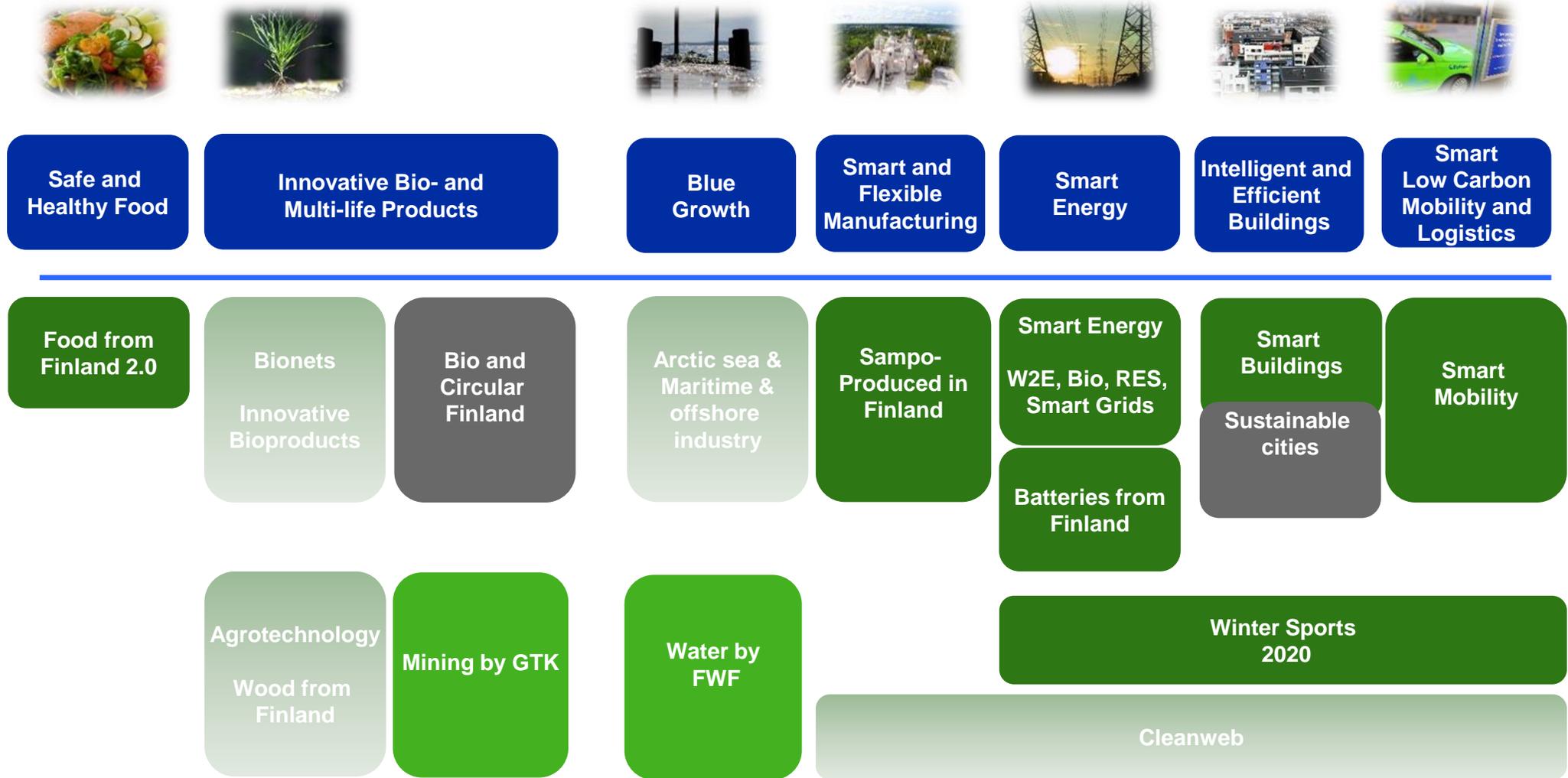
Towards joint innovation, invest-in and export-promoting service packages*

Cross-cutting

- Digital transformation
- Developing markets
- New value creation
- Arctic dimension



Bioeconomy, Circular Economy and Cleantech Focus Areas - 2018



SAMPO – Valmistettu Suomessa

- Sampo-kampanja haluaa kehittää valmistavan teollisuuden toimintaa edelleen.
- Kampanja on kohdistettu kaiken kokoisille valmistavan teollisuuden yrityksille



Ron Mueck: Saara Hilden museo

Rahoitushaku 10.9.2018 alkaen

- Business Finland käynnisti SAMPOon liittyvän rahoitushaun, joka on auki 10.9. – 31.10.2018





THINK
OUTSIDE
THE BOX

Kenelle ja tavoitteet

- Valmistavan teollisuuden pk- ja Midcap-yrityksille tutkimuspainotteisiin hankkeisiin.
- Tutkimuksella tavoiteltavan muutoksen tulee olla merkittävä
- Toimenpiteiden odotetaan tämän jälkeen johtavan laajempiin kehitysprojekteihin



Tavoitteet

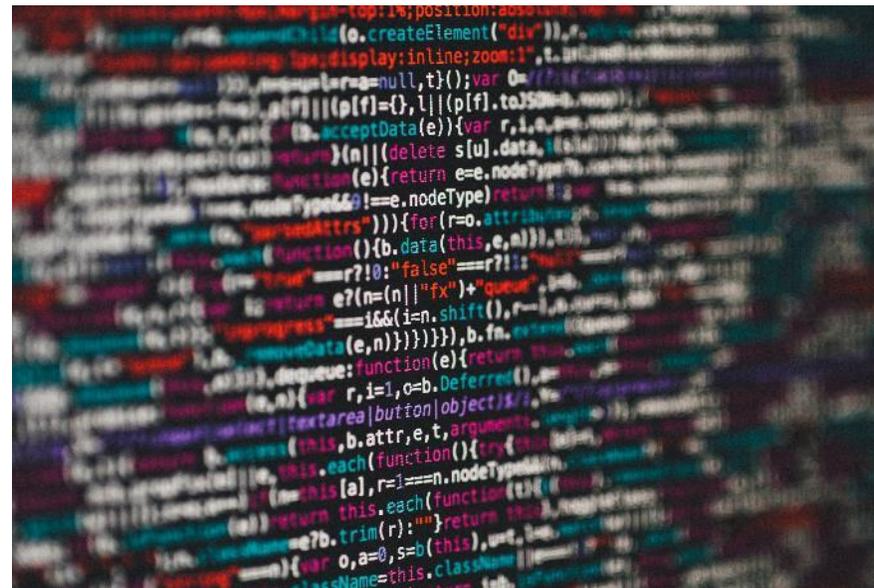
- Tutkimuksen lopputuloksena on löydetty keskeiset toimenpiteet yrityksen kansainvälisen kilpailukyvyn parantamiseksi.
- Toimenpiteiden odotetaan tämän jälkeen johtavan laajempiin kehitysprojekteihin.
 - Niiden seurauksena odotetaan suoran ja välillisen viennin lisääntyvän vähintään 50 %:lla viiden vuoden kuluessa sekä yritysten kannattavuuden paranevan.
- Tähän hakuun liittyvissä hankkeissa suositellaan käyttämään apuna tutkimuslaitosten osaamista

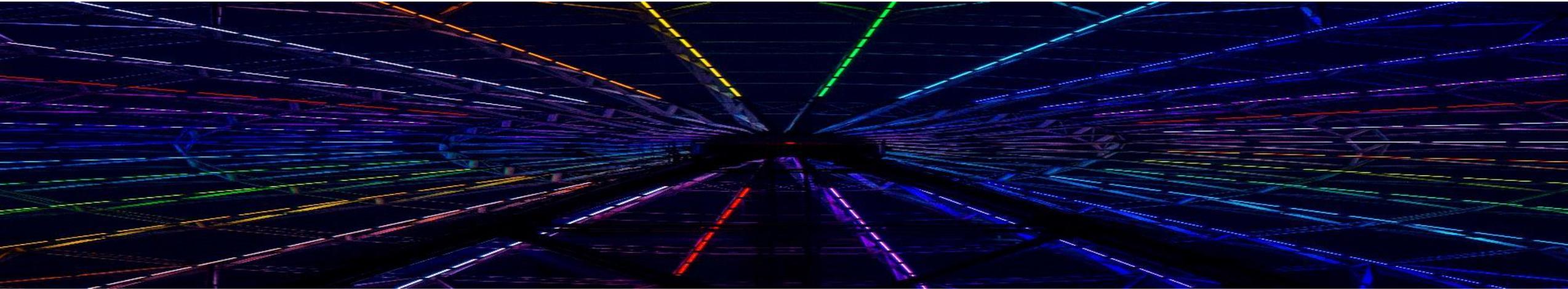
Painotukset

- **Hakemuksessa edellytetään, että hakija pystyy kertomaan selvästi ja mitattavasti esimerkiksi, kuinka**
 - parannetaan toimitusvarmuutta tai
 - lyhennetään toimitusaikaa tai
 - kohotetaan toiminnan ja toimitusten laatua tai
 - parannetaan toiminnan kannattavuutta
 - lisätään suoraa ja/tai epäsuoraa vientiä tai
 - etsitään uusia tuote-, palvelu-, digitalisaatio- tai alustaratkaisuja
- **Haku on tarkoitettu ensisijaisesti yrityksille**
 - joilla on kyky ja halu kasvaa nopeasti (esimerkiksi liikevaihto on vähintään 4 miljoonaa euroa)
 - joilla on suoraa vientiä tai ovat merkittävässä roolissa vientiyritysten kumppanina
 - jotka tekevät aktiivista ja jatkuvaa t&k – toimintaa

Lisätietoja hausta antavat

- Nuppu Rouhianen, puh. 050 557 7949
 - Päivi Uotila, puh. 050 557 7866
 - Harri Kivelä, puh. 040 067 1471
 - Jarmo Raittila, puh. 050 323 2442
 - Marko Kivimäki, puh. 044 436 8122
 - Pasi Viitanen, puh. 050 395 2475
 - Reino Pesonen, puh. 040 576 9858
 - Seppo Keränen, puh. 040 053 5907
- s-posti: [etunimi.sukunimi\(at\)businessfinland.fi](mailto:etunimi.sukunimi(at)businessfinland.fi)





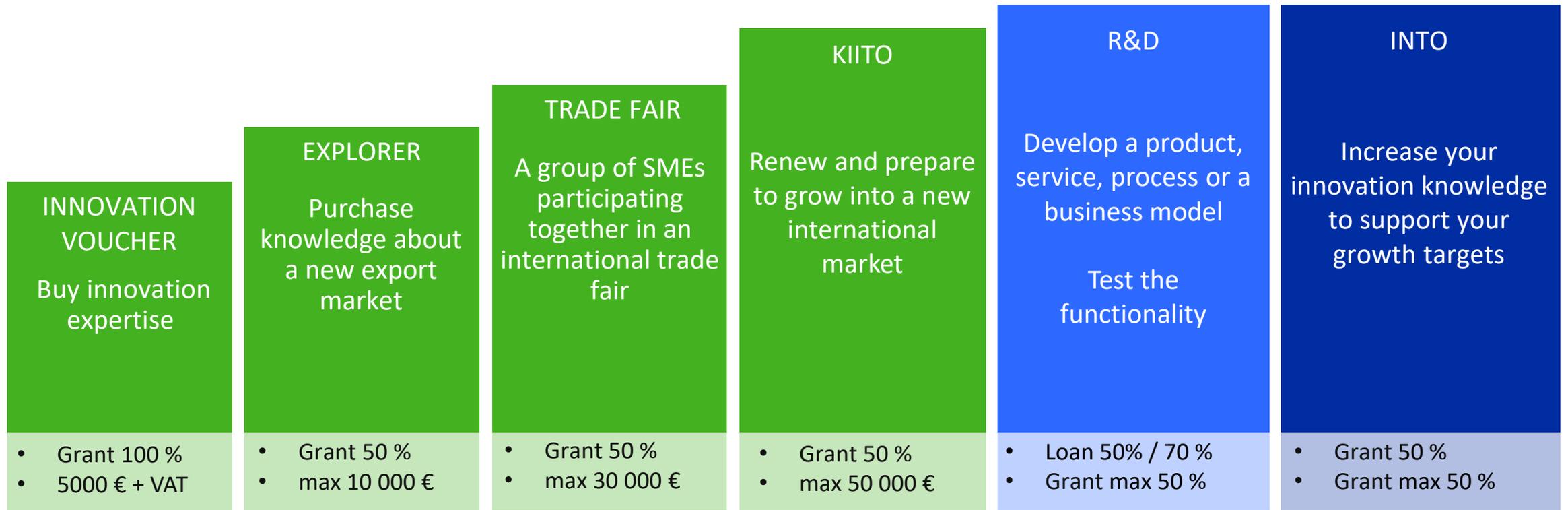
Hakeminen

- Hakemukset pyydetään jättämään Business Finlandin asiointipalvelun kautta **viimeistään 31.10.2018 klo 23:59.**

FUNDING SERVICES FOR SMEs

EXPLORE, TEST, GO GLOBAL

RESEARCH, DEVELOP, RENEW, GROW



The amount of funding depends on the company's needs and resources

R&D FUNDING LEVELS

	SMEs	MIDCAP COMPANIES Turnover max. 300 M€	LARGE COMPANIES
COMPANY RESEARCH PROJECT GRANT Create new knowledge and competence	Grant max 50%	Grant max 40%	Grant max 40% Large companies must buy services from SME's and / or research organizations or implement the project as a joint project with them. The share of the bought services has to be 40 % of the project's overall costs.
DEVELOPMENT AND PILOTING LOAN Develop or renew products, services and business model. Demonstrate the functionality of your solution	Loan 50% / 70%	Loan 50% / 70%	Loan 50% Large companies must buy services from SME's and / or research organizations or implement the project as a joint project with them. The share of the bought services has to be 15 % of the project's overall costs.

Thank You!



Circular Economy Playbook for the Manufacturing Industry



Jyri Arponen
Senior Lead
Circular Economy
Sitra



Laura Juvonen
Executive Director
Growth and renewal
Teknologiateollisuus



Pekka Vanne
Managing Director
Accenture Strategy

Next, the playbook and tools will be further promoted through promotional events and additional learning sessions



Playbook publication

- **Online version** of playbook and downloadable full version, including deep dives
- **Supporting tools** and user instructions



Promotional events

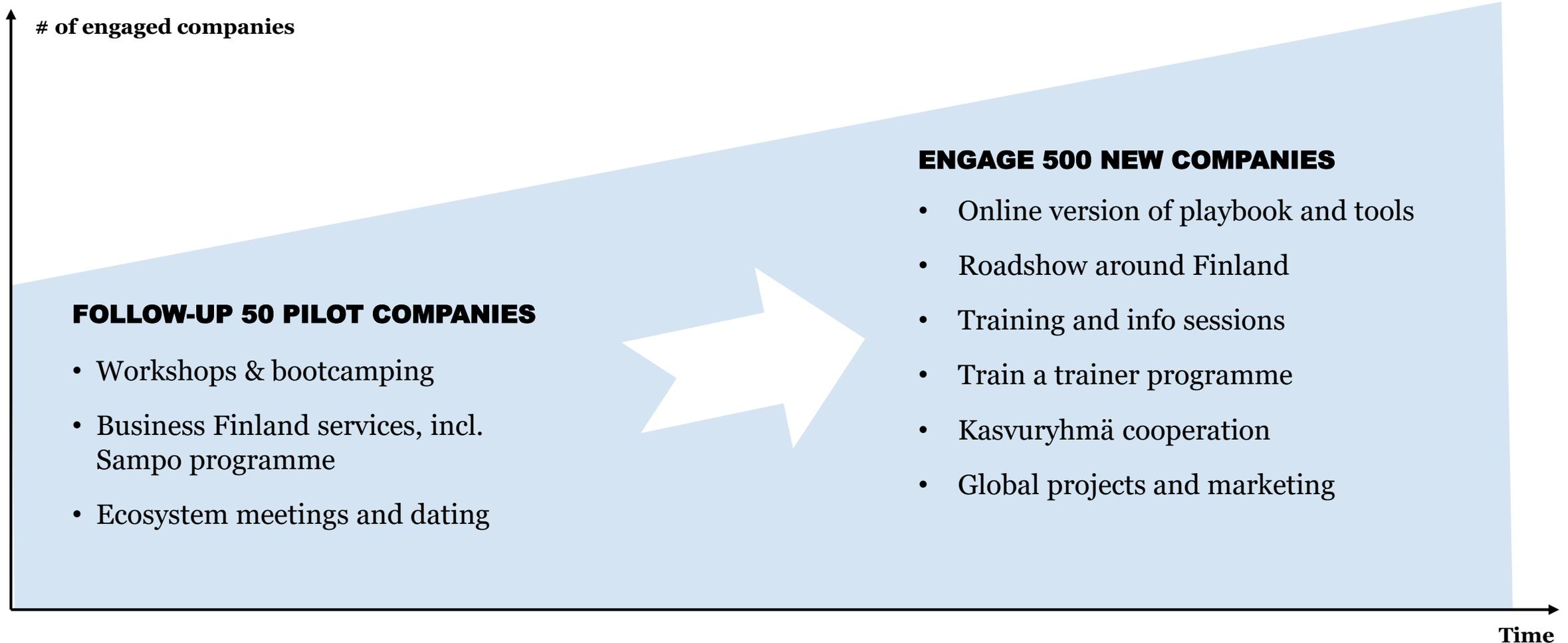
- **Roadshow** around Finland to increase awareness of playbook and tools
- **Local networks / ecosystems** around circular economy



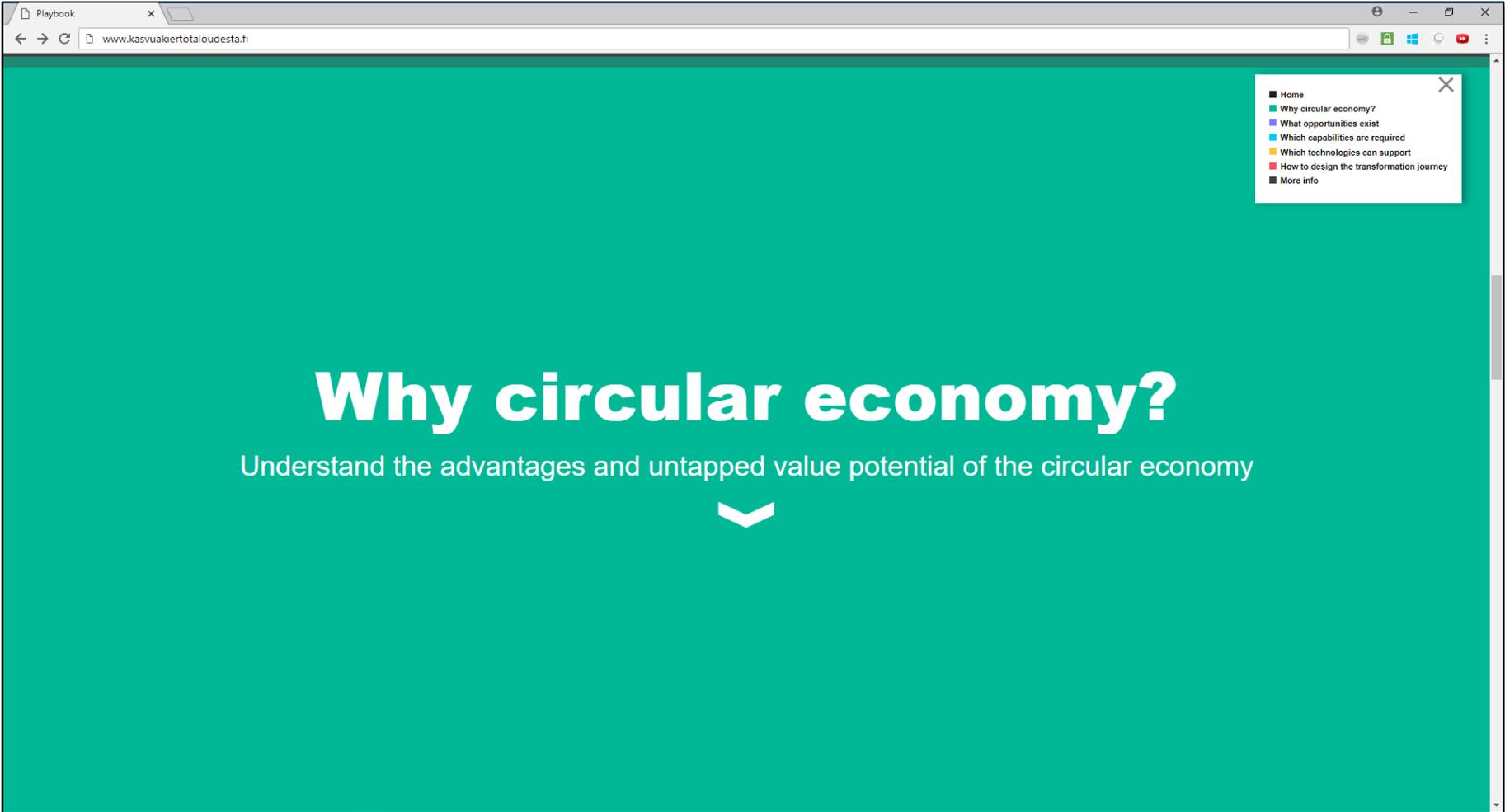
Additional learning opportunities

- Additional **workshop series** for new group of SME's
- **Deep-dive** sessions and training around specific topics, e.g. financing

Going forward, the ambition is to engage 500 more companies to start their circular transformation



The playbook and tools can be accessed online at www.kasvuakiertotaloudesta.fi



Would you like to know more about the circular economy opportunities?

Key contacts



Jyri Arponen
Senior Lead, Circular Economy
+358 40 7662906
jyri.arponen@sitra.fi



Piia Simpanen
Advisor, Growth and renewal
+358 40 0199399
piia.simpanen@teknologiateollisuus.fi



Anna B. Töndevold
Program Manager
+467 30 513296
anna.b.tondevold@accenture.com

