

Tackling today's metalworking fluid challenges by selecting ideal additives in times of a reduced toolbox.

Track 2 - Lubricants for Key End Industries:
Accessing Higher Operating Speeds, Light-Weighting
Opportunities and More for Metalworking Professionals
Essen, September 6th 2022

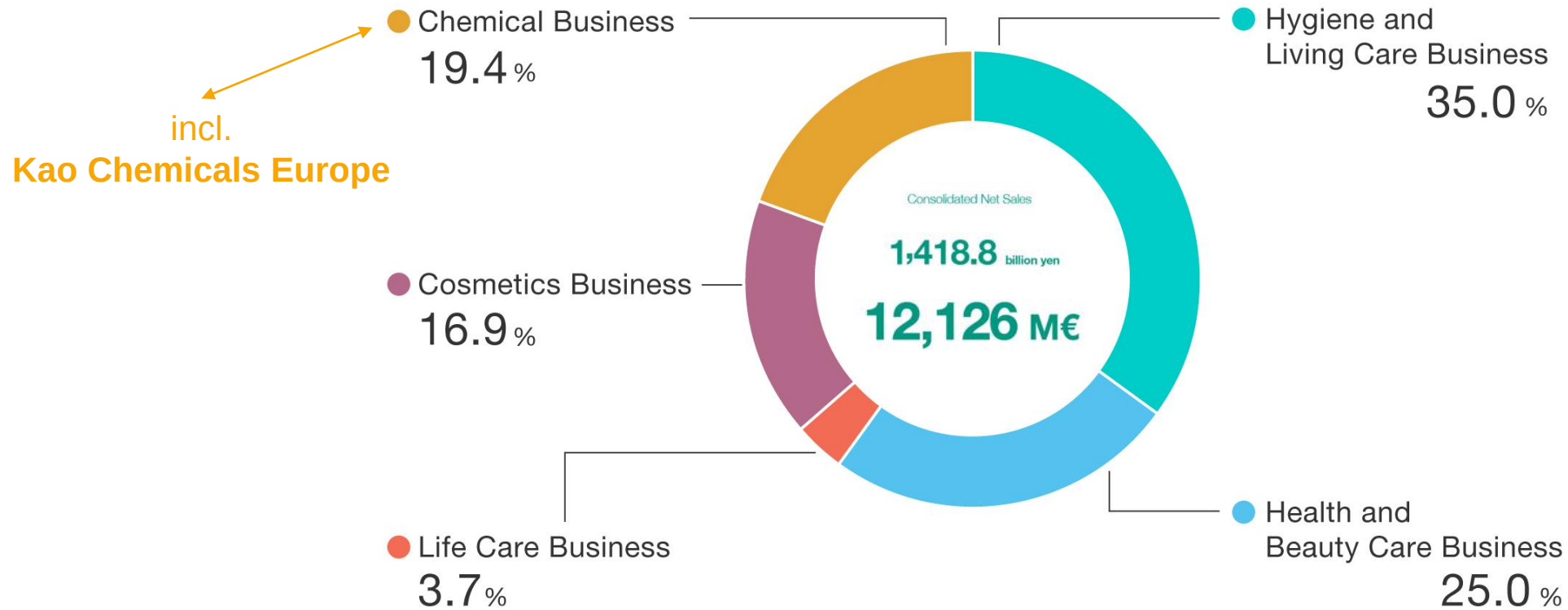
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OVERVIEW OF KAO'S BUSINESS

SALES COMPOSITIONS BY SEGMENT

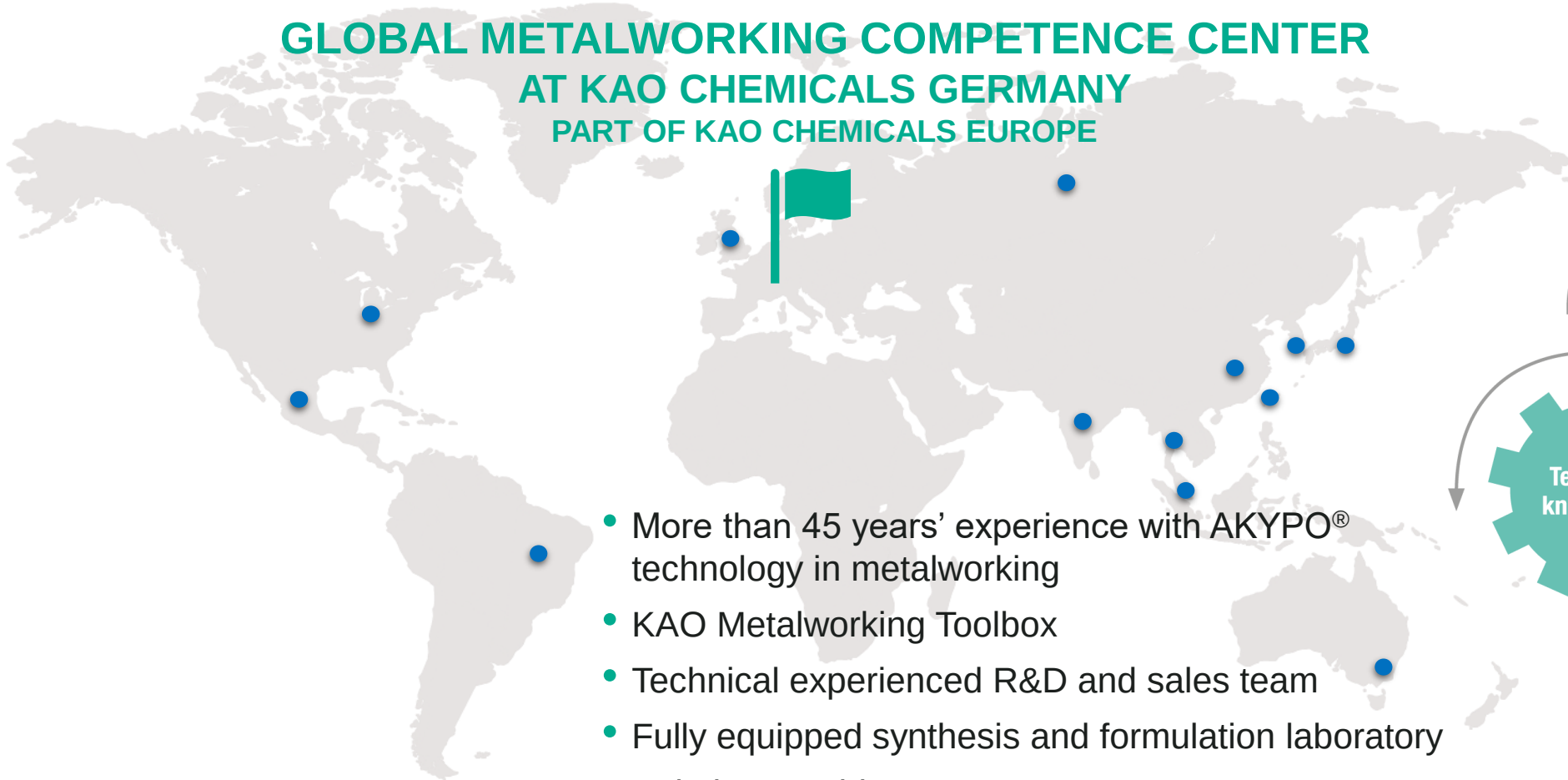
Consolidated Net Sales (FY2021)



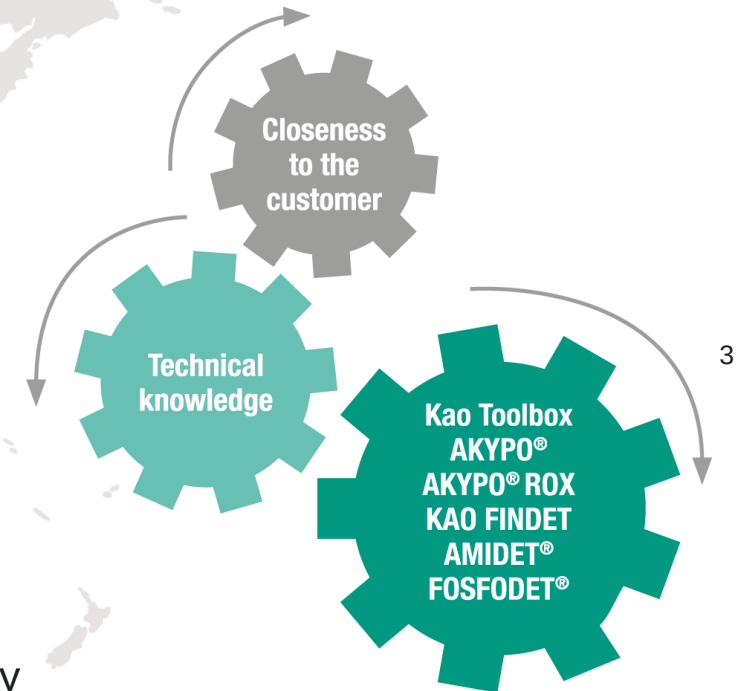
* Share of net sales is calculated based on sales to customers.

kaO KAO metalworking expertise satisfying customer needs

GLOBAL METALWORKING COMPETENCE CENTER AT KAO CHEMICALS GERMANY PART OF KAO CHEMICALS EUROPE



- More than 45 years' experience with AKYPO® technology in metalworking
- KAO Metalworking Toolbox
- Technical experienced R&D and sales team
- Fully equipped synthesis and formulation laboratory
- Solution providers
- Formulation support
- Global available products and distribution network



KAO Providing emulsifier solutions for cutting edge and sustainable metalworking fluids

- Foaming behavior
- Emulsions and emulsion stability
- Corrosion tests
- Lubrication tests
- Basic surfactant and emulsion tests

Evaluating
quality and
performance



Product
properties and
design



Desire to
provide ideal
emulsifier
solution

- Guideline formulations
- Formulation support
- Design of experiments
- Product design



KAO Metalworking Toolbox



- Main emulsifiers
 - KAO FINDET / AKYPO® ROX
 - AMIDET® TEC N
- Anionic co-emulsifiers and solubilizers
 - AKYPO® RO
 - AKYPO® PO-EO
 - AKYPO® RA
 - AKYPO® LF
- Anionic co-emulsifiers FOSFODET
- Further products
- Customized solutions



Challenges faced when formulating metalworking fluids

Fluid stability
and longevity

Foam control

Water quality
and
hardness
tolerance

Shrinking
additive
toolbox

Supply chain
issues

Additive
efficiency

Enhanced
performance

One fluid fits
all alloys and
operations

Increasingly
sever and
diverse
machining
conditions

Corrosion &
staining
protection

Cost
effectiveness

Sustainability
requirements

Global
availability
and
useability

Safe use



kaō Metalworking fluid formulation and ingredients

Ingredient types	Examples
Water	
Lubricant	Mineral and vegetable oils, esters,...
Extreme pressure / anti-wear (EP/AW)	S- and P-chemistry, chlorinated paraffins...
Emulsifier	Fatty alcohol ethoxylates, tall oil fatty acid, petroleum and natural sulfonates,...
Corrosion Inhibitor	Alkanolamine, P-additives, boric amines, diacids,...
Foam regulator	Silicone-based, oil-based,...
Biocides / Fungicides	Amines, Isothiazolinone,...



kaō The biocides example



Phenol
Boric acid
Formaldehyde
Secondary amines
Isothiazolinone
Carbamates
Special amines

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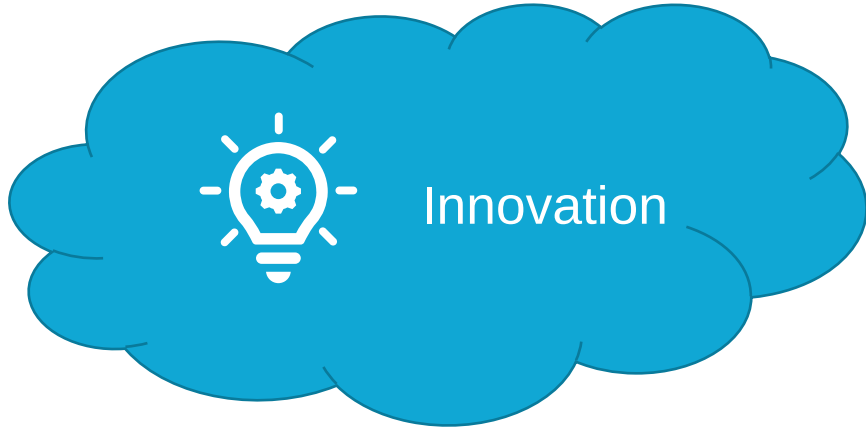
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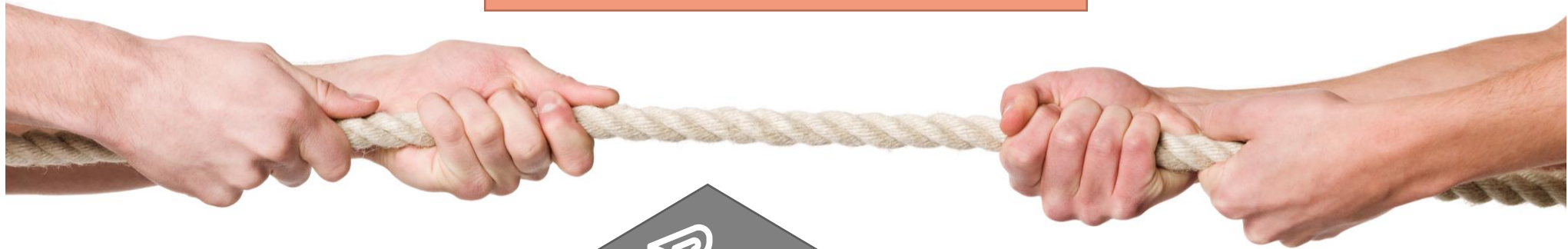
Sustainability trends a part of Environmental Social Governance (ESG) targets



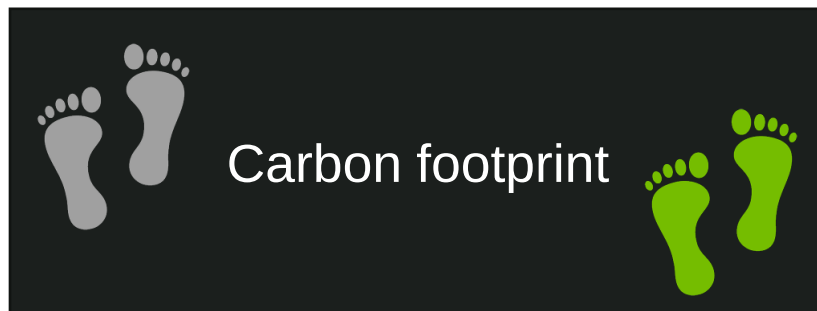
kaō Tug-of-war



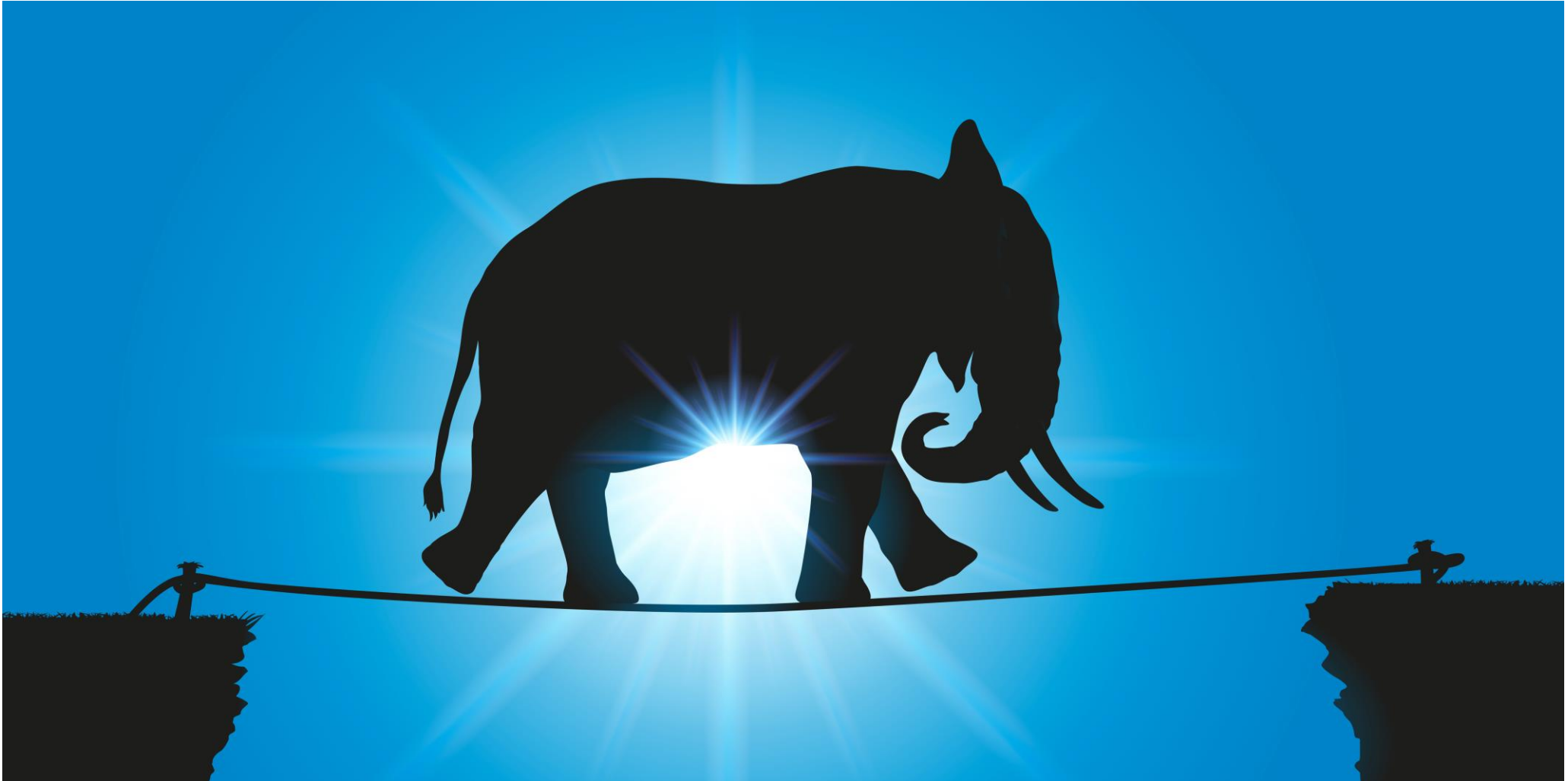
Return **O**n **I**vestement



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kaō Additive selection and developement today and in the future



Meet us and learn more at booth 253



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