



**Think Lean. Use Tech. Achieve the Goals.**

# **The Lean-Digital Paradox**

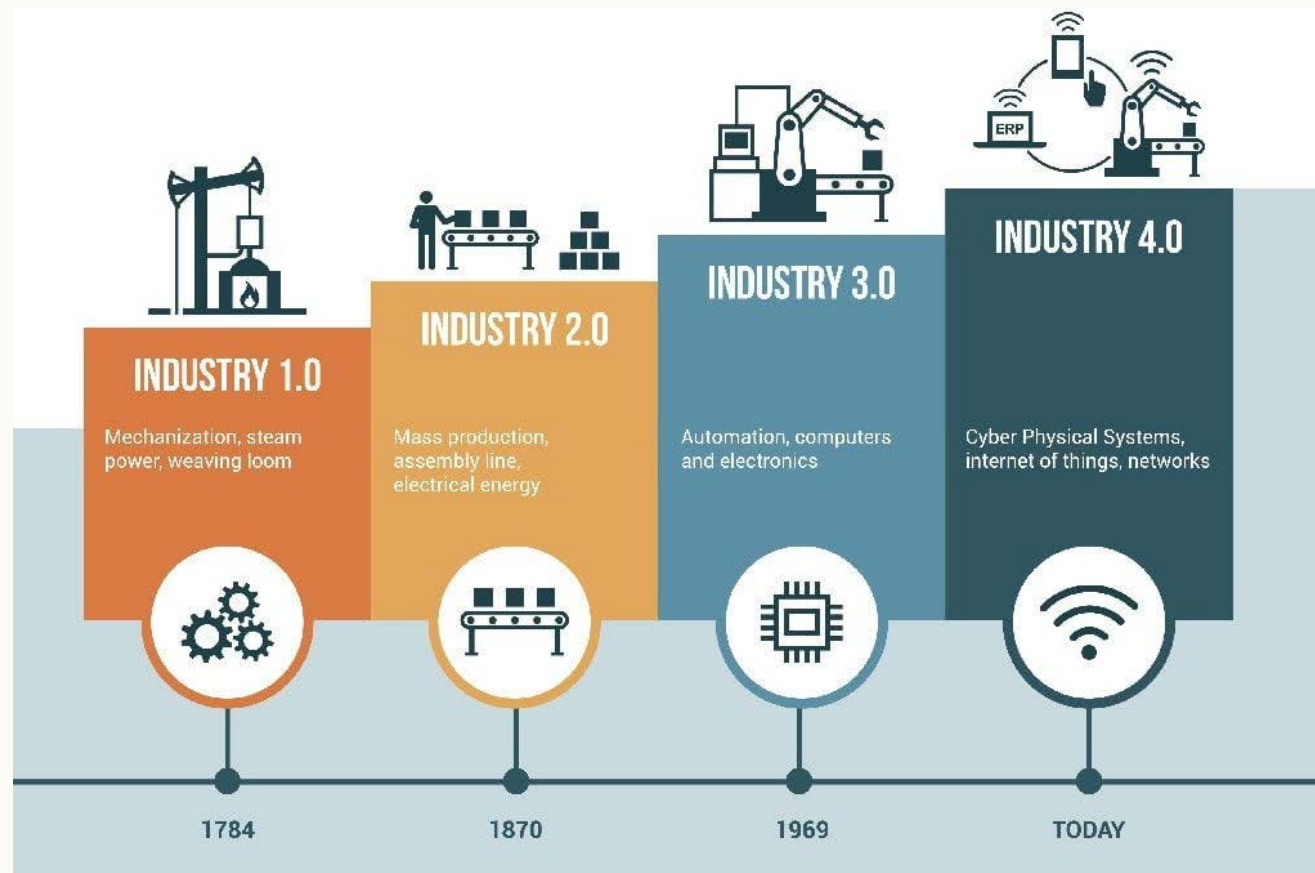
**Dr. Daryl Powell**  
**Chief Scientist - SINTEF, Norway**  
**KZN Lean Conference 2022**

# What technology do you use?



# The Fourth Industrial Revolution...

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...or Industry 5.0?



# Lean Digital. Digital Lean.

*"Lean paves the way for successful digital transformation and digitalization enriches lean practices".*

Source: Powell, Lodgaard, and Dreyer (2020) *Investigating the Challenges and Opportunities for Production Planning and Control in Digital Lean Manufacturing*. Advances in Production Management Systems, Springer, Berlin.



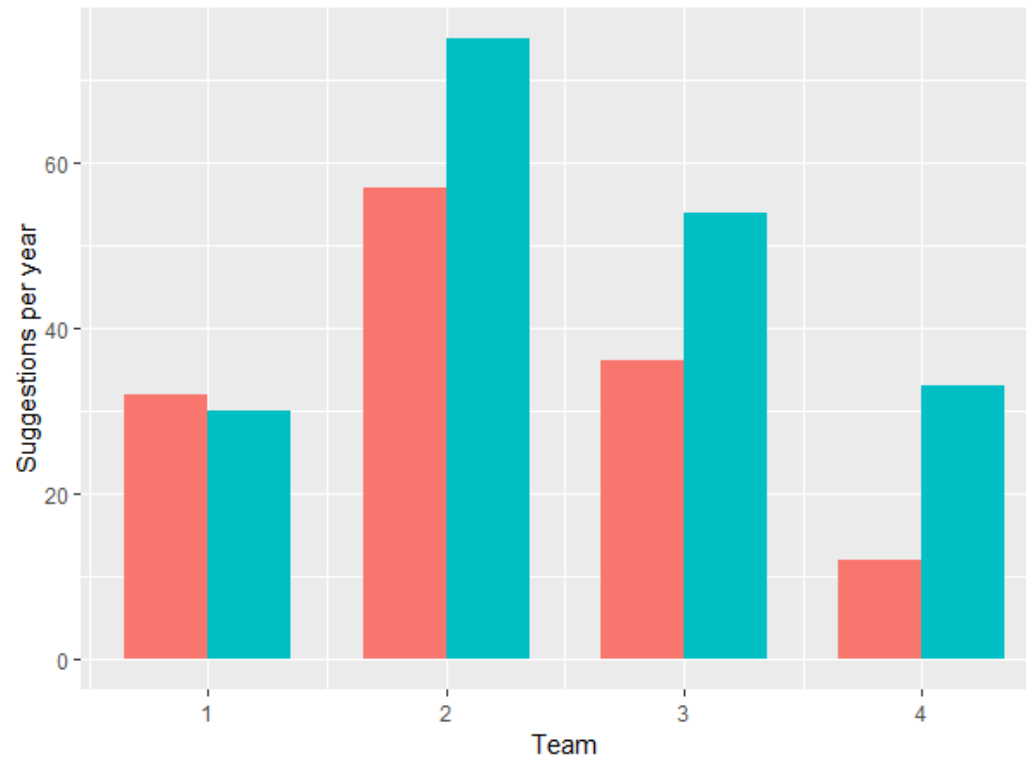
# Digitalization of Shop Floor Management



# Results

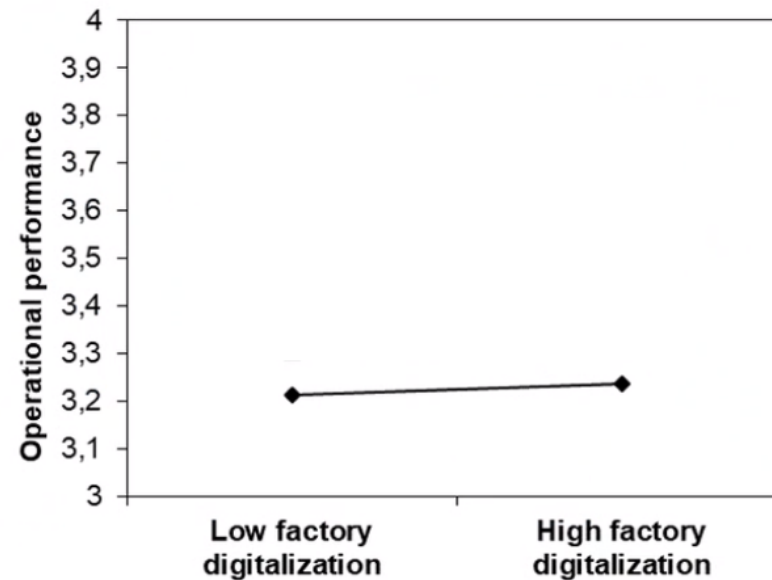
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Team ID	Area	Employees
1	Shop floor	24
2	Shop floor	5
3	Management	10
4	Shop floor	16



# Complementary effect...

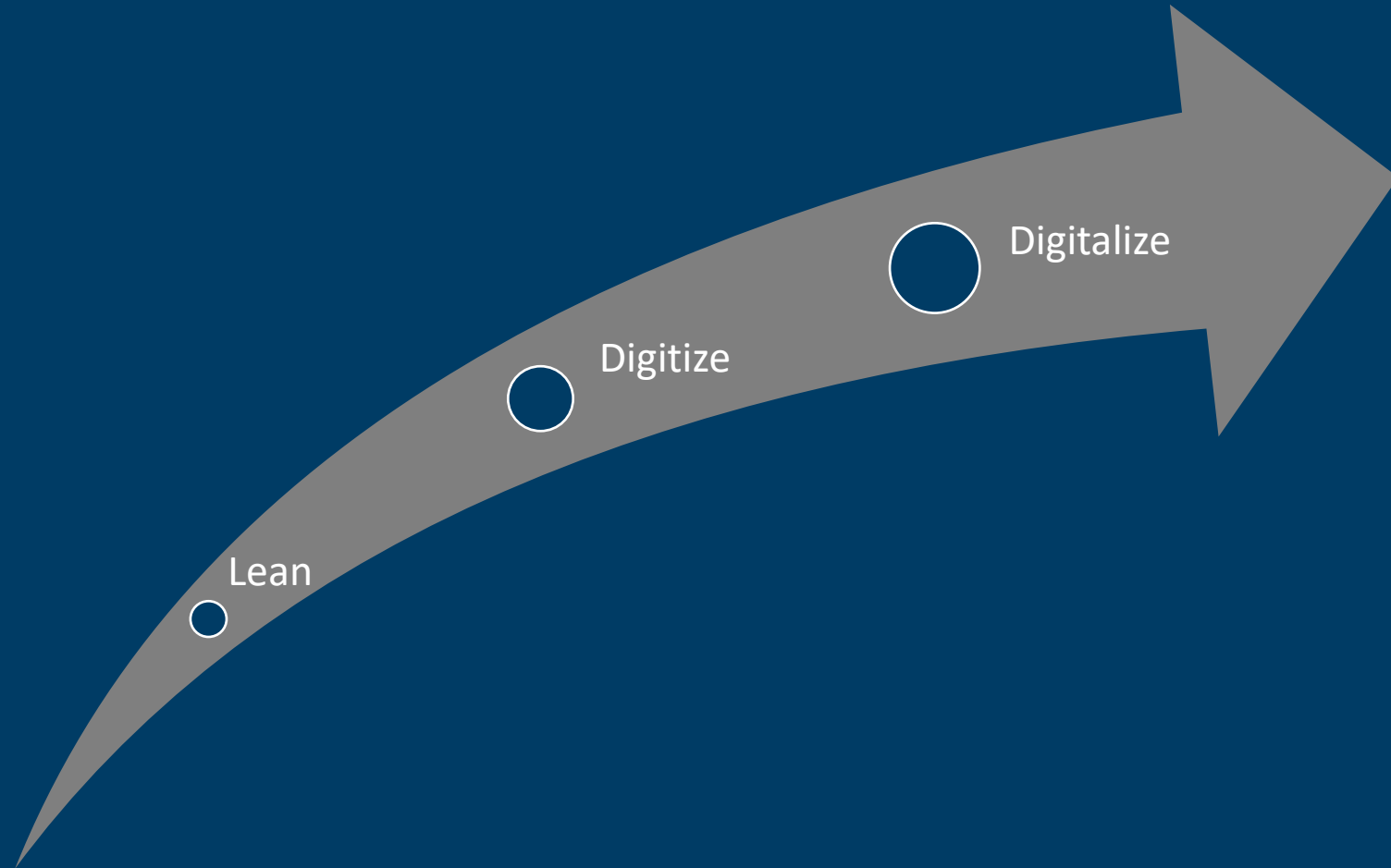
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Source: Buer et al. (2021) The complementary effect of lean manufacturing and digitalization on operational performance. *International Journal of Production Research*. 59(7), pp. 1976-1992



# Lean First ... Then Digitalize



# Lean First ... Then Digitalize



- Digital transformation must often begin far from the adoption of digital technologies (particularly in SMEs)
- In addition to the low levels of awareness of smart manufacturing, most SMEs also lack awareness of what lean manufacturing really entails
- Though digitalization promises to enhance lean practices, we suggest that lean is required as a foundation for successful digitalization.

Source: Powell, Howe, and Morgan (2021) *Lean first ... then digitalize: a standard approach for Industry 4.0 implementation in SMEs*. Advances in Production Management Systems, Springer, Berlin.





**THE  
LEAN  
SENSEI**  
**Go See Challenge**

With an introduction by **Daniel Jones**

**Michael Ballé**

**Nicolas Chartier**

**Pascale Coignet**

**Sandrine Olivencia**

**Daryl Powell**

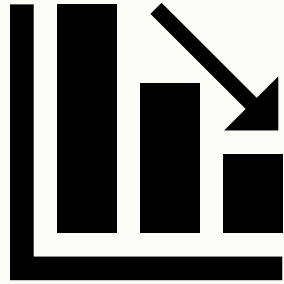
**Eivind Reke**

Lean Enterprise Institute

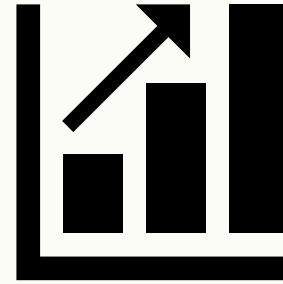


*“Learning is at the heart of lean. Indeed, lean is more accurately described as an education system rather than a production system”.*

# It's Simple, But Not Easy!



Half the bad.



Double the good.

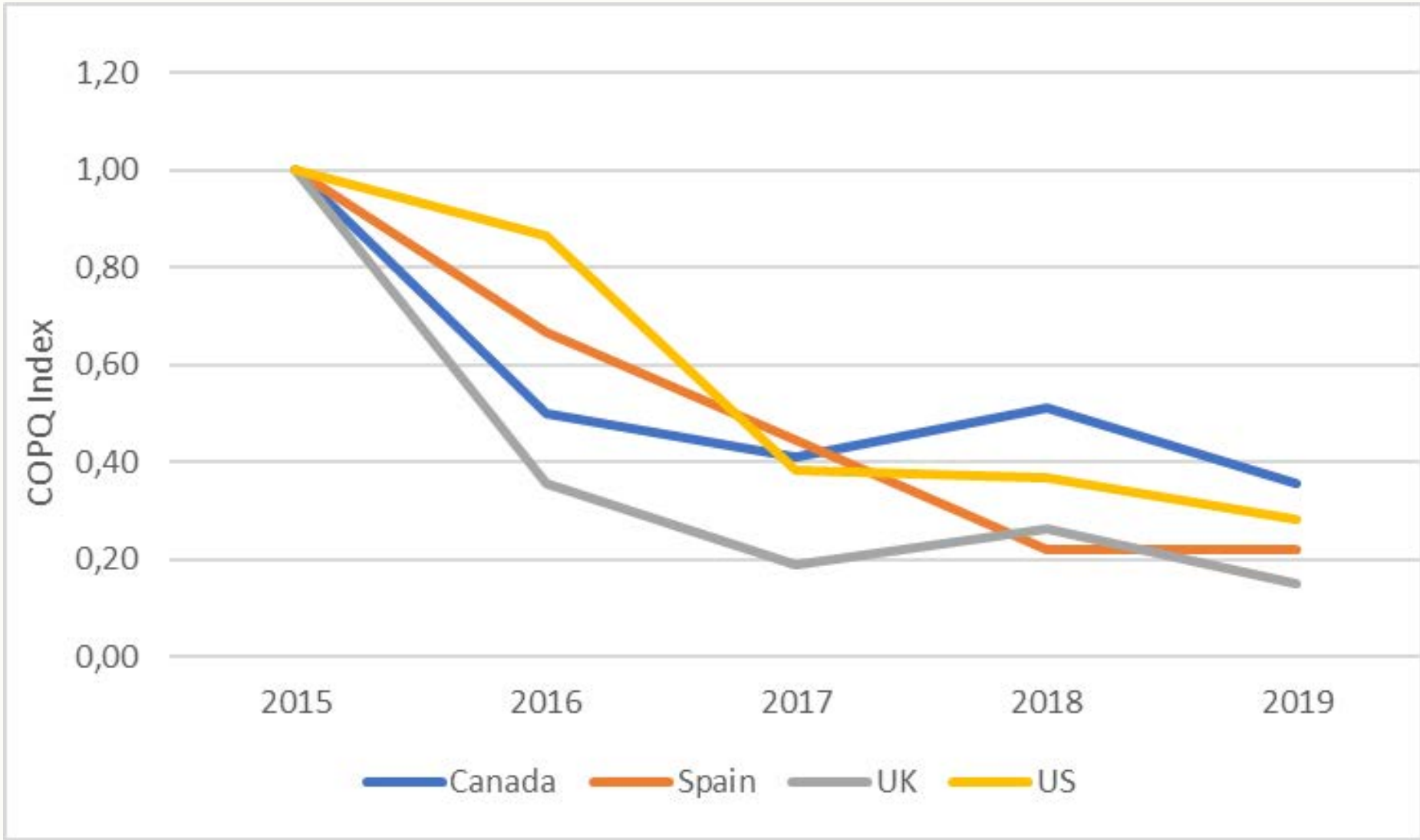


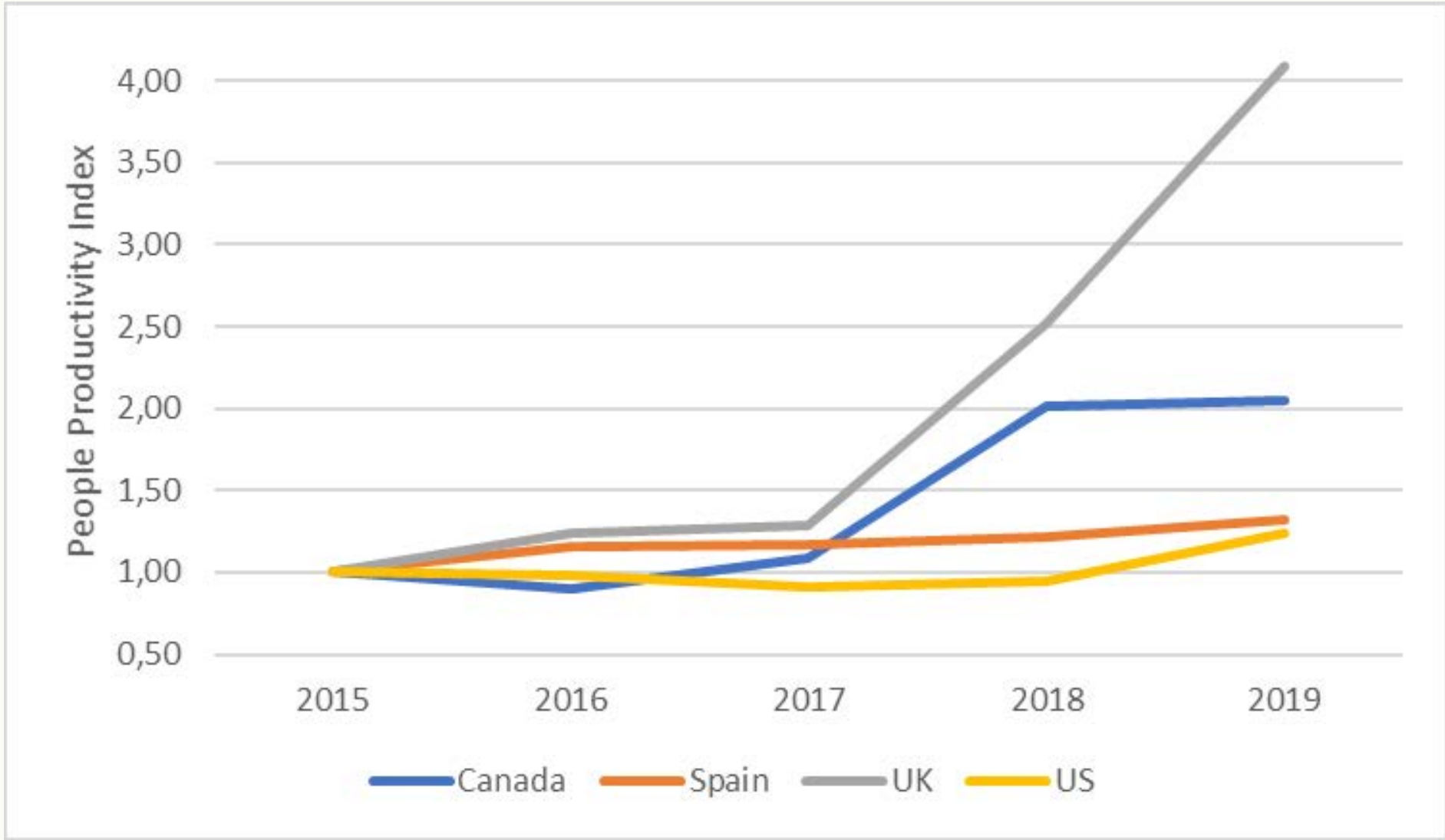


 HUGIN

 KONGSBERG

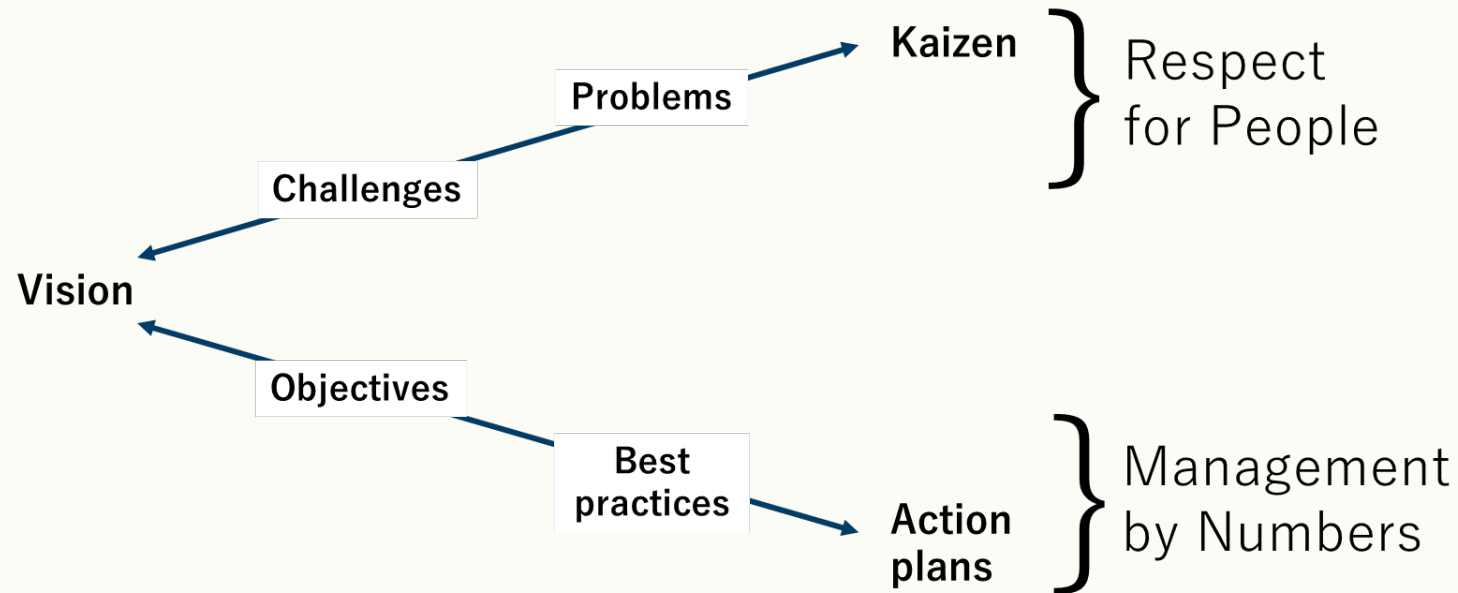
Photo: Kongsberg Maritime AS





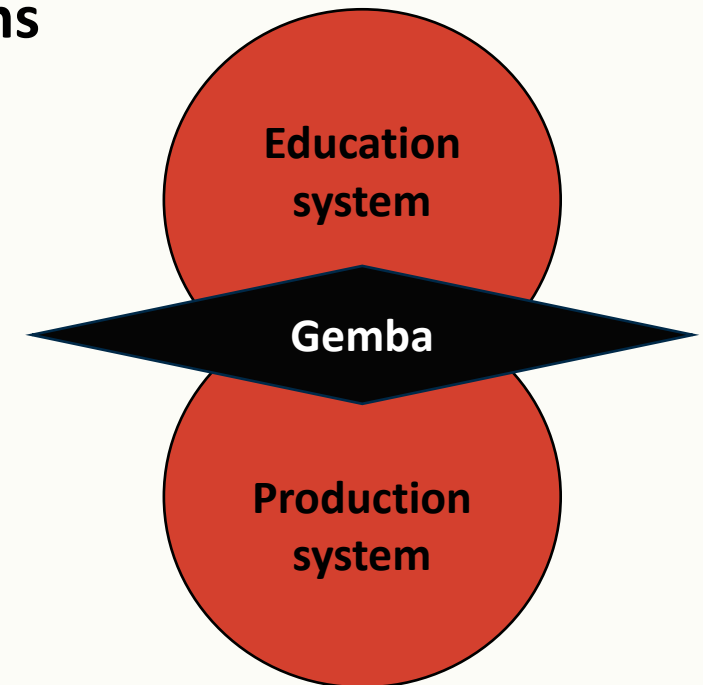


# Lean vs. Classical Management



# The Lean Strategy for Sustainable Growth

- Create consensus around the right **challenges** - together with the team
- Develop the right systems - to discover the right **problems**
- Develop people through **kaizen**



"Our greatest challenge is creating a carbon-neutral society..."

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**Toyota  
Times**



Digitalization and  
Carbon Neutrality Come Into Focus

Achieve Zero CO<sub>2</sub> Emissions

Achieve a Net Positive Environmental Impact



Life Cycle Zero  
CO<sub>2</sub> Emissions Challenge



New Vehicle Zero  
CO<sub>2</sub> Emissions Challenge



Plant Zero  
CO<sub>2</sub> Emissions Challenge

**TOYOTA**   
**ENVIRONMENTAL  
CHALLENGE 2050**



Challenge of  
Minimizing and Optimizing  
Water Usage

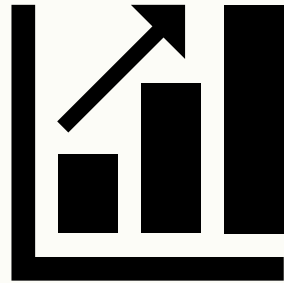


Challenge of  
Establishing a Recycling-  
based Society and Systems

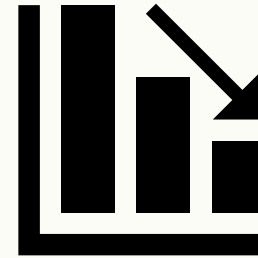


Challenge of  
Establishing a Future Society  
in Harmony with Nature

# What is the problem?



Increase efficiency?



Reduce the impact?



# Troublesome problems



## SUSTAINABLE DEVELOPMENT GOALS



# CLEVER PACKAGING SOLUTIONS

The shipping of parts and vehicles to and from our factories is an area where we can reduce carbon emissions by thinking how we can transport items efficiently, with the least waste. Teams work together and look closely at the different types and shapes of items we use so as to come up with packaging that allows as many items as possible to be carried at one time, whether by road or rail.

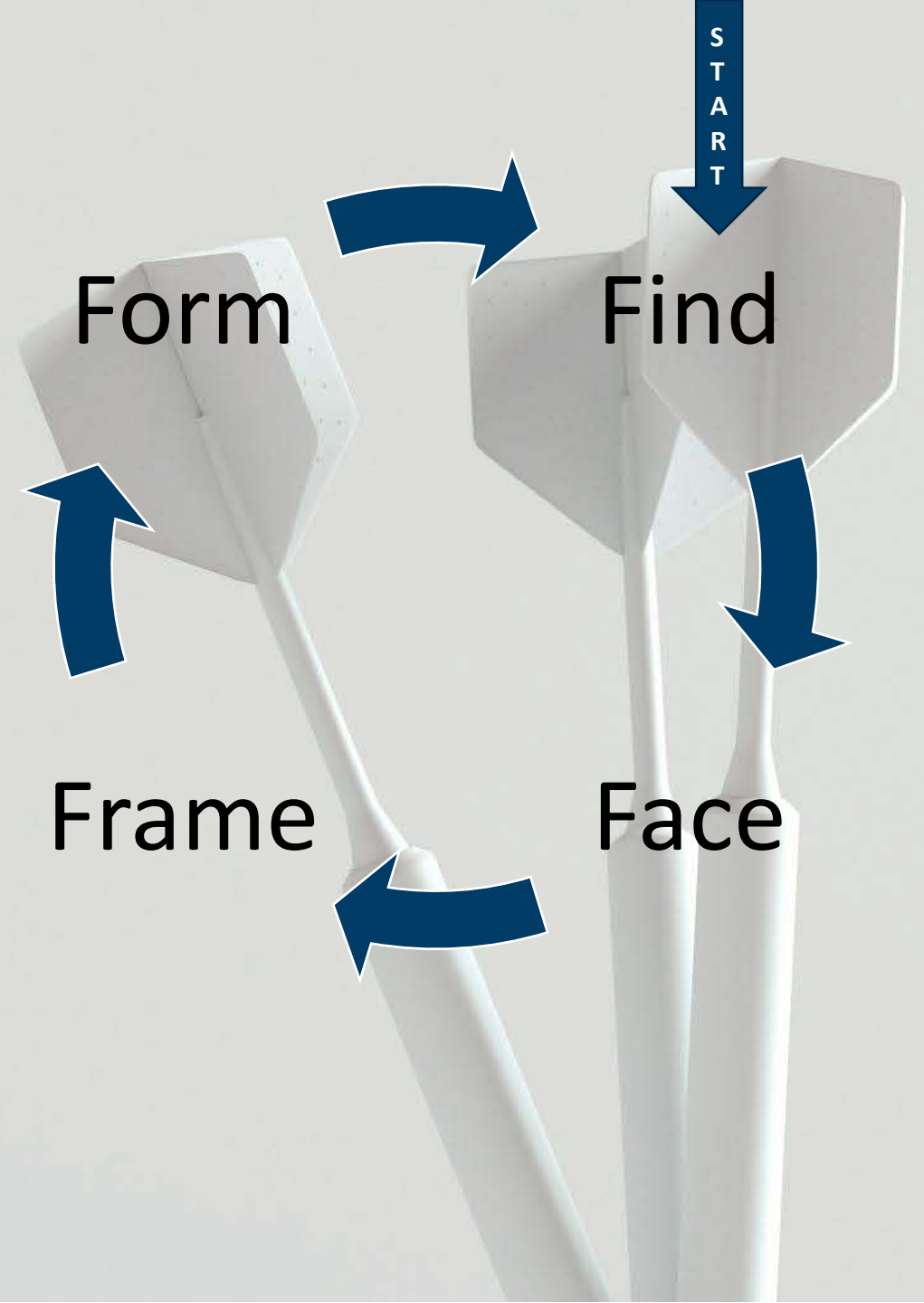
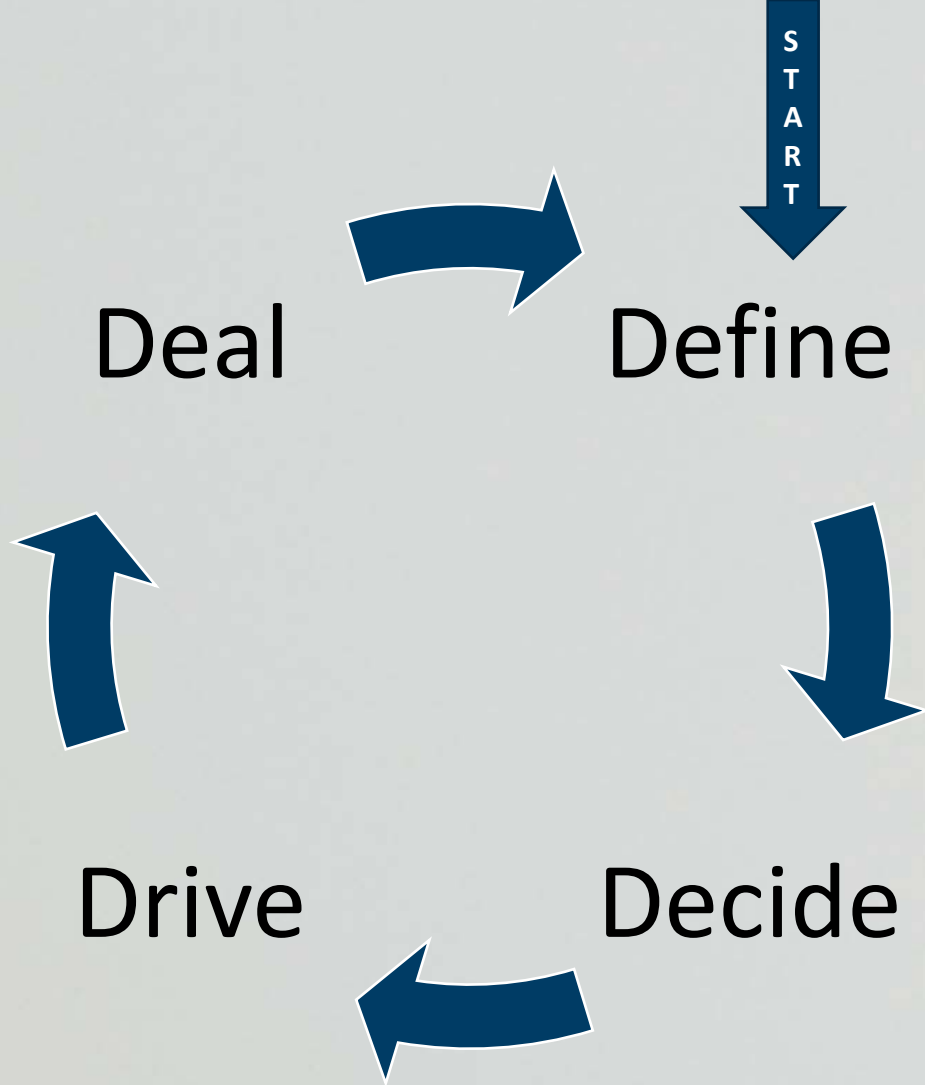
The results are better space efficiency, lower CO2 emissions and packaging that is easier to fill, load and unload. We encourage new ideas like this in our annual Global Eco Awards, and our European Parts Depot in Belgium has been among the winners for its innovative solutions in this area.

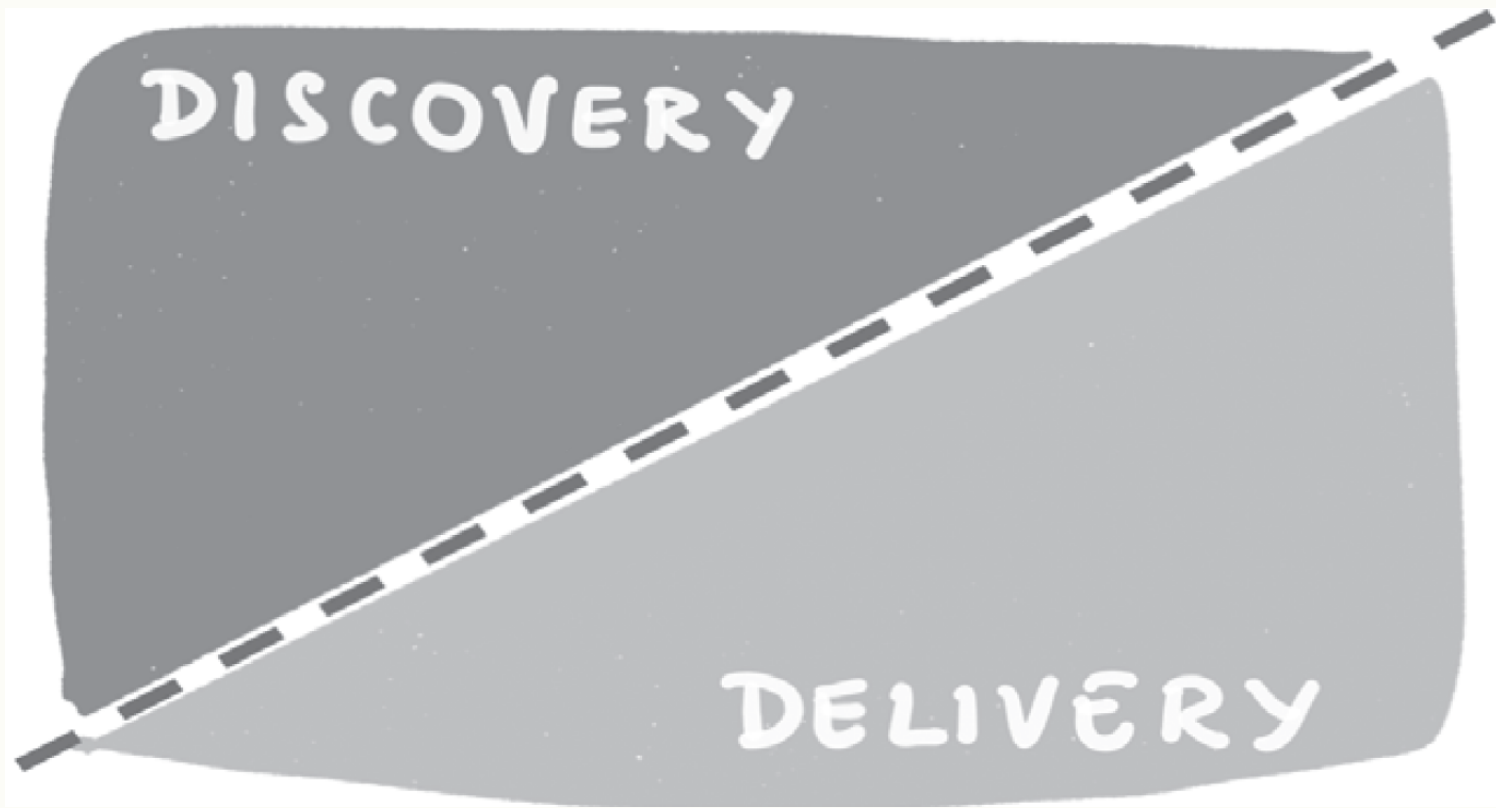


TOYOTA PARTS CENTRE EUROPE

**15T**  
of waste  
**SAVED**







# Fostering improvements from IIoT

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[Saabye, H.](#) and [Powell, D.J.](#) (2022), "Fostering insights and improvements from IIoT systems at the shop floor: a case of industry 4.0 and lean complementarity enabled by action learning", *[International Journal of Lean Six Sigma](#)*



**Smart technology is not so smart  
when used to digitalize waste**