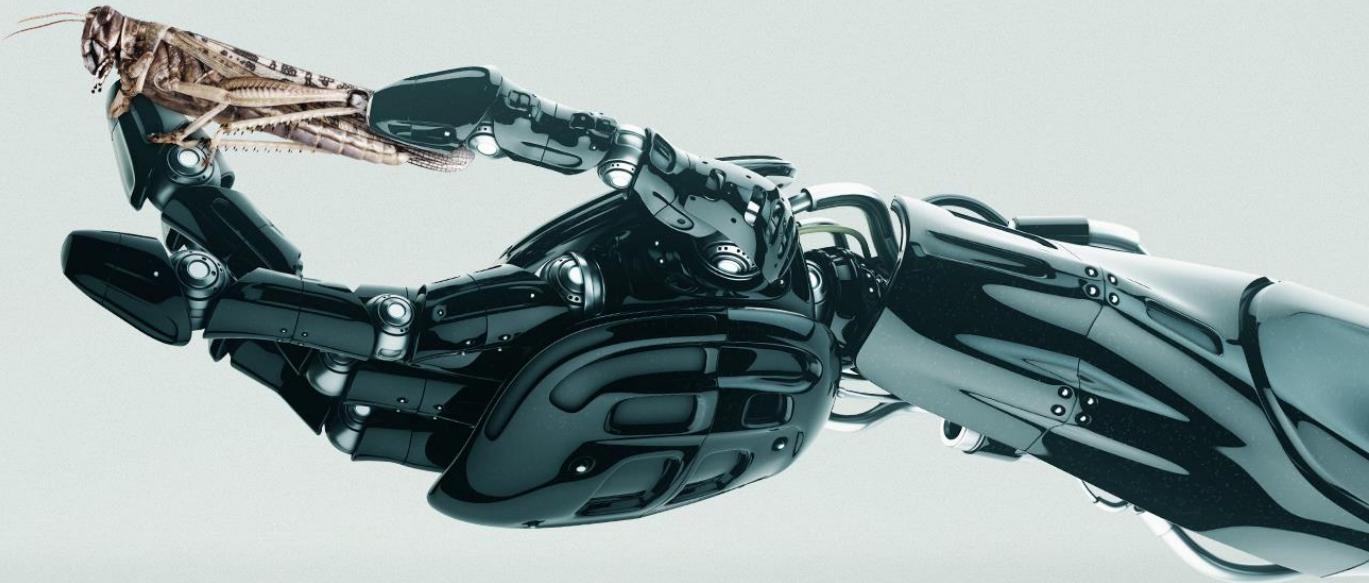


SAMARBEJDENDE ROBOTTER – EN UNIK MULIGHED FOR DANMARK.



Malene Tofveson Nibe
Designingeniør, konsulent
mtni@teknologisk.dk



AGENDA

- Hvem er vi? Hvor kommer vi fra?
- Barrierer for automation
- Robot CoWorker
- Robot Investment
- De danske virksomheders udfordring: High mix low volume
- Løsninger med samarbejdende robotter
- Kendte teknologier i nye domæner
- Industri 4.0



DTI HAS EXISTED SINCE 1906

To support Danish industry, mainly small enterprises, by providing technical assistance in the form of teaching, advice, testing and technological research



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Stavanger

Stockholm

Hirtshals

Gothenburg

Aarhus

Sønder Stenderup

Odense

Taastrup

Warsaw



Danish
Customers

38 %

11 %

24 %

27 %

International
Customers

Revenue 2015
DKK 1,017.8 million

Research and
Development Activities

DTI, ROBOT TECHNOLOGY IN NUMBERS

35.000.000 DKK revenue in 2015

12.000+ views per year on our YouTube-videos (www.youtube.com/dtirobot)

5.000+ guests per year

3.300+ robot newsletter recipients

2.000 square metres innovation facilities

400 customers in 2015

40+ robotics experts

15+ robots

5 robotics start-ups in the Odense Robotics StartUp Hub



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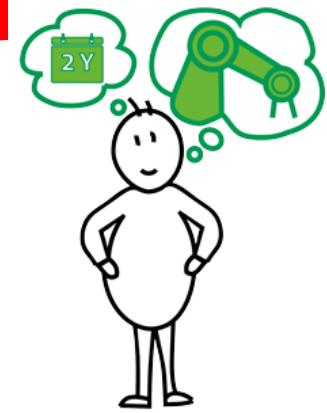
HVOR MEGET KENDER I TIL ROBOTTER OG PRODUKTION?



2

3

4



WHAT WE DO

- Implementation of **robot and automation solutions** in the industry
- **Dissemination, training and education** towards industry within new robot technologies
- **Analysis and consultancy** on strategic automation and choice of technologies
- **Research, development and innovation** within robot technology





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DTI, ROBOT TECHNOLOGY

Head of Center
Kurt Nielsen



Industry

Section Leader
Jens Fynbo



Flexible Industrial Robots

Team Leader
Anders Billesø Beck



Sensors and Process

Team Leader
Jacob Kortbek



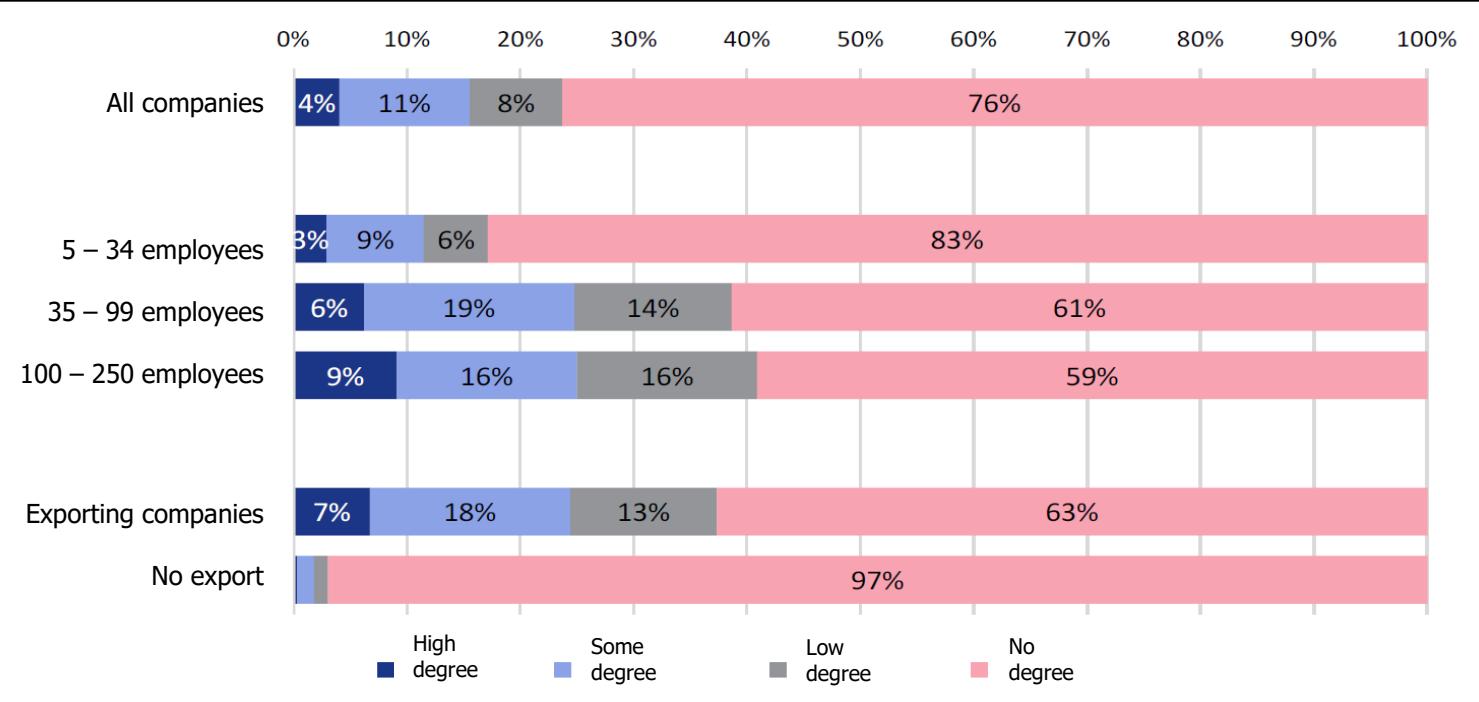
Service Robotics

Team Leader
Lars Dalgaard



HVORFOR HAR VIRKSOMHEDERNE
IKKE AUTOMATISERET ENDNU?

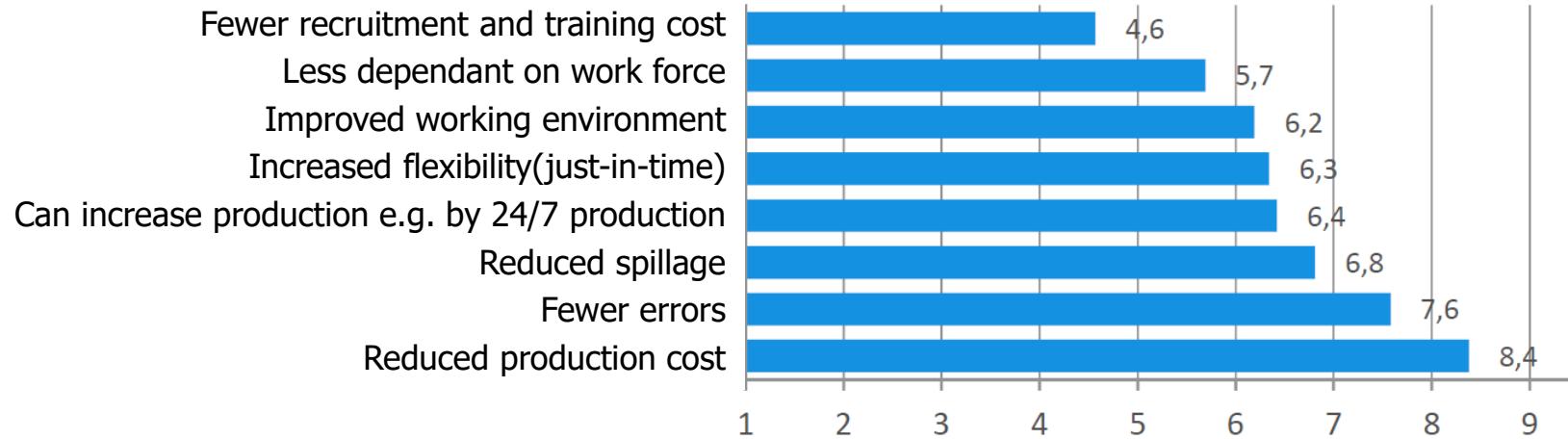
BRUGEN AF INDUSTRIROBOTTER



"To which extend do your company use **robots in the manufacturing process?**"

Source: "Robotter i global kamp",
DTI, august 2015

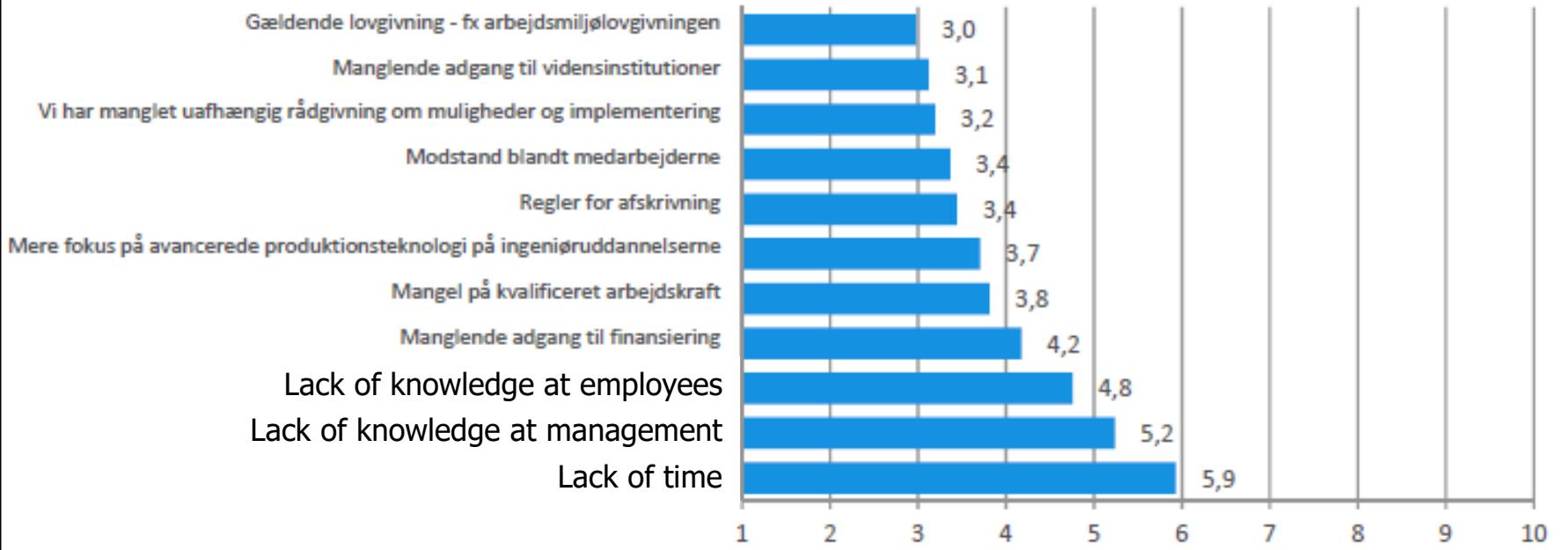
INCITAMENTET FOR AT AUTOMATISERE



"Importance of **incitement to automate?**" (1 = no significance, 10 = very significant)

Source: "Automatisering i industrien", IDA, oktober 2015

BARRIERER FOR AUTOMATION?



"In which scale has your company experienced the following **barriers to automate?**" (1 = no significance, 10 = very significant)

Source: "Automatisering i industrien", IDA, oktober 2015



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Hvordan kan vi hjælpe virksomheder med at bryde barriererne og komme igang med automation?

Robot CoWorker



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Actions

Søg

- > Primitives 11
- > Calibration 3
- > Main skills 4
- > OPC-Test 1
- > OPC-UA 85
- > Other 26
- > raha 4
- > RV 7
- > Smøre skills 20
- > Smøre skills Back-up 16
- > Tests 22

Luk system Nulstil Hjem Konfiguration Ny skill Operatør Log ud English

Proces Driftstilstand I/O parametre Vis detaljer Rediger

Gem Slet skill Tilføj if or loop

[Smøre skills] Set robot speed 71 ([Smøre skills] Set robot speed) diameter = 0 On X = roll = 0 On Y = pitch = 0 On

[Smøre skills] Pick up bolt ([Smøre skills] Pick up bolt) X = 0 roll = 0 On Y = pitch = 0 On

[Smøre skills] Spray bolt ([Smøre skills] Spray bolt) diameter = 0 totallengt sprayHead = 0 On threadSpr On

Get Detect bolt result 130 (Get Detect bolt result) value = 0 On

If detect bolt status !=5 (inside loop) (Output Relay Double) value = 0 On

if Result != 5

ErrorInrow (yes) 53 (Save Pose) X = 0 roll = 0 On Y = 0 pitch = 0 On Z = 0 yaw = 0 On

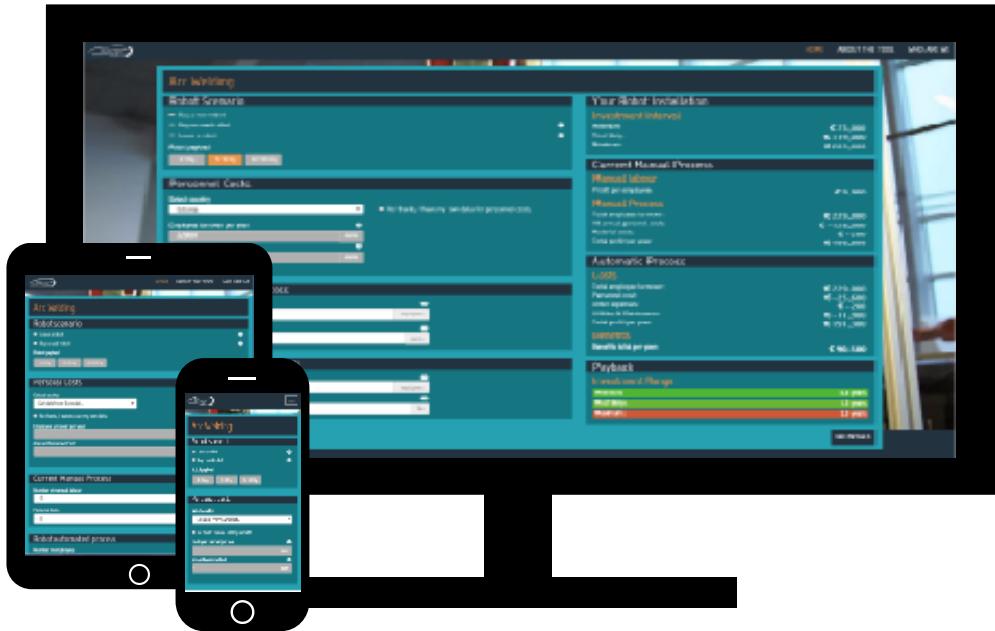
else if Result == 5

ErrorInrow (no) 66 67 (Save Pose) X = 5 roll = 0 On Y = 0 pitch = 0 On Z = 0 yaw = 0 On

Save Pose 10 115 (Save Pose) X = 0 roll = 0 On Y = 0 pitch = 0 On Z = 0 yaw = 0 On

Aktuel tilstand: Okay, Aktuel funktion: Stop, Logget ind som: administrator Gendan Database Hjælp

Robot Investment



Værktøjet udregner en business case på en robotinvestering.

Database med priser fra
integratorer,
robotproducenter og
eksperter inden for
automation.

https://www.youtube.com/watch?v=POrt7_gqtj0

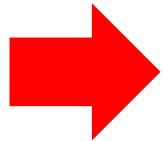


TENDENS I DANSKE PRODUKTIONSVIRKSOMHEDER

FRA MASSEPRODUKTION TIL HIGH **MIX** LOW **VOLUME**

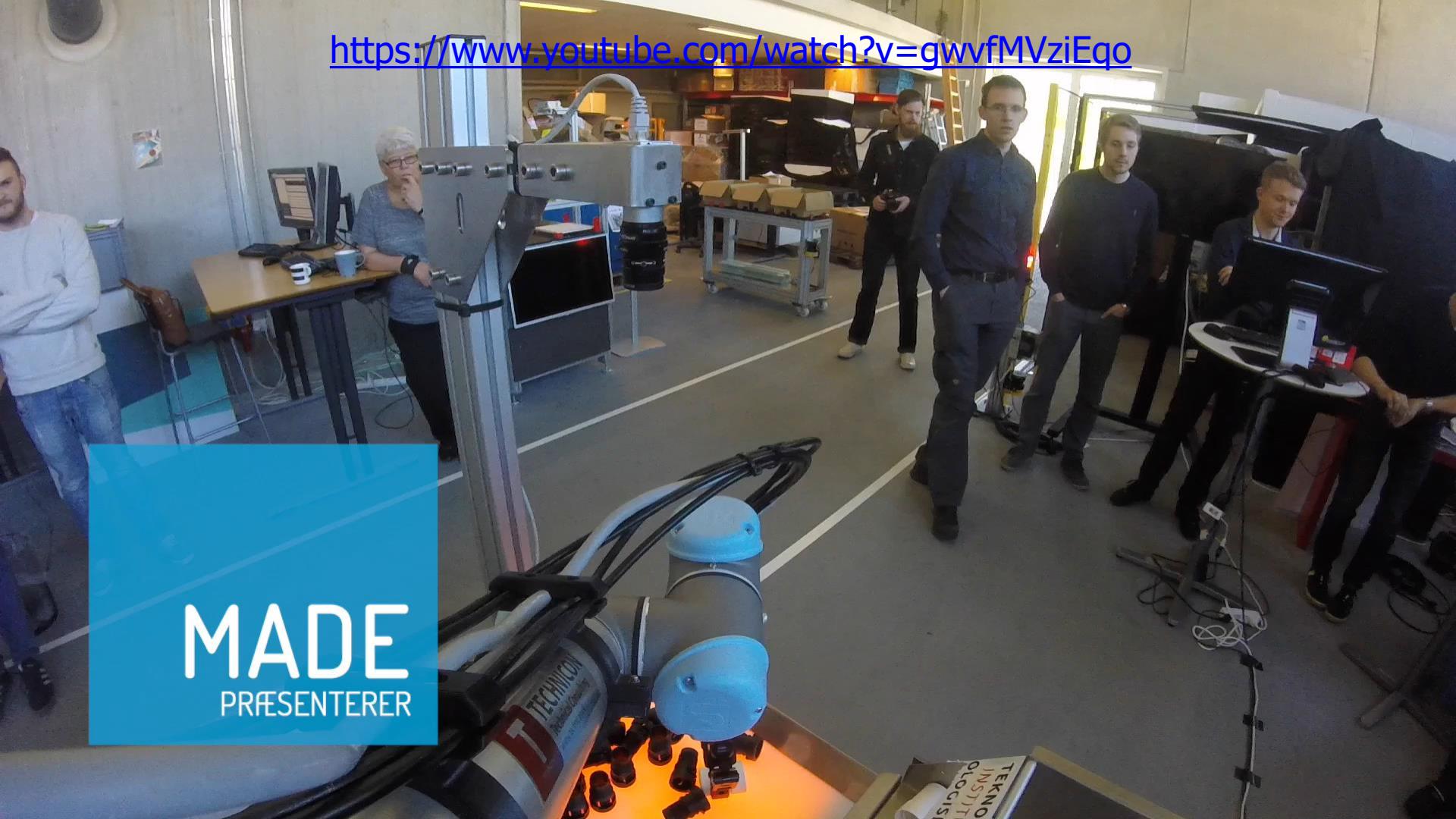


Højt styktal – få varianter
Lav fleksibilitet
Ringere mulighed for produktoptimering



Lavt styktal – flere varianter
Høj fleksibilitet
Nem omprogrammering

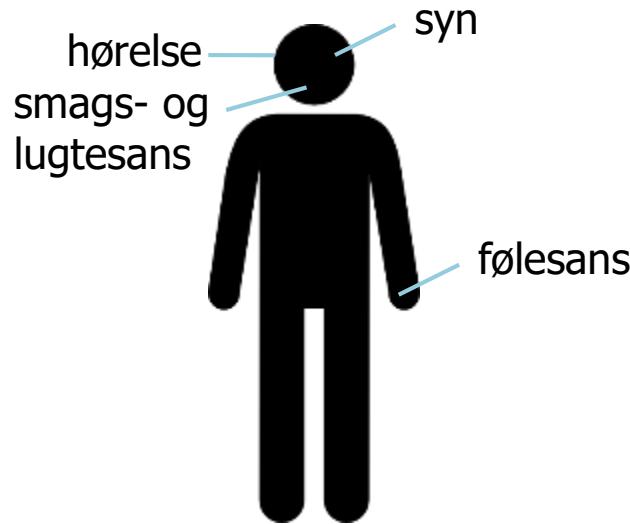
<https://www.youtube.com/watch?v=gwvfMVziEqo>



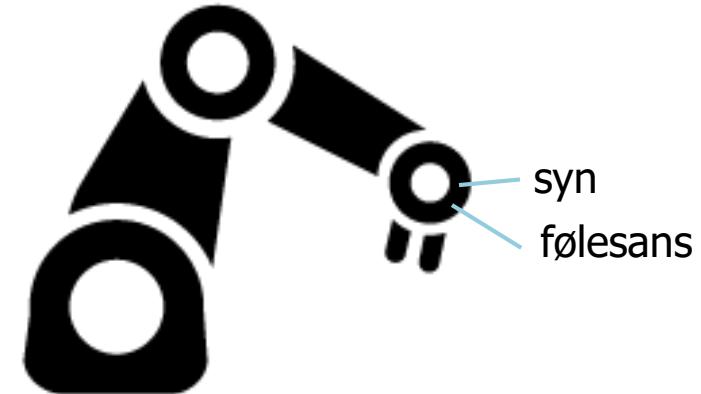
MENNESKE VS. ROBOT



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Personlighed og følelser - på godt og ondt
Evne til at prioritere og vurdere



I stand til at arbejde hårdt
Har ikke brug for barnets 1. sygedag
Stiller ikke krav til en inspirerende arbejdssdag

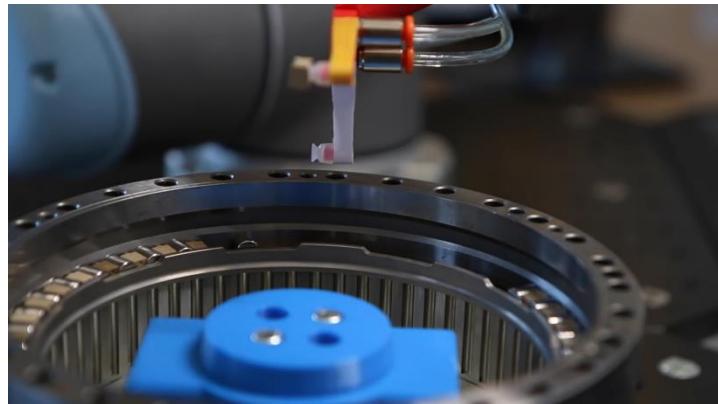
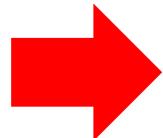
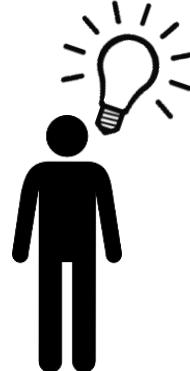
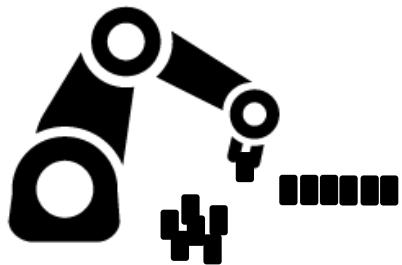
80 / 20 REGLEN



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Du skal ikke nødvendigvis automatisere
en proces 100 % for at det er en succes!

Brug robotten hvor den er bedst og
mennesket hvor det er bedst.





TECHNOLOGY INTEGRATION MADE EASY

Lean Intelligent Assembly Automation (LIAA)

CONTRIBUTING
PARTNERS



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Robots with Super-Senses to Sort Waste for Recycling



If you fish out e.g. 41 cell phones, you have the same amount of **gold** that can be found in an entire ton of ore from a goldmine.

<https://www.youtube.com/watch?v=AVTVkJEeSAs>

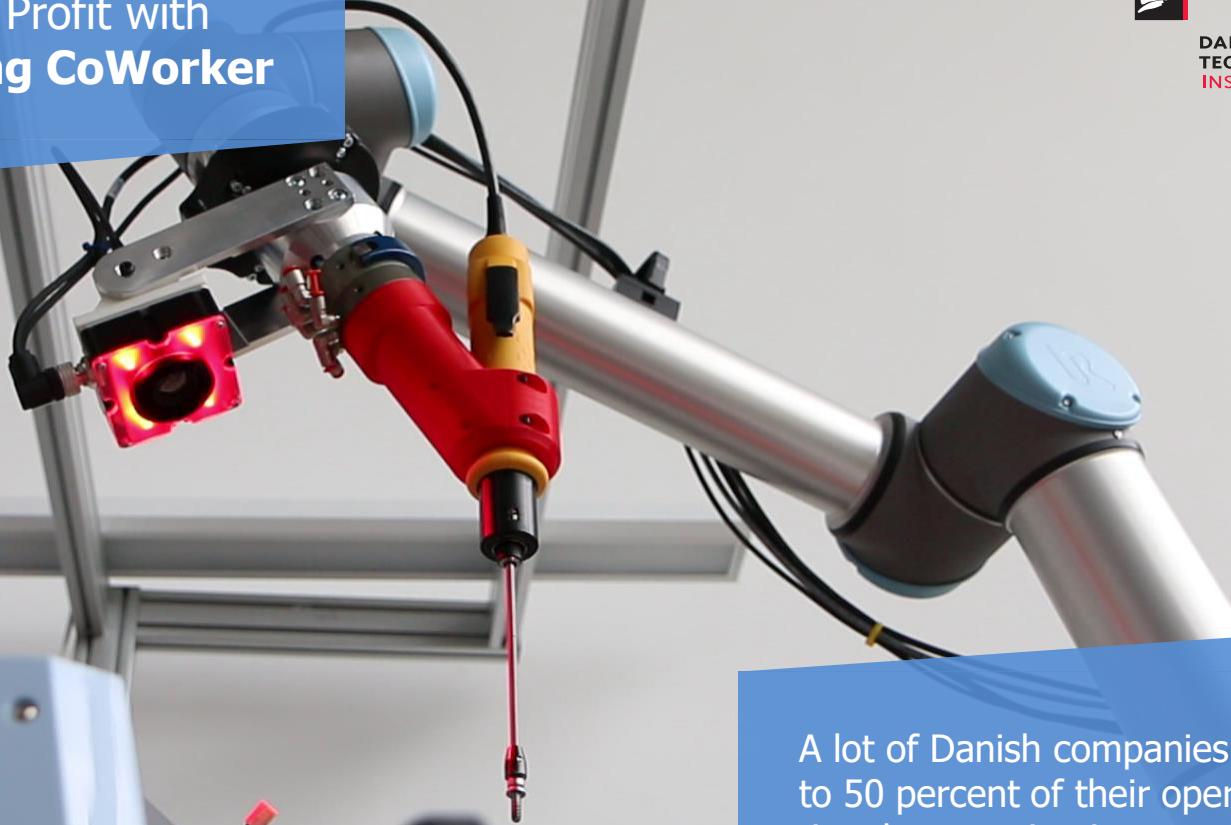
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**KENDT TEKNOLOGI
I NYE DOMÆNER**

Gain Productivity Profit with the **Screwdriving CoWorker**



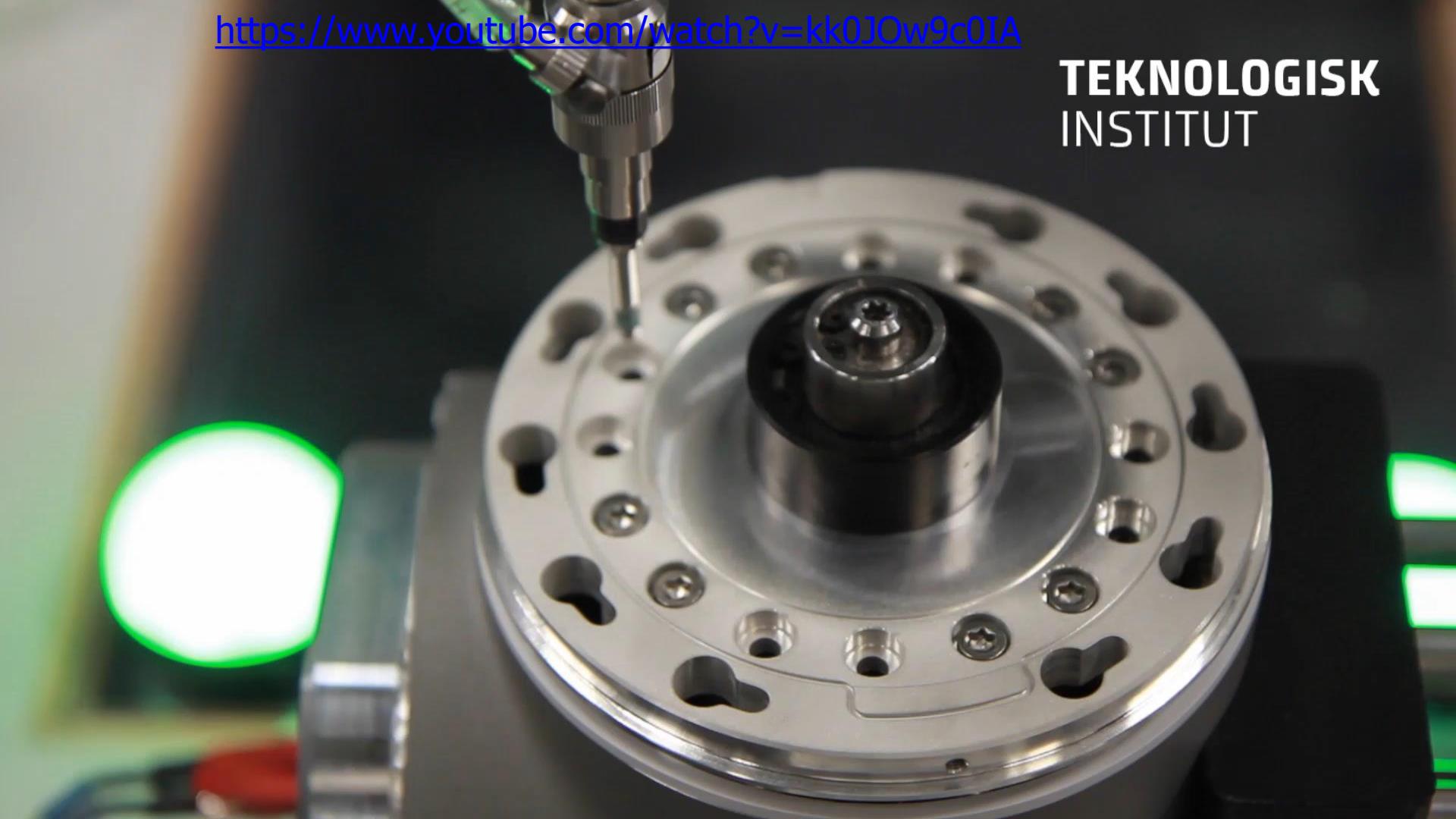
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A lot of Danish companies use up to 50 percent of their operator time by screwing in screws.

<https://www.youtube.com/watch?v=kk0J0w9c0IA>

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**ROBOT MED
FØLESANSER**

RoboPAM: Flexible Robot Technology Makes De-Palletizing Easy

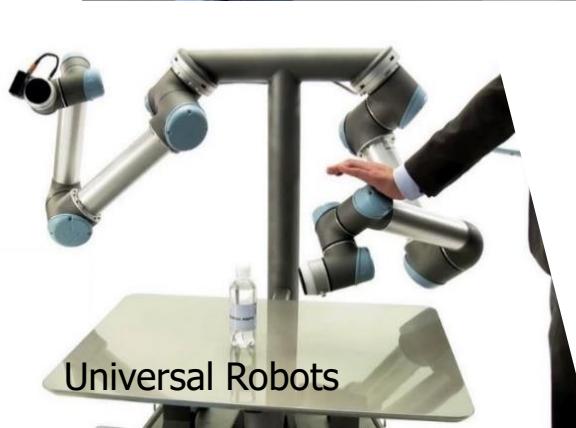


"A robotic solution with a combination of advanced vision technology, advanced force/torque control plus intelligent motion planning and collision control in the underlying engine."

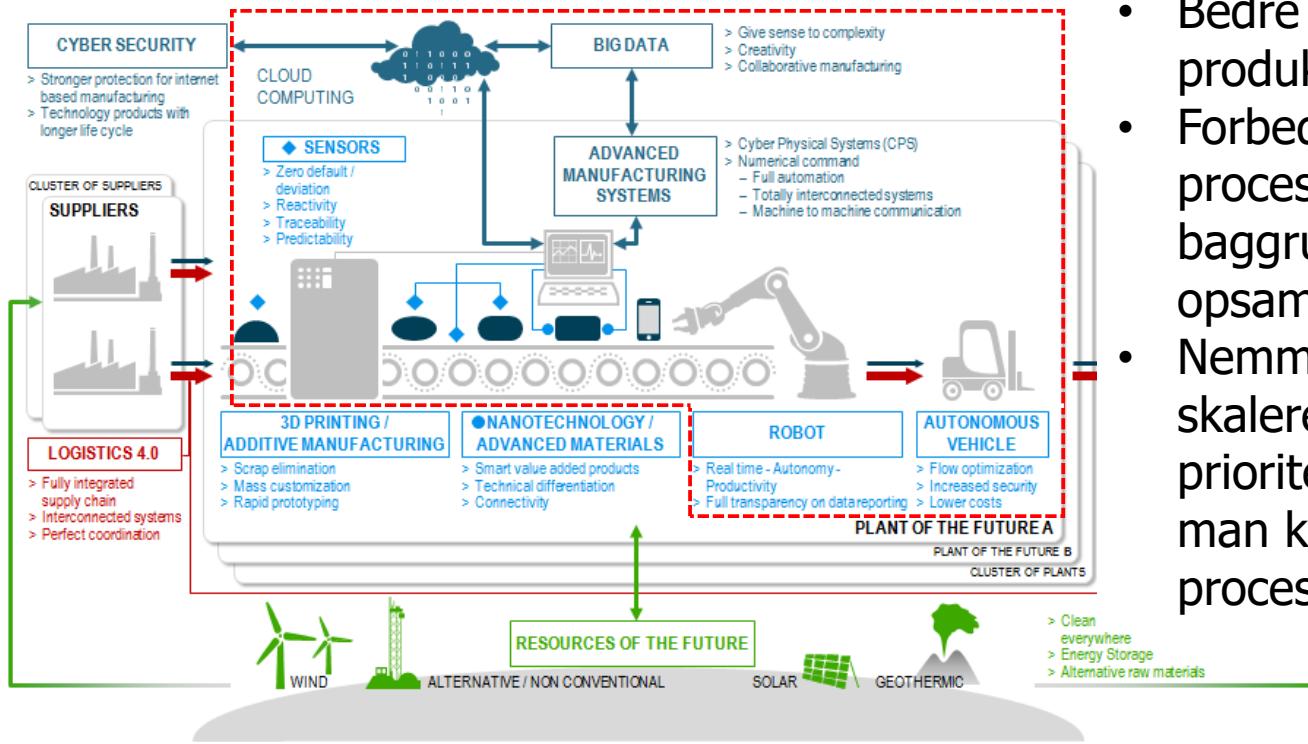
<https://www.youtube.com/watch?v=sozs8IDQAI4>

THE DANISH TECHNOLOGICAL INSTITUTE

INDUSTRY ROBOTS → KOLLEGAER



THE INDUSTRY 4.0 ECOSYSTEM



- Bedre styr på produktionen
- Forbedre processen på baggrund ag opsamlet data.
- Nemmere at skalere og prioritere, når man kender sine processer.

Kilde: Roland Berger

SPØRGSMÅL?

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SUBSCRIBERS
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PRØV ROBOTTER I FROKOSTPAUSEN



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HOLD #1 – ROBOTTER 12.30-13.00

HOLD #2 – ROBOTTER 13.25-14.00

HOLD #2 – FROKOST: 12.30-13.25

HOLD #1 – FROKOST: 13.00-14.00

**PRØV ROBOTTER
I FROKOSTPAUSEN**



HVEM FÅR HURTIGST DELT PAKKER
UD MED ROBOTTEN?



PRØV AT STYRE ROBOTTEN MED
HÅNDBEVÆGELSER

MANGE TAK!



Malene Tofveson Nibe
Designingeniør,
konsulent
mtni@teknologisk.dk

