WERKBAAR WERK
DE INTERACTIE TUSSEN MENS EN MACHINE

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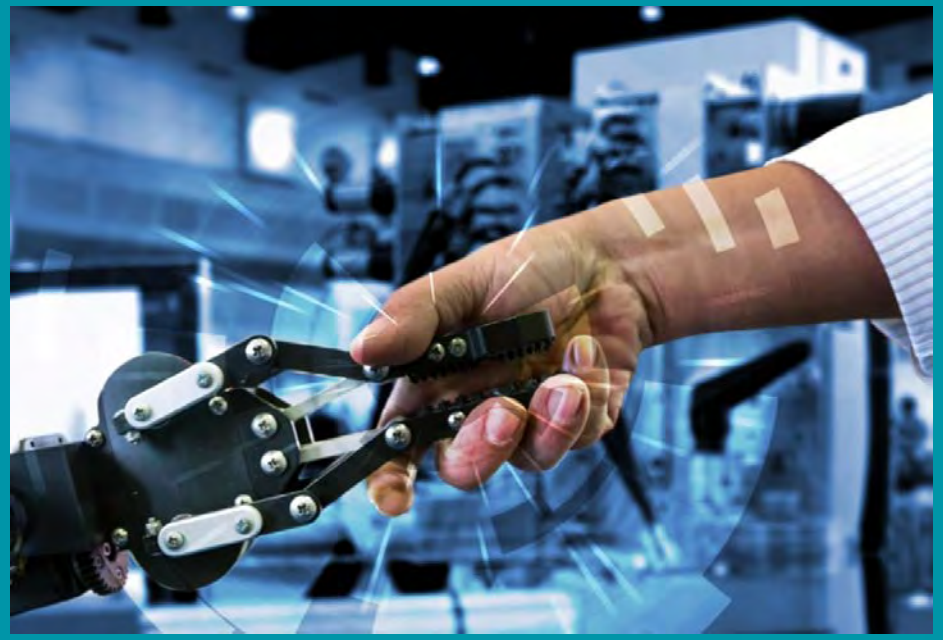
CEO Flanders Make

Oesterbank Roadshow Event

24 Mei 2018



WERKBAAR WERK

- ❑ Mens (Werk –Privé)
- ❑ Omgeving (veiligheid, gezondheid, arbeidsomstandigheden)
- ❑ Bedrijf (Groei, arbeidsomstandigheden)
- ❑ Organisatie (structuur, collega’s, leiding)
- ❑ Mens (flow, burn-out, bore-out)
- ❑ Technologie en impact
- ❑ Fysische ondersteuning, Ergonomie
- ❑ Cognitieve ondersteuning

WERKBAAR WERK: AGENDA

- Hoe technologie ons leven verandert
- Industrie 4.0 – Werk 4.0
- Mens – Machine : Fysisch
- Mens – Machine : Cognitief
- Besluit

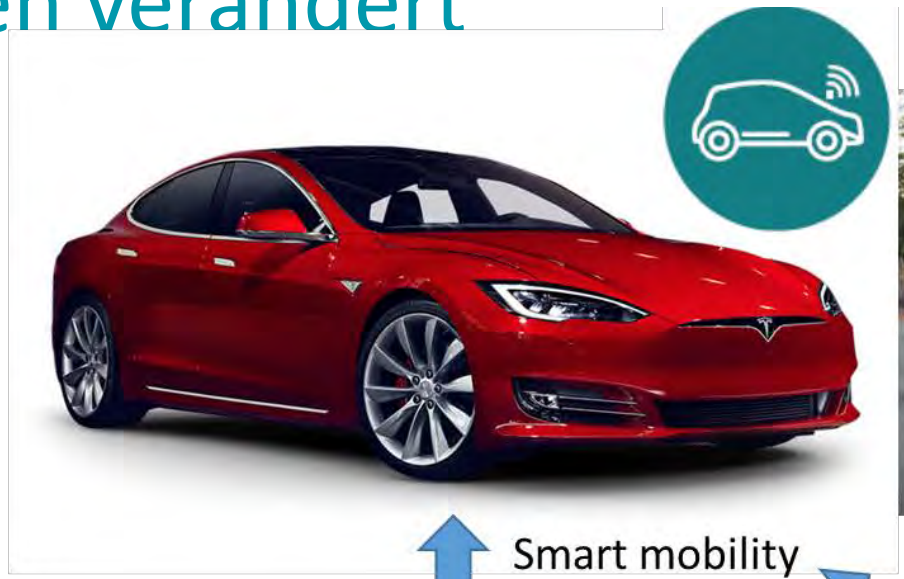
Hoe technologie ons leven verandert

Speed of transport

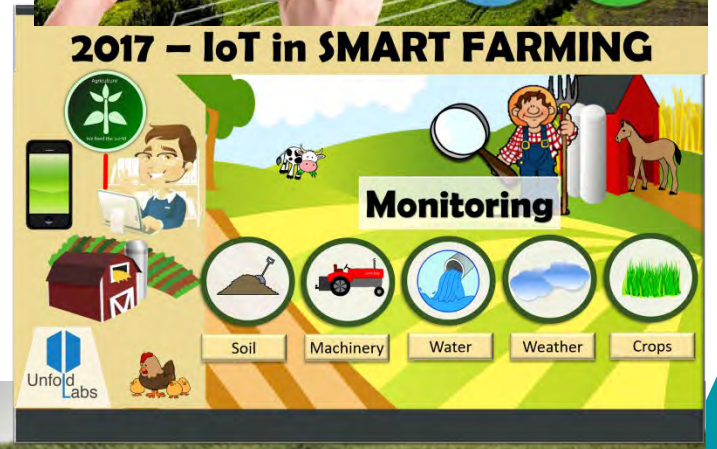
Disruptive innovation

Safety & comfort of driving

Smart mobility



Hoe technologie ons leven verandert



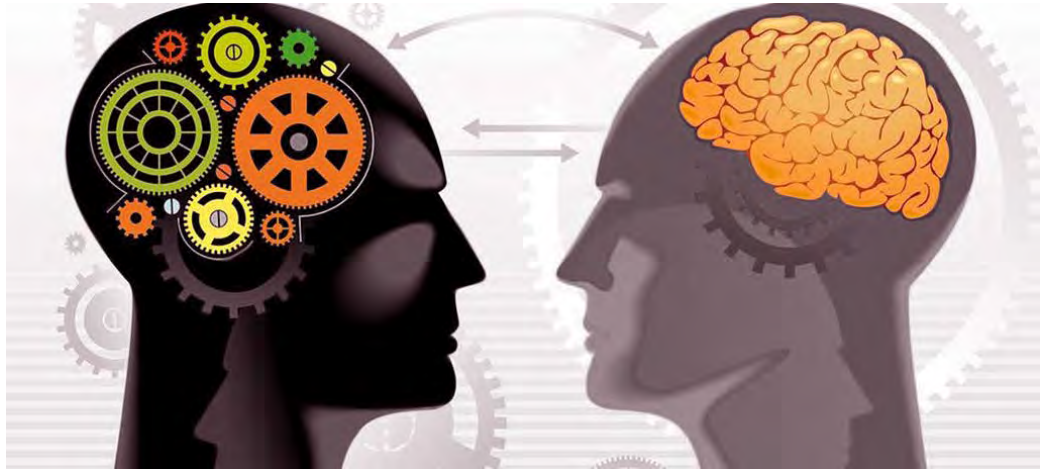
MODERNE TIJDEN

Anno 1937

Anno 2017

Nieuwe technologie en productie methoden => verandering, snelheid

ONDERSTEUNENDE TECHNOLOGIEEN



Uitdagingen Maakindustrie

- Bekwame Werkkrachten
- Verhogen efficientie en kwaliteit
- Gepersonaliseerde & complexe produkten
- Voorkomen van uitval van personeel

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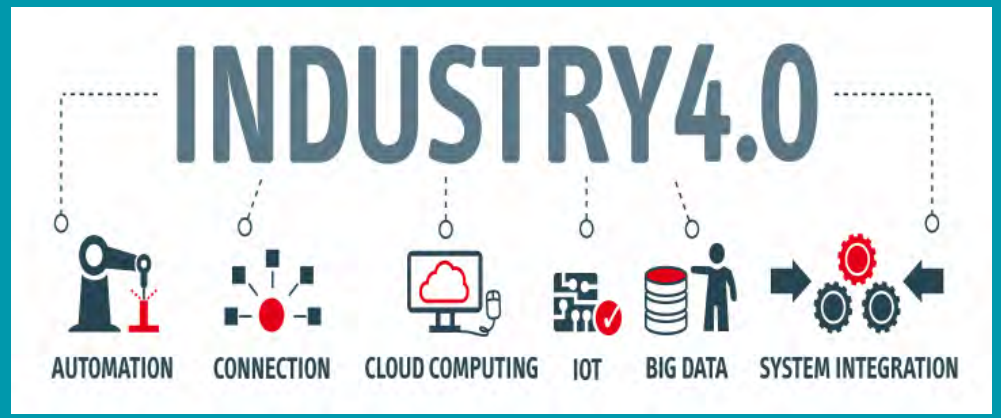
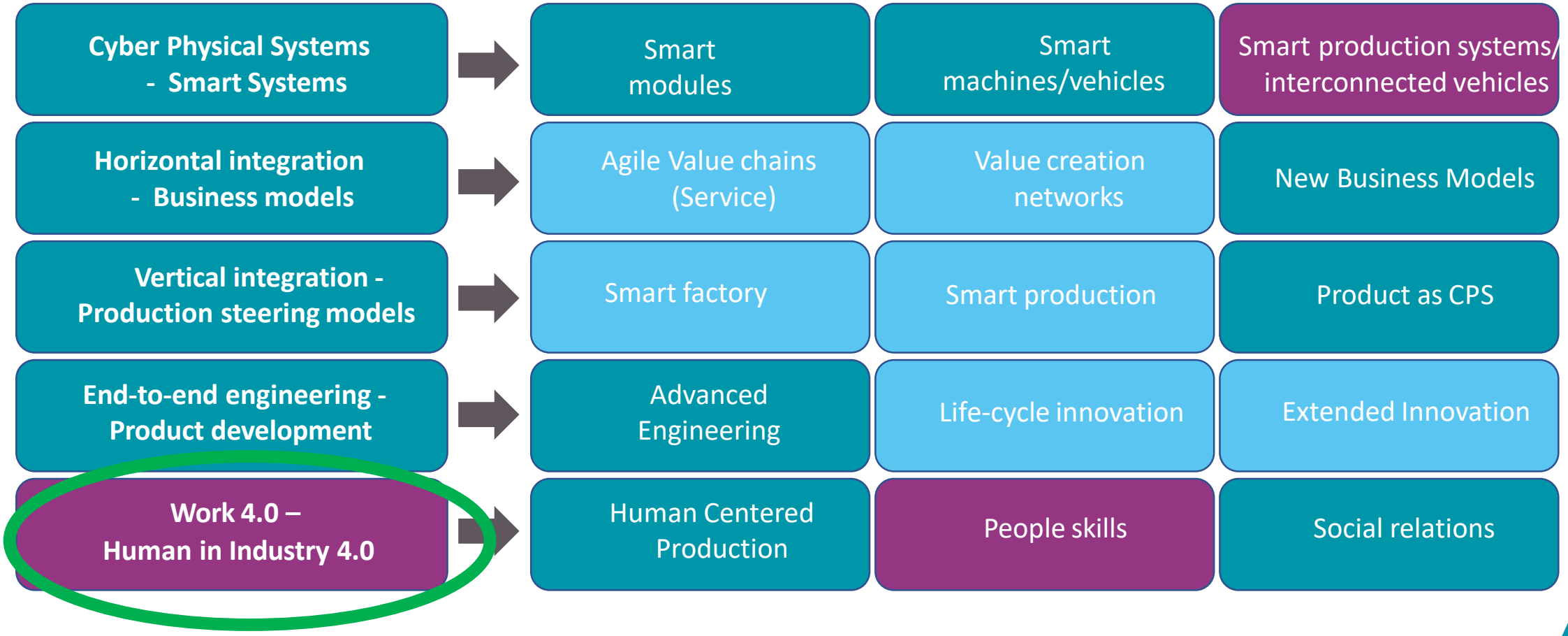
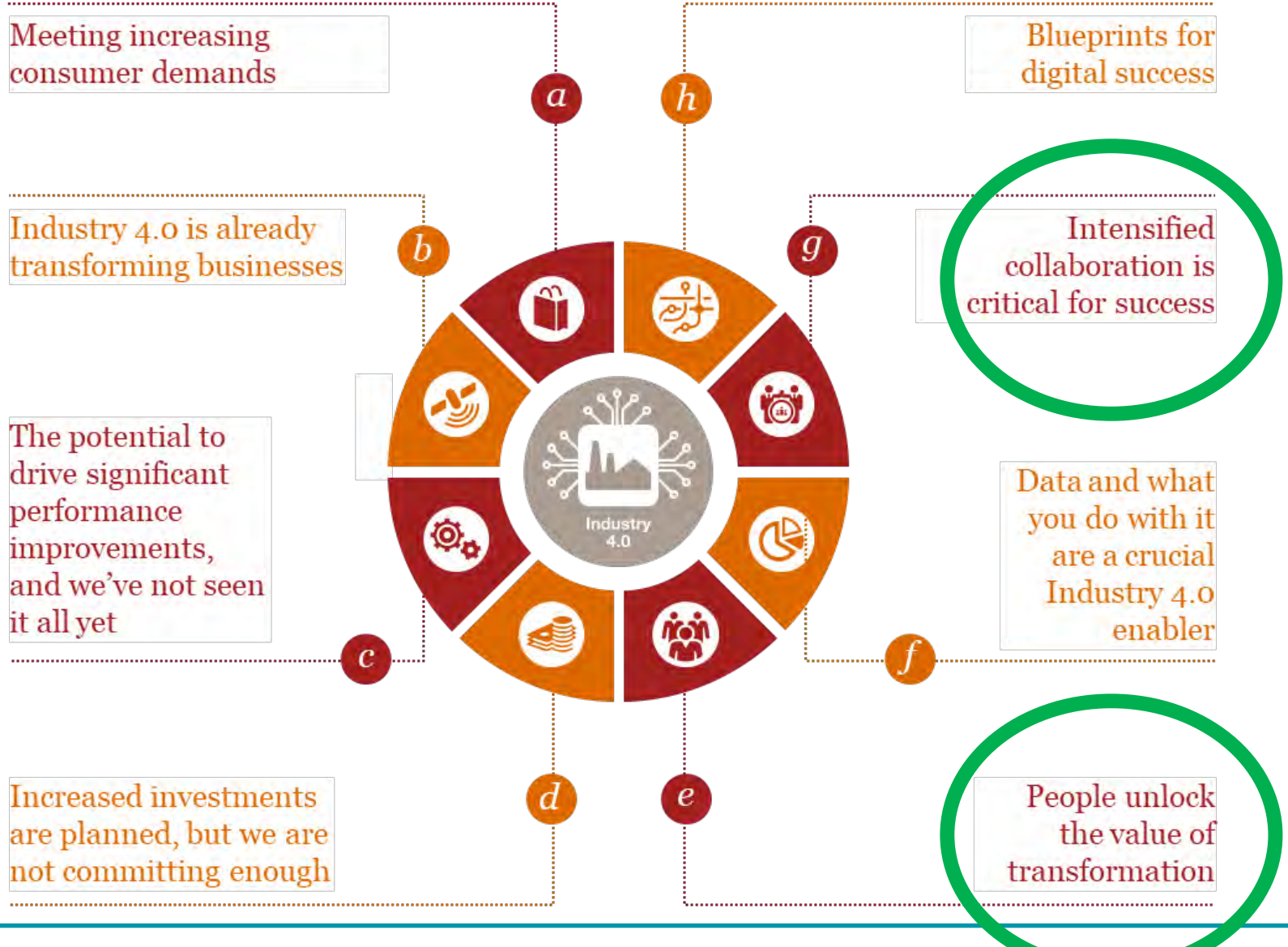
MANUFACTURING INNOVATION NETWORK



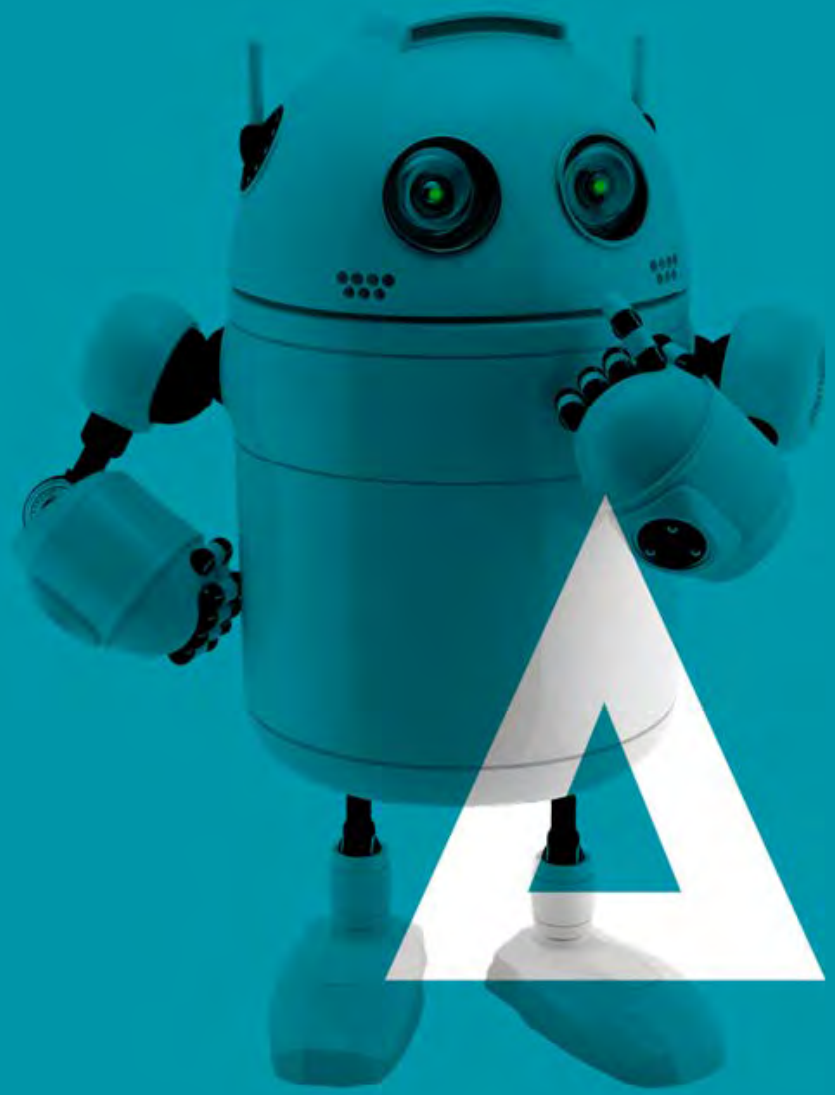
Flanders Make-PWC study: Industrie 4.0 end prioriteiten



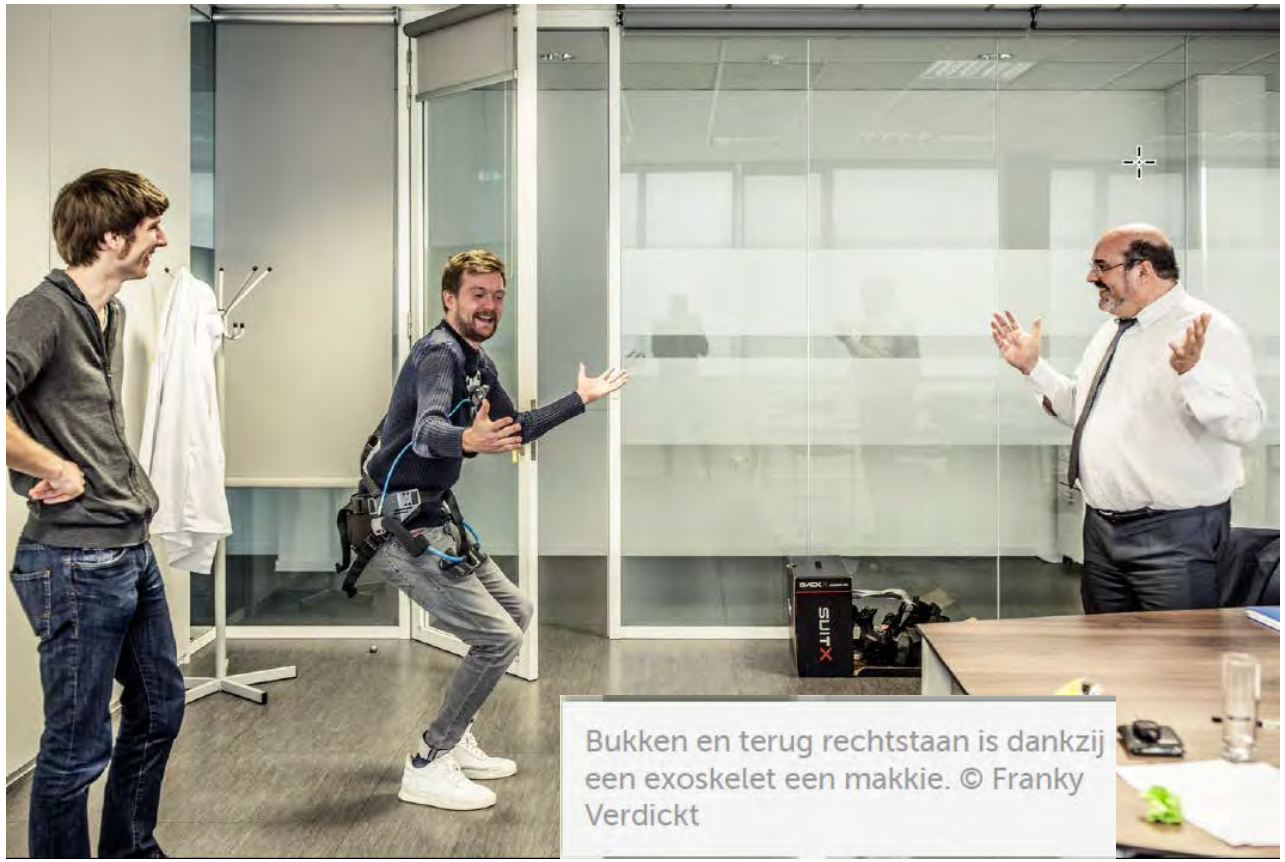
Flanders Make – PWC study



MENS – MACHINE INTERACTIE: FYSISCH



Mens – Machine : Fysisch : Exoskeleton @ Picanol



Bukken en terug rechtstaan is dankzij een exoskelet een makkie. © Franky Verdickt

Mens – Machine : Fysisch @ Audi

Ergoskeleton is especially useful when lifting and carrying heavy boxes.

Audi is applying the exoskeleton to prevent backache and injuries.

BMW: **LEANER, FASTER, MORE STABLE**

Industry 4.0 won’t replace people. Human beings will remain the pivotal success factor.

BCG

EXHIBIT 4 | Automated Systems Can Assist Workers

LINE WORKER HAS A PHYSICALLY DEMANDING TASK

1. Worker lifts the roof lining into a car; the shape is difficult to handle
2. Worker manually aligns the roof lining and holds it in place
3. Worker fastens the roof lining with screws, which requires being in an uncomfortable position

ROBOT PROVIDES ERGONOMIC IMPROVEMENTS

1. Robot lifts the roof lining and places it in the chassis
2. Worker guides the robot in aligning the roof lining but carries no weight
3. Robot fastens the lining with screws as directed by worker, who maintains a comfortable position

Sources: Expert interviews; BCG analysis.

Platform – Program – Proeftuin potentieel

Platform focus

Maximize HRCW productivity, keeping quality and operator load acceptable

- *Challenge:*

Cognitive and muscular issues are the main 2 reasons for sick leave of employees

- *Opportunity*: flexible production

Collaborative robots enable adaptation of task division

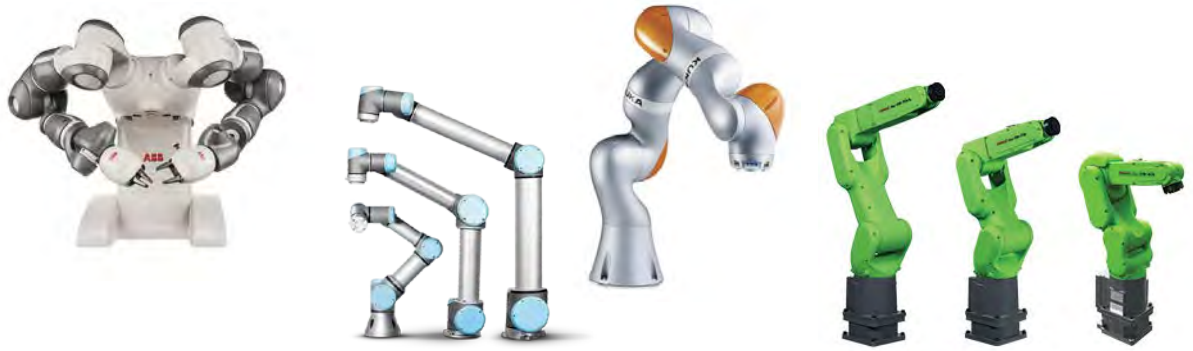
But: safety requirements (ISO/TS 15066)

In Belgium, 2014: invalidity due to

Psychological illness
26,12% (9168)

Illness movement system
33,81% (11867)

Current generation of cobots



- Payload range 0,5 - 10kg
- Maximum speed ≤ 250mm/s (0.9 km/h)
- Limited reach ≤ 1m

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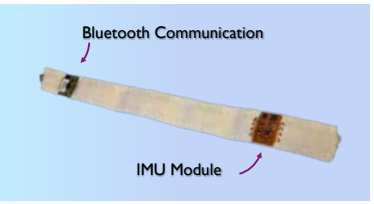
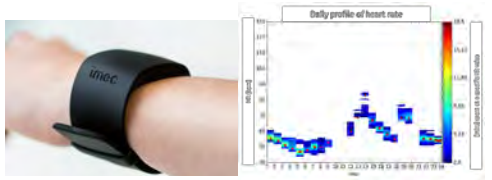
Pilot case: Adapt HRCW to actual cognitive load
Closing the loop

Physiological data:
- Pose, movements, …
- Heartrate, sweat, …

Actual execution times



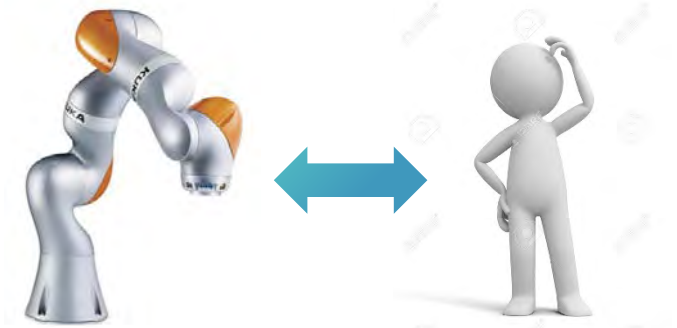


Measure the operator in action

Analyze data to extract actions and link with load

Machine learning based on
- Physiological data
- Process schedule
- Execution times

Adapt to improve productivity



Shift tasks from/to cobot
Increase/decrease speed

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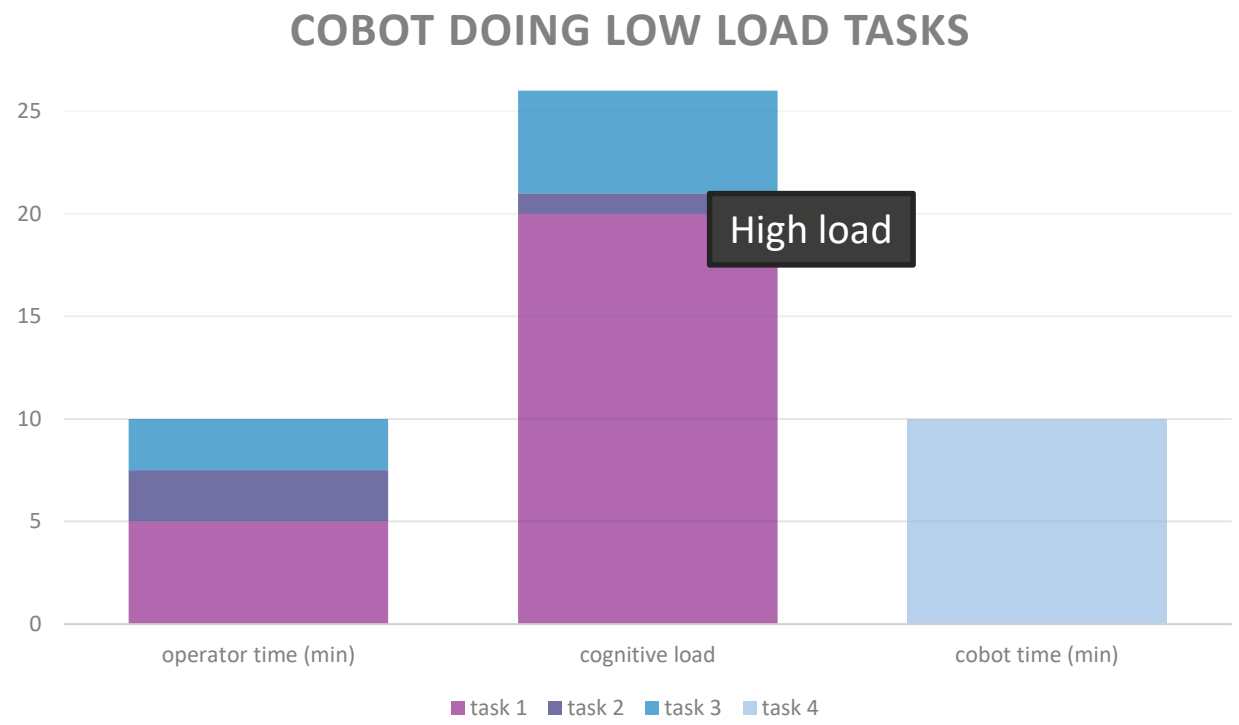
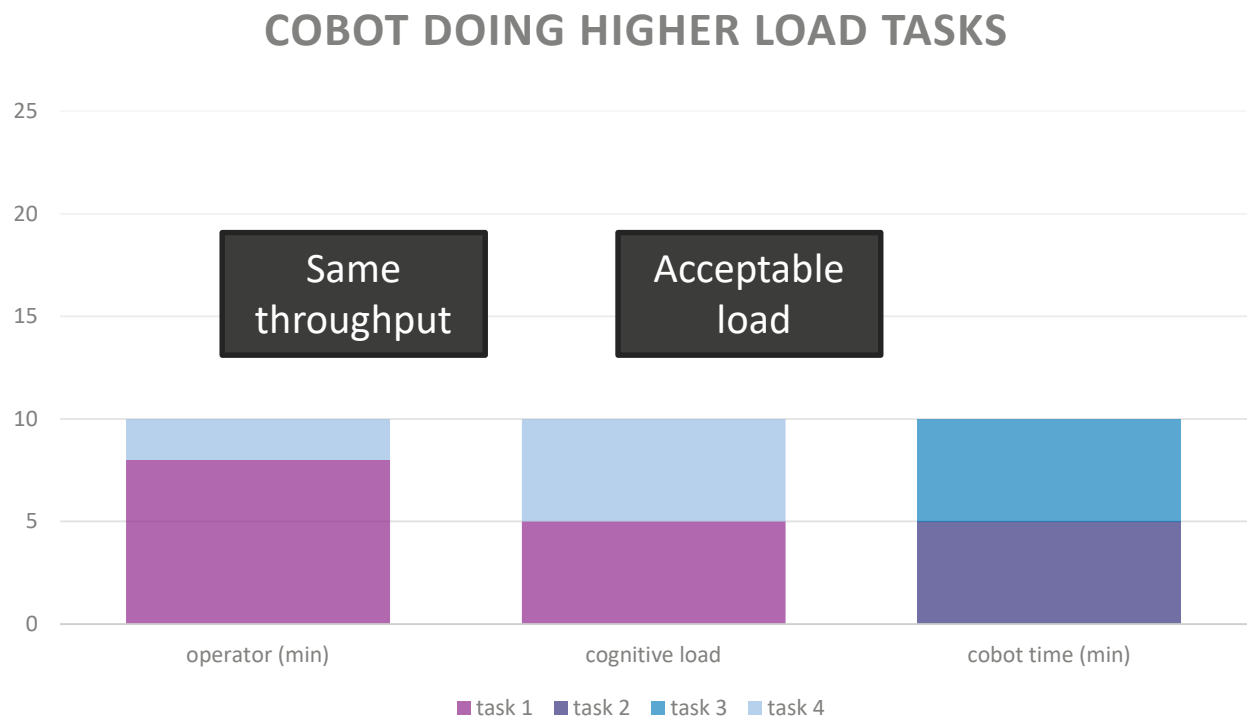
Pilot case:
Example application

Vary operator-cobot task assignment AND operator TAC times to maximize productivity under acceptable load





Remaining questions:

- Does the case make sense? Can TAC times be varied to reduce load?
- Should both be maximally busy?

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