

Inspection robotisée autonome :

perspectives 5.0 et cas d'étude
dans le monde pharmaceutique



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Junior lecturer

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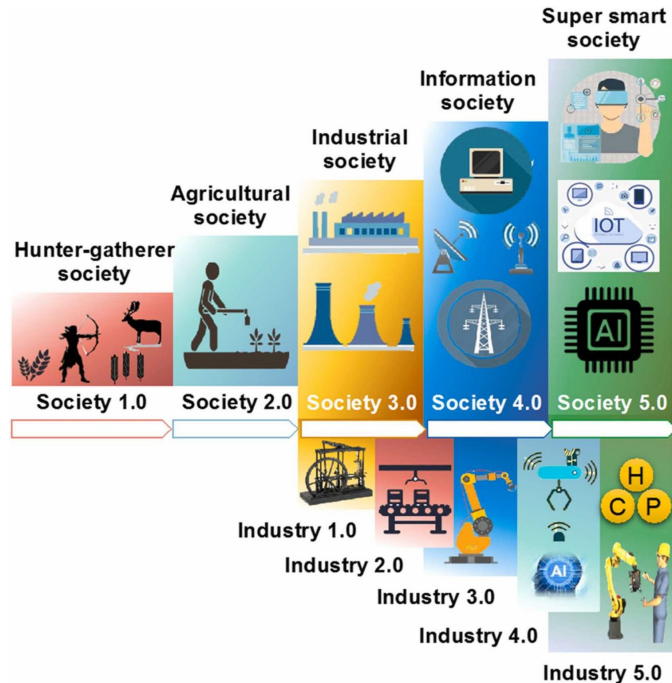
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Global ANYmal Research
Manager

ANYbotics

ANYbotics

5.0 : Société et industrie, deux systèmes interconnectés



Société 5.0

- Guidée par la science et la technologie
- *Super-smart*
- *Knowledge-intensive*
- Equilibre économie ↔ questions sociales

Industrie 5.0

- Centrée sur l'humain
- Résiliente
- Soutenable (durable)

[huan2022]

5.0 : Soutenable pour être résiliente

pénurie des semi-conducteurs
jan 2020 ▢ ...

incendie Renesas
mars 2021

inondations Belgique
juillet 2021

vague froid Californie
février 2023

cyberattaques
... 2014 ▢ ...

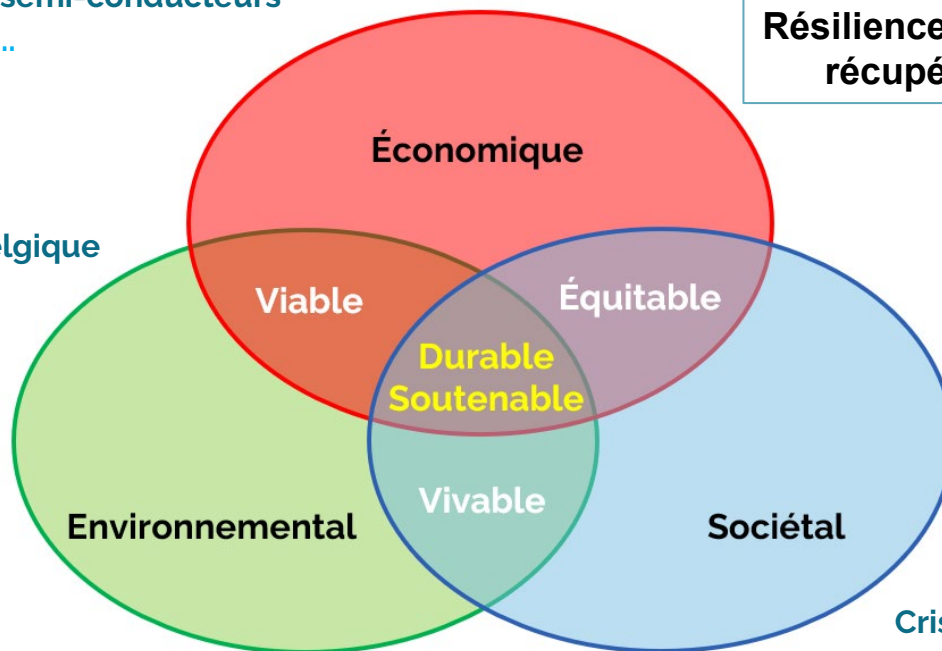
obstruction canal Suez
mars 2021

famine Afrique Est
avril 2022

Droits de douane
2025 **NEW!**

COVID-19
jan. 2020 ▢ ...

Résilience : capacité à supporter ou à récupérer de perturbations (...)



difficultés approvisionnements
matières premières
janvier 2021 ▢ ...

guerre Ukraine
février 2022 ▢ ...

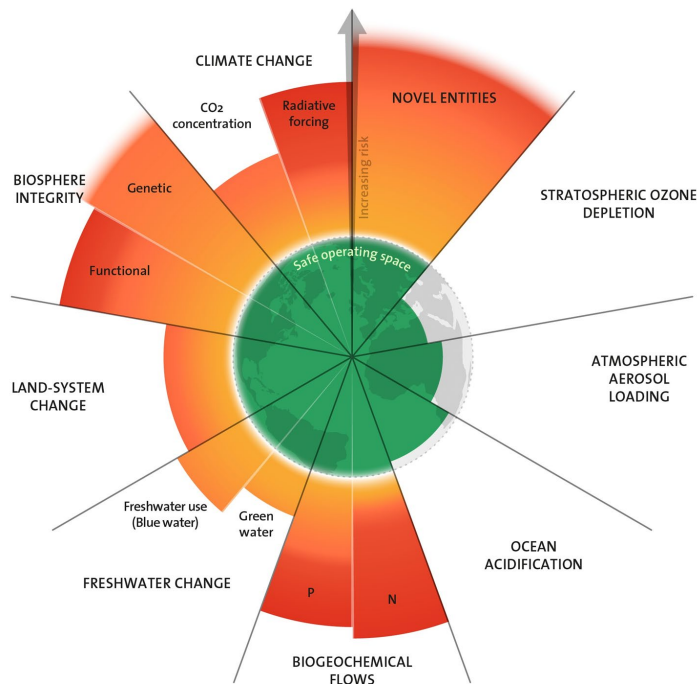
Crise de l'énergie
2021 ▢ 2023 ?

gilets jaunes puis retraites
nov. 2018 ▢ ...

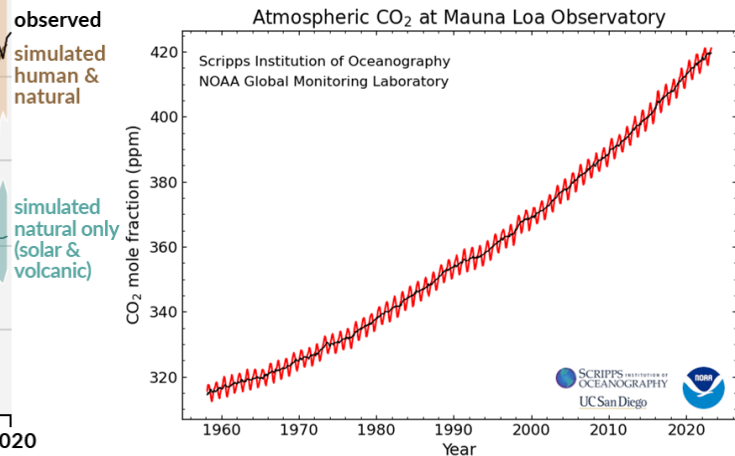
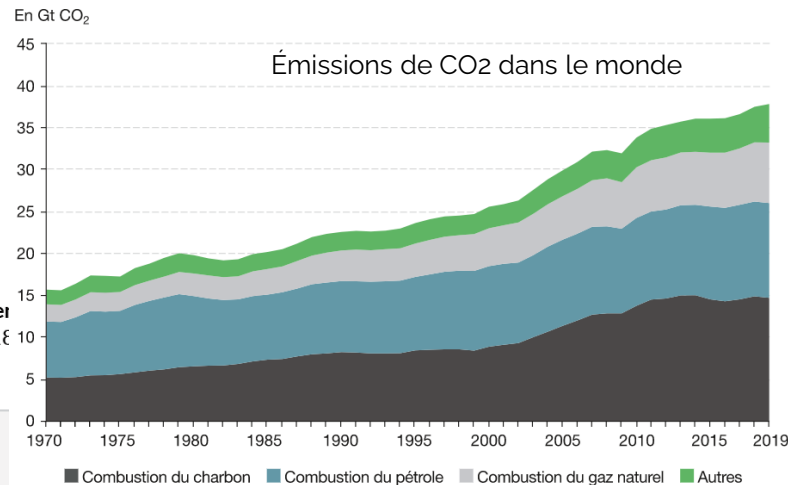
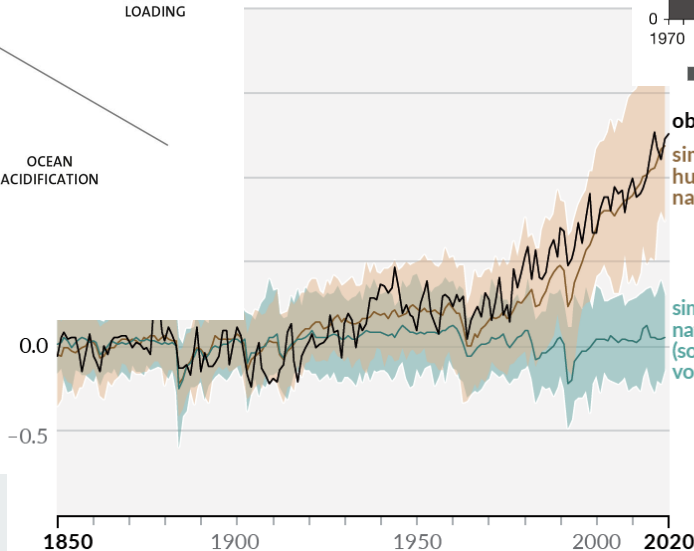
Adapté de [deho2022]



5.0 : Sustainable face aux plus grands périls

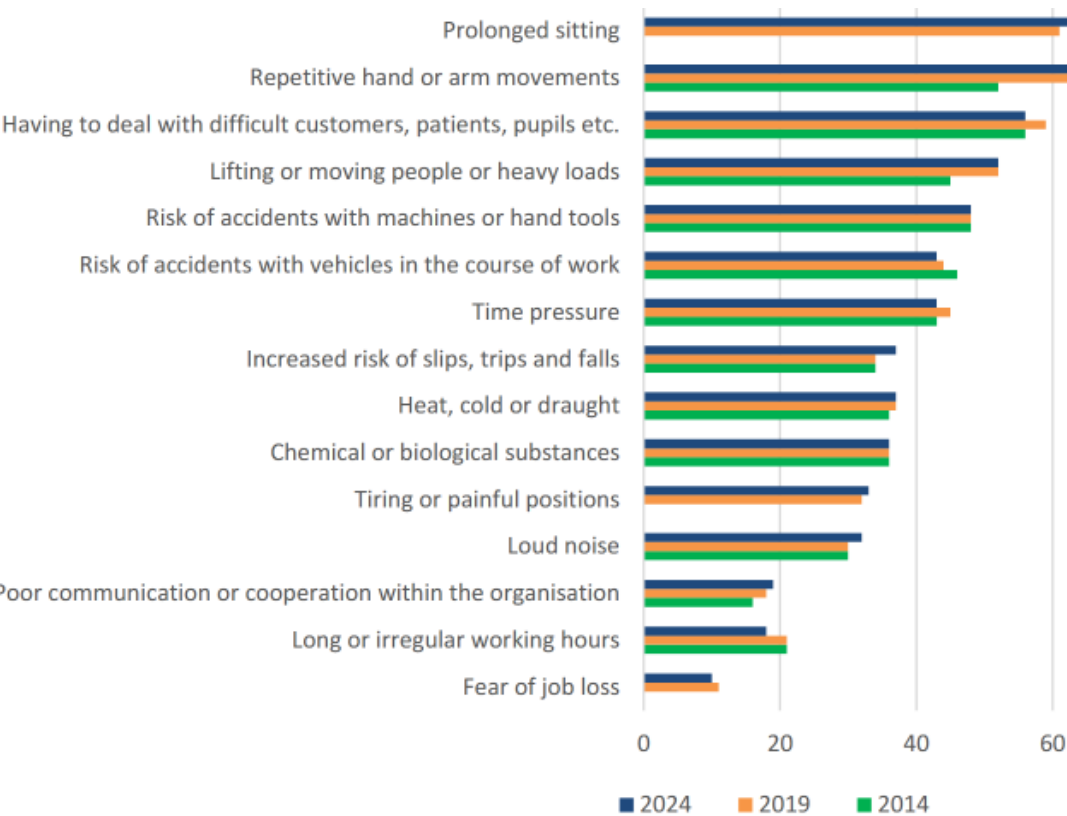


ace temperature (annual average) as obser
 ✂ natural and only natural factors (both 1€



[alla2021, clim, mini, rich2023]

Une évolution sociale nécessaire



Facteurs de risque (45000 entreprises EU)

% des entreprises répondantes qui estiment le risque présent

Vert = 2014
Jaune = 2019

[euro2025]



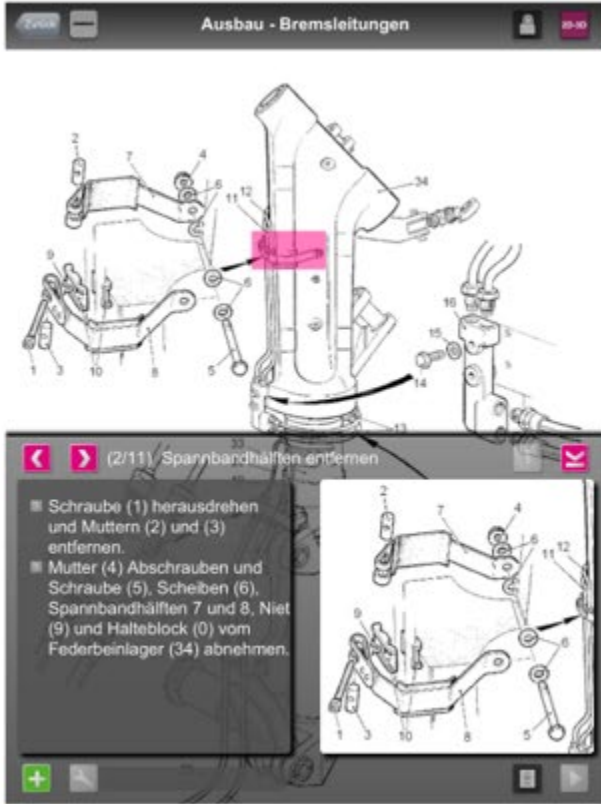
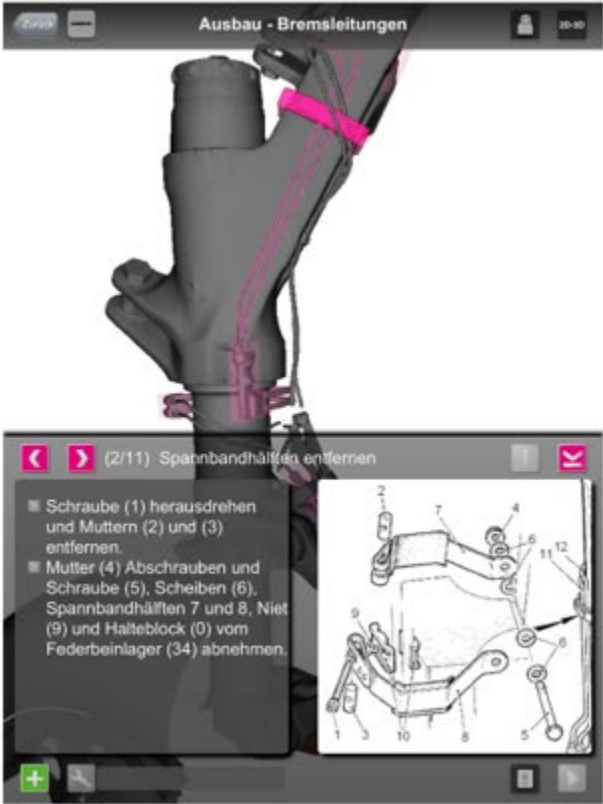
Quelle soutenabilité sociale ? – Une question ouverte

- Ergonomie
- Formation
- EPI
- Politiques RH
- OHSAS
- Conditions de travail
- Équité dans les opportunités
- Environnement de travail
- Rétention des travailleurs et travailleuses
- Absentéisme
- Respect de la vie privée
- Politique salariale
- Support à la communauté locale
- Etc.

Court extrait de [blan2025]



Des pistes en soutenabilité sociale – Ergonomie (réalité augmentée)



[enge2015]

Des pistes en soutenabilité sociale – Ergonomie (exosquelettes)



[ekso]

Inspection robotisée – Les enjeux sociaux

- **Ergonomie**

- Lieux difficiles d'accès
- Postures complexes
- Détection de la fatigue des travailleurs et travailleuses [ross2024]

- **Formation**

- À l'utilisation du robot
- À l'interaction avec le robot [pair2019, schn2023]

- **Conditions de travail**

- Environnements difficiles
- ATEX
- Bruit, poussière

- **Rétention des travailleurs et travailleuses**

- Désirabilité du travail avec des technologies innovantes

#N1 äÄ

- ANYbotics vision for future with robotics
- DSM-Firmenich introduction & mutual goals for collaboration
- ANYbotics' framework for employee centric change management
 - DSM-Firmenich motivation for robotics
 - Challenges anticipated
 - Joint approach to solve the problem
 - Results
 - Partnership based approach to enable success at change management
- ANYmal Research: quick overview

ANYbotics & DSM-Firmenich

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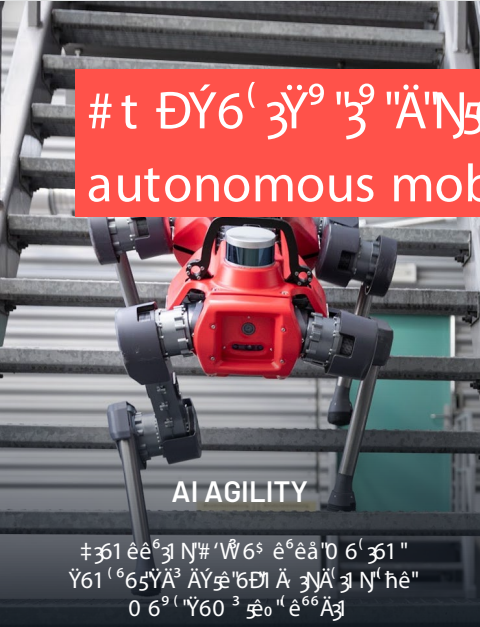


Autonomous industry // Autonomous mobile robots bridge the skill gap required to operate plants without human presence.

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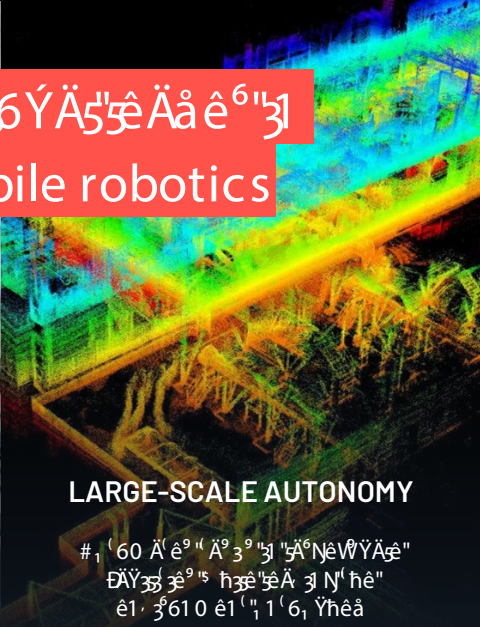
ANYbotics - Creating a workforce of autonomous robots



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AI AGILITY

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LARGE-SCALE AUTONOMY

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SUPERHUMAN INSPECTIONS

Brings AI to the real world to uncover invisible risks beyond human perception & accuracy



Cognite aws Microsoft

INTEGRATED WITH ECOSYSTEM LEADERS

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World-leading robotics technology since 2009

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2015
Patented robotic drive technology



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ANYbotics



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2020
First robot sales to industrial customers



2021
Certified & industrial-grade inspection solution



2022
World's first legged robot for Oil & Gas and Chemicals



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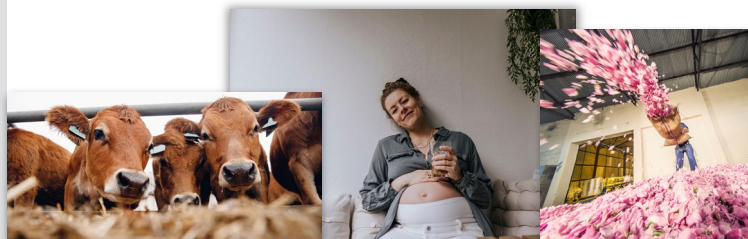
dsm-firmenich ●●●

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- 30,000 employees globally
- 150 + years of innovation heritage
- € 12 + Billion revenue
- 88 Manufacturing sites, 78 applications for labs, 40 creation centers, 70 premix sites

SISSELN
SITE
OVERVIEW

- Production of Vitamins A, E, K1, B9
- Intermediates for perfume production, food and animal nutrition
- Pharmaceutical active ingredients
- 11- 15 audits/ year



Sisseln, Switzerland



ANYBOTICS & DSM-FIRMENICH //

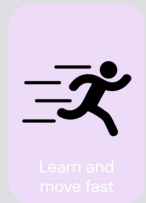
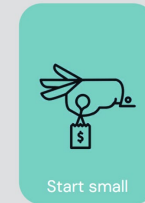
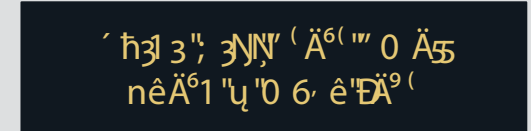
ANYbotics is DSM-Firmenich's preferred partner for ground robotics. Mutual aim for the collaboration: Think **BIG** Start small, Learn & move fast.



Year **3**

dsm-firmenich 

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DSM-Firmenich's motivation for robotics



Today's industrial operations

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WORKFORCE SHORTAGE

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³ 69 } 3619", 1' 35 } 2[2"3" hê"F" "Ä61 ê



LIMITED PRODUCTIVITY

Undetected issues lead to downtime
costs of \$270 billion each year



SAFETY REQUIREMENTS

Human error is the leading
cause of industrial accidents

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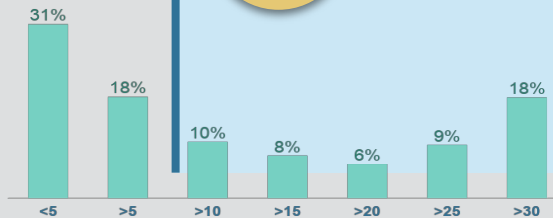


WORKFORCE SHORTAGE

1.5 million unfilled plant operator
positions until 2030 in the EU alone

dsm-firmenich

>50%



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~ 25%
retirement
of all employees on
Site
in the next 5-7 years

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dsm-firmenich ●●●



Time consuming & high impact



High degree of automation possible

Routine inspections



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If no occurrence,
no added value



Quality depends highly on
experience



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ê5² ê5⁵ hê⁶ê

DULL

Repetitive, predictable,
& require little critical
thinking, often leading to
boredom and fatigue



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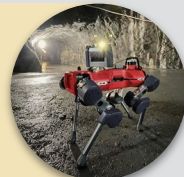
DANGEROUS

Hazardous environments
or other risks that can
lead to injury or death



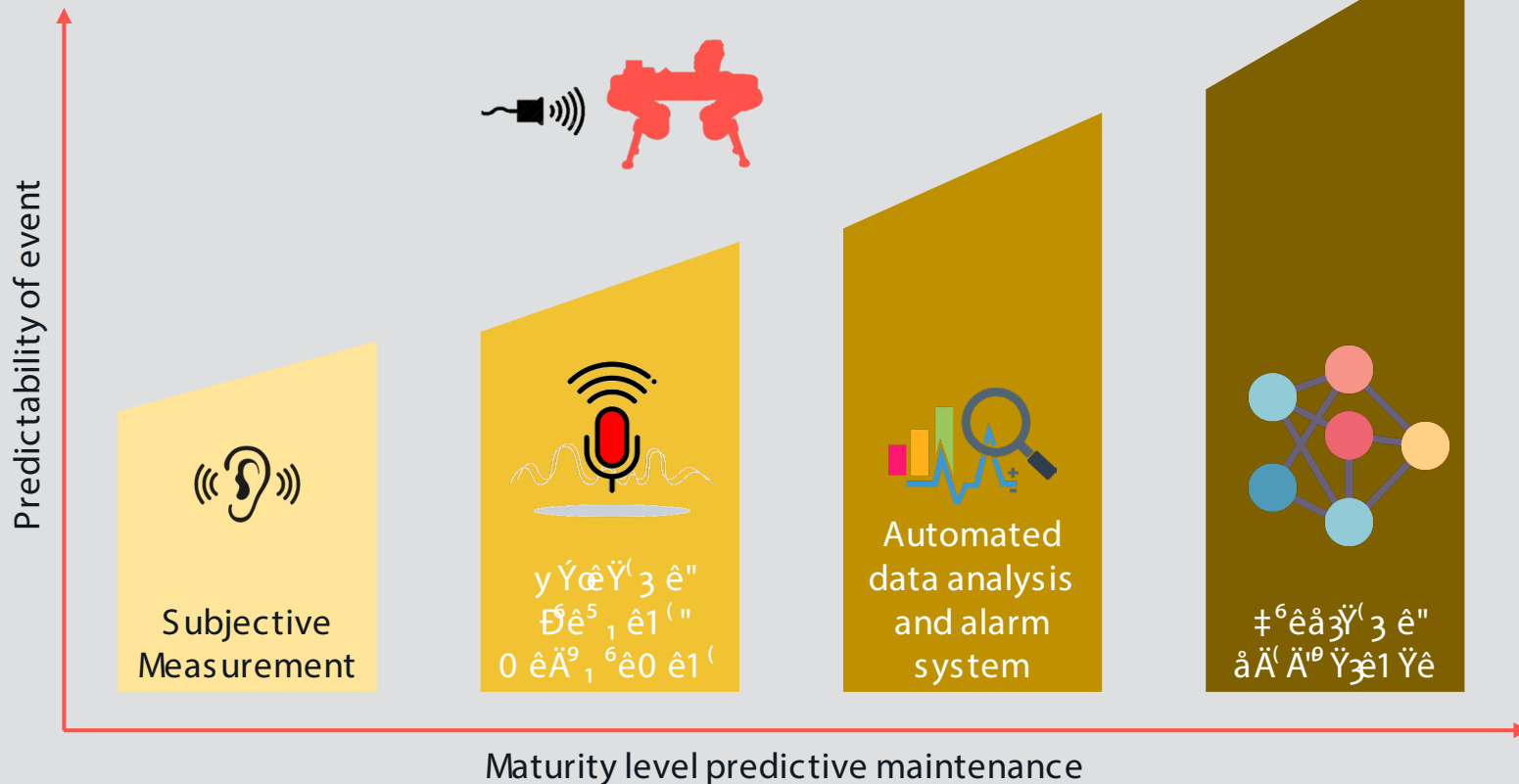
DISTANT

Difficult to reach due to
height, distance, or
accessibility limitations.



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dsm-firmenich ●●●



DSM-Firmenich Robotics Change management journey with ANYbotics

Challenges anticipated



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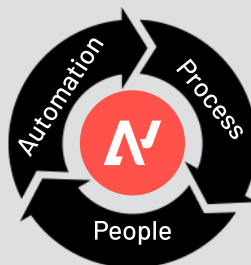
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Customer's success with robotics

DSM-Firmenich Robotics Change management journey with ANYbotics

Approach to solve the problem with joint
collaboration



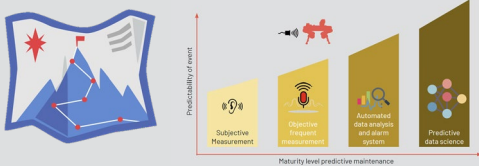
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Usually, with high focus on
target, people aspect is
overlooked!

Pitfall



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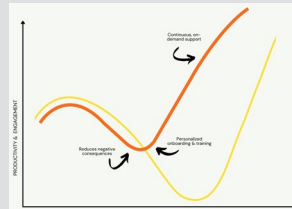


dsm-firmenich

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F0³ 51 êêYê1¹ 63Y¹
YhÄ1 Nê¹
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Build & deploy
the team early



daily
operations



robot
operator

ANYbotics' framework for customer centric change management: Employee at the center supported by ANYbotics team

ANYbotics' customer centric change management framework

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Site visit & evaluation



Joint KPI setting, business case & ROI



Create the 'Why robotics?' & 'What's the target?'



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ANYmal integrated and accepted by people as co-worker



Consistent mission success & data delivery



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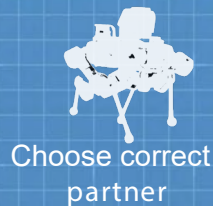
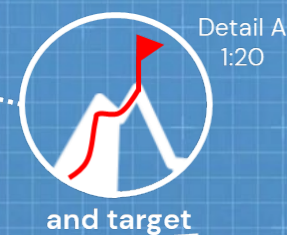
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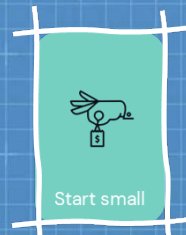
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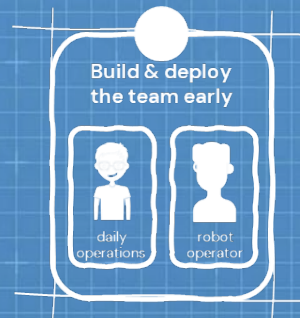
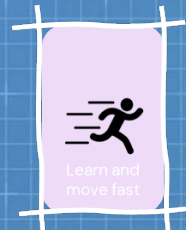
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ANYbotics



ANYbotics



ANYbotics



ANYbotics

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Preparation phase:

- Clearly identify **why** are you introducing robots
- Clearly define the **targets to achieve** with the robots
- Prepare to **own the narrative** and story (Ex: Robot is a co-worker and there to help you)
- Choose **internal champion** with consideration for experience & reputation in the plant/company

Communication phase:

- Clearly communicate **why** are you introducing robots
- Clearly communicate the **targets to achieve** with the robots
- Narrate the story company wide and own the story to restate to hammer down the key messaging (why and target)



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Inspire early adopters and choose right plants & plant managers

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ACCESSIBLE //

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Inspect, ask, try out

The day after arrival, visit employees of the pilot plants and invite to take a look, try it out and ask questions.

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End to end support by ANYbotics Field engineers and customer success manager throughout the process



Involve people from all parts of the company early on. Example: Robot naming competition



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ER / SIE ist da und hat noch keinen Namen...

Unser ANYmal ist der 100. Roboter von ANYbotics AG weshalb er / sie im goldenen «Cocktailkleid» angeliefert wurde.

In seiner roten Arbeitsmontur wird er / sie in den nächsten Tagen zum Kennenlernen im Werk unterwegs sein.

Mach mit und schlage einen Namen für sie / ihn vor.

Interne Publikation 2-11-2023/fea dsm-firmenich

Wie soll unser Roboter heißen?

Danke für 240 Rückmeldungen
Wählt aus den Top10 euren Favoriten
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Interne Publikation 17-11-2023/fea dsm-firmenich



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Intimate collaboration between ANYbotics & DSM enables fast adoption and business value generation



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DSM-Firmenich Robotics Change management journey with ANYbotics

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Successful integration & acceptance of robot as co-worker

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Efficient collaboration & innovation between DSM & ANYbotics

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Empowering operations & future strategies

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DSM-Firmenich Robotics Change management journey with ANYbotics

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Partnership based approach and proactive employee centric change management sets us for success with robotics value creation

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ANYBOTICS CHANGE MANAGEMENT FRAMEWORK //

ANYbotics' framework for customer centric change management: Employee at the center supported by ANYbotics team

ANYbotics' customer centric change management framework

Preparation

KPI/target setting, champion selection process, Business case, building ROI models, Internal messaging

- ✓ Site visit & evaluation
- ✓ Joint KPI setting, business case & ROI
- ✓ Create the 'Why robotics?' & 'What's the target?'



Onboarding

Preparation, Training & Commissioning, Coaching, site evaluation, choosing relevant points of interest

- ✓ Champion training: ANYbotics academy & coaching (online or in person)
- ✓ Deliver first time value with support from ANYbotics
- ✓ Customer is confident with ANYmal



Create Value

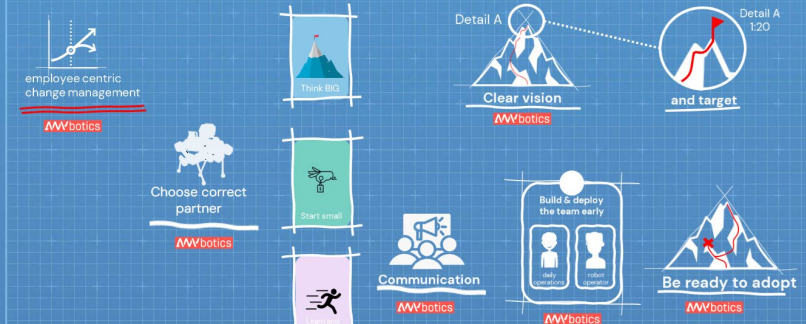
Proved long-term operational impact

- ✓ ANYmal integrated and accepted by people as co-worker
- ✓ Consistent mission success & data delivery
- ✓ Proven value with tangible benefits



BLUEPRINT //

Our blueprint to success for employee centric change management



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ANYbotics provides framework





ANYmal Research

A leading solution for cutting-edge research





Research institutions base their work on ANYmal to develop cutting-edge algorithms and novel applications



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Perspectives et questions de recherche

- **Ergonomie**

- Interaction avec le robot : que « comprend »-il, que comprends-je ?
- Quel usage du langage naturel dans l'interaction ?
- Comment partager l'espace de travail ?
- Quel usage de la vision du robot pour l'inspection ?
- Quels capteurs pour quel job ?
- Comment favoriser l'interaction productive avec le robot ?
- Comment assurer la sécurité des interactions ?

- **Formation**

- Quelle formation pour quel travailleur, quelle travailleuse ?
- Quelle approche de l'anthropomorphisation et la posthumanisation ?

- **Rétention des travailleurs et travailleuses**

- Quelle menace perçue ou réelle pour l'emploi ?
- Quelle éthique, quelle attitude face à la vie privée ?

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