



Sicheres und gesundes Arbeiten mit KI-basierten Systemen und fortschrittlicher Robotik

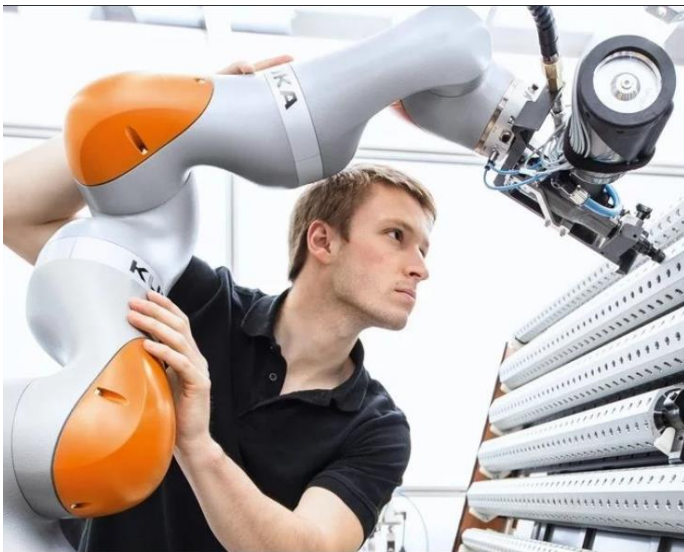
E. Heinold, P.H. Rosen, S. Wischniewski



Einleitung

Automation can be defined as “a device or system that accomplishes (partially or fully) a function that was previously, or conceivably could be, carried out (partially or fully) by a human” (Parasuraman et al., 2000).

Fortschrittliche Robotik



Smart ICT

DEMO

Text-to-Speech in Aktion

Geben Sie Ihren Text ein, wählen Sie eine Sprache aus und klicken Sie auf „Speak It“, um ihn anzuhören.

Text to speak:
New innovations in robotic automation and artificial intelligence is soon to have a disruptive impact in knowledge intensive industries, like banking & finance. In the near future we will witness a large adoption of robots in the workplace.

text [ssm1](#)

Language / locale: English (United States) | Voice type: WaveNet | Voice name: en-US-Wavenet-D

Audio device profile: Default | Speed: 1.00 | Pitch: -4.40

Show JSON [v](#)

[Speaker icon](#)

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Fortschrittliche Robotik

- Cobots
- Industrieroboter
- Serviceroboter
- Transportroboter
- Bildungsroboter
- Bauroboter
- ...



Smart ICT

- Künstliche Intelligenz
- Machine Learning
- Cloud Computing
- Augmented Reality
- Deep Learning
- ...



Einleitung

- Digitalisierung ist eine treibende Kraft bei der kontinuierlichen Veränderung von Arbeitsplätzen und Arbeitsaufgaben
- Zwei maßgebende Technologien dabei sind:

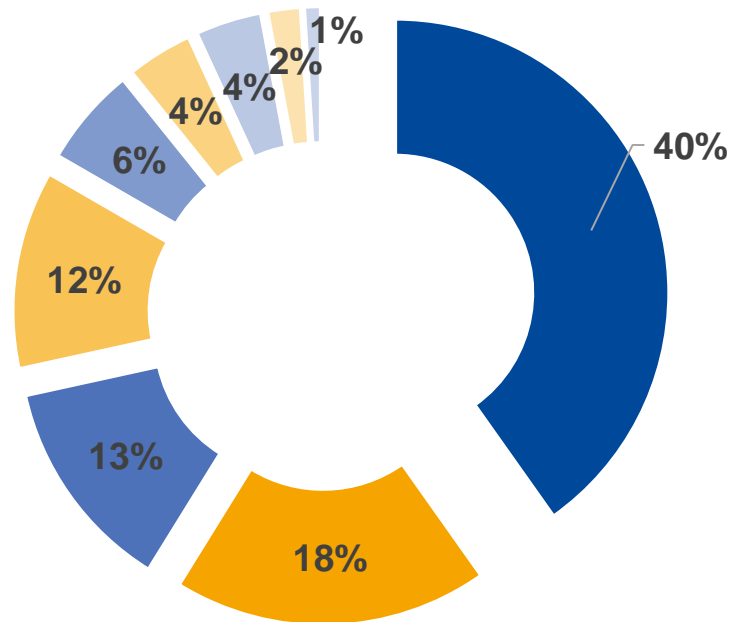
Künstliche Intelligenzen (KI)

Fortschrittliche Robotik

- KI und fortschrittliche Robotik eröffnen neue Möglichkeiten für die Aufgabenautomatisierung
- Es ist von entscheidender Bedeutung, auf neu auftretende *Risiken* zu reagieren und Auswirkungen im Zusammenhang mit Sicherheit und Gesundheitsschutz am Arbeitsplatz (OSH) frühzeitig *aufzuzeigen*
- Dazu gehören: arbeitsbedingte physische, psychosoziale und organisatorische Aspekte der Sicherheit und Gesundheit der Arbeitnehmer

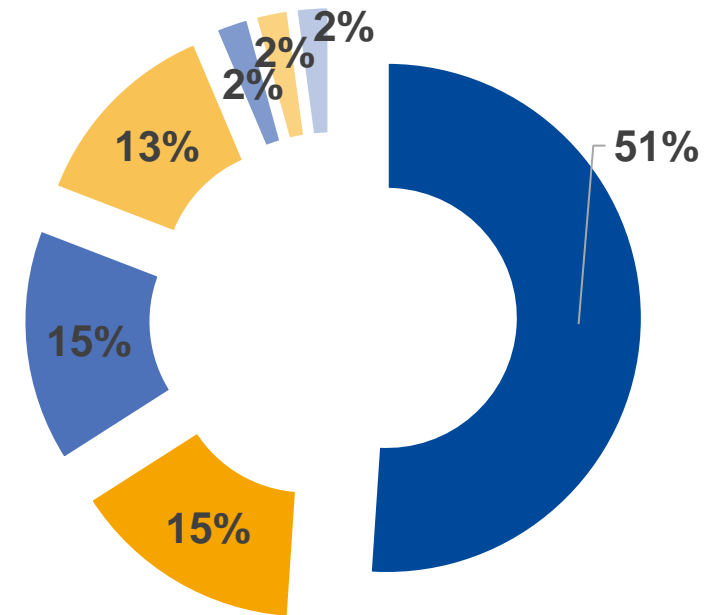
Abbildung aktueller und potenzieller Nutzung

Kognitive Aufgaben



- Human Health and Social Work Activities
- Education
- Professional, Scientific and Technical Activities
- Other
- Administrative and Support Service Activities
- Information and Communication
- Other Service Activities
- Construction
- Manufacturing

Physische Aufgaben



- Human Health and Social Work Activities
- Manufacturing
- Other
- Transportation and Storage
- Construction
- Mining and Quarrying

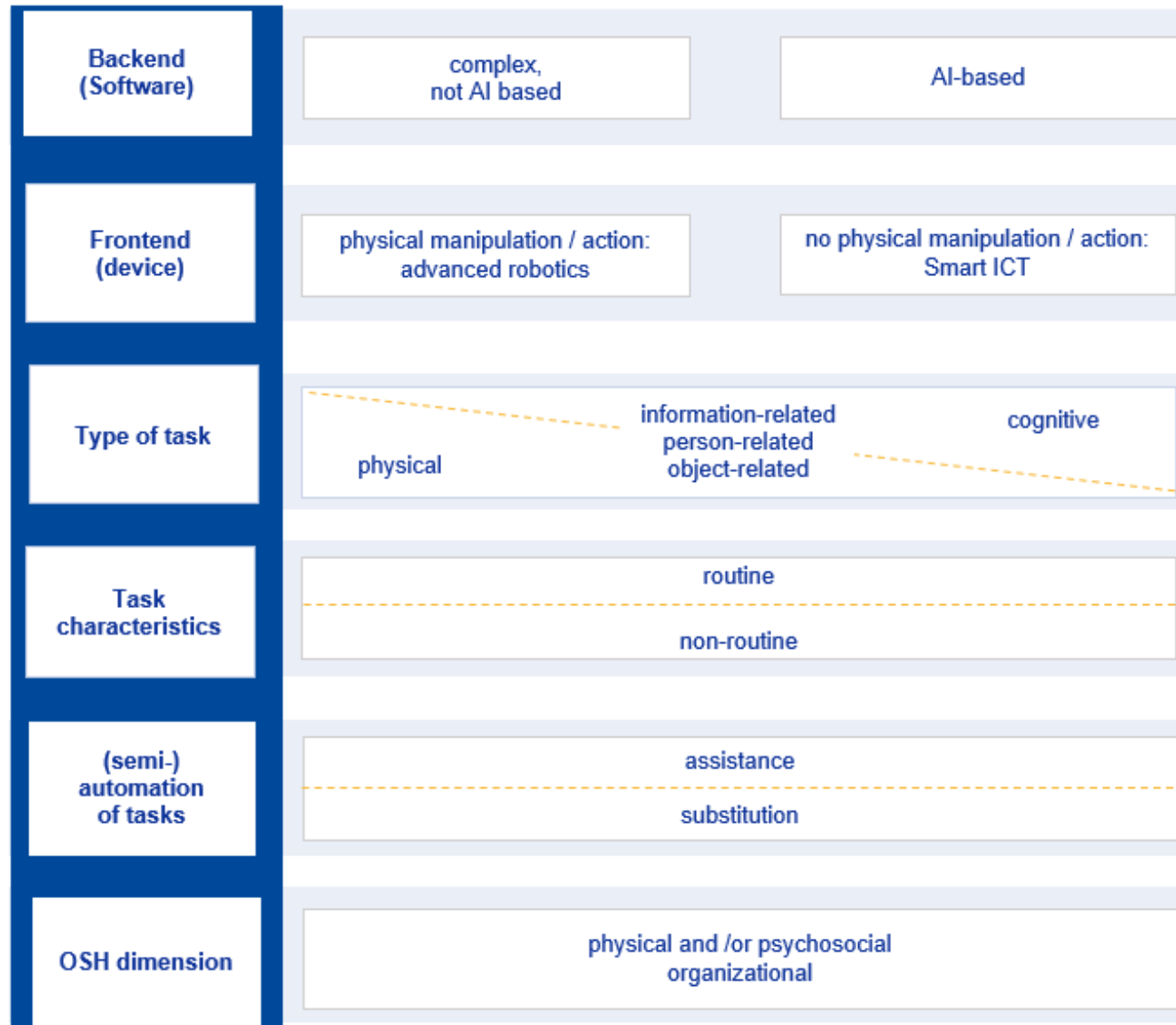
Einleitung

- **EU-OSHA startete ein 4-jähriges Forschungsprogramm " *OSH overview on digitalisation* "**
- **Die Ziele sind:**
 - Entwicklung und Verbreitung von Informationen über Herausforderungen und Chancen für den Arbeitsschutz im Zusammenhang mit der Digitalisierung
- **Hauptthemen sind:**
 - Die Auswirkungen fortschrittlicher Robotik und KI-basierter Systeme zur Automatisierung von Aufgaben auf den Arbeitsschutz
 - Die Auswirkungen neuer Formen des Arbeitnehmermanagements durch KI-basierte Systeme auf den Arbeitsschutz
 - Arbeitsschutz in der digitalen Plattformarbeit OSH in digital platform work
 - Die Möglichkeiten für den Arbeitsschutz neuer Systeme zur Überwachung der Sicherheit und Gesundheit der Arbeitnehmer

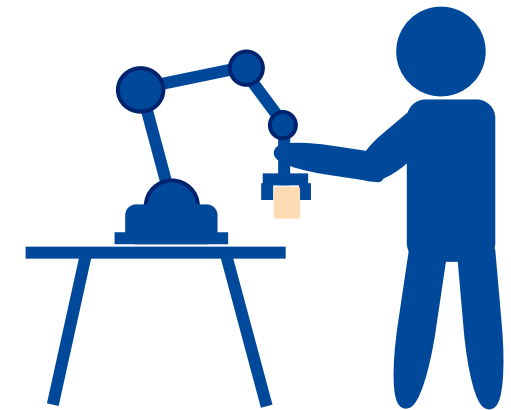
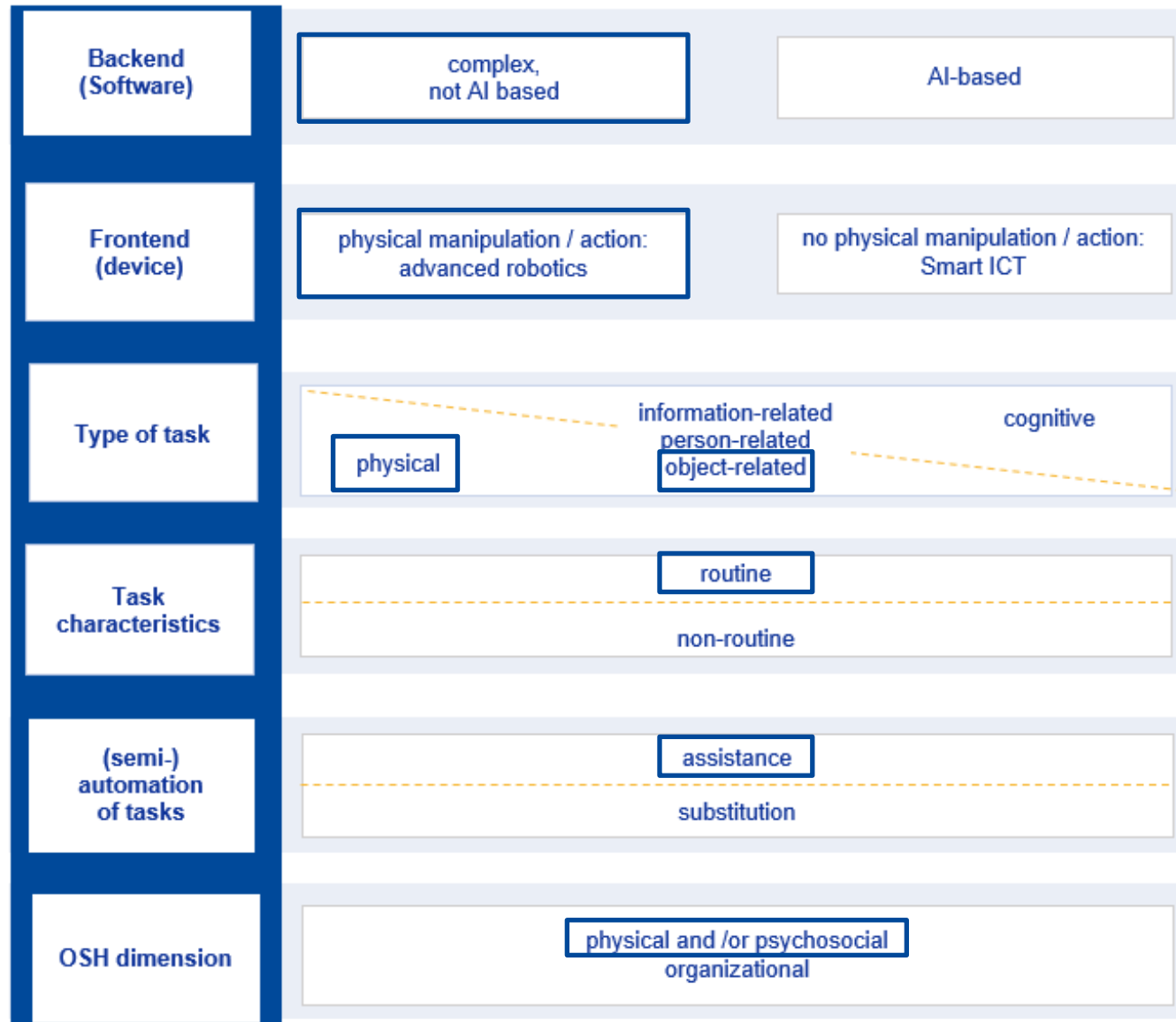
Inhalt

- **Einleitung**
- **Taxonomie**
- **Datenerhebung & Methode**
- **Chancen und Risiken für den Arbeitsschutz**
 - **Aus Theorie**
 - **Und Praxis**
- **Risiken minimieren, Chancen maximieren**
- **Ausblick**

Taxonomie



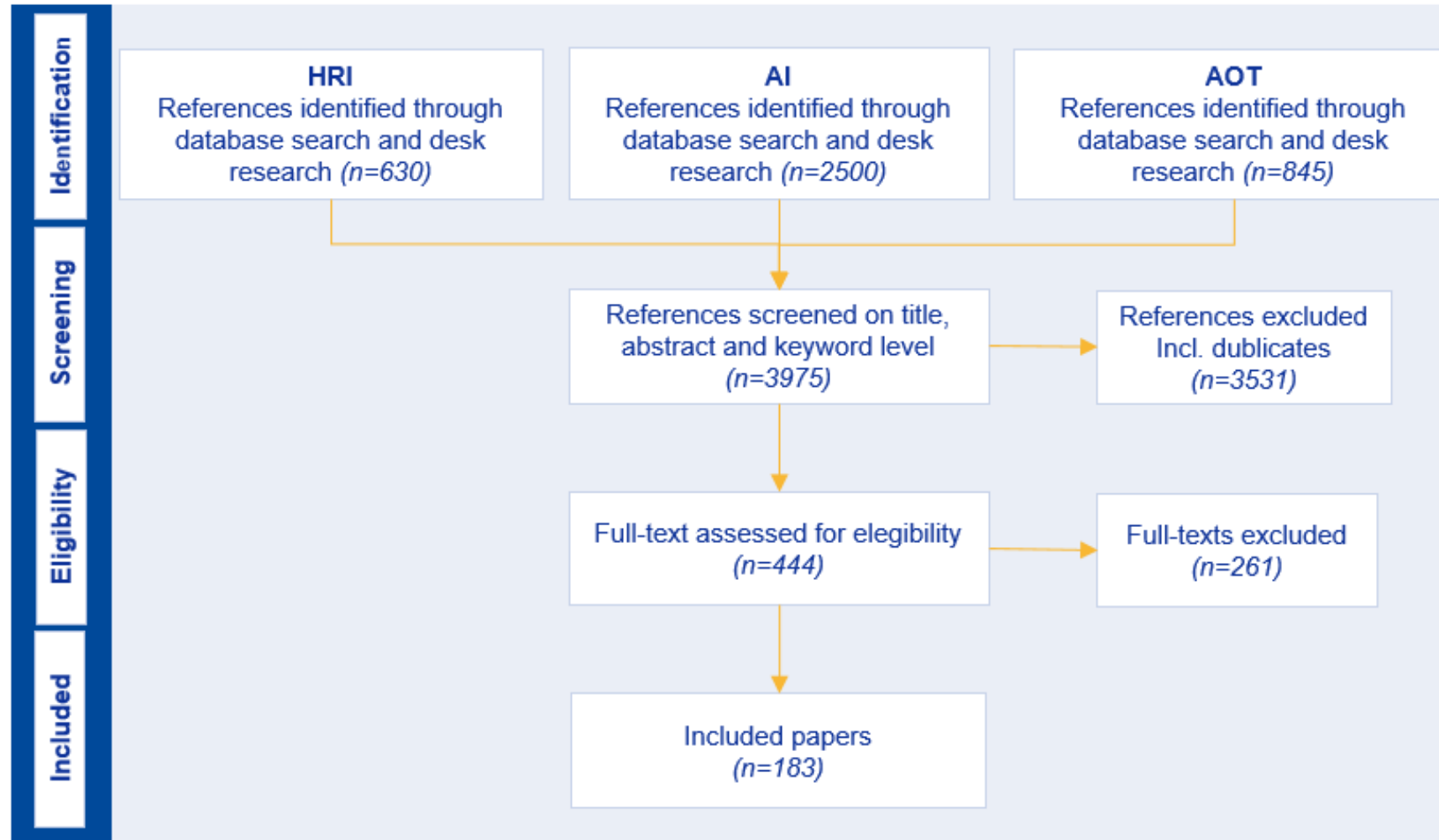
Taxonomie



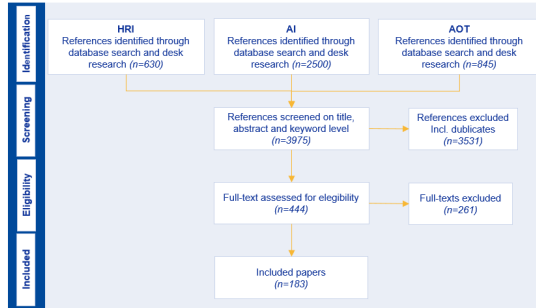
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Datenerhebung & Methode: Literaturrecherche



Datenerhebung & Methode: Experteninterviews



INTERVIEW GUIDE

OVERVIEW OF POLICIES, RESEARCH AND PRACTICES IN RELATION TO ADVANCED ROBOTICS AND AI-BASED SYSTEMS FOR AUTOMATION OF TASKS AND OCCUPATIONAL SAFETY AND HEALTH (OSH)

Introduction to the study

This interview is part of the project "Overview of Policies, Research and Practices in Relation to Advanced Robotics and AI-based Systems for Automation of Tasks and OSH". The project is one out of four main projects from the 4-year research programme "OSH overview on digitalisation" conducted by the European Agency for Safety and Health at Work (EU-OSHA). This project is conducted by the German Federal Institute for Occupational Safety and Health (BauA), Milieu Law & Policy Consulting and the University of Leicester on behalf of EU-OSHA.

The goal is to assess the current landscape in Europe regarding the (semi/full) automation of cognitive and/or physical tasks with AI-based systems (like advanced robots able to directly interact with humans or smart information and communication technology) and the impact on occupational safety and health (OSH). We try to address the research questions of how AI-based systems can be defined and categorised, in which sectors we can find current and potential use cases and what policies, strategies, initiatives and programmes regarding AI-based systems and related to OSH can be found on a national and international level.

To analyse national policies, strategies, initiatives and programmes especially related to intelligent robots and OSH, we use the several quantitative and qualitative data collection methods:

- Literature review, including scientific and grey literature,
- development, submission and analysis of a questionnaire addressed to the national focal points in a survey form and
- semi-structured interviews of technology experts, social partners, labour inspectors and representatives from standardisation bodies.

Information collected via desk research and online surveys will be complemented via semi-structured interviews to address gaps in the collected data and to gain deeper insights through expert knowledge. In addition, interviews will allow following-up with stakeholders on certain issues, which are too specific and/or detailed to be addressed via surveys.

The focus of this interview lies on the (semi/full) automation of tasks, physical and/or cognitive, through AI-based systems such as

- advanced robotics (incl. collaborative robots) or
- smart information and communication technology (ICT) (e. g. decision support systems).

As defined by the European Commission artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely

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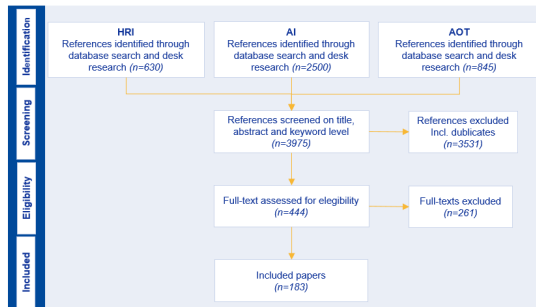
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Datenerhebung & Methode: Focal Point Befragung



AI-OSH-FOP-Survey

Fields marked with * are mandatory.

EU-OSHA consultation on the automation of tasks through AI-based systems and OSH implications

Dear participant,
thank you for taking part in this survey!

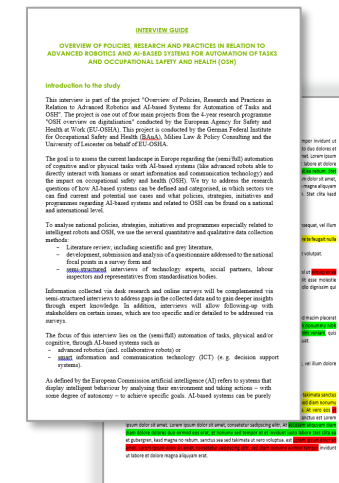
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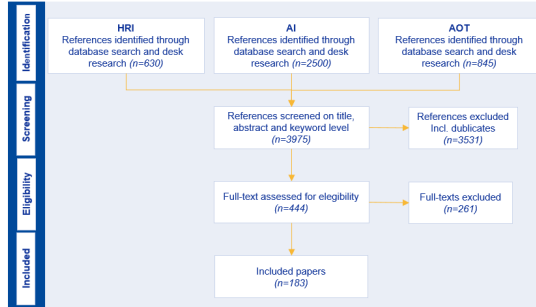
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As defined by the European Commission artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. **AI-based systems** can be purely software-based, acting in the virtual world (e.g. decision support systems, voice assistants, image analysis software, speech and face recognition systems) or be embedded in hardware devices (e.g. advanced robots like collaborative robots (cobots), autonomous vehicles or drones). Hence, AI-based systems can be **embodied** or **non-embodied**. Within this survey embodied AI will subsequently be referred to as **advanced robotics** (incl. cobots), while non-embodied AI will be referred to as **smart ICT** (e.g. decision support systems).

The survey is part of the project work and aims at expert knowledge within the national focal points. Results will be merged and published by EU-OSHA.



Datenerhebung & Methode: Anwendungsfälle



AI-OSH-FOP-Survey

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VEHICULAR AUTOMATION START-UP **6**

OSH IMPACT	
CHALLENGES	OPPORTUNITIES
<ul style="list-style-type: none"> INCREASED COGNITIVE DEMAND 	<ul style="list-style-type: none"> MINIMAL EXPOSURE TO PHYSICAL RISKS LIKE... <ul style="list-style-type: none"> VIBRATION HEAT LOUD NOISE!

GOVERNMENT RESEARCH FACILITY **8**

OSH IMPACT	
CHALLENGES	OPPORTUNITIES
<ul style="list-style-type: none"> LOSS OF EXPERTISE! 	<ul style="list-style-type: none"> MORE TIME FOR ACTUAL RESEARCH! HIGH JOB SATISFACTION!

GAS INFRASTRUCTURE OPERATOR **10**

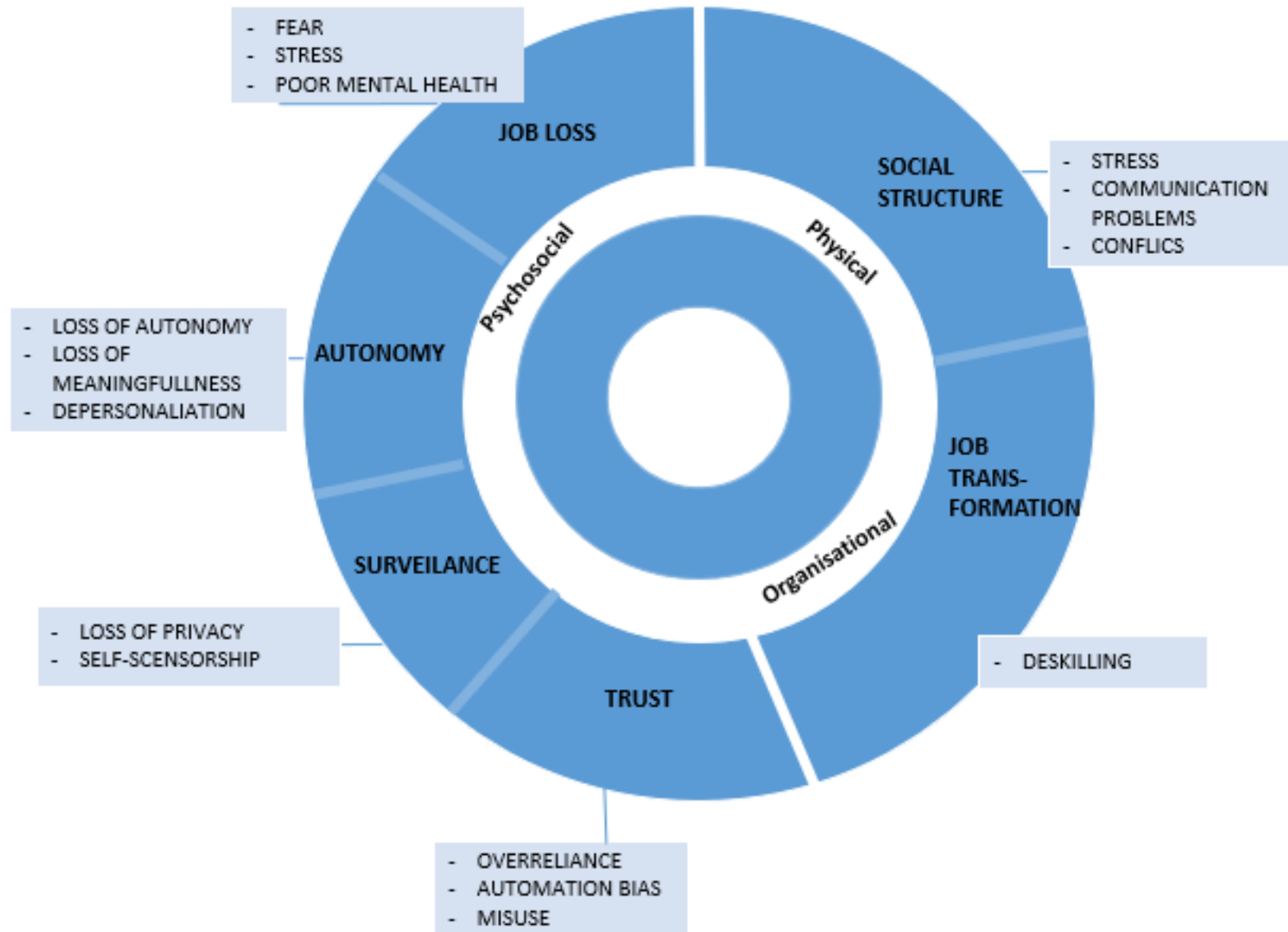
OSH IMPACT	
CHALLENGES	OPPORTUNITIES
<ul style="list-style-type: none"> FEAR OF JOB LOSS! 	<ul style="list-style-type: none"> LESS EXPOSURE TO RISKS! MORE LESS COGNITIVE LOAD!

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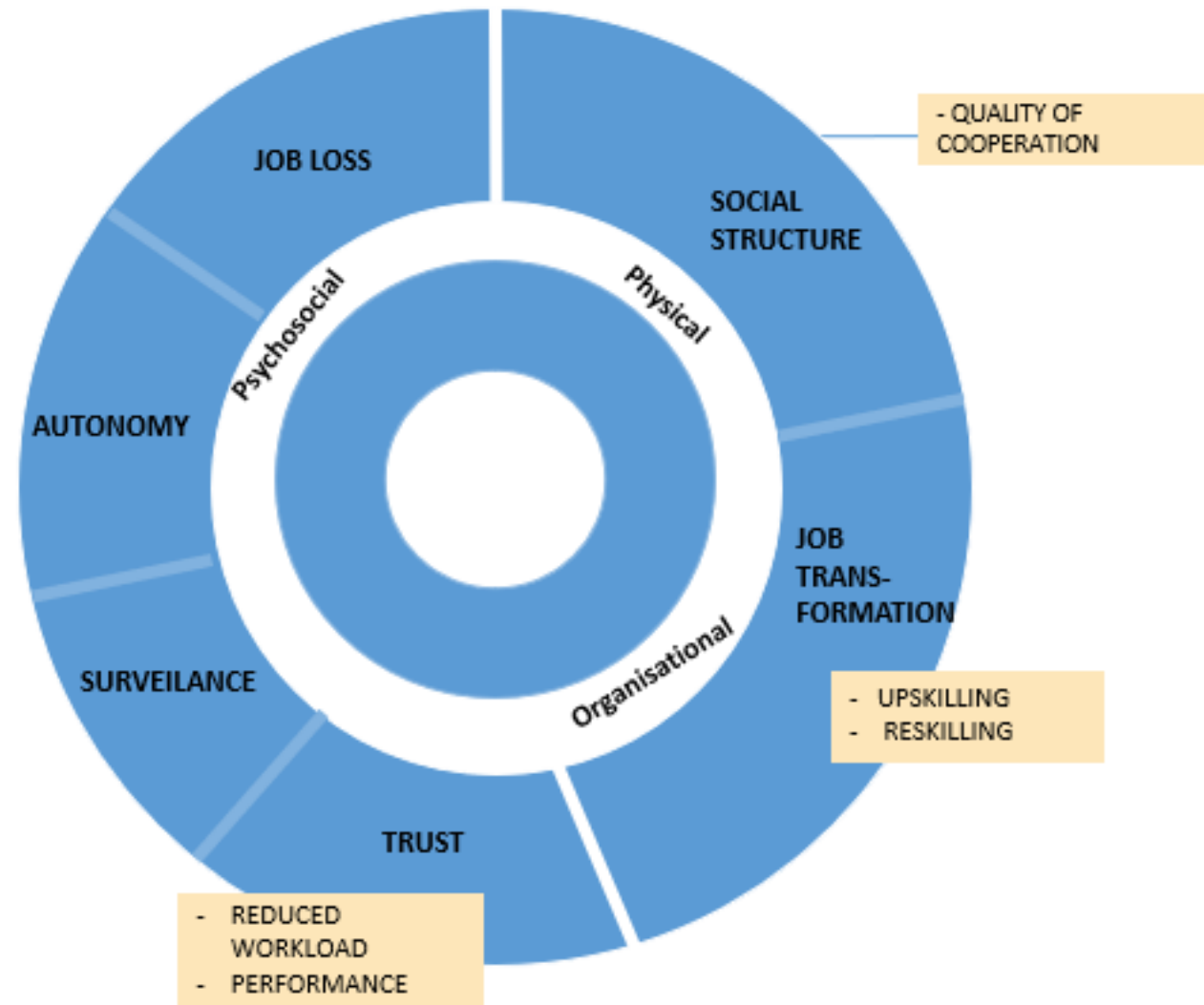
Arbeitsschutzrisiken und -chancen KI-basierter Systeme

THEORIE



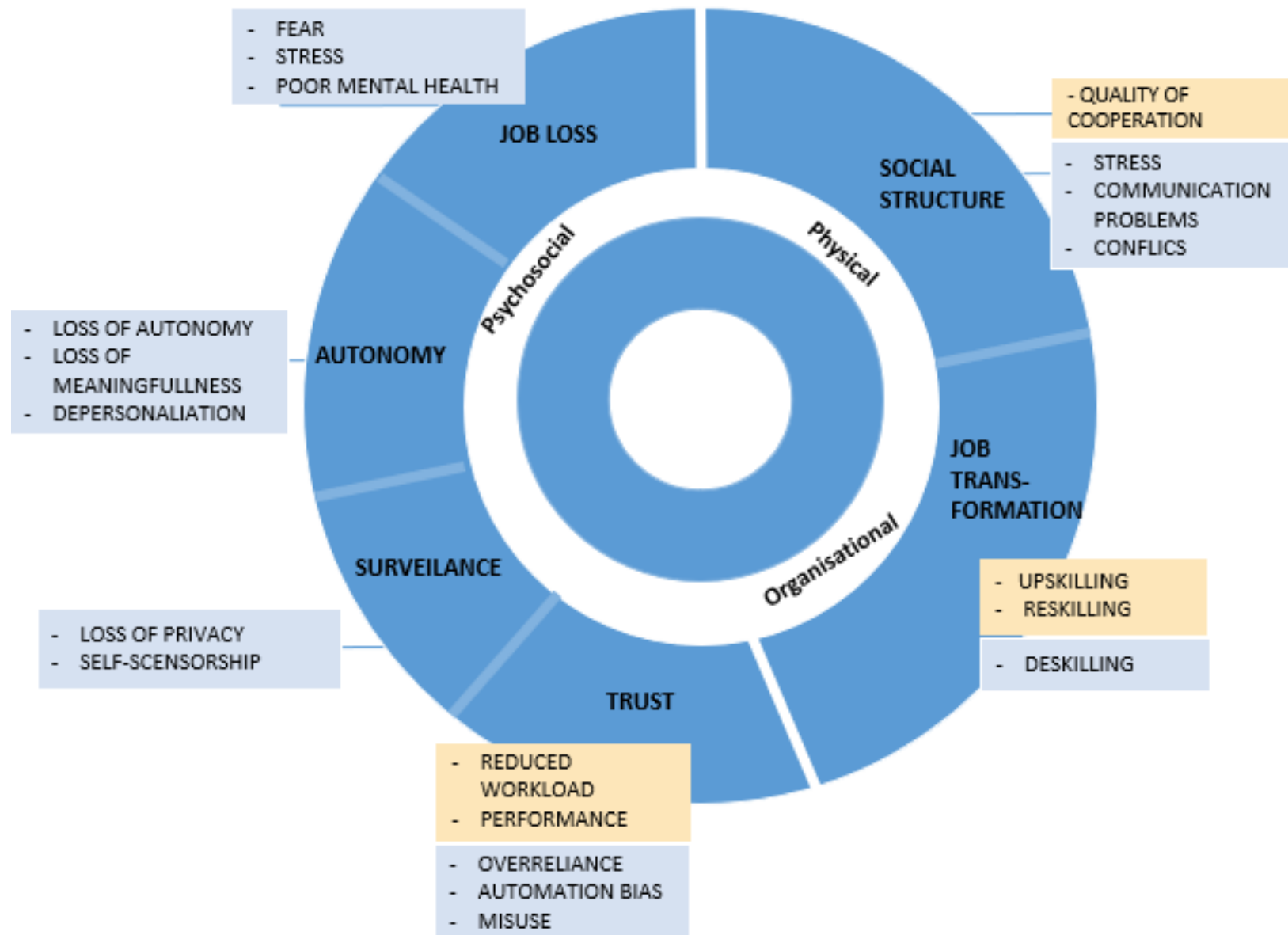
Arbeitsschutzrisiken und -chancen KI-basierter Systeme

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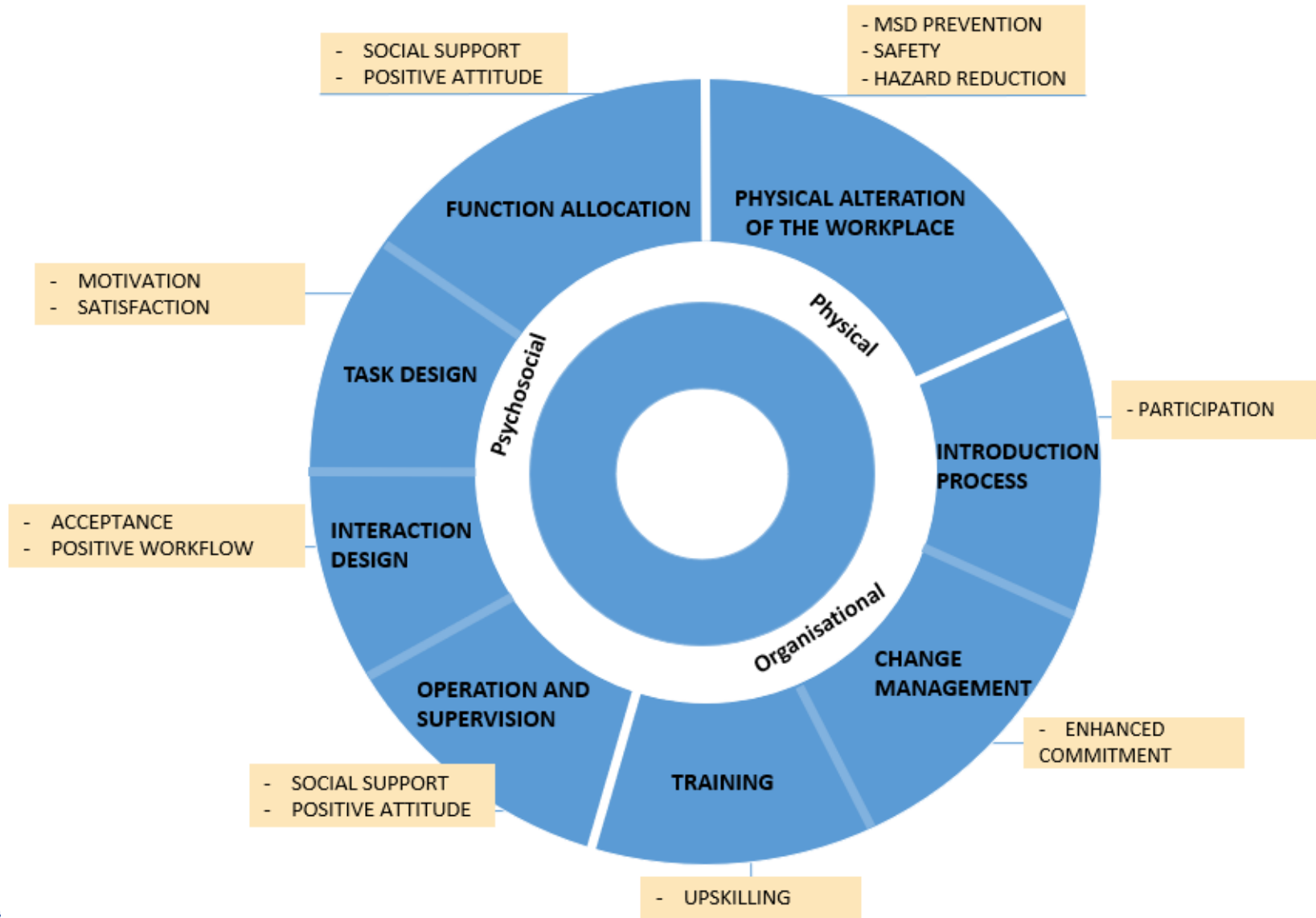
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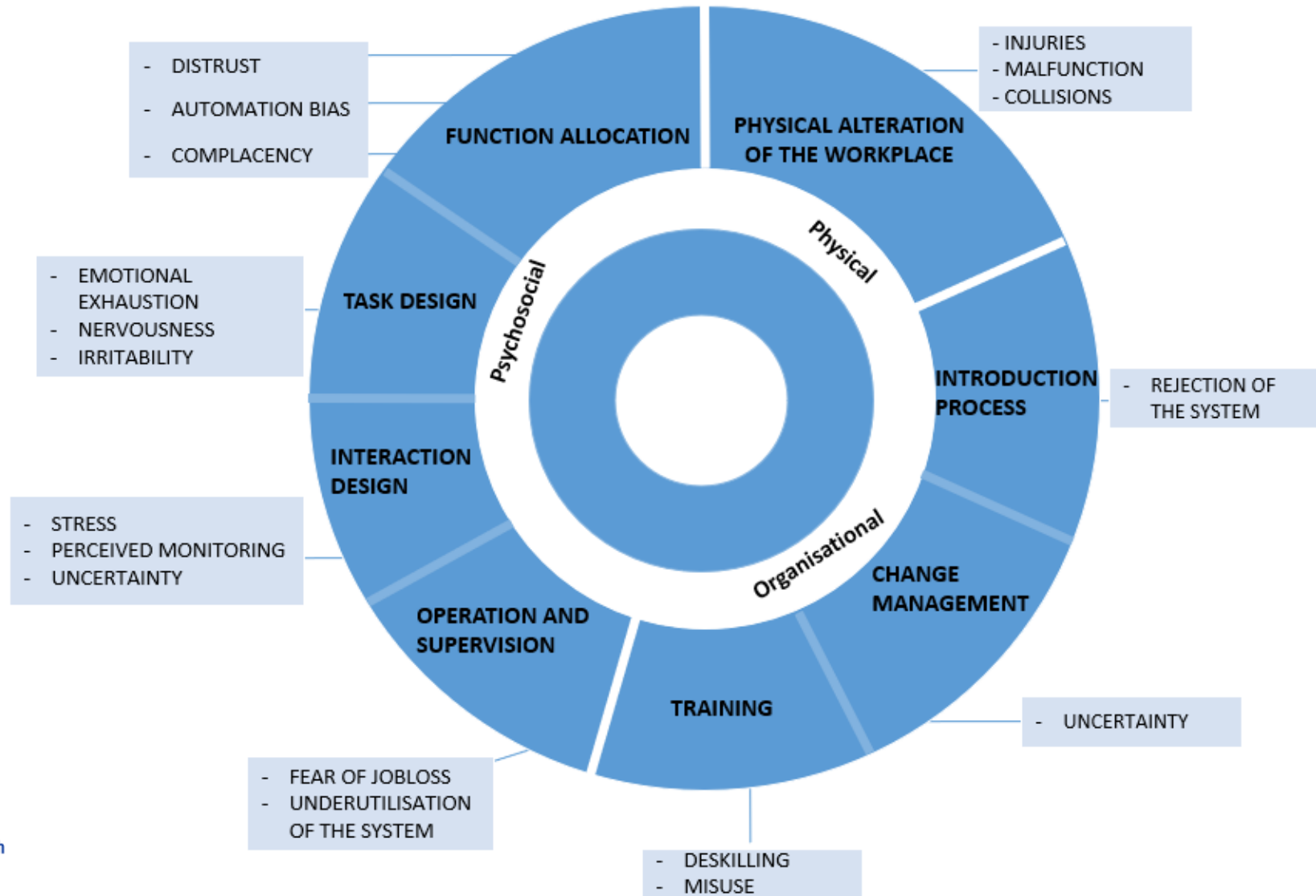
Arbeitsschutzchancen fortschrittlicher Robotik

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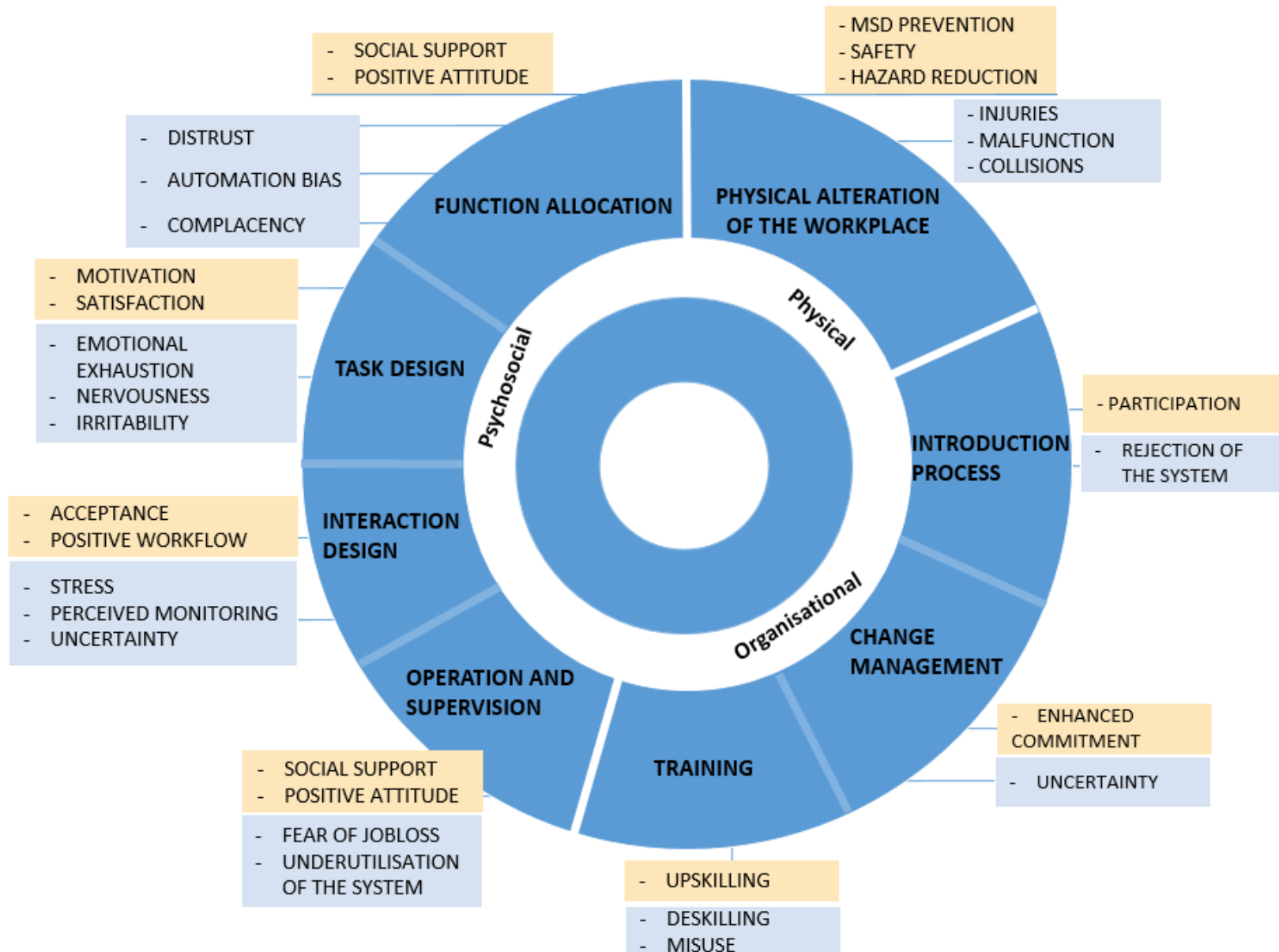
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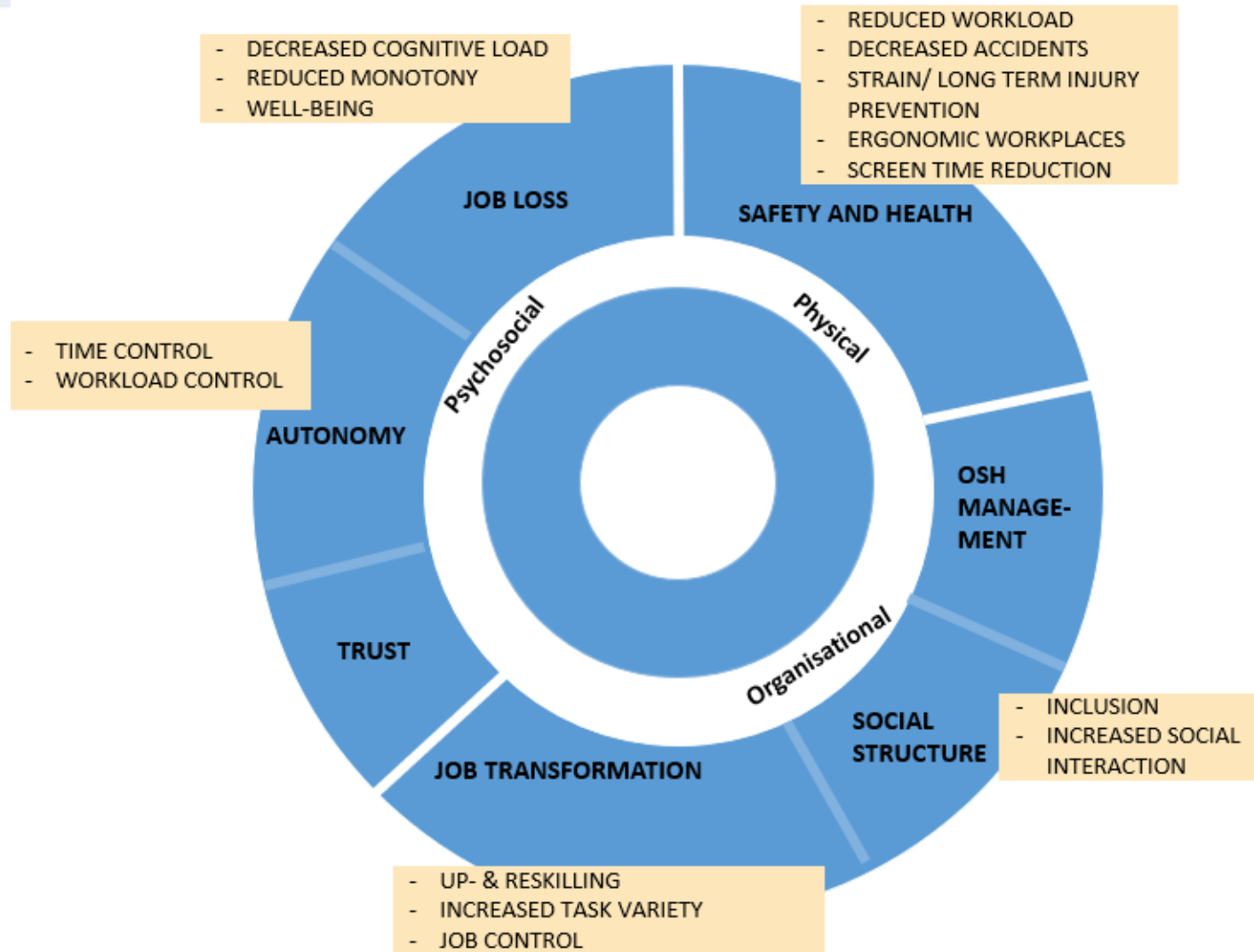
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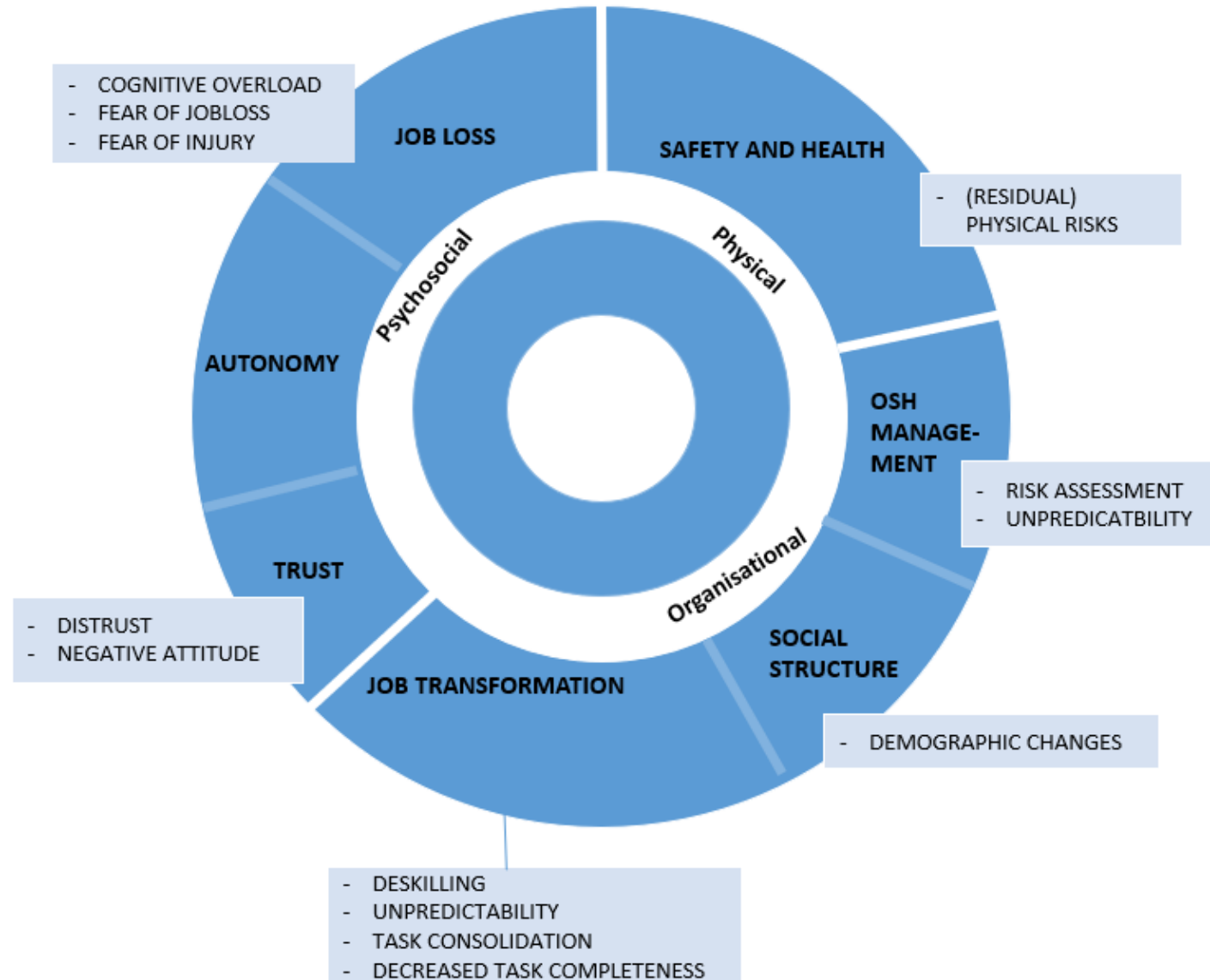
Arbeitsschutzrisiken und -chancen in Anwendungsfällen (KI + Roboter)

PRAXIS



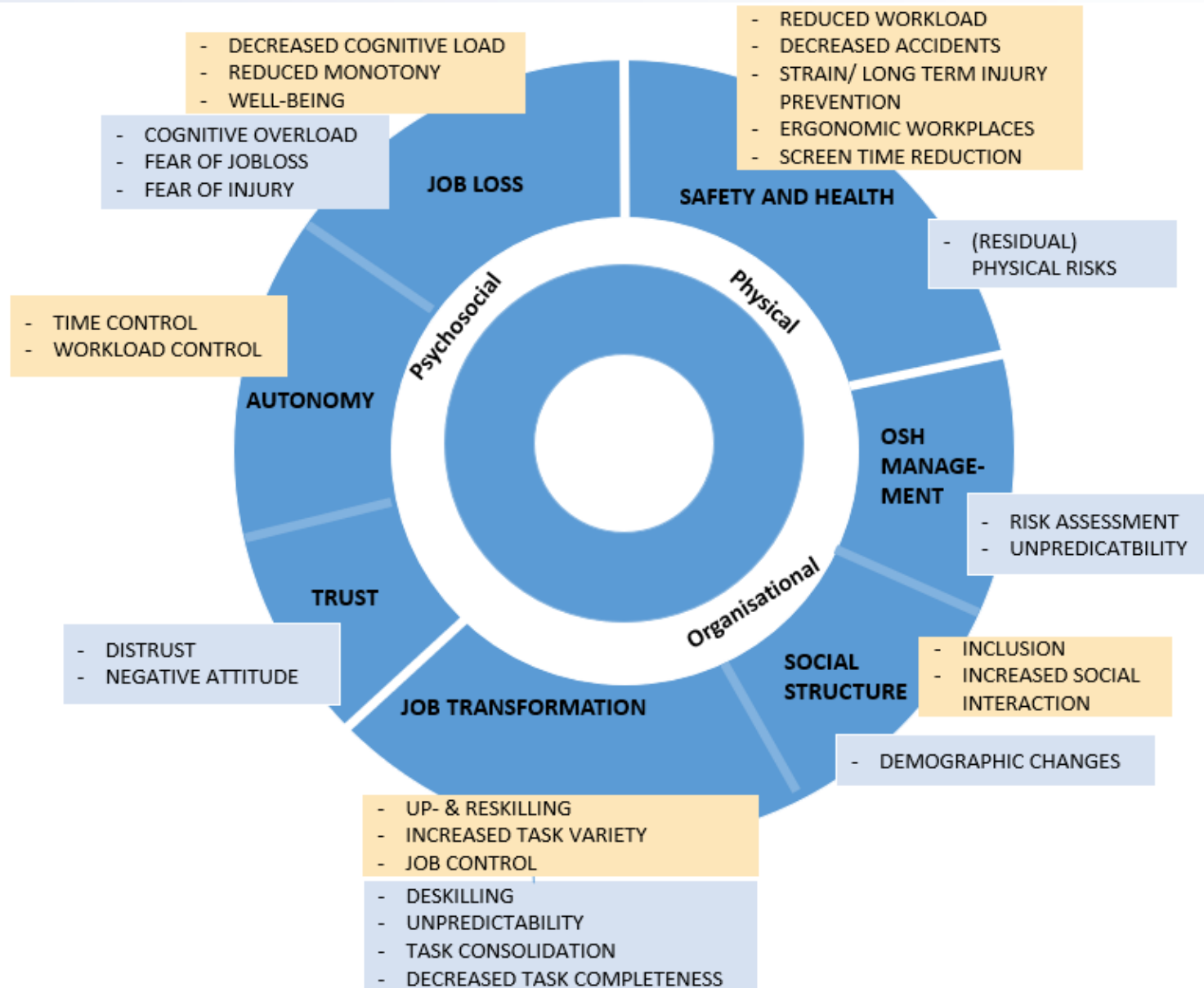
Arbeitsschutzrisiken und -chancen in Anwendungsfällen (KI + Roboter)

PRAXIS



Arbeitsschutzrisiken und -chancen in Anwendungsfällen (KI + Roboter)

PRAXIS



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Risiken minimieren, Chancen maximieren

Früh handeln lohnt sich

- Frühzeitige Maßnahmen können den Erfolg erleichtern und langfristig negative Auswirkungen verhindern.
- Der Aufbau einer Unternehmenskultur, die Arbeitnehmer unterstützt, braucht Zeit.

Mehr und bessere Kommunikation

- Dies umfasst sowohl die unternehmensinterne Kommunikation als auch die Kommunikation zwischen Stakeholdern.
- Aus den Erfahrungen anderer Unternehmen zu lernen, kann bei der Risikominderung von unschätzbarem Wert sein.

Risiken minimieren, Chancen maximieren

Einbeziehen der Arbeitenden

- Es hat sich gezeigt, dass die Beteiligung der Arbeitnehmer einen positiven Einfluss auf die Akzeptanz der Technologie hat.
- Bieten Sie die Möglichkeit, sich weiterzubilden und umzuschulen, noch bevor dies unvermeidlich wird.

Aktueller Gesetzesstand

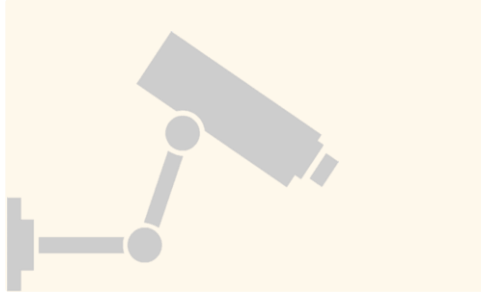
- Für die Bewältigung von Arbeitnehmeranliegen ist es von grundlegender Bedeutung, über behördliche Entscheidungen in Bezug auf Arbeitsschutz und Datenschutz und -sicherheit auf dem Laufenden zu bleiben.

Risiken minimieren, Chancen maximieren

- **Psychosoziale Risiken** werden für den Arbeitsschutz im Zusammenhang mit fortschrittlicher Robotik und KI immer relevanter, da Risiken durch Missbrauch aufgrund von falschem Vertrauen oder geringer Akzeptanz oder durch Automatisierungsvoreingenommenheit entstehen können
- **Menschzentrierte Arbeitsgestaltung** ist wichtiger denn je. Die Technologie soll den Menschen unterstützen, nicht andersherum.
- Bei KI-basierten Systemen besteht die Gefahr von **Autonomieverlust** und **Depersonalisierung**
- Veränderungen gehen mit **der Angst vor dem Verlust von Arbeitsplätzen** einher, bergen aber auch das Potenzial für Um- und Weiterqualifizierung
- Angemessene **Schulung und Weiterqualifizierung** sollten nicht vernachlässigt werden. Erfahrungen aus erster Hand sind jedoch von entscheidender Bedeutung, um vielen psychosozialen Risiken zu begegnen

Einsatz KI-basierter Systeme für den Arbeitsschutz

Prozess- und/oder Arbeitsschutzüberwachung



- Systeme mit integrierter Fehlererkennung / vorbeugender Wartung
- Sicherere Arbeitsplätze
- Selbstlernende Systeme zur Verbesserung des Arbeitsschutzes
- Individualisierungsmöglichkeiten

Überwachung



- Mehr Kameras & Digitales Tracking
- Unsicherheit darüber, welche Daten erfasst werden
- Grundannahme: „Die Kamera ist immer eingeschaltet.“

Klare Kommunikation darüber, welche Daten wann, wo und zu welchem Zweck erhoben werden. Ebenso wichtig: wann, wo und was nicht!

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Ausblick

- Fortschrittliche Robotik und KI-basierte Systeme werden in Zukunft vorwiegend drei Arten von Aufgaben stark automatisieren:

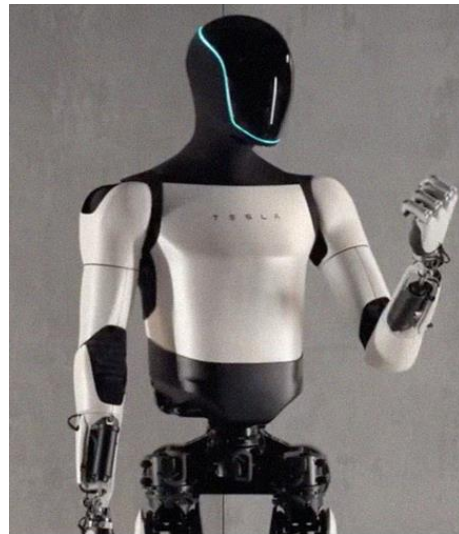


- Dies hat das Potenzial, einen Wandel in Richtung Höherqualifizierung herbeizuführen, und Arbeit in Richtung



zu ändern.

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Thank you