



Healthy Workplaces Campaign 2020-22: LIGHTEN THE LOAD

# New forms of worker management based on artificial intelligence (AI) and their implications for occupational safety and health (OSH) : ergonomist's perspectives

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# Algorithmic management: 'high-tech' version of old management principles ?

↑ Use of algorithms across a range of purposes, industries and business functions (Deloitte, 20217)

## ↗ Human resources algorithmic management

- Recruitment – selection for assigning people to jobs
- Promotion – termination

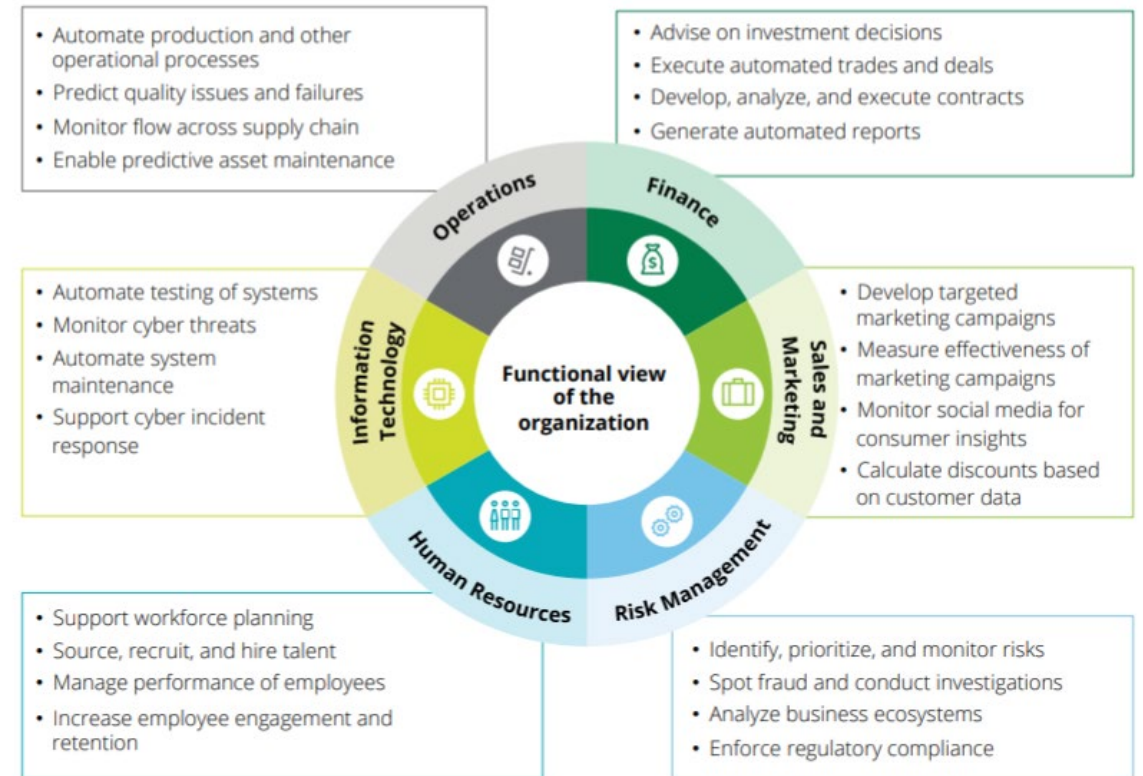
## ↗ Algorithmic management for improving scheduling and productivity

- Task allocation – monitoring – evaluation

→ **5 principles** (Möhlmann and Zalmanson, 2017; Bérastégui 2021) :

- Continuous monitoring of workers' behaviour (*digital surveillance*)
- Constant performance evaluation
- Automatic decisions without human intervention
- Interaction with the system with no opportunities for feedback or negotiation
- Low transparency (*'black box of decision making' ?*)

Figure 2. Algorithm use across business functions



Deloitte (2017)



e.g., **Digital platform** with algorithmic management and permanent controls of workers (De Groen, 2018)

e.g., **Agile manufacturing** with workers interacting with cobots imposing automated decision-making

# Algorithmic management: The twenty-first century's scientific management ?

**Manager's perspective** : 'prescribed' task (*what is requested to do*)

→ **technical and organizational logic**

- Optimizing the efficient allocation of resources in the production (goods, services)
- Highly adaptative production methods
- **Strict procedural control of the prescribed task**
- Reduce costs and increase productivity

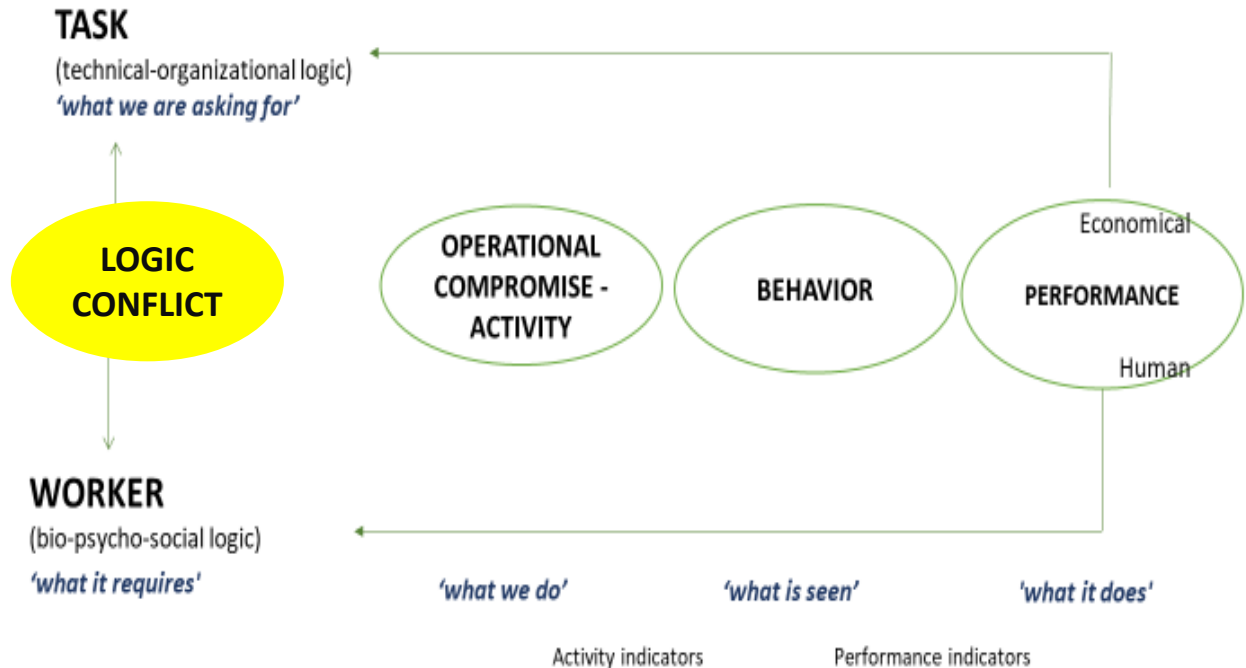
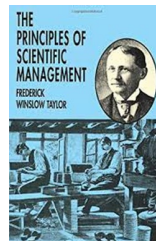
**Worker's perspective** : 'Activity' (*what this requires*)

→ **Bio-psycho-social logic**

- Highly variable 'real work' organization
- Constant need to adapt its operating methods
- Permanent adaptation of gestures, information gathering, information exchange, etc.
- Very low possibility of decision making and self-regulation
- Very little operational leeway to cope with the task

→ **New forms of "Digital Taylorism" ?**

→ **Job quality ?** (*Nurski, 2021*)



**The Activity of the operators** is not a simple application of **prescribed instructions**, but a **re-conception of the task and a self-regulatory process** to achieve the **objectives** while managing the **variations** in the technical-organizational system and its own individual variability



# Ergonomic perspective: the importance to preserve the margin of maneuvers

## Situational margin of maneuvers (MMs) refers to :

- options (space of freedom) available or created by workers
- to elaborate alternative strategies and ways of working
- according to their skills, knowledge and values
- in order to achieve production targets,
- reducing psychological, mental and physical strains
- avoiding negative health effects



## Variability of the working strategies of two assembly line workers performing the same task in an automotive plant

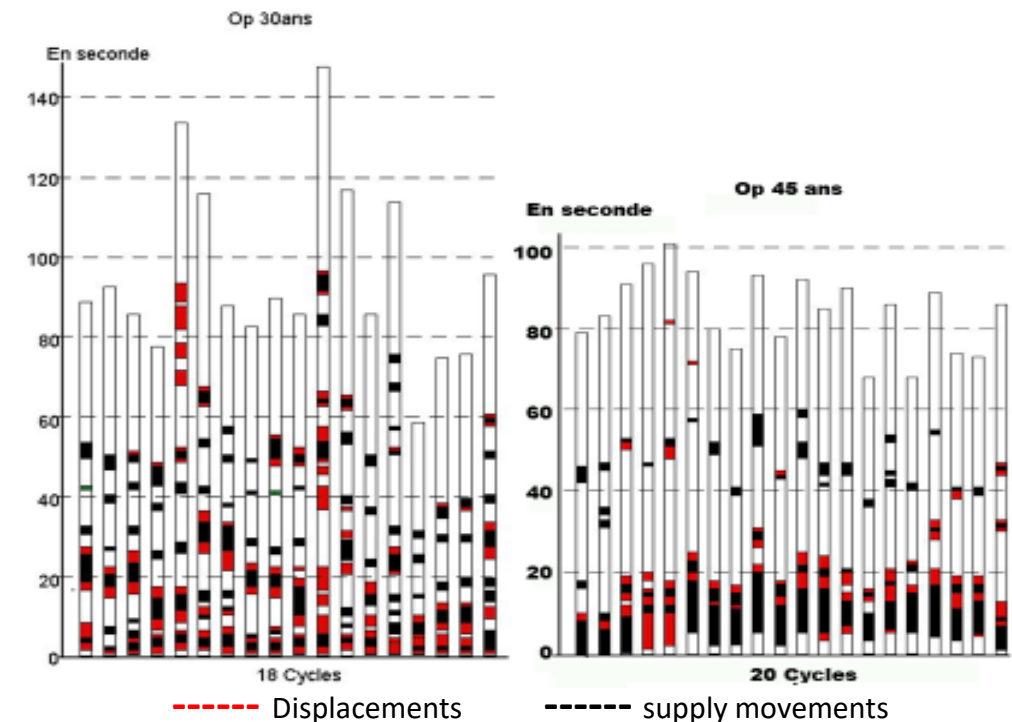
(Gaudart, 1998)

## Various forms of MMs (operational leeway)

- Organizational, spatial, temporal
- Individual and collective

## Several levels of MMs

- **Sufficient MMs** : several working strategies are possible, and the operator can alternate and invent new ones (*developmental perspective*)
- **Low MMs** : the range of possible operating methods is very limited, which can lead to overstrain and/or difficulties in achieving performance
- **Absence of MMs**: failure in achieving objectives can occur, even at the cost of overstrain and/or health disorders



# Algorithmic management : cascading effects on the risk of MSDs

## Supra level

### Company level

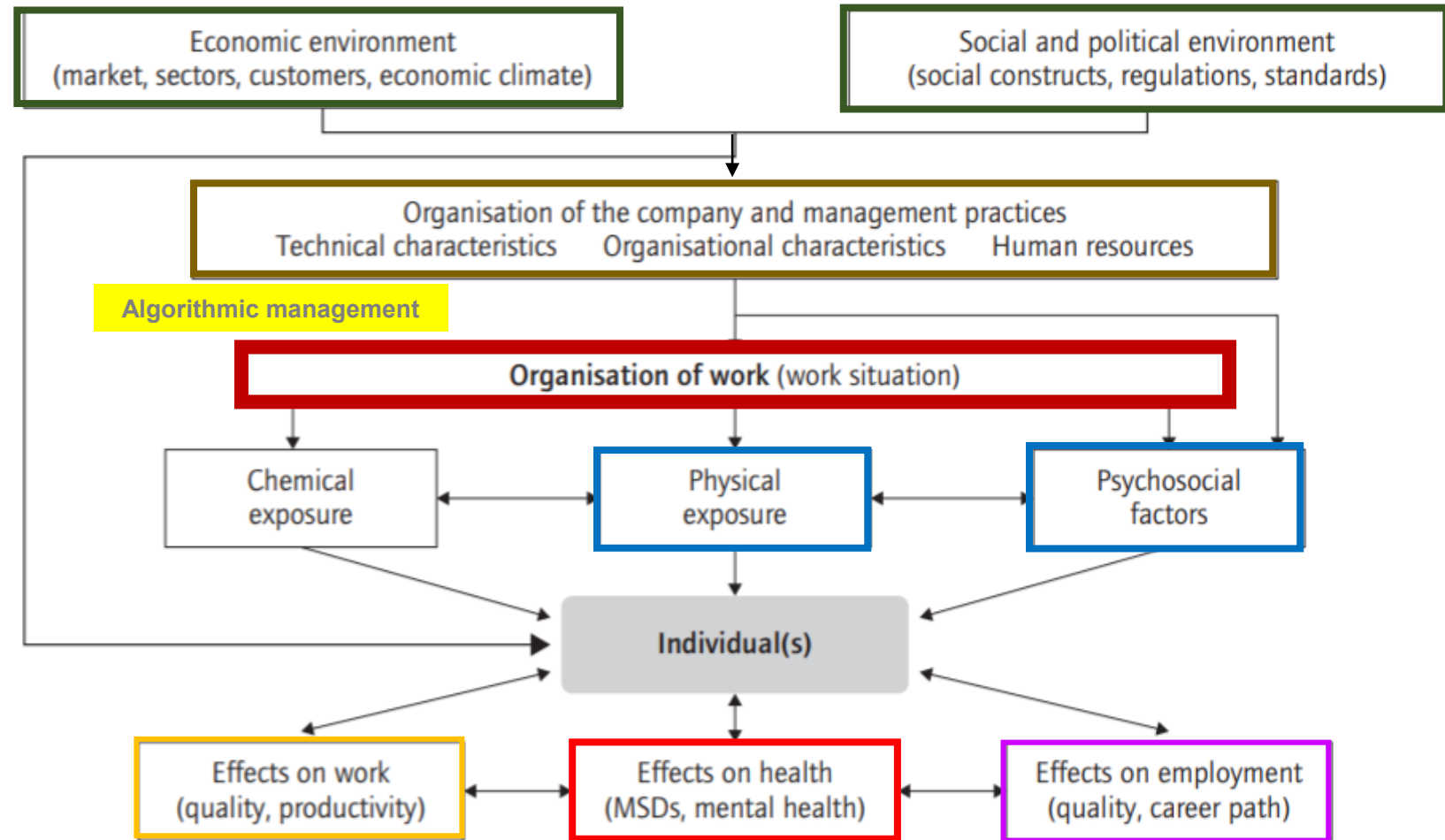
- Digital technologies
- New forms of work organization
- New forms of management (AI-based systems)
- Job insecurity
- ...

### Work situation level

- Work intensity - repetitiveness
- Cognitive overload
- Performance pressure (e-monitoring)
- Excessive micro-management
- Autonomy given to workers
- Ability to take break/change activities
- Social support (managers, colleagues)
- Lack of transparency (decision)
- ...

### Workers' level

- Adapted cognitive strategies
- Gestural strategies
- Social behaviors (cooperation)
- Worker's skills – knowledge – values
- Worker's functional status
- ...



Source: based on Roquelaure (2017)

# Algorithmic management: cascading effects on the workers' situational margin of maneuvers

## Work situation level

### Available operation leeway

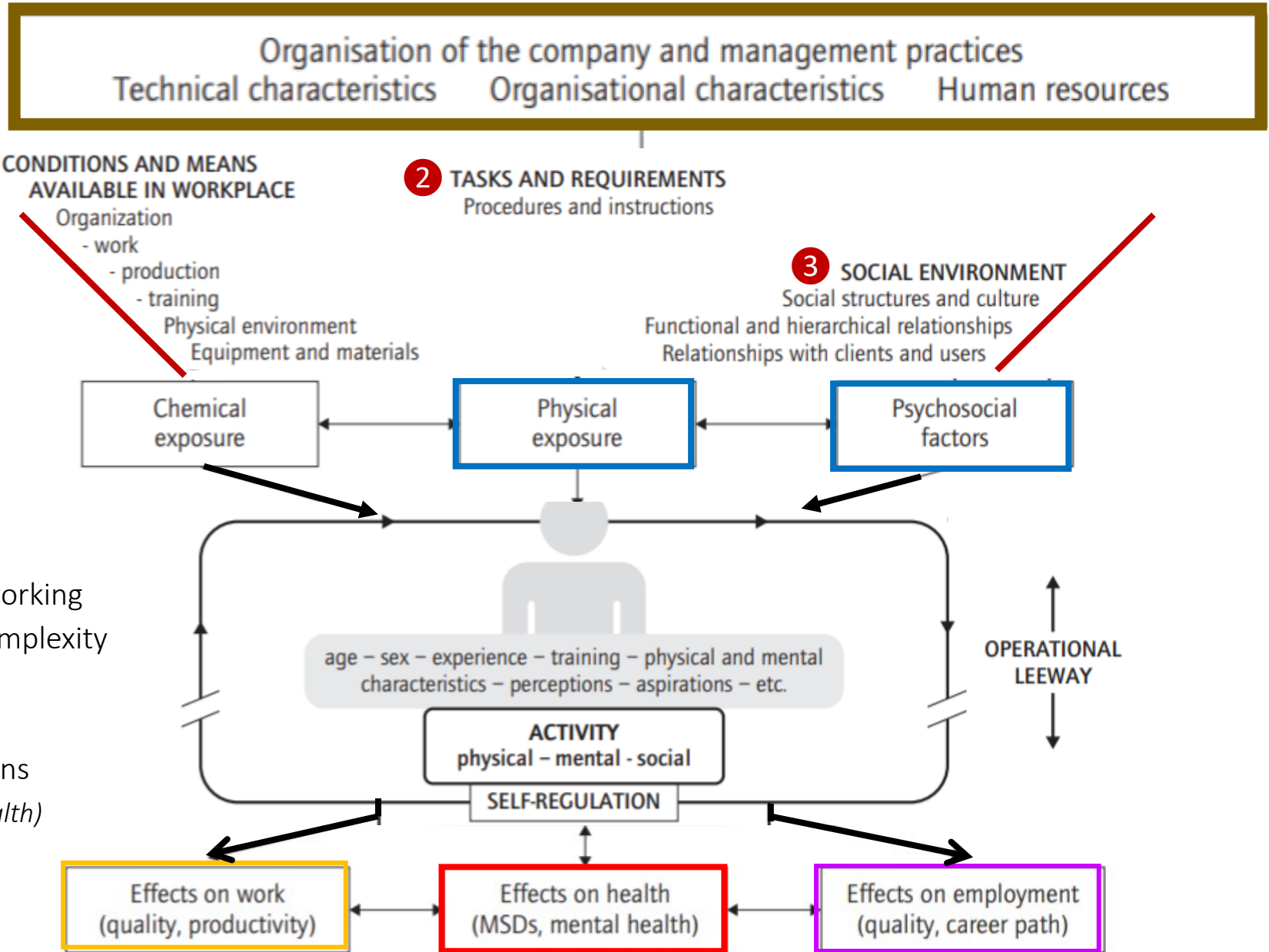
#### ALGORITHMIC MANAGEMENT

- Performance pressure (e-monitoring)
- Excessive micromanagement
- Low autonomy given to workers
- Little possibility to cooperate
- ...

## Worker's level

### Situational operational leeway

- to elaborate alternative strategies and ways of working
- to cope with the task intensity, variability and complexity
- to reduce physical and psycho-social exposures
- in order to achieve production targets,
- reducing psychological, mental and physical strains
- avoiding negative health effects (*MSDs, mental health*)



Adapted from Vezina (2010) et Roquelaure (2018)

# Implications for the prevention of OSH risks

- **Digital management techniques can increase OSH risks** (*MSDs, mental disorders, CV diseases, accidents...*)
- From an ergonomic perspective, **MSDs or mental disorders can be conceived as the consequence of a lack of workers' margin of maneuvers and a defect in the self-regulatory processes of Activity**
- Need to consider the **global dimension of the work activity in the digital working world** – which mobilizes the individual in all its dimensions (*physical, cognitive, subjective and social*) -
- **Incorporate ergonomic concepts, user-centered approach and participatory methods** to enrich the design and uses of algorithms, and to avoid the **come back of old Taylorian 'one best way' of designing working methods'**
- **Job quality measures** (*e.g., Eurofound*) should be included explicitly in **health and safety risk assessments** for workplace artificial-intelligence systems
- **Improve the managers and engineers' knowledge** related to human functioning (*incl. subjectivity*), ergonomic principles, and the risks associated with digital technologies
- **Reinforce regulations** on digital technologies in the workplace and **develop adapted prevention interventions**

# Thank you for your attention !

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