

OSH Webinar Series 2020, #10

# Cognitive Analysis of Safety Work

Conducting Work Domain Analysis  
for Safety Work

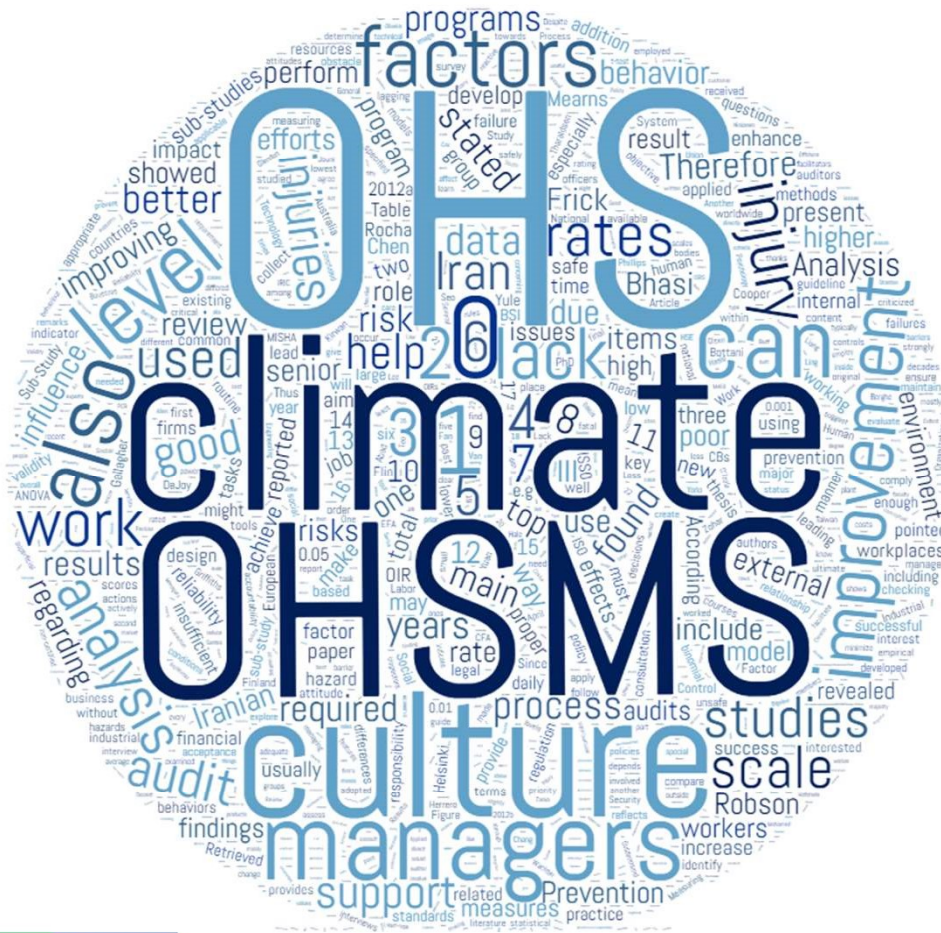
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# Introduction



# Assessment of Occupational Health and Safety Management Systems (OHSMS) Status and Effectiveness in Manufacturing Industry (2016)

*This study was conducted to explore the effect of OHSAS 18001 on the occupational injury, safety climate, and Occupational Health and Safety (OHS) practices in OHSAS 18001-certified companies compared with a control group*

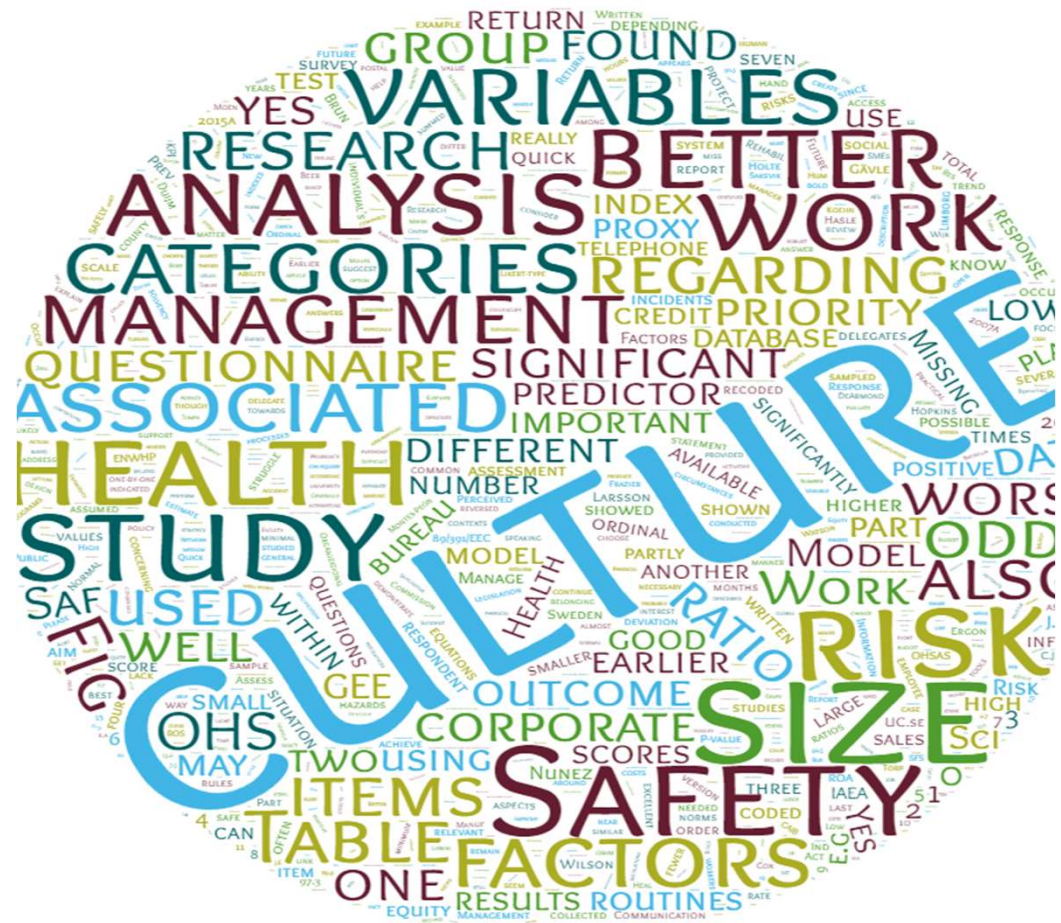
OHSAS 18001 Procedure-based  
ISO 45001 Process-based

*The main difference is that ISO 45001 concentrates on the interaction between an organization and its business environment, while OHSAS 18001 was focused on managing OH&S hazards and other internal issues*



## A cross-sectional study of factors influencing occupational health and safety management practices in companies (2017)

*The aim of this study was to investigate whether factors like company size, safety culture, and different measures of financial performance are associated with OHSM practices in companies.*



# Comparison of important aspects...

**Assessment of Occupational Health and Safety Management Systems (OHSMS) Status and Effectiveness...**

- OHS Climate
- OHSMS (the management system)
- Culture (of the workplaces)
- Managers (the role they play)
- Improvement...
- Analysis, audit, level...
- Prevention, process, support...

**A cross-sectional study of factors influencing occupational health and safety management practices in companies**

- Culture
- Safety
- Health, Risks, Size(of company)
- Analysis, Better work...
- Management...
- Variables

# What is Cognitive Work Analysis?

- Method for assessment of complex work domains
- Insight in relationships between elements within a system
- Look at different dimension
- Formative method; analyses the work out from how it can be done contra *normative* (how the work shall be done) and *descriptive* (how the work is done)
- Focus on identifying constraints
- Useful in designing work systems
- Deal with complex issues without simplifying

# Work Constraints

- Definition of Constraints...
  - ✓ Limits on behaviour which must be respected for a system to perform effectively
- Constraints despite limiting the courses of actions possible...
  - ✓ allow for a degree of freedom of behaviour, which in turn enables adaptation within the limits of effective performance to situational eventualities not always a priori predictable

Naikar N (2013). Work domain Analysis. Concepts, Guidelines and Cases. CRC Press, Taylor & Francis Group, p5.

# What one analyses with CWA...

Work domain (Safety work)

## Work Domain Analysis

- Identify work domain affordances

## Activities analysis

- activities necessary in the system to achieve the system's purposes

## Strategy analysis

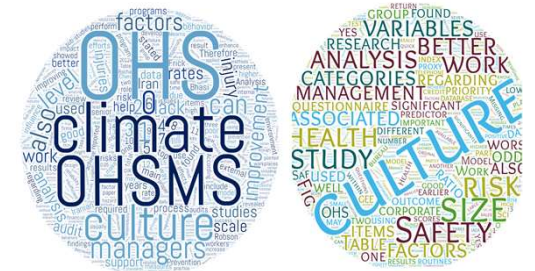
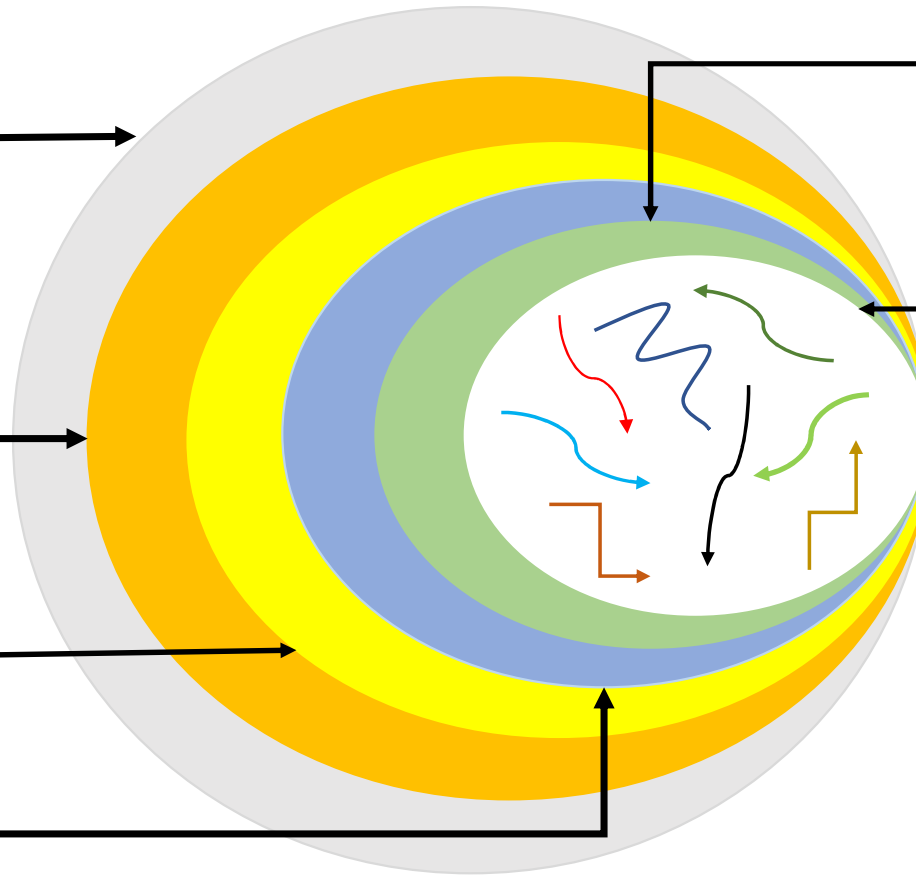
- strategies that can be utilised for achieving the activities

## Socio-organisational analysis

- how the work can be allocated, distributed and contained in a system

## Competence analysis

- how the work demands of the system can be met given human cognitive capabilities and limitations





# Work Domain Analysis (WDA)

## Comprise of five phases:

1. Domain purpose – Goal/objective of the work
2. Values and principles – Measure of success of objective attainment
3. Purpose-related functions – What is necessary/must for the purpose and the values/principles
4. Object-related functions (Physical processes) – The activities necessary
5. Physical objects (Physical processes attributes) – Instruments necessary to achieve the system purpose

# WDA: Safety work

Abstraction Hierarchy

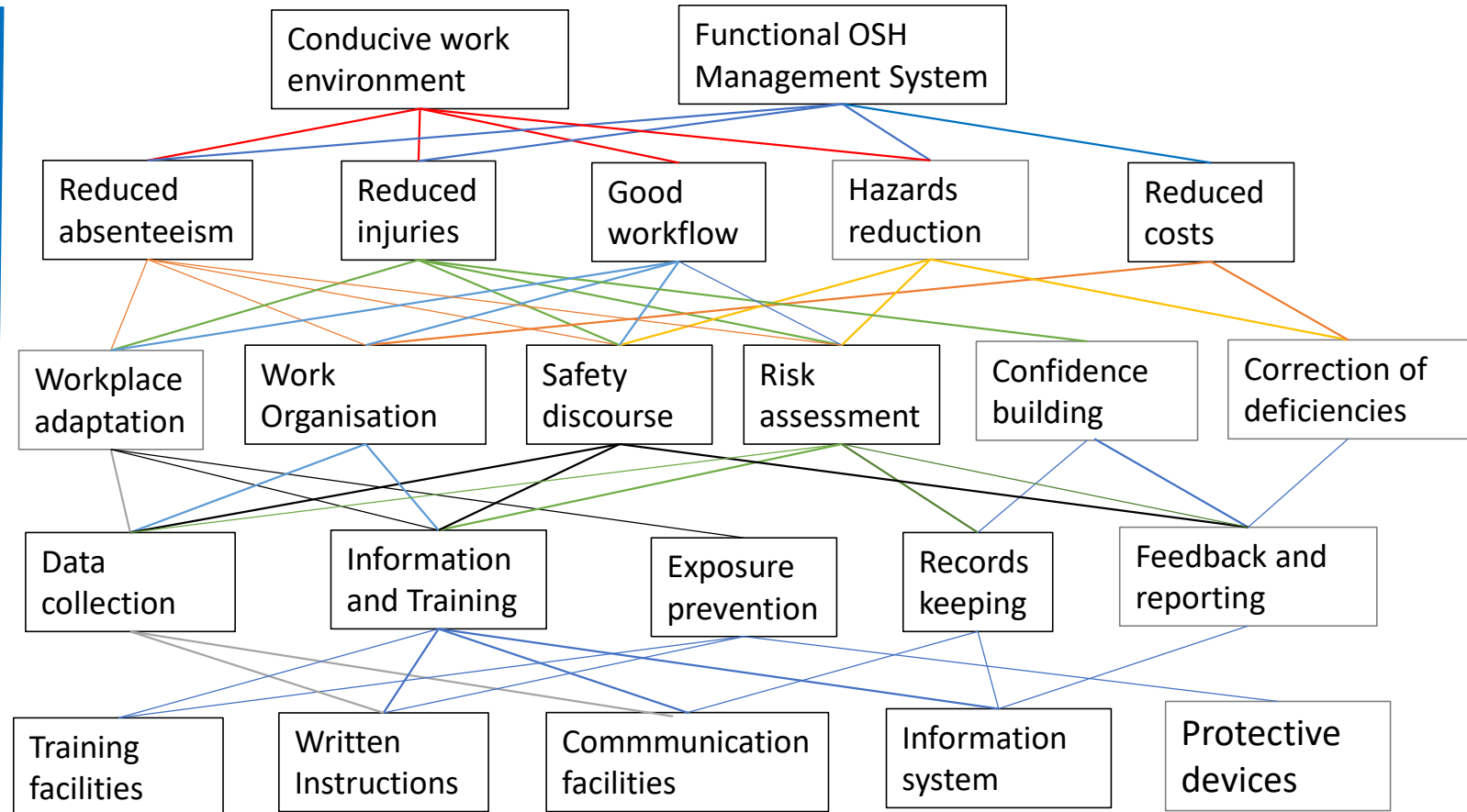
Domain Purpose

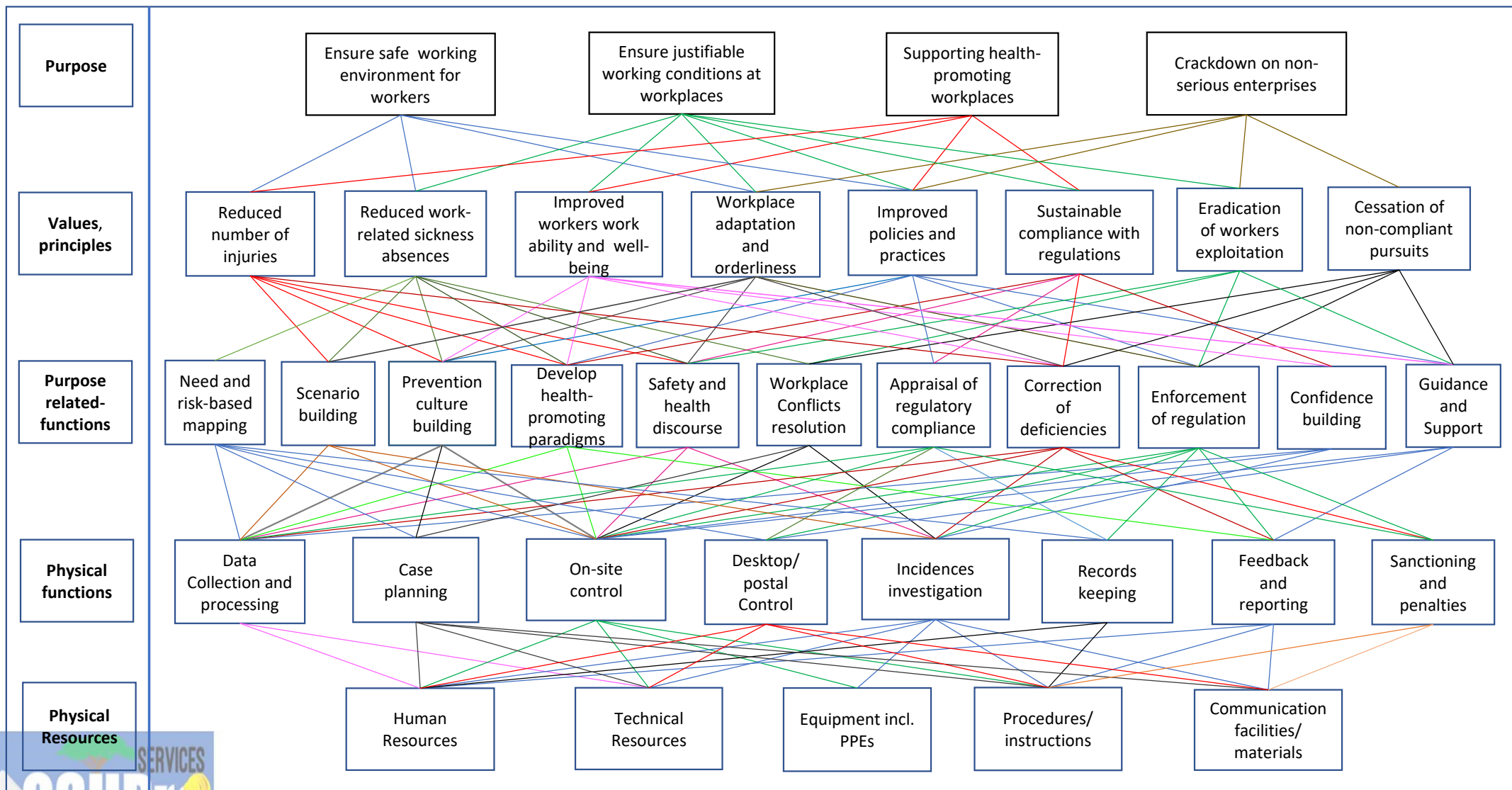
Values/principles

Purpose-related functions

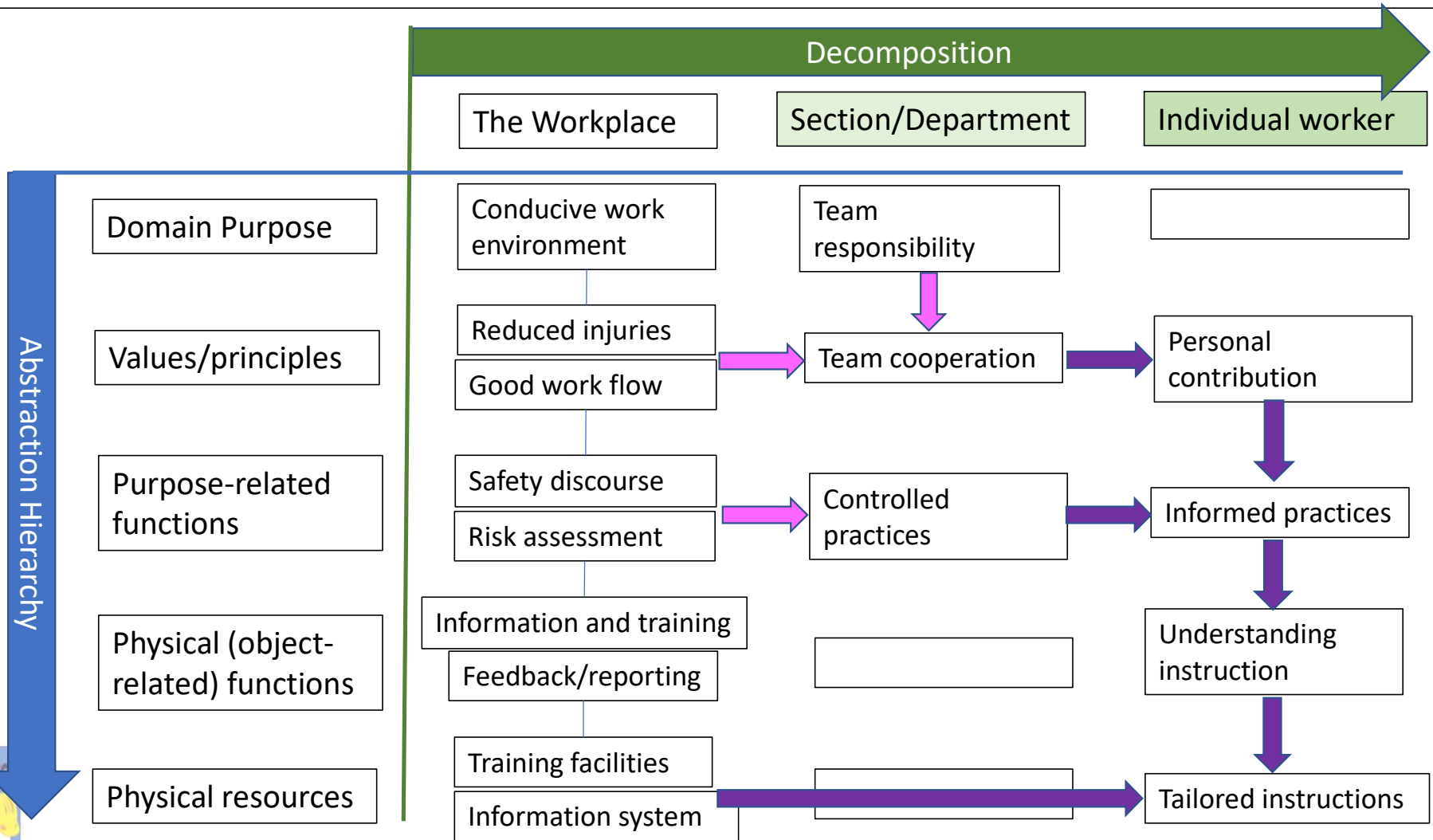
Object-related functions

Physical objects





# Abstraction Decomposition



# WDA subgoals and subsidiary functions

Purpose-related function	Subgoals and subsidiary functions
Safety and health discourse	Engage in dialogue with workers and employer; discuss the significance of OSH practices; motivate promotion of workers' mental health and well-being; advocate for workers' good psychosocial work environment; raise awareness of regulatory requirements
Correction of deficiencies	Help comprehend implementation shortcomings; investigate and address incidences; correct the interpretation of relevant regulatory provisions; guide on attaining an optimal level of compliance; influence adaptation of OSH management system to various situations



## Diversity of WDA (CWA) use

- Safety – Nuclear power station; Manufacturing; Workers behaviour adaptation...
- Military – Safety passage for jet-fighters; Control of submarines; Anti-Missile Systems
- Aviation – Determining flight path; Airline operations
- Hospitals/Health systems – Organising follow-up of cardiac surgery patients; Modelling for ICU patients; Surgical training; Patients falling from beds
- Road Traffic – Reducing fuel use; Automation of trucks; Traffic lights control
- Sports – Determining effective netball team strategy
- Safety work – ??

# Conclusion

- Safety work is complex
- Analysis of safety work is very wide and demanding
- With Cognitive analysis one get a good understanding of the work
- WDA allows for identifying domain affordances
- Abstraction hierarch and decomposition provide details of hat one needs to do
- Establish means-ends relations identified in the hierarchy
- Effective within the work constraints
- Support of effective system design

# Thank you for listening



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