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Prevention of work injuries using a systematic KTE approach:

Experiences from a research project in Denmark

IWH Speaker Series
26 jun 2018
Institute for Work and Health
Toronto, Canada

National Research Centre for the Working Environment in Denmark (NFA)

- The psychosocial working environment
- Musculoskeletal disorders and physical work load
- **Work accidents and safety culture**
- Chemical working environment, toxicology, nano safety and microbiology
- Working environment epidemiology
- Interdisciplinary: Senior workers and young workers

145 persons, and about half of the staff are researchers

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Agenda

Safety interventions:

Knowledge of the effectiveness of safety interventions is important for the prevention of accidents, translation and exchange are important for its use!

I. What do we know about the effectiveness of safety interventions? (*SIPAW review)*

II. How can we translate and exchange such information with industry, employers and OHS professionals (*the interactive approach to* KTE)?

Aknowledments

1. Safety Interventions for the Prevention of Accidents at Work

Dyreborg J., Lipscomb H.J., Nielsen K., Törner M., Rasmussen K., Lund J., Frydendall K.B., Bay, H.; Gensby U., Kines P., Bengtsen E., Guldenmund F.W., Zohar, D.

2. SIPAW-KTE Project

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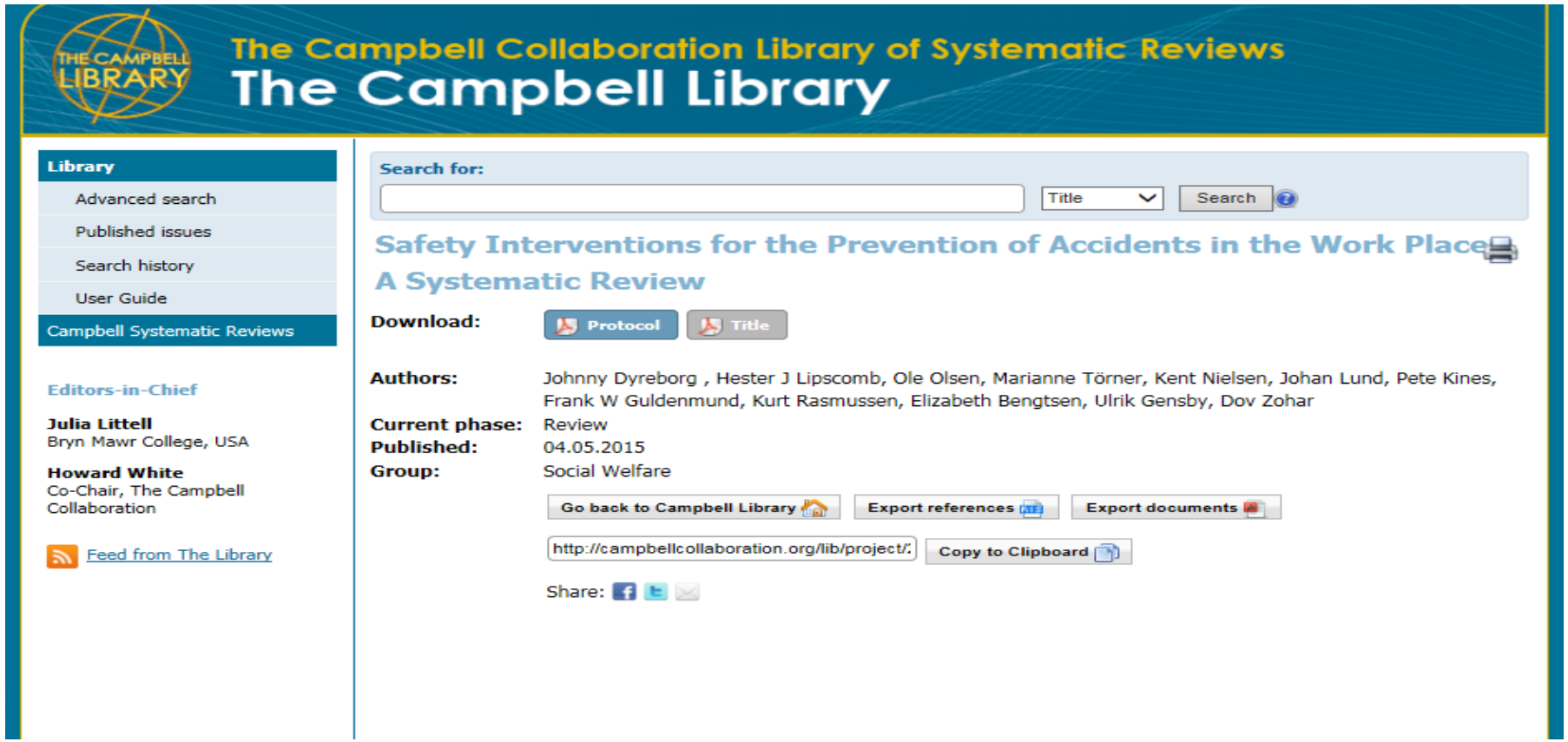
Part 1: SIPAW review

Hazardous work in many sectors all over the world

- In the EU-28 3.2 million accidental injuries annually
- In the EU-28 nearly 4000 fatalities annually
- Worldwide, hazardous conditions in the workplace were responsible for a minimum of 312,000 fatal unintentional occupational injuries (Concha-Barrientos 2005)

SIPAW project

- Preliminary results from a Campbell review, where we synthesized the effects of the main types of safety interventions



- **Grant project number: 48-2010-09, The Work Environment Research Fund, Denmark**

Method: systematic review

- Systematic search in electronic databases (Scientific and grey litt)
- About 60.000 reports identified
- 111 articles fulfilled inclusion criteria (accidents at work, intervention study, eligible design – RCT, CBA and serial measures)
- This included 121 safety interventions to be evaluated
- All studies coded and classified for narrative analysis, and meta-analysis where applicable.

Method: systematic review

Table 1: Number of included safety interventions by continent and study design

Continent	Study design RCT	CBA	ITS	Number of safety interventions
AFRICA		1		1
ASIA	4	2	1	7
AUSTRALIA	1	2	4	7
EUROPE	7	11	15	33
NORTH AMERICA	8	27	38	73
Number of safety interventions	**20**	**43**	**58**	**121**

Method: systematic review

Table 2: Number of included safety interventions with high, moderate and low level of quality, by study design				
Number of safety interventions	Study design:			
Level of quality	RCT	Serial Measures (ITS)	CBA	Total
High quality	10	18	8	36
Moderate quality	7	15	15	37
Low quality	3	25	20	48
Total	**20**	**58**	**43**	**121**

Safety interventions – defined:

- "any attempt deliberately applied to promote safety and decrease the frequency or severity of accidental injuries at work" (Robson et al., 2001)
- Safety interventions can include one or more component, such as, safety training, safety campaign, goal setting, safety feedback or machine safeguarding.
- Components defined by their underlying mechanisms (theory/idea)

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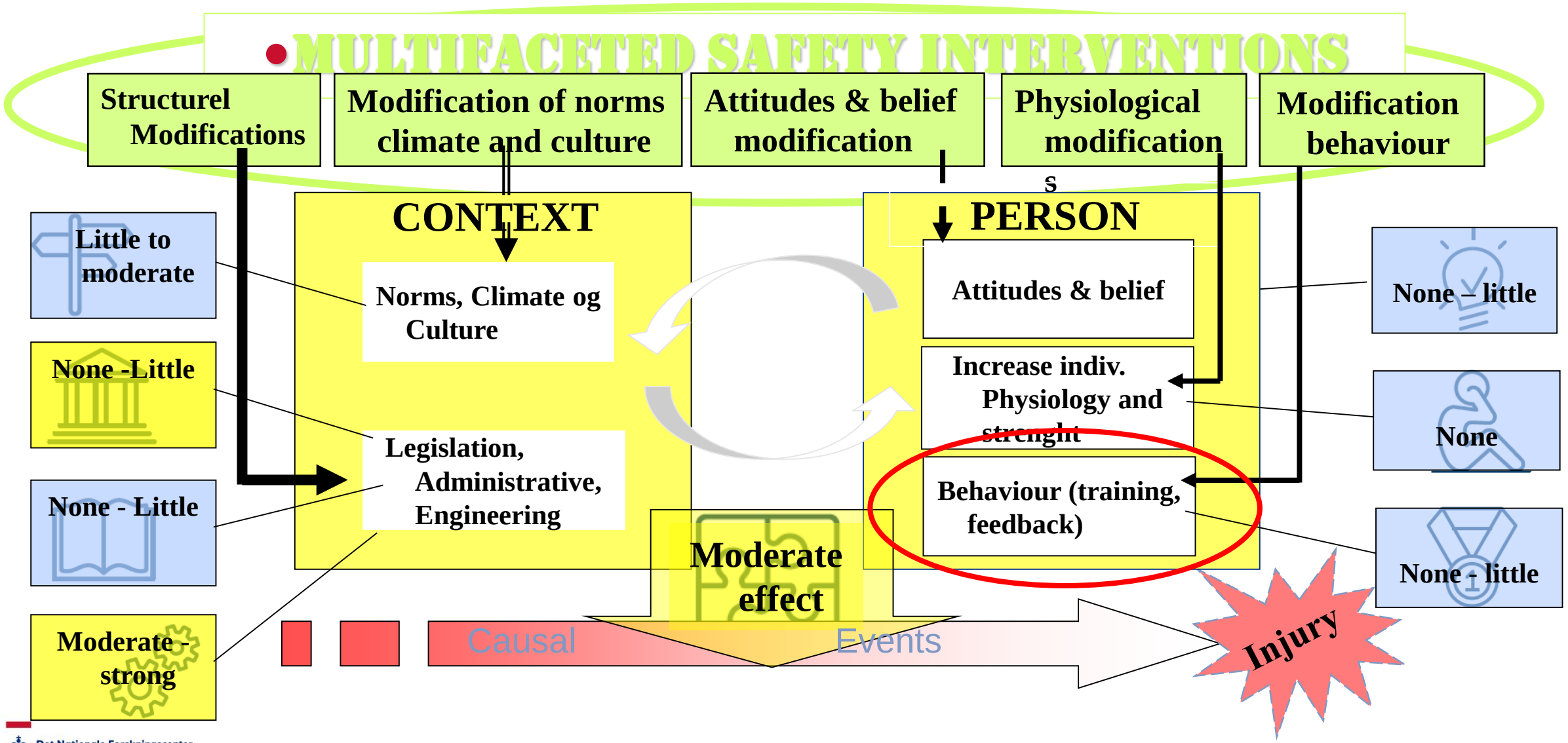
Method: systematic review

Tabel 3: Main type of safety intervention and study design				
Number of safety interventions	Study design			
Type of safety intervention	**RCT**	**CBA**	**ITS**	**Total**
1.1.0 Attitude modification	3	6	2	11
1.2.0 Behaviour modification	4	2		6
1.3.0 Modification of physical capacity	1	3	1	5
2.1.0 Climate modifications	2	3	6	11
2.2.0 Structural modifications	6	15	30	51
3.0 Integrated interventions	4	13	19	36
Type of intervention not reported or unclear		1		1
Total	**20**	**43**	**58**	**121**

SIPAW RESULTS: Effectiveness of safety interventions



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Conceptual model based on: Lund, J. and Aarø, L. E., (2004) Accident prevention, Safety Science

Part 2: The interactive approach to KTE

From systematic review results to accident prevention in practice!

How can we translate and exchange such information with industry, employers and OHS professionals (*the interactive approach to* KTE)?

Systematic reviews

- Aims at finding patterns of effectiveness across studies/contexts and types of safety interventions (***internal validity focus***), thus tend to

De-contextualize results

- If results should be used in a meaningful way in practice (company level, knowledge brokers and policy level) (***External validity focus***), the results need to be

re-contextualized

Method: The interactive approach to KTE

We combine **(a)** the IWH KTE method with an **(b)** interactive knowledge exchange approach for implementing evidence-based 'best practice' injury prevention at the workplace.

(a) IWH defines KTE as '*a process of exchange between researchers and stakeholders / knowledge-users designed to make relevant research information available and accessible for use in practice, planning, and policy-making'*

- Source: Van Eerd, Dwayne, & Saunders, Ron. (2017). Integrated Knowledge Transfer and Exchange: An Organizational Approach for Stakeholder Engagement and Communications. Scholarly and Research Communication, 8(1): 0101274, 18 pp.

What is 'interactive research'?

(b) "*Research approach which position itself in contrast to traditional academic research on the one hand and action research on the other hand*".

The three fold task of interactive research:

- **First task**: Contribute to practical concerns, for example, how to find the most optimal safety measures and identify barriers and drivers
- **Second task**: Create scientifically acceptable knowledge, for example, new concepts, theories, and models for improving fidelity of safety interventions.
- **Third task**: Enhancing the competencies of the parties involved in the interactive research process, through processes of dialogue and learning.

- Per-Erik Ellström (2007) **Knowledge Creation Through Interactive Research: A Learning Perspective,** Linköping University, Sweden

Knowledge development through interactive research

Research practice

Evidence based safety interventions and change processes

Problem definitions and research questions

Translate evidence base to context

FOCUS

Preventing work accidents

Common understandings

–transfer / exchange

Facilitate

Interactive exchange processes

Evidence based "best practice"

Production practice

Decision making and measures at the workplace

Problem definitions and possible solutions

Practical challenges barriers and drivers

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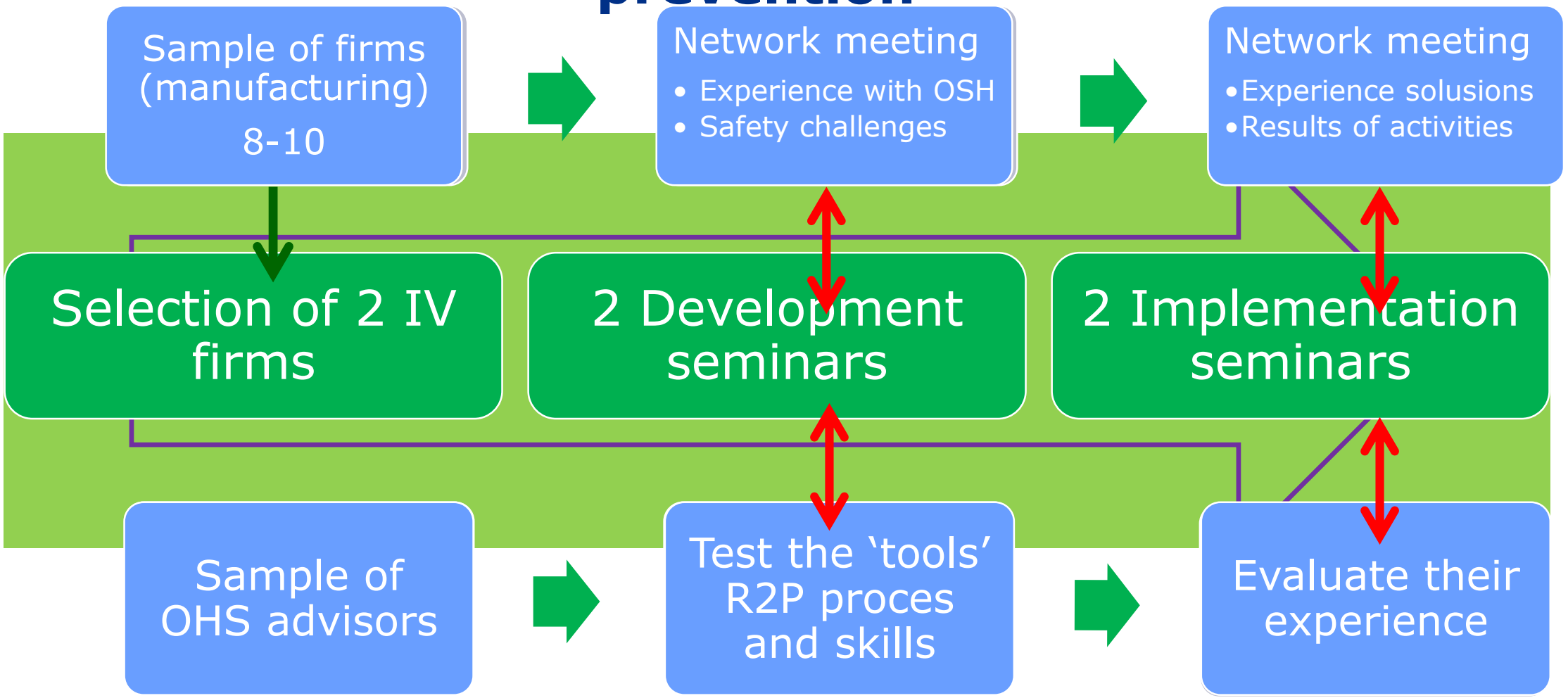
- Adapted from: Per-Erik Ellström, HELIX VINN Excellence Centre Linköping University, Sweden

Downstream KTE

- **Source:** White paper project: How to mobilise research based OHS knowledge in the Danish work environment system (downstream focus)

- Team Working Life (U. Gensby, H-J Limborg)
- Bispebjerg Hospital (P. Malmros)
- National Research Center for the Working Environment (J. Dyreborg, E. Bengtsen)

KTE SIPAW – improving knowledge uptake in accident prevention



• Knowledge brokers / intermediaries

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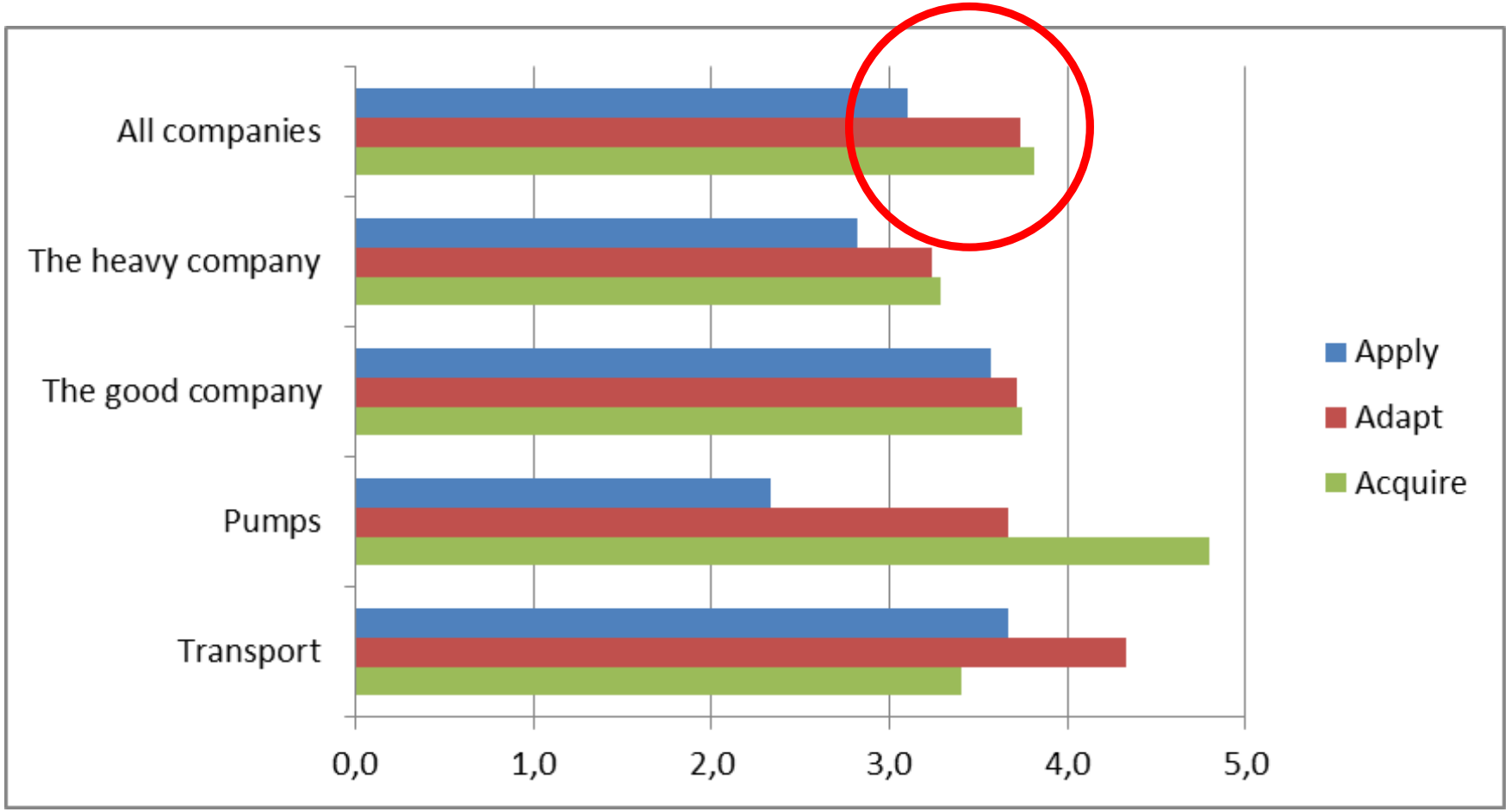
COMPANIES CAPACITY TO USE EVIDENCE IN PRACTICE AT BASELINE

FOUR MEDIUM/LARGE MANUFACTURING COMPANIES (USING SATORI S-A TOOL)



- Gholami J, Majdzadeh R, Nedjat S, Nedjat S, Maleki K, Ashoorkhani M, Yazdizadeh M. (2011). How should we assess knowledge translation in research organizations; designing a knowledge translation self-assessment tool for research institutes (SATORI). *Health Research Policy and Systems; 9*:10.

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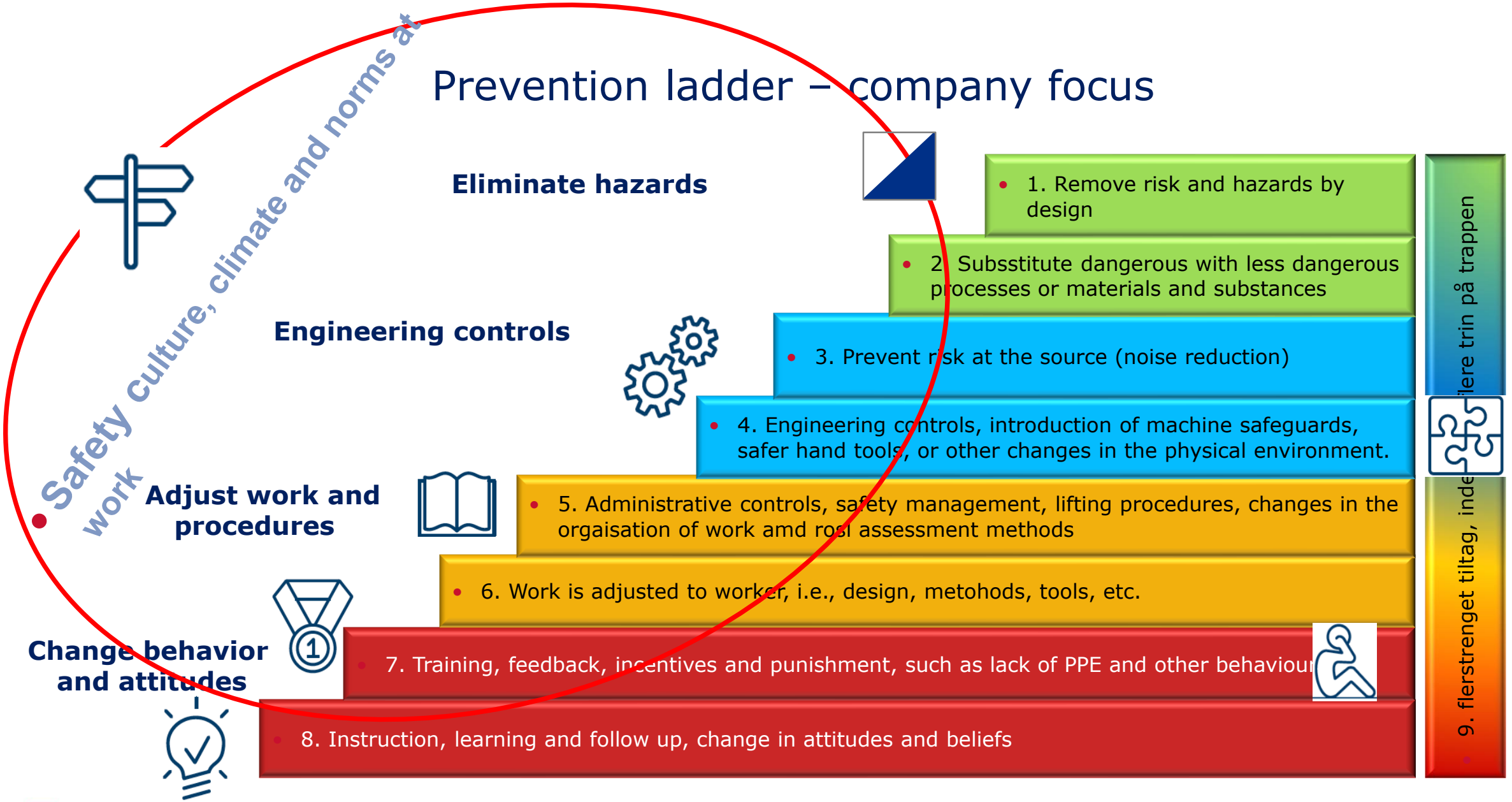
Prevention ladder – company focus



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Logic of change model: Graphic tool to facilitate accident prevention

What is a logic of change?

- Implicit or explicit ideas about why and how a measure will work
- Can be simple or complex
- Can be based on experience og various sources of knowledge

What can it be used for?

- Process tool for planning, development and implementating measures
- Evaluation tool
- Can open ”the black box” (Theory- or implementation faillure)

Dahler-Larsen, Peter (2013): ”Evaluering af projekter - og andre ting, som ikke er ting”, Syddansk Universitetsforlag.

The interactive approach the ‘Tech’ company

The ‘tech’ company

1. Risk’ of falls from production platform
2. Cuts and laceration
3. Reporting near-miss and safety issues
4. Integrating safety in production practices

CASE:

Program: near-accidents/safety as a point at Lean meeting

PROBLEM: Better risk assessment and prevention of accidents

Logic of change

Target group

- Workers and magagers in productin

Activities / ressources

Main activity

- **Near accident reporting and safety issues on the lean meetings**

Support activities:

- Coordinator and leader as pioneers
- Production Director must back up AMO / AMU
- Info to employees generally about 'safety at table meetings' (morning meetings, information campaigns)
- Additional info for employees in pilot projects
- Design 'red stickers' for working environment on the lean board
- System for detecting security issues

Mechanisms

Why should it work?

- Is linked to existing meetings
- Dialogue ml. employees and managers
- Has already preventive knowledge in mind

Drivers?

- **Security integrates with central management processes etc.**
- **Put useful systems in the process of registration, creates visibility and feedback.**
- **Experience that things are moving ahead.**

Barriers

- **Fall back into old habits**
- **Lack of acceptance and priority from managers.**
- **Opposition from colleagues against making ideas and / or reporting 'right-by' events.**
- **The red stickers are not used, removed or forgotten**
- **The leaders feel they can not move on with solutions**

Output

- More reports of near misses / 20 pr. month
- More workers report
- More dialogue and inspirations at lean meetings will increase reports
- Accept from workers that pictures can be taken in case of near accidents
- Respect for procedures
- Larger involvement of leaders and workers in safety issues
- Etc.
- Etc.

Outcome (long term)

- Safety improves
- Less accidents

- Becomes a routine
- Change in culture
- "It is just something we do"

- Etc.

Opfølgning og evaluering
Sker tingene som planlagt?

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The interactive approach at steel company

1. Risk of stumpling and fall in production
2. Risk of starting machine when maintenance people are operating
3. Coordinate and communicate between shifts
4. Coordinate and communicate between production and maintenance

Problem 4

Activity: Change in work organisation and procedures for safe produktion in the plate shear line — **Change logik**

PROBLEM: Lack of coordination and cooperation og koordinering between production and maintenance

FOKUS: Workflow for handover between guard, production team and foremen in relation to repairs and breakdowns

Target group	Activities / ressources	What will work? (core components)	Output	Goal (what should be improved)
• Workers and leaders in plate production (sakslinjen) and maintenance team	**Supportive activities:** A. Create better communication between foremen and guardians B. Establishment of 'white board meetings' between foremen and guardians between day, evening and night. C. foremen are granted access to SAP (internal communication system) to report problems to maintenance team	Improve koordination and meet those you hand over to, gives more respect and koordination	• The white board is hanging • Meetings are held with relevant people • Foremen knows SAP and are avke tu use it • Foremen uses SAP and guard act on reports in SAP rapporter i SAP	**Safety improves.** Common understanding of task solution and prevention of security risks Alignment of expectations between production and maintenance
	Supportive activities: A board is established in the hallway in front of the foremen office. Outgoing and incoming foremen and guard for the upcoming shift, meet in front of the board at 05:45, 13:45 and 21:45 (about 5 min). Foremen are taught how to use SAP	Buy a whithe board, etc Overlap between staff cost money	• ? • ? • ? • ?	**Ongoing systematic cooperation between production teams and maintenance ifm. repairs and crashes**
		Involve shopfloor Get suport from upper management New OHS Manager, etc Less break downs		**Changed safety culture and safety standards for repairs and maintenance team**
				Everyone has access to relevant information across departments

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Follow up

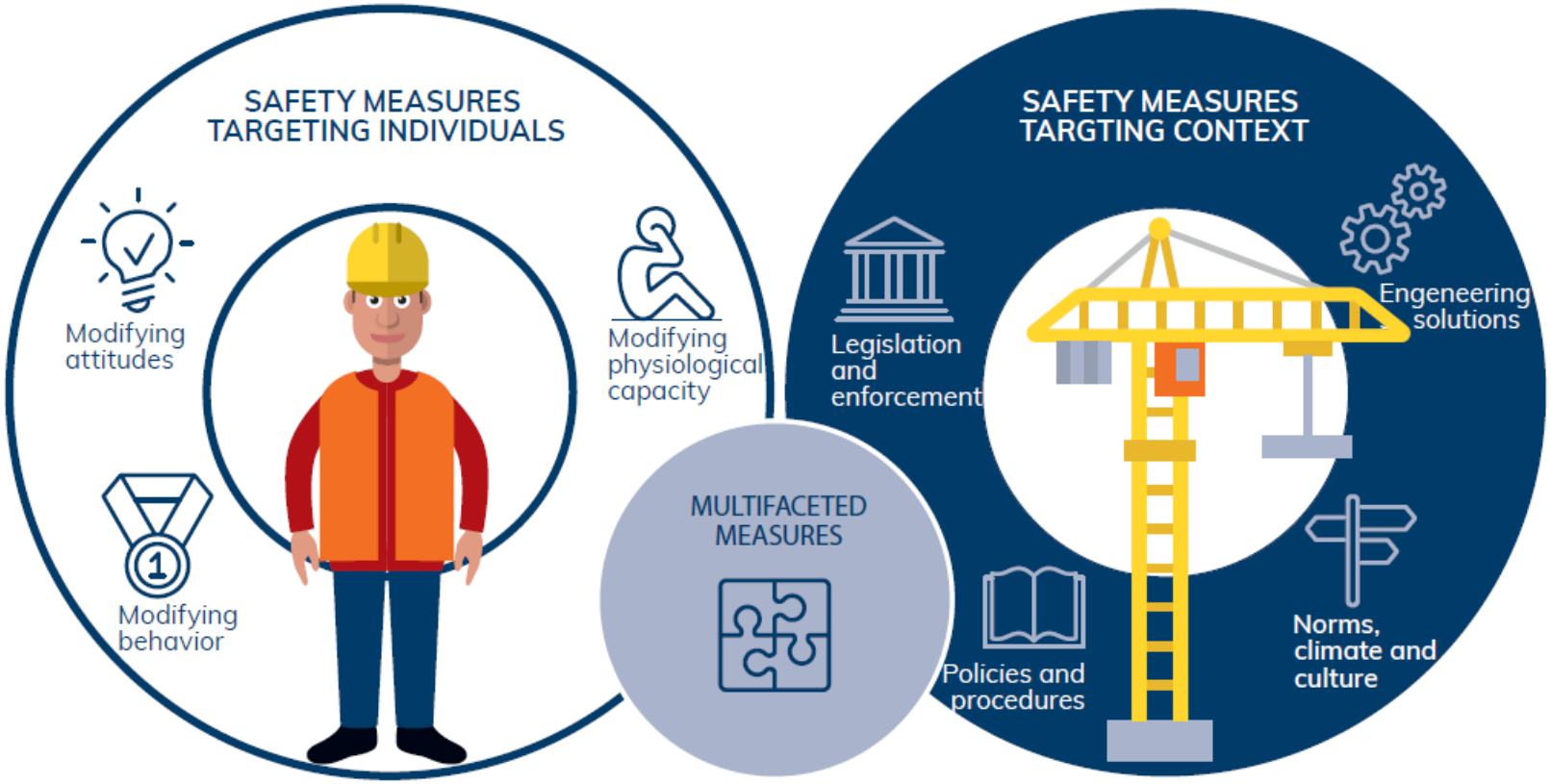
Are we following the plan, are we arriving at our outputs?

Conclusions

1. We have good evidence on how to prevent work accidents – but it needs to be translated to the particular context.
2. To achieve evidence based best practice we built on the knowledge exchange approach (KTE method proposed by IWH in Canada)
3. Knowledge brokers are important intermediaries (solving the numbers problem)
4. Research and practice needs to be seen as two different fields with different overall aims and work processes.
5. The interactive research approach can provide a framework for handling this.

Prevention of accidental injuries what works?

QUICK GUIDE 1



See further desciptions on following pages

Products

Safety tools

- Quick Guide
- Prevention ladder
- Cause analysis
- Safety triangle

Process tools

- Logic change
- Relational coordination
- Time lines
- Videos from firms

Thank you for your attention!

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