

Roskilde School of Management
Esbjerg University

RSM Helsingør

Ergonomics for Performance



RSM - a force for positive change

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My earlier keynotes at NES

- 2006 Hämeenlinna, Finland
"The business value of ergonomics"
Dul, J., Neumann WP (2009) Ergonomics contributions to company strategies, *Applied Ergonomics* 40 (4), 745-752
- 2013 Reykjavik, Iceland
"The future of ergonomics"
Dul, J., Bruder, R., Buckle, P., Carayon, P., Falzon, P., Marras, W.S., Wilson, J.R., Van der Doelen, B., (2012). A strategy for human factors/ergonomics: developing the discipline and profession., *Ergonomics* 55 (4), 377-395
- 2015 Lillehammer, Norway
"Work environments for creativity and innovation"
Dul, J., Ceylan, C., (2011), Work environments for employee creativity, *Ergonomics* 54 (1), 12-20
- 2016 Kuopio, Finland
"Towards a necessity theory of Human factors/ergonomics"
Dul, J. (2016) Necessary Condition Analysis (NCA): Logic and methodology of "necessary but not sufficient" causality, *Organizational Research Methods* 19(1), 10-52

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NES 2006

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Definition ergonomics

"Ergonomics (or human factors) is the scientific discipline concerned with understanding the interaction among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance"

(IEA 2000)

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NES 2006

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Ergonomics

Overall system performance

	YES	NO
Well being	YES "True" Ergonomics	NO Limited Ergonomics (only health and safety)
NO	Bad Ergonomics (only performance improvement)	Bad product or process

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Unique features of human factors/ergonomics (IEA policy)

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1. Design driven
 - Focus on improving the (work) environment
2. Systems approach
 - Not just technical environment, also organizational environment
 - Not just physical effects, also psychological effects
3. Dual outcomes
 - Performance
 - Well-being

Dul, J., Bruder, R., Buckle, P., Carayon, P., Falzon, P., Marras, W.S., Wilson, J.R., Van der Doelen, B., (2012). A strategy for human factors/ergonomics: developing the discipline and profession., *Ergonomics* 55 (4), 377-395

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Can we deliver both?

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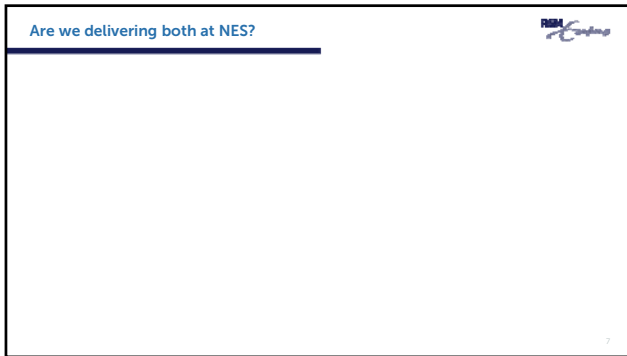
Review of 38 empirical studies of changes in the work environment

		"Well being"	
		Negative	Positive
"Performance"	Negative	8%	3%
	Positive	3%	87%

Neumann, P. & Dul, J. (2010). Human factors: spanning the gap between OM and HRM. *International Journal of Operations & Production Management* 30 (9), 923-949

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Are we delivering both at NES?



Keywords in titles of presentations at NES 2016

'Well-being'		'Performance'	
Health	10	Productivity	1
Safety	7	Performance	0
Well-being	2	Innovation	0
Satisfaction	2	Profit	0
Stress	3	Turnover	0
Load (work, over-)	2	TOTAL	1 (2%)
Risk (human)	5		
Disorder(s) (MSD's, sick)	2		
Symptoms	2		
Injuries	2		
Accidents	2		
TOTAL	39 (98%)		

Keywords in titles of presentations at NES 2019

'Well-being'		'Performance'	
Health	6	Productivity	2
Safety	4	Performance	3
Well-being	1	Innovation	2
Satisfaction	1	Profit	0
Stress	1	Turnover	0
Load (work, over-)	5	TOTAL	7 (19%)
Risk (human)	5		
Disorder(s) (MSD's, sick)	4		
Symptoms	0		
Injuries	2		
Accidents	1		
TOTAL	30 (81%)		

Good exception at NES 2019

"Perceptions of satisfaction, collaboration, well-being and productivity after relocation to activity-based office"

Virpi Ruohomäki, Finland



Our current main approach

Still focus on well-being

- Core competence: Improving the working environment for human well-being



Happy worker company

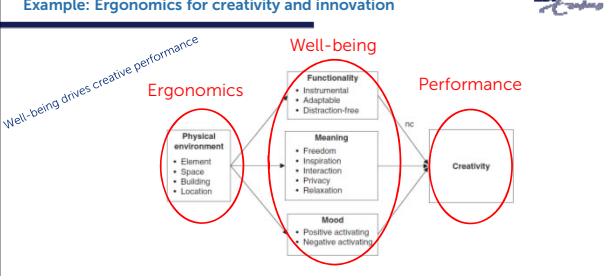
- Company has a social policy
- Initiates well-being driven changes

Examples can be primarily found in:

- Large companies
- Knowledge companies
- Rhinelandic Western companies (stakeholder orientation)



Example: Ergonomics for creativity and innovation




Dul, J., Ceylan, C., & Jaspers, F. (2011). Knowledge workers' creativity and the role of the physical work environment. *Human Resource Management, 50*(6), 715-734.

Dul, J. (2019). *The Physical Environment and Creativity: A theoretical framework*. In J.C. Kaufman, R.J. Sternberg (Ed.), *Cambridge Handbook of Creativity* (2nd Edition)(481-509). Cambridge: Cambridge University Press.


Dul, J. & Ceylan, C. (2011). *Work environments for employee creativity. Ergonomics, 54*(1), 12-20.

Another reality: performance by human resources





Performance driven organization

Ergonomics for well-being is not so desired!




Another reality: well-being by legislation



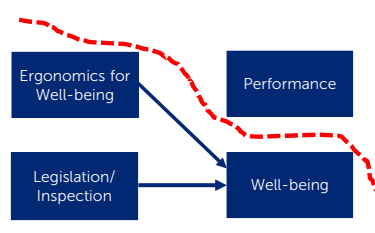



Performance driven organization

Ergonomics for well-being is not so desired!



Another reality: performance and well-being are separate

"Isolated ergonomics"

Dul, J., and Neumann W.P. (2009) Ergonomics contributions to company strategies. *Applied Ergonomics* 40(4) 745-752.

Performance driven company

- Company's policy aims at performance
- Initiates performance driven changes
- Well-being ensured by legislation/inspection

Examples can be primarily found in:

- Small and medium sized companies
- Manufacturing companies
- Anglo-Saxon Western companies (shareholder orientation)
- Non-Western companies

Longitudinal Research Project with SME's

Importance of SME's:

- 95% of firms are SME's (OECD)
- 60%-70% of employment is from SME's (OECD)
- Lower productivity than in large firms (ILO)
- Poorer working conditions than in large firms (ILO)

Results: Number of changes made by the companies

Results from Sample 1 of 59 companies
Analysis at company level (all companies)


- Total 704 changes
- Average 4 changes per company per year (range 0-14)
- Average investment per company per year: € 140,000 (range € 0 – € 2,400,000)

Results: Types of changes

<p>Technical</p> <ul style="list-style-type: none"> ○ New machinery ○ Robots ○ Tools, e.g. lifting tables ○ Personal protective equipment ○ Machine safety devices ○ Etc. 	<p>Organizational</p> <ul style="list-style-type: none"> ○ Worker participation ○ Information sharing ○ Training ○ Production planning ○ Reward system ○ Distribution of responsibilities ○ Etc.
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Results: Primary motivation for changes

- Performance driven: 81%
- Well-being driven: 15%
- Other (e.g. personal): 4%



Results: Average Investment for changes

Per company per year:

Technical performance driven changes:	71,000 €
Organizational performance driven changes:	37,000 €
Well-being driven changes:	7,000 €

Lessons for ergonomics

In performance driven companies:

1. Sell ergonomics as a discipline/profession that helps to improve performance.
2. Identify performance problems and opportunities
3. Deliver performance improvement
 - With our design-driven, systems approach
4. Ensure well-being as a professional goal and side effect
 - Enhance positive well-being effects (meet highest standards).
 - Avoid negative well-being effects (meet minimum standards)
5. Selling and delivering ergonomics via well-being and probability of preventive labour inspection seems not very effective.

Note: Performance is a goal of nearly all organizations !

