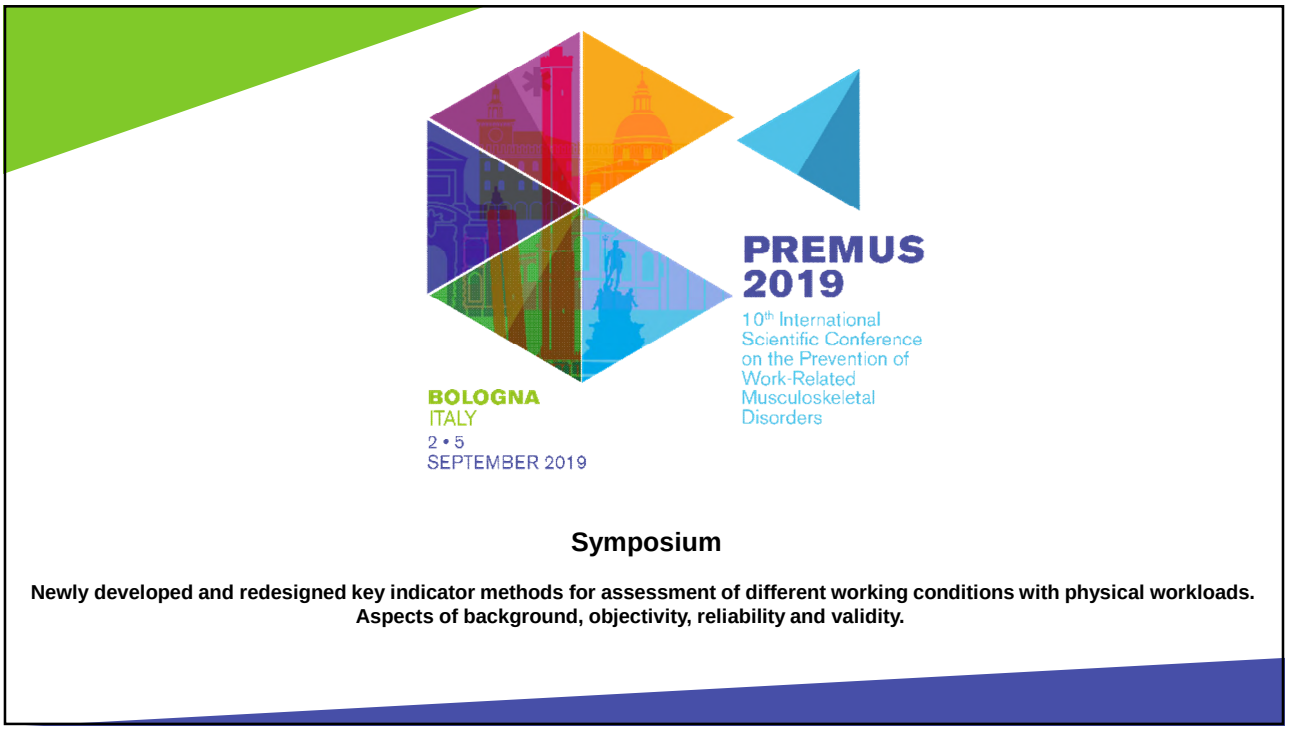
PREMUS
2019
10th International
Scientific Conference
on the Prevention of
Work-Related
Musculoskeletal
Disorders
BOLOGNA
ITALY
2 • 5
SEPTEMBER 2019
Symposium
Newly developed and redesigned key indicator methods for assessment of different working conditions with physical workloads.
Aspects of background, objectivity, reliability and validity.

Symposium
Newly developed and redesigned key indicator methods for assessment of different working conditions with physical workloads.
Aspects of background, objectivity, reliability and validity.
Part 1: 09:15-10:00 AM
Part 2: 10:30-12:00 AM
Salone del Podestà

Presenters:

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Part 1: 9:15-10:00 AM

- Background of development of Key Indicator Methods &
- The draft of the new Key Indicator Method “Manual Handling Operations” (KIM MHO): **Aspects of <u>background, objectivity and reliability</u>**
  (André Klussmann et al.)
- The draft of the new Key Indicator Method “Manual Handling Operations” (KIM MHO): **Aspects of <u>criterion validity</u>.**
  (Falk Liebers et al.)

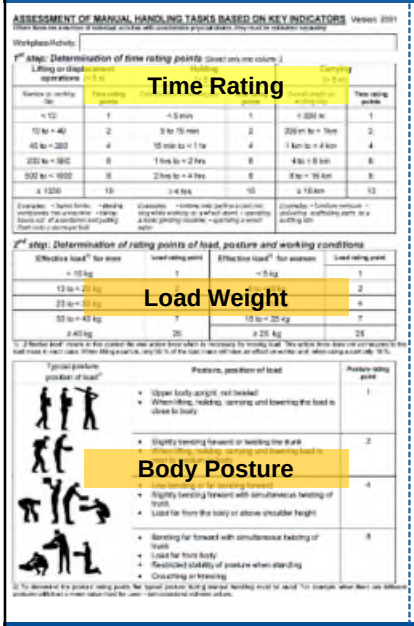
Part 2: 10:30-12:00 AM

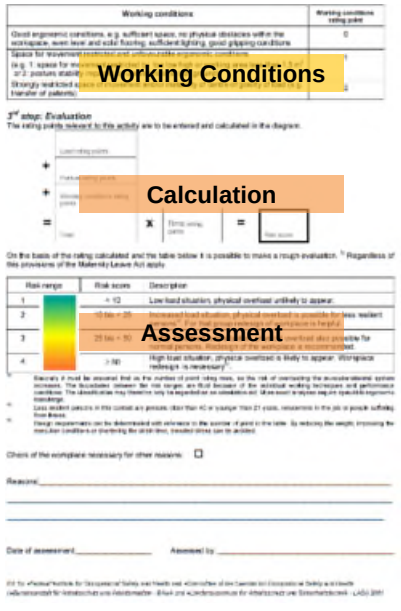
The draft of the new Key Indicator Method for …

- Manual Lifting, Holding and Carrying Loads" (KIM LHC)
  (Patrick Serafin et al.)
- Manual Pushing and Pulling of Loads" (KIM PP)
  (Marianne Schust et al.)
- Awkward Body Postures (KIM ABP)
  (Bernd Hartmann et al.)
- Body Movement (KIM BM)
  (Hansjürgen Gebhardt et al.)
- Whole Body Forces (KIM BF)
  (André Klussmann et al.)

Aspects of background, objectivity, reliability and criterion validity.

What is a Key Indicator Method (KIM)?





- **Key Indicator Methods (KIM) are specific screening methods for the risk assessment for different types of physical workload**
- **Different "indicators" (like e.g. for lifting and carrying**
  - **time rating**
  - **load weight**
  - **body posture and**
  - **working conditions)**

are taken into account and an overall risk is calculated.

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Development of the Key Indicator Methods for the Risk Assessment of Physical Exposures

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Council Directive 90/269/EEC of 29 May 1990 on the **minimum health and safety requirements for the manual handling of loads** where there is a risk particularly of back injury to workers

Beginning of Review of existing Methods and **Development of a first Guideline** for Risk Assessment of manual handling of loads by the Federal Institute of Occupational Safety and Health (BAuA)

Implementation of the Council Directive 90/269/EEC in the national German law system

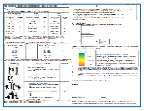
First draft of the Guideline for Risk Assessment of manual handling of loads by BAuA

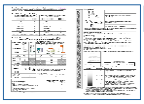
Beginning of Development of a **Guideline for "Pushing and Pulling"** by BAuA

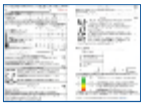
Publication of validated first "KIM Lifting/Holding/Carrying" by BAuA

Publication of "Pushing and Pulling" by the BAuA in 2002

Beginning of development of the KIM "manual handling operations" by the BAuA in 2005







90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18

First ideas for drafts of three further KIMs: **"awkward body posture", "extensive body movement" and "body force"** by the BAuA

Publication of the **first draft of KIM "manual handling operations"**

Publication of the **validated KIM "manual handling operations"**

Evaluation of the tree existing KIMs, development of drafts, evaluation and validation of the three further KIMs "awkward body posture", "extensive body movement" and "whole body forces", harmonization with other tools and measurement devices within the MEGAPHYS Project by BAuA/DGUV (2013-2018)

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Common MEGAPHYS products as a basis for a harmonized and consecutive method concept

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study protocol

- Common definition of method levels
- Common definition of six types of physical workloads
- Common risk concept (4 stages)
- Common effective modell Definition of Outcomes
- Common data protection concept

MEGAPHYS
Mehrstufige Gefährdungsanalyse physischer Belastungen am Arbeitsplatz
[Multilevel risk assessment of physical exposures]

Acknowledgements: *The methods and results presented here were generated within the framework of the MEGAPHYS project.*
More results from the MEGAPGYS-Project, see Symposium tomorrow, 2.30 – 4.30 pm, Salone del Podestà
The project was funded by the Federal Institute for Occupational Safety and Health (BAuA) and the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA). All authors of this presentation are MEGAPHYS partners of BAuA. Further MEGAPHYS partners are IFA, the Institute of Ergonomics at the Darmstadt University of Technology (IAD) and the Leibniz Research Centre for Working Environment and Human Factors (IfADo).

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A priori definition of the data evaluation for the method level specific screening (KIM)

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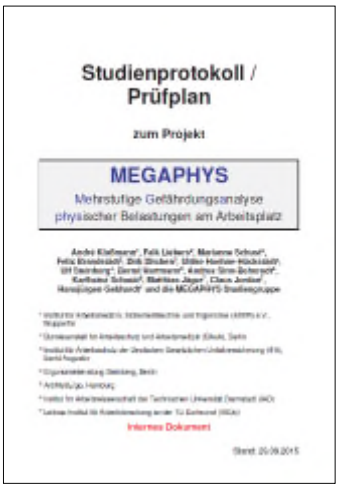
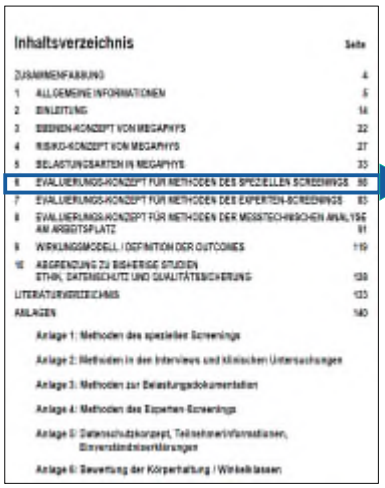
study protocol


Studienprotokoll / Prüfplan

zum Projekt

MEGAPHYS

Mehrstufige Gefährdungsanalyse physischer Belastungen am Arbeitsplatz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BMJ Open Validation of newly developed and redesigned key indicator methods for assessment of different working conditions with physical workloads based on mixed-methods design: a study protocol

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Validation of the KIMs within the MEGAPHYS project: Study design: working hypotheses

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- The working hypotheses (WH) include the examination of different quality criteria of the KIMs
  - WH 1: The KIMs are an adequate reflection of the construct to be measured (**face validity**)
  - WH 2: At the completion of the KIMs, no relevant deviations occur between different users assessing the same workplaces (**reliability**).
  - WH 3: Assessing workplaces using the KIMs and other screening methods measuring the same type of physical workload will result in no relevant differences (**convergent validity**).
  - WH 4: It is assumed that employees at workplaces with high physical workloads show adverse health-related outcomes (e.g. musculoskeletal symptoms) more frequently than non-exposed workers. It is assumed that high-risk scores derived in the assessment of workplaces with the KIMs are associated with a high prevalence of musculoskeletal symptoms and disorders (**criterion validity or content validity regarding hypotheses testing**).

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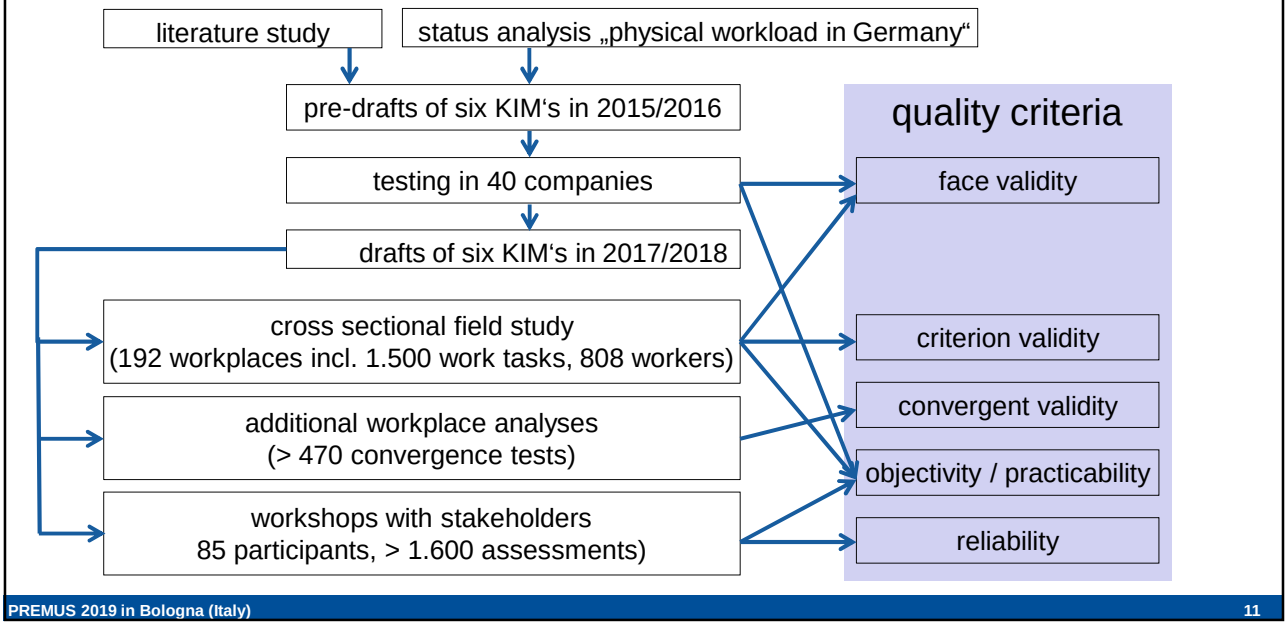
Which steps were taken during the KIM's development and testing?



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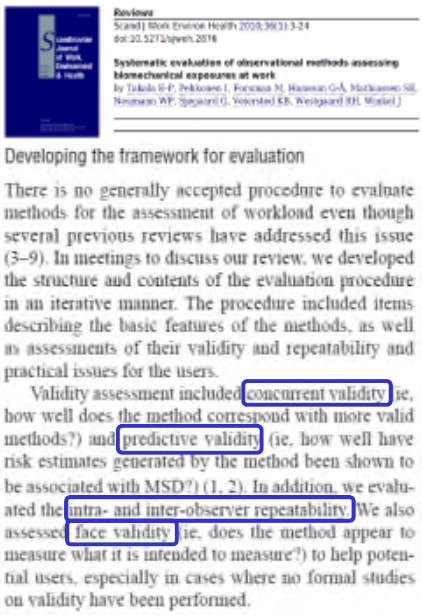
Selection of quality criteria

- Selection of the quality criteria described in the working hypotheses was derived from a systematic evaluation of observational methods, also taking into accound the findings and definitions of “Takala et al., 2010”.
- For analysis of the quality criteria, the recommendations of the COSMIN checklist (COnsensus-based Standards for the selection of health Measurement INstruments) was taken into account.



Reviews

Scand J Work Environ Health 2010;36(1):3-24
doi:10.5271/sjweh.2876

Systematic evaluation of observational methods assessing biomechanical exposures at work

by Takala E-P, Pehkonen I, Forsman M, Hansson G-Å, Mathiassen SE, Neumann WP, Sjøgaard G, Veiersted KB, Westgaard RH, Winkel J

Developing the framework for evaluation

There is no generally accepted procedure to evaluate methods for the assessment of workload even though several previous reviews have addressed this issue (3–9). In meetings to discuss our review, we developed the structure and contents of the evaluation procedure in an iterative manner. The procedure included items describing the basic features of the methods, as well as assessments of their validity and repeatability and practical issues for the users.

Validity assessment included concurrent validity (ie, how well does the method correspond with more valid methods?) and predictive validity (ie, how well have risk estimates generated by the method been shown to be associated with MSD?) (1, 2). In addition, we evaluated the intra- and inter-observer repeatability. We also assessed face validity (ie, does the method appear to measure what it is intended to measure?) to help potential users, especially in cases where no formal studies on validity have been performed.

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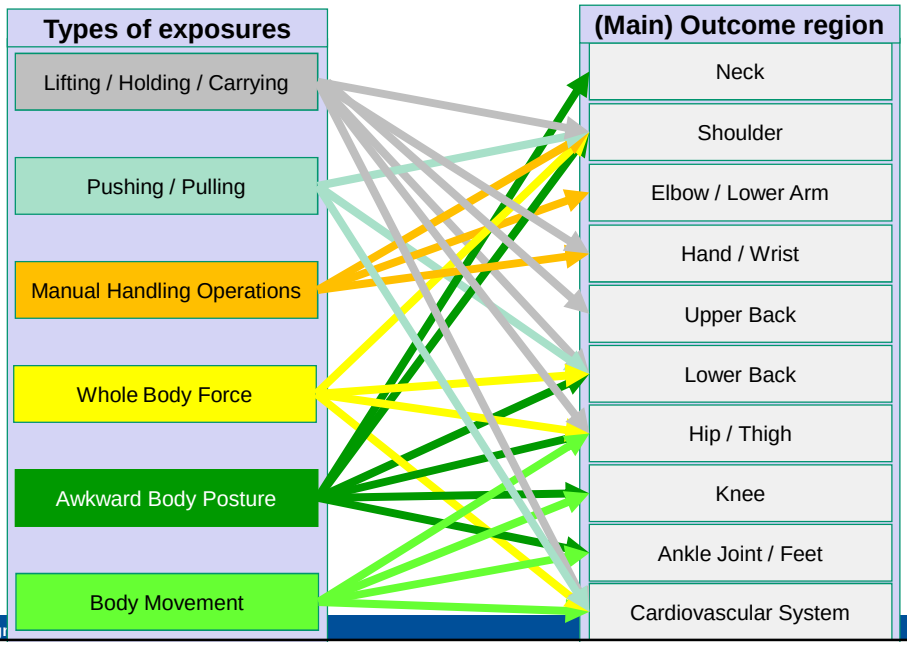
Types of exposures and (expected) relation to different outcomes



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Study design: methods and collectives

- Cross-Sectional-Study at workplaces in voluntarily participating companies
  - For the determination of **criterion validity**, a cross-sectional study among 808 employees at 192 different workplaces was carried out.
  - Employees were interviewed (Nordic Questionnaire, WAI, COPSOQ) … and examined by a physician (standardized diagnostic procedure).
  - Workplace analyses were done by direct observations and assessments using a standardized documentation form, KIMs, interviews, measurements (eg, noise, climate) and video recordings.
  - These workplace analyses were also used for the determination of **face validity**, **reliability, convergent validity, criterion validity and further aspects of utility**.
- 16 workshops with over all 85 practitioners (**reliability/objectivity**)
  - Presentation and training of the proposed method based on examples.
  - Assessment of different example tasks by several workshop participants (users) at T1.
  - Repeated assessment of the example tasks (in modified order) by the workshop participants at T2 (approx. 4 weeks later).
  - Assessment of same tasks with the proposed method by experts (reference).
  - Over all, > 1.600 assessments of work tasks with the KIMs

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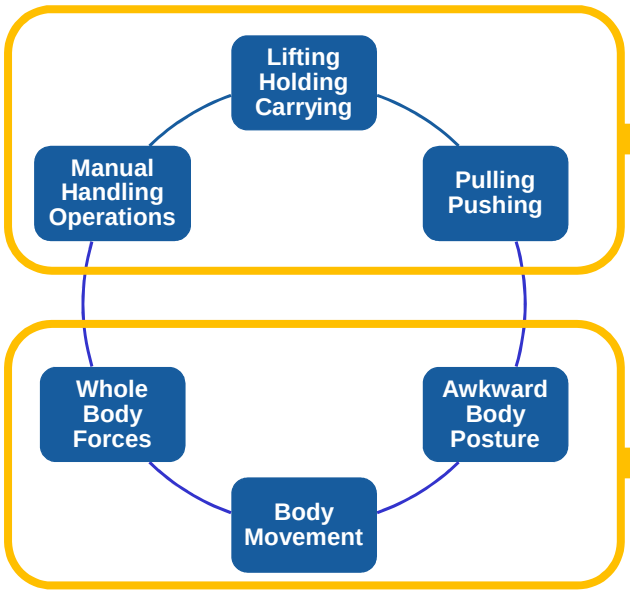
Types of physical exposures and the "KIM-Family"



Already developed and revised within the current research project

Developed de novo during the current research project

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End

Thank you for your attention

Any Questions?

I declare no conflict of interest

www.baua.de/leitmerkmalmethoden

Acknowledgements: *The methods and results presented here were generated within the framework of the MEGAPHYS project. The project was funded by the Federal Institute for Occupational Safety and Health (BAuA) and the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA). All authors of this presentation are MEGAPHYS partners of BAuA. Further MEGAPHYS partners are IFA, the Institute of Ergonomics at the Darmstadt University of Technology (IAD) and the Leibniz Research Centre for Working Environment and Human Factors (IfADo).*

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