

Examining the Relationship between IT working practices and ill health

New concept for occupational health professionals for assessing work load factors in mobile work

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ICT-based mobile work

- An employee is considered mobile when he works more than ten hours per week away from his primary workplace and uses ICT for collaboration.
- Mobile employees work during their business trips/working days in multiple different locations with the help of ICT (concepts of multi-locational, virtual work).
- There are new complexity and workload factors related to this kind of working (Andriessen & Vartiainen 2006, Hislop & Axtell 2009, Vartiainen & Hyrkkänen 2010).

Need for assessing work load factors of mobile work

- Occupational health care professionals met the contradiction: they should be able to analyze the load of mobile work as well as the stress and strain of a mobile employee and to offer adequate instructions for optimizing and controlling the load although they meet the employee only occasionally.

“Funnel” model for assessing work load factors of mobile work

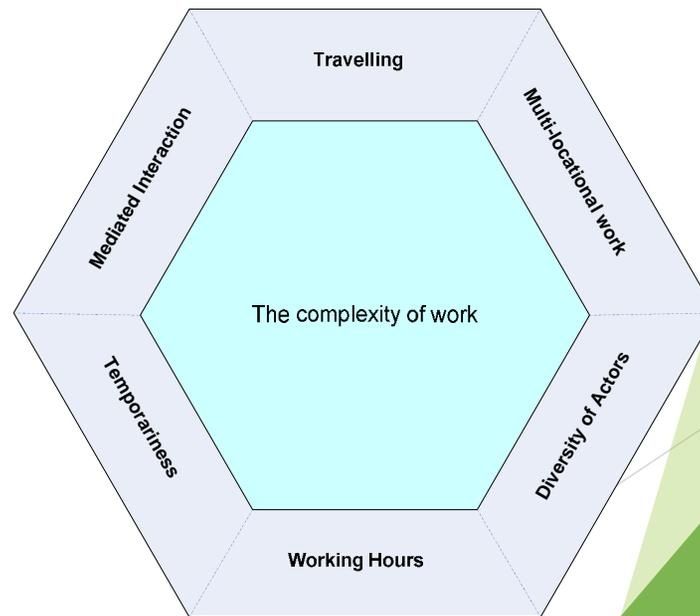
- The virtual workload assessment procedure was developed for identifying the work load factors of mobile work
- The developed procedure and related concrete tools form a flow of actions, which can be described as a “funnel”
- The procedure consists of methods and tools for three different levels of accuracy
 - the first level tools are generic and aimed for screening and picking out those employees who have high work load factors and thus risk for diseases
 - the second and third level tools are accurate and aimed for rigorous and detailed **assessment** of work load factors of employees with strain

The first level assessment

- u Aim: at the organization level, identify those mobile employees who have high work load factors related to business travelling and thus risk for ill health
- u Uses data from the normal HRM travelling data system of organizations
 - u When taking a business trip, an employee normally fills the information concerning his/her trip in the travelling management system
 - u By using this information, those with a high work load could be filtered out
- u Two factors selected for filtering according to the evidence shown in prior studies
 - u over 50 travelling days per year
 - u over 20 broken nights due to travelling, i.e. set offs or returns during the time from 11 PM to 6 AM

The second level assessment

- If both factors are materialized, the employee will be selected into a closer consideration
- Aim: examine which work load factors in each complexity factor are realized in the employee's work and what is employee's related experience; what is the feeling of strain
- Tools: digital questionnaires
 - A questionnaire on the work load factors related to six complexity factors
 - A questionnaire on ergonomics of multi-location work
- Produces "traffic lights"
 - If red, more and specific measurements and health consulting
 - If yellow, the option for closer assessment offered, health consulting
 - If green, positive feed back



The third level assessment

- Aim: specific assessment - accurate **physiological** measurements revealing the stress and recovery of an individual and his/her bodily systems
- Arranged for those employees, who have got “red marks” from the second level assessment
- Methods and tools:
 - Well-being diaries and interviews
 - HRV (Heart Rate Variability) and diary, feedback meeting
 - Actigraph (validated suite of accelerometer-based hardware and software solution for deliver continuous, 24 hour physical activity and sleep information)

DIGITIZED PHYSIOLOGY THROUGH HRV



- **Heart rate variability** (HRV) refers to beat-by-beat changes in heart rate
- HRV is mediated by autonomic nervous system (ANS)
- Different body functions influence HRV. We use **HRV as a window to map underlying physiology**
- Firstbeat creates a **digital model of key physiological functions**

The measurement procedure



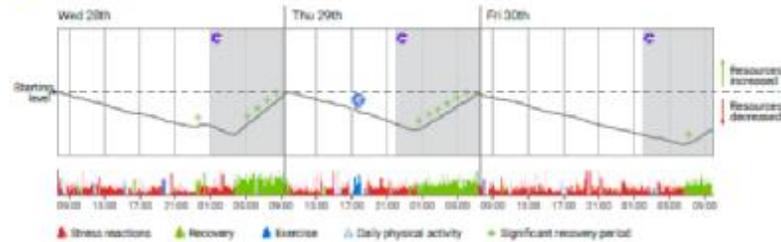
- HRV recording procedure
 - u Each testee carried for three business travelling days the heartbeat recording system
 - u Each testee carried three for three normal office days the recording system
 - u Each testee entered all his actions from these days into a diary
 - u Analysis of HRV was done by using the FirstBeat program
 - u The HRV chart was discussed (interviewed) with each testee

Feedback

LIFESTYLE ASSESSMENT SUMMARY

Person: 83485	Age: 44	Activity Class: 4.0 (Average)	Assessment: Wed 28 May - Fri 30 May 2014
Height (cm): 180	Resting heart rate: 54		
Weight (kg): 80	Max. heart rate: 184		
Body Mass Index: 24.7			

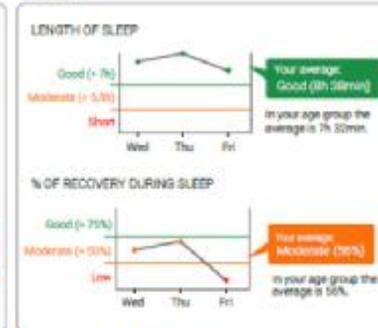
BODY RESOURCES



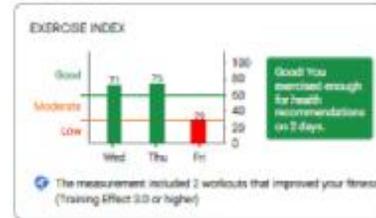
STRESS AND RECOVERY



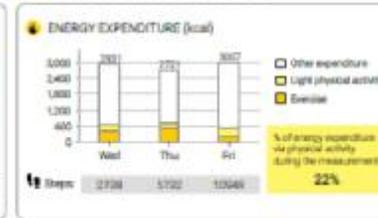
SLEEP



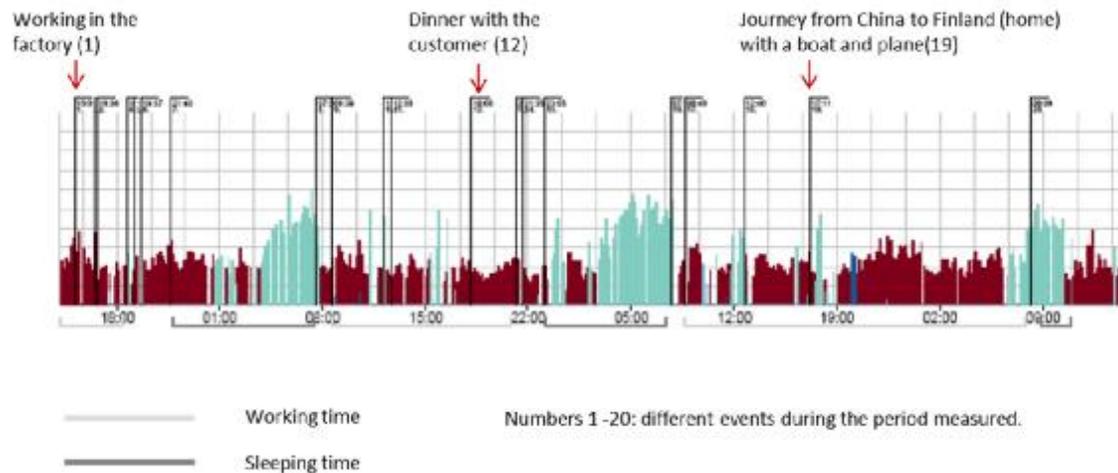
EXERCISE



ENERGY EXPENDITURE & STEPS

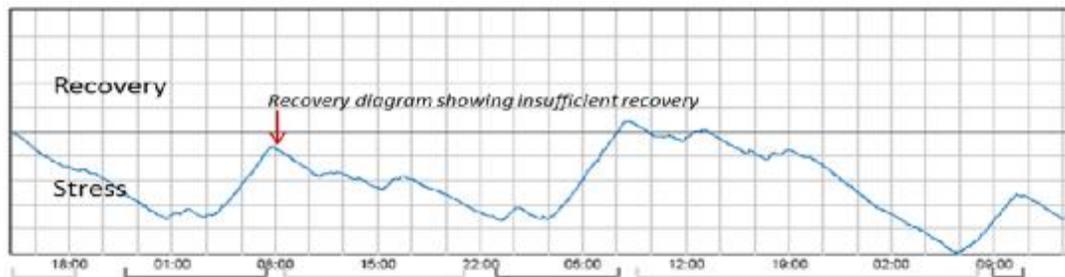


From HRV diagram for assessing stress and recovery reactions



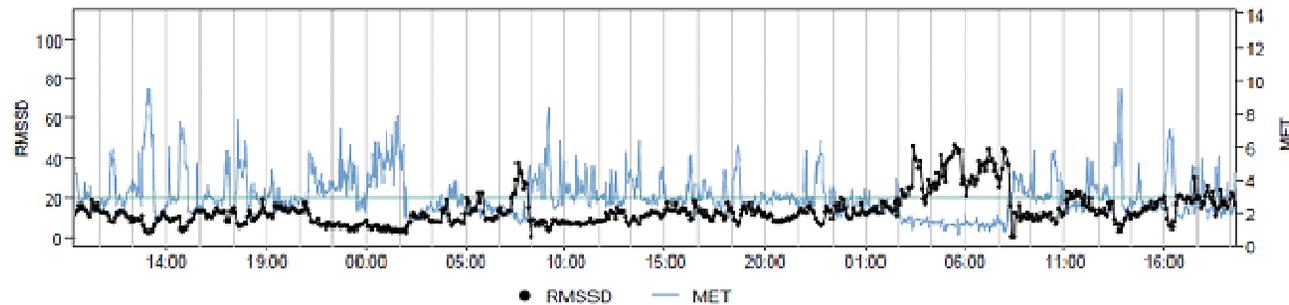
The HRV diagrams showed that during business trips, the mobile employees' sympathetic activation dominated and parasympathetic activation phases remained relatively short. Mobile working days were long and filled with sympathetic activation. During the working period there seldom were breaks for recovery.

The diagram of recovery



The diagram demonstrating the balance of stress and recovery reactions shows reduction of energy reserves

RMSSD – for assessing the quality of sleep



RMSSD is a measure of parasympathetic cardiac modulation, which could be used for assessing the quality of sleep.

The First Beat application produces estimations of the quality of sleep based on the analysis of RMSSD during sleeping time.

The average of RMSSD during sleep pointed out bad quality of sleep during the business trip

Conclusions

- u An extensive amount of business travelling with a large area of operation embodies work load factors, which can be made visible for employees by the help of the HRV measurement. The measurement acts as health behaviour enhancing material.
- u Through HRV measurement, occupational health care practitioners gain valid information of the mobile employee's ANS stress and recovery reactions.
- u When connecting the diary information to HRV data, knowledge of working conditions and work load factors may also be reached.

Conclusions

- u However, the measurement procedure is time consuming and expensive to execute.
- u Therefore it is not reasonable to assess the stress and recovery reactions of ANS of every mobile employee by the HRV procedure. Instead the HRV measurement target should be on those mobile employees, who have difficulties with controlling their work-life balance and who are suffering from symptoms assumed to be due to their mobile working mode.

Experiences

- u The occupational health care professionals find the analysis phase of the HRV data the most difficult. For adequate analysis not only the demographic parameters (age, gender) but also the health status related issues as well as the medication should be taken into account. How these factors affect the fluctuation of sympathetic and parasympathetic activation was not simple to conclude.
- u The feedback meeting was considered a beneficial learning situation for a mobile employee. At the sight of HRV results the mobile employees started to discern the demands of their work, the work–life balance as well as the recovery enhancing possibilities. As this feedback situation was significant to the measured mobile employee, it really was essential for the occupational health care professional for ensuring the clinical reasoning. The tables of the HRV parameters as well as the diary filled with work and other events act as a stimulus to health related discussions.

CASE - INDUSTRIAL FOREST COMPANY : OCCUPATIONAL HEALTH

*“ We can assess our employees comprehensively. When you can match analysis results with the person’s own observations and insights, the process becomes **concrete and personal.**”*

Tero Kemppainen, Head Physician of Occupational Healthcare

To Whom: 3000+ assessments in Finland, China and Germany

How? 1) **Targeted health promotion programs:** Health inspections with lifestyle assessment for individuals or focus groups

2) **Assessments for risk groups: Annual check-up**
Shift workers, people who travel a lot

Results: 60-70% fulfillment of well-being commitments resulting in better stress management

If used for research purposes

- u It is essential to motivate the testees to do proper entries into the diary during several measurement days.
- u Defining the baseline: analysis needs individual normalization by defining an individual's normal baseline resting level of HR and HRV.
- u Comparison, 3 days on the move, 3 days at the home office - demanding for the testee.
- u Ethical considerations
 - u health related information of cardiovascular system functioning
 - u enough time for health related feed-back and advice

Thank you !

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