



# Building consensus

Achievements and challenges in international  
working hour research communities

Dr. Anna Arlinghaus

I am here today in 3 different functions ...



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[www.arbeitszeitgesellschaft.org](http://www.arbeitszeitgesellschaft.org)

**XIMES GmbH**

- Senior consultant since 2016 and shareholder since 2021
- Working on research, consulting and software projects in the field of working time and personnel demand

**Working Time Society**

- Member of the Executive Board since 2013
- Current Position: Treasurer

**Arbeitszeitgesellschaft / German Language WTS**

- Founding member of the Board since 2013
- Current Position: President

## XIMES – Specialists for time-related resource optimisation

WHO is **XIMES**®?

- A team of approx. 20 experts for consulting, software development and training, Headquartered in Vienna. Sales partners in Germany and other European countries.
- Successful for over 20 years with consulting and tools for resource optimization.
- Broad international customer base: Austria, Germany, Switzerland, Great Britain, USA, Scandinavia, South-East Europe.
- Spin off of TU Vienna, research projects & cooperations, books

WHAT does **XIMES**® do?

- **XIMES provides solutions for optimal staff deployment.**
- **Software and Training**
  - TIS Forecasting and Controlling of personnel requirements and deployment
  - OPA Design of Shifts/Duties – Calculation of persons needed
  - SPA Development of shift schedules
- **Consulting across all sectors**



- **Research on shift work and working hours**

## Working Time Society Milestones

### **1957: Foundation of the Scientific Committee “Shiftwork” of the Permanent Commission and International Association on Occupational Health (ICOH)**

Objectives:

- a) discussing basic and applied problems related to shift and night work
- b) being an advisory Committee for national and international bodies
- c) promoting co-operative efforts for the solution of occupational work problems in this area

### **1997: Foundation of the Working Time Society as twin scientific body of the ICOH SC Committee “Shiftwork”**

### **2018: Working Time Society incorporated into a registered not-for-profit organization (in Austria)**

## Current Working Time Society Goals

- Reimagine the Shiftwork and Working Time symposia
- Increase equitable access to our organization, meetings and products
- Increase worldwide capacity around working time research and issues
- Promulgate our knowledge to benefit shiftworkers, organizations and governments
- Support further professionalization of the field

# The Working Time Society

## Introduction of the Board

- **Chair:** Stephen Popkin
- **Secretary:** Claudia Moreno
- **Treasurer:** Anna Arlinghaus
- **Board Members:** Phil Bohle, Anne Helene Garde, Kimberly Honn, Elaine Marqueze, Kyriaki Papantoniou, Greg Roach, Mikael Sallinen, Celine Vetter
- **Co-opted Board Members:** Frida Fischer, Thomas Kantermann, Masaya Takahashi, Imelda Wong

## Arbeitszeitgesellschaft (German Language WTS)

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- „Sister-Organization“ of the Working Time Society in the German speaking countries (Germany, Austria, Switzerland)
- Founded 2013 in Austria
- Goals of the society
  - Research and practice in the design of working times (especially night and shift work), as well as their effects, risks, optimization and related questions
  - Support of interdisciplinary research, collaboration amongst researchers, spreading knowledge and developing recommendations for work hour scheduling
  - Collaboration with scientific institutions, organizations, and individuals who pursue similar goals
- Ca. 50 members as of June 2023

[www.arbeitszeitgesellschaft.org](http://www.arbeitszeitgesellschaft.org)

## Executive Board 2022 - 2024

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### *President*

Dr. Anna Arlinghaus, XIMES GmbH, Wien

### *1. Vice President*

PD Dr. Anne Marit Wöhrmann, BAuA, Dortmund

### *2. Vice President*

Dr. Bettina Stadler, Universität Graz

### *Treasurer*

Dr. Sylvia Rabstein, IPA der DGUV, Bochum

### *Secretary*

PD Dr. Johannes Gärtner, Technische Universität Wien,  
XIMES GmbH, Wien



## Scientific Committee

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- Prof.in Dr. Beate Beermann, Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (BAuA)
- Dipl.-Arb.-Wiss. Veit Hartmann, ifaa, Düsseldorf
- Prof. Dr. Michael Kundi, MedUni Wien
- Dr. Steffen Lehndorff, Universität Duisburg-Essen
- Dr. Yvonne Lott, Wirtschafts- und Sozialwissenschaftliches Institut (WSI)
- Prof. Dr. Friedhelm Nachreiner, GAWO e.V., Oldenburg
- PD Dr. Christoph Oberlinner, BASF Ludwigshafen
- Prim. Dr. Erich Pospischil, AMZ - Arbeits- und sozialmedizinisches Zentrum Mödling, Wiener Neudorf
- Prof. Dr. Till Roenneberg, Ludwig-Maximilians-Universität München
- PD Dr. Sebastian Schief, Universität Fribourg
- Dr. Hartmut Seifert, ehem. Leiter (WSI) in der Hans-Böckler-Stiftung, selbstständig
- Prof. Dr. Norbert Semmer, Universität Bern
- Prof. Dr. Céline Vetter, University of Colorado, Boulder, USA / seit 08/21 XIMES GmbH, Wien
- Prof. em. (ETH) Dr.Dr.h.c. Eberhard Ulich, iafoB GmbH, Zürich

## Overview of activities

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- Annual Symposia since 2013
  - Locations: Dortmund Germany, Vienna Austria and Fribourg Switzerland
  - Biannual working hour events with the BAuA, Dortmund
    - „Fachveranstaltung Arbeitszeit“ (Fachbereich 1)
- Publications of proceedings in special issues in Zeitschrift für Arbeitswissenschaft, Sozialpolitik.ch, ASU
- Newsletter
- Twitter Account
- Consensus Papers
- Statements and political activities
- „Stammtisch Spätschicht“ in Dortmund – informal meeting

## Overview of Consensus Papers by the WTS and by the Arbeitszeitgesellschaft

### Arbeitszeitgesellschaft

- „Dortmunder Erklärung“ (statement regarding importance of working hour research and request to strengthen research and institutions, 2014)
- Consensus paper on the effects of **permanent night shifts** (2015)
- Consensus paper on the effects of **12h-shifts** (2016)

<https://arbeitszeitgesellschaft.wildapricot.org/page-1315612>

### Working Time Society


- Special issue in „Industrial Health“ 2019
- 9 consensus papers on different topics in shift work and working hour research

[https://www.jstage.jst.go.jp/browse/indhealth/57/2/\\_contents/-char/en](https://www.jstage.jst.go.jp/browse/indhealth/57/2/_contents/-char/en)



## Consensus Process in the Arbeitszeitgesellschaft

Literature review and draft of consensus statements by the Board and scientific committee



Presentation and discussion of consensus statements at the Symposia of the German Language WTS in 2015 (permanent night shifts) and 2016 (12h-shifts)



Publication of consensus statements online

## Recommendations of Arbeitszeitgesellschaft regarding **permanent night shifts**

1. It should be assessed if the amount of night work can be reduced prior to the decision about night shifts or permanent night work. This assessment should be periodical and part of the risk evaluation.
2. Higher proportion of night work should lead to a working time reduction in order to
  - Reduce work demands
  - Counter the effects of self-selection due to income optimization

E.g. compensation in time instead of money.

This could lead to increased probability that employees will take up second jobs.

3. Intensive support by occupational physicians can be helpful.
4. Work demands of night workers should be minimized or working hours should be reduced since the same work load leads to higher stress and strain during the night compared to the day.

Arbeitszeitgesellschaft, 2015: Dauernachtarbeit - Eine Sichtung des vorhandenen Wissenstandes mit Thesen, Empfehlungen & Forschungsfragen der Arbeitszeitgesellschaft

[https://arbeitszeitgesellschaft.wildapricot.org/resources/Documents/3.%20Symposium%20AZ-Gesellschaft/151020%20Dauernacht\\_Thesen\\_mit\\_Lit10aa\\_jg\\_.pdf](https://arbeitszeitgesellschaft.wildapricot.org/resources/Documents/3.%20Symposium%20AZ-Gesellschaft/151020%20Dauernacht_Thesen_mit_Lit10aa_jg_.pdf)

## Recommendations of Arbeitszeitgesellschaft regarding **12h-shifts**

1. 12h-shifts should be the (absolute) exception especially due to the high accident and injury risks and unknown questions regarding maximum exposures.
2. Employees need to be able to decline working in 12h-shifts.
3. 12h-shifts should contain on-call duties (30% or 1/3 of the time) or very low work demands.
4. Longer rest breaks than in 8h-shifts: 60 minutes breaks, which should be divided depending on work demands and lie within the 12h plus short handover time.

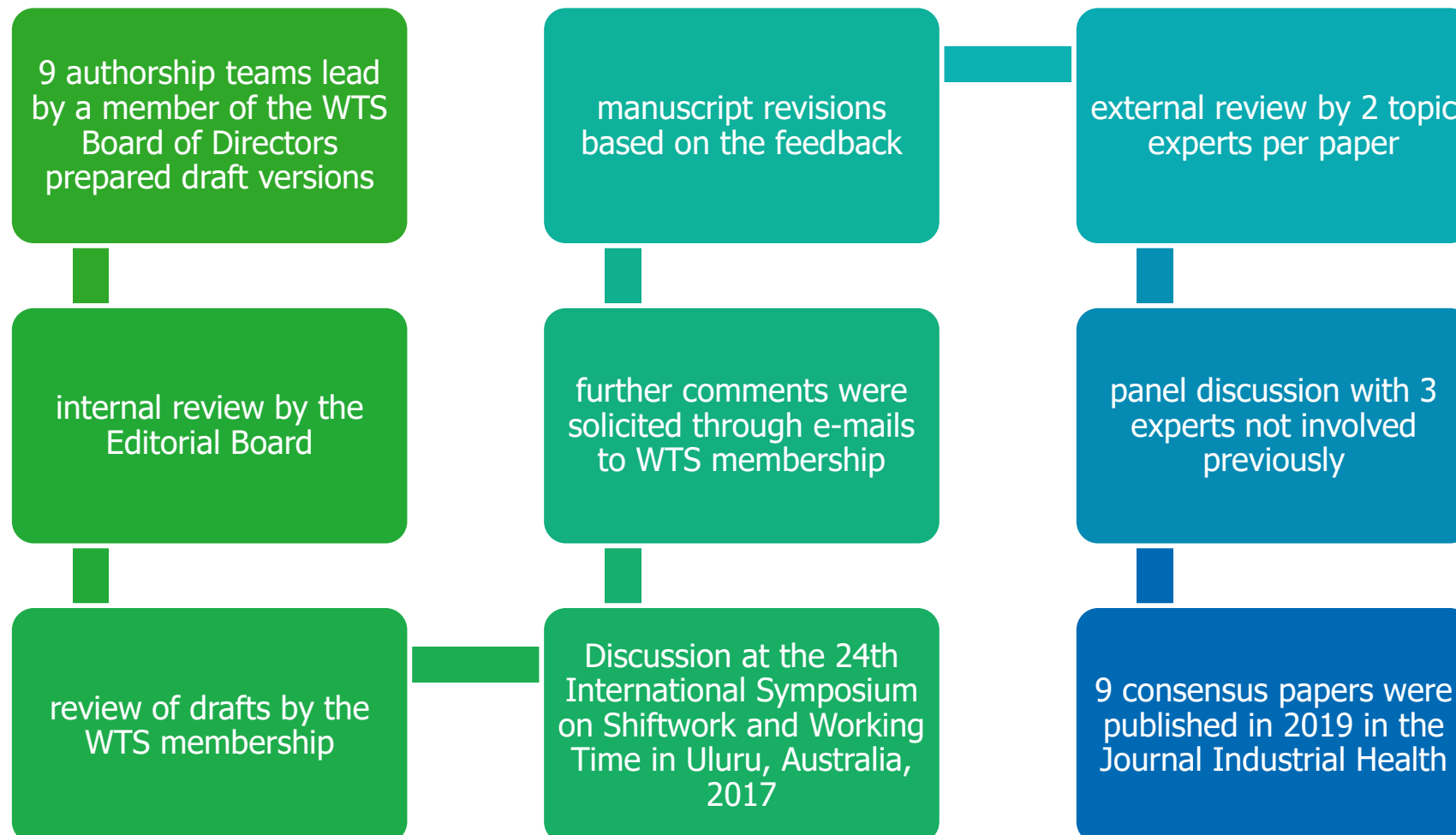
Arbeitszeitgesellschaft, 2016: 12-Stunden-Schichten–Stand der Diskussion.

<http://arbeitszeitgesellschaft.wildapricot.org/resources/Documents/4.%20Symposium%20AZ-Gesellschaft/161019%20Thesen%2012h-Schichten%20Symposium%20v07aa.pdf>

## Consensus Process in the WTS



## Consensus Process in the WTS





## Results

- Evidence-based effects of shift work on physical and mental health (Moreno et al. 2019)
- Circadian time structure impacts vulnerability to xenobiotics—relevance to industrial toxicology and nonstandard work schedules (Smolensky et al. 2019)
- Psychosocial stressors relevant to the health and wellbeing of night and shift workers (Fischer et al. 2019)
- Evidence-based effects of shift work and non-standard working hours on workers, family and community (Arlinghaus et al. 2019)
- Individual differences in shift work tolerance and recommendations for research and practice (Ritonja et al. 2019)
- Evidence based interventions using light to improve circadian adaptation to working hours (Lowden et al 2019)
- A multi-level approach to managing occupational sleep-related fatigue (Wong et al 2019)
- Regulatory approaches to reduce risks associated with shift work—a global comparison (Gärtner et al 2019)
- Prescriptive rule sets and risk management-based approaches for the management of fatigue-related risk in working time arrangements (Honn et al 2019)

## Why are consensus papers important?

### **External benefits:**

- ✓ Easier orientation for third parties, teachers, new researchers ...
- ✓ Minority positions do not stand side by side with well established knowledge
- ✓ Easier reference to specific states of the art if versions are updated

### **Internal benefits for research communities:**

- ✓ It facilitates thorough internal discussions
- ✓ and a joint understanding of strengths & weaknesses
- ✓ It helps to demonstrate the usefulness & results
- ✓ Existing evidence and research gaps have been identified
- ✓ Inform future research programs in the field of working hours

## Challenges

- ✓ Expert consensus can be challenging, e.g.
  - ✓ achieving a common concept,
  - ✓ understanding different use of words (a fast forward rotating schedule in DACH is rather different from a rotating schedule in the US)
  - ✓ getting many people involved,
  - ✓ discussion via email/forums
  - ✓ ...
- ✓ Translation of the findings into practice / including practitioners
- ✓ COVID – physical meetings, running a society remotely, membership fluctuation
- ✓ Resources (the societies rely heavily on volunteers)
- ✓ ...

## Consensus papers results have practical consequences

- ✓ Results strengthen previous findings and give support to existing recommendations for shift scheduling
- ✓ Results can be used for ergonomic / social assessment and design of working hours and shift schedules
  - As included in shift scheduling tools like XIMES SPA
  - Fatigue Risk Management systems
  - Gefährdungsbeurteilung der Arbeitszeit
  - ...
- ✓ They have partly been included in tools for risk assessment such as the Fatigue and Risk Index
  - New version: XIMES Accident Risk Calculator

# XIMES Accident Risk Calculator

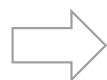


**Shift  
schedules**



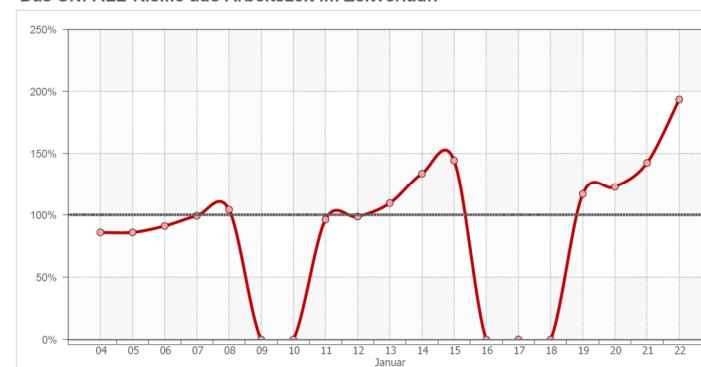
## Standardised Reports

**Pay roll  
data**



XIMES Accident Risk Calculator

Das UNFALL-Risiko aus Arbeitszeit im Zeitverlauf:

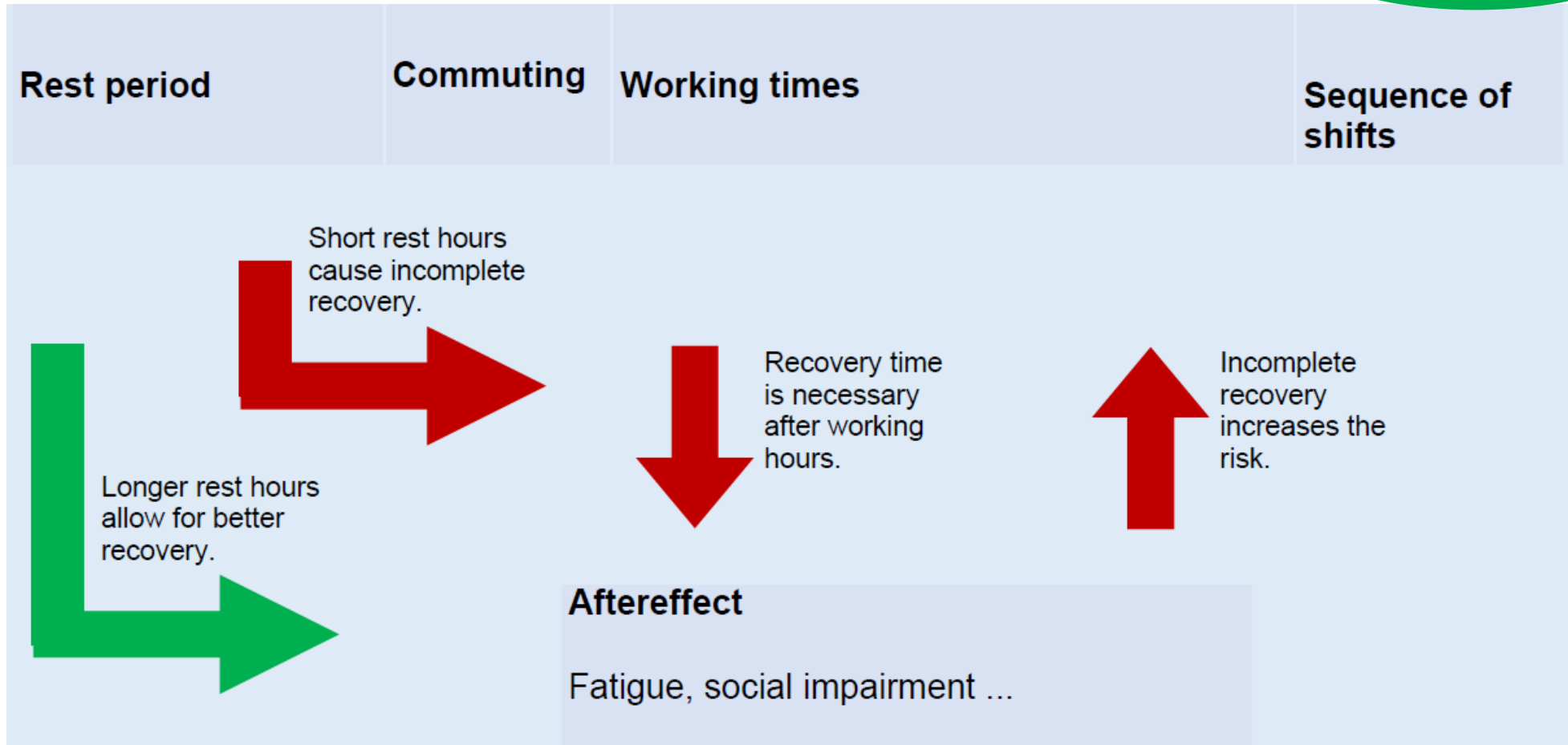
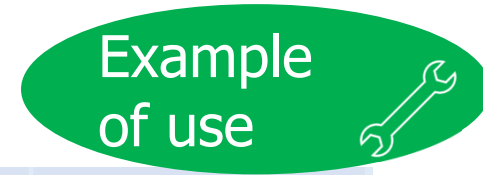


- ✓ Estimation of accident risk
- ✓ Detailed explanations!

OPEN source calculation engine  
FREE use for scientific purposes

<https://www.eval.at/de/arbeitsplatzevaluierung/evaluierung-arbeitszeit/>

The model



## The relative accident risk changes by:

**33 %**

RELATIVE RISK: Risk research often uses relative risk, which expresses the factor by which a risk differs between two groups of people. If, for example, the absolute accident risk in some working area across all employees is 2% per year, but if night work is included, it is 3%, then the relative risk is  $3\%/2\% = 150\%$ , an increase of 50%. If the risk remains unchanged, the result is 100% relative risk. If it drops to 1.5%, the relative risk is reduced to 75%, a decrease of 25%.

The calculation of the relative risk thus shows the expected change under different conditions (e.g. other dangers of work).

The risk is calculated in relation to the average risk of the reference working time model of five morning shifts with 8h of working time and 30 minutes break each followed by two days off = REFERENCE RISK.

### Risk assessment per shift

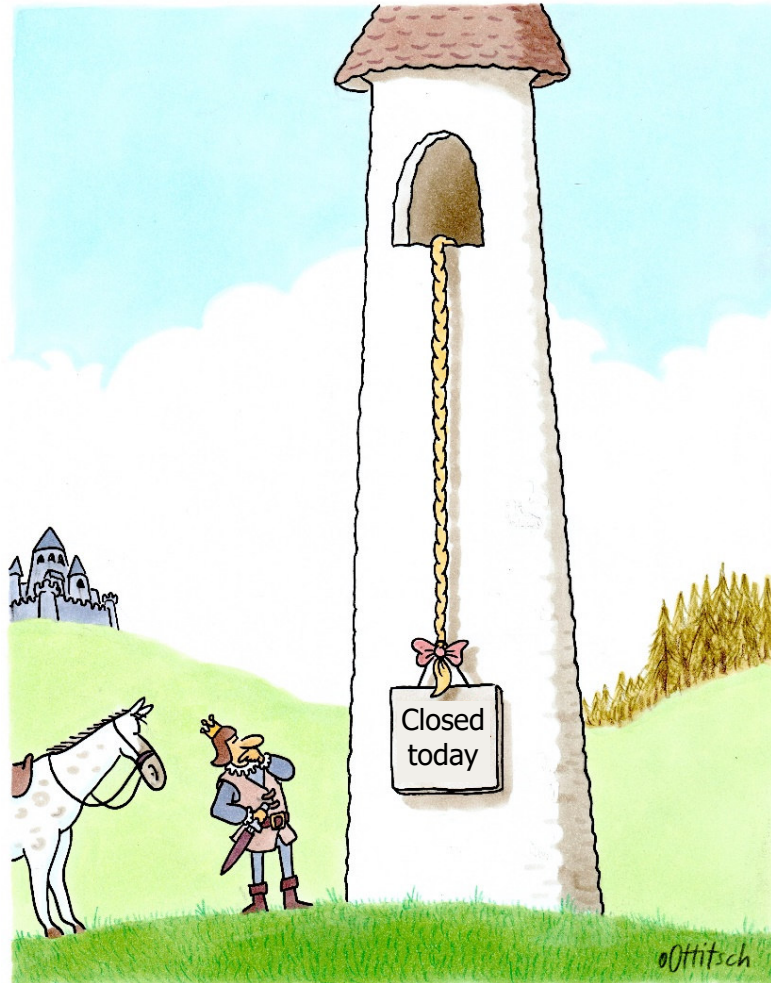
#### Risk factors relative to reference risk

No.	Date	Start	End	Summary of working times	Commuting time	Rest period	Shift sequence	Shift length incl. breaks	Total	Difference
1	01.08.2019	06:00	16:00	Long rest period before shift start 6.00h working time, then 1.00h break 3.00h working time 9.00h total working time 10.00h shift length	100 %	100 %	93 %	103 %	97 %	-3 %
2	02.08.2019	06:00	16:00	14.00h rest period before shift start 6.00h working time, then 1.00h break 3.00h working time 9.00h total working time 10.00h shift length	100 %	100 %	93 %	103 %	97 %	-3 %
3	03.08.2019	06:00	16:00	14.00h rest period before shift start 6.00h working time, then 1.00h break 3.00h working time 9.00h total working time 10.00h shift length	100 %	100 %	99 %	103 %	102 %	2 %

Example  
of use



**Thank you for listening!**



The 4-day work week arrives at fairyland

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