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Forum »Towards a Sustainable Working Life« • Brussels, 29. October 2009

# Prevention through human-centered design – Information work and OHS



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Stuttgart (Germany)

# Profile of Fraunhofer Institute for Industrial Engineering



<b>Located:</b>	Stuttgart, Germany
<b>Founded:</b>	1981
<b>Director:</b>	Prof. Dr.-Ing. Dr.-Ing. E.h. Dieter Spath
<b>Staff:</b>	210 employees*, 185 student assistants
<b>Budget:</b>	24 million EUR*, of which 38% from industrial contracts
<b>Internet:</b>	<a href="http://www.iao.fraunhofer.de">www.iao.fraunhofer.de</a>



\* Figures from 2007, including IAT University of Stuttgart

# Fraunhofer IAO – Our areas of expertise

## Technology Management



- Strategy Development
- Future Scenarios
- Technology Radar
- Rapid Product Development
- Evaluation of New Technologies
- Research and Development Roadmaps

## Organisational Development



- Digital Production
- IT Management
- Service Engineering
- Knowledge Management
- Research and Development Management
- Business Process Management
- Innovation Management
- Production Management

## Human Factors



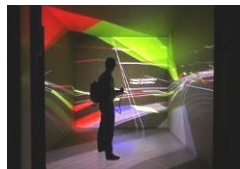
- Product Design
- Usability Engineering
- Occupational Health
- Future Office
- Performance Management
- Age-based Living Environment

## Human Resources Management



- Change Management
- Learning Environments
- HR Development
- Demographic Trends
- Work Innovation
- Remuneration

## Information Technology



- Virtual Reality
- Virtual Engineering
- IT-Strategies
- Software Engineering and Management
- Document and Workflow Management
- Mobile Software Applications

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# Agenda

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- Presentation of Fraunhofer IAO
- Recent developments in occupational health
- Creativity and health: the principle of dynamic balance
- Impulses for a preventive work design
- Conclusion

# Impact of work on health: Percentage of workers reporting each individual symptom, European Union 27

Symptom	Percentage
Backache	24,7 %
Muscular pain	22,8
Fatigue	22,6
Stress	22,3
Headache	15,5
Irritability	10,5
Injuries	9,7
Sleeping problems	8,7
Anxiety	7,8
Eyesight problems	7,8
Hearing problems	7,2
Skin problems	6,6
Stomach ache	5,8
Breathing difficulties	4,8
Allergies	4,0
Heart disease	2,4
Other	1,6

Nearly one third of German workers is absent from work due to health problems, with the average duration of absence 3.5 days.

With 3.6 % the absenteeism rate in Germany is on the lowest level in the past 30 years.

At the same time, a significant increase in **psychological illnesses** is reported.

Source: Fourth Survey on working conditions in the European Union, 2005

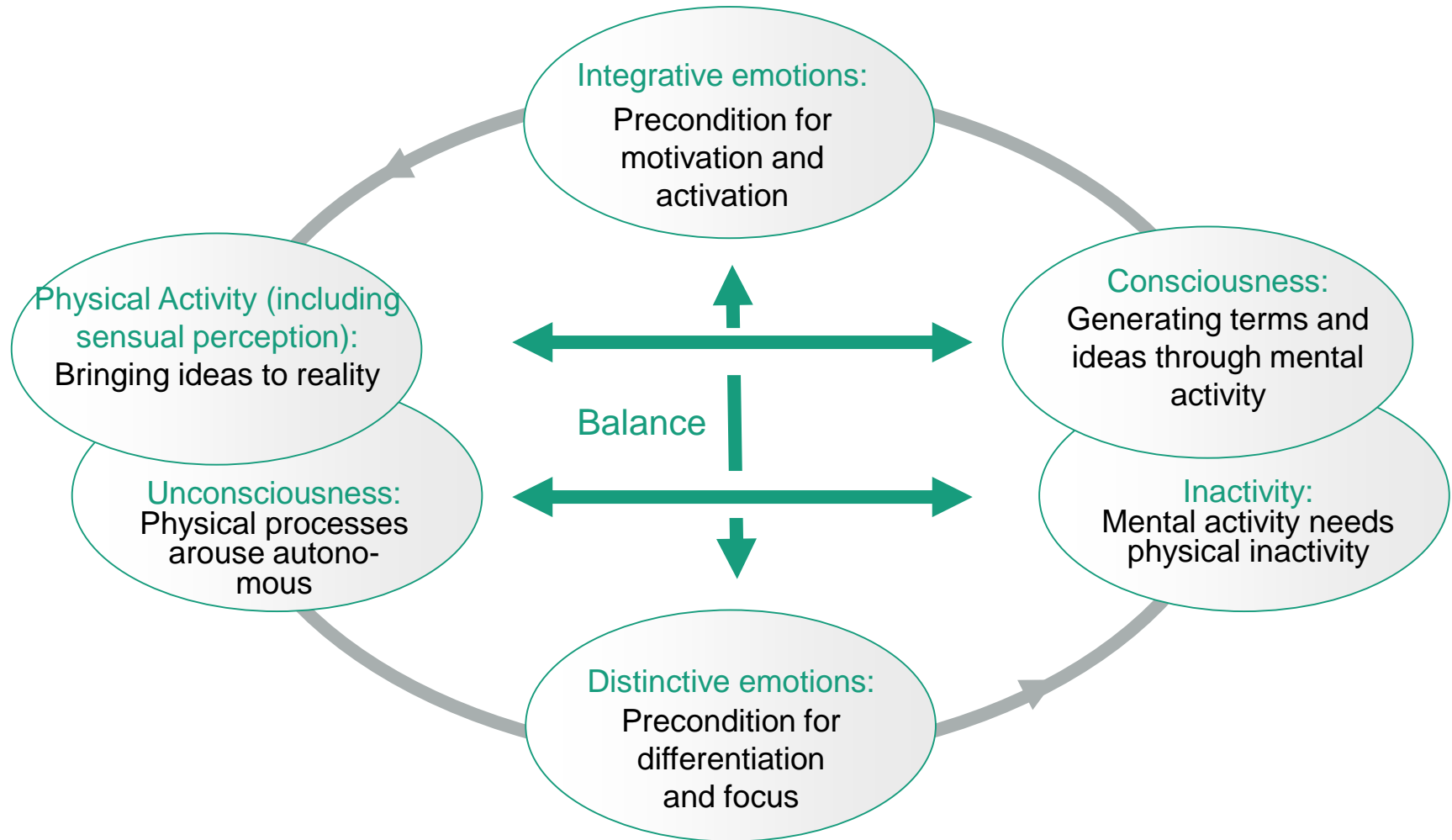
# Recent developments in occupational health

- Over the past years the number of **psychological illnesses** has significantly increased.
- Occupational causes of illness are for example:
  - Time and performance pressure: Two of three workers in Germany work at very high speed, with tight deadlines.
  - Monotone tasks without adequate job control.
  - Poor corporate culture (e. g. bad leadership, insufficient collegial support, anxiety of job loss).
- We should regard the phenomena of occupational psychological illnesses primarily from the view of **individual creativity** and the **companies' capability for innovation** – and less under the focus of absenteeism.

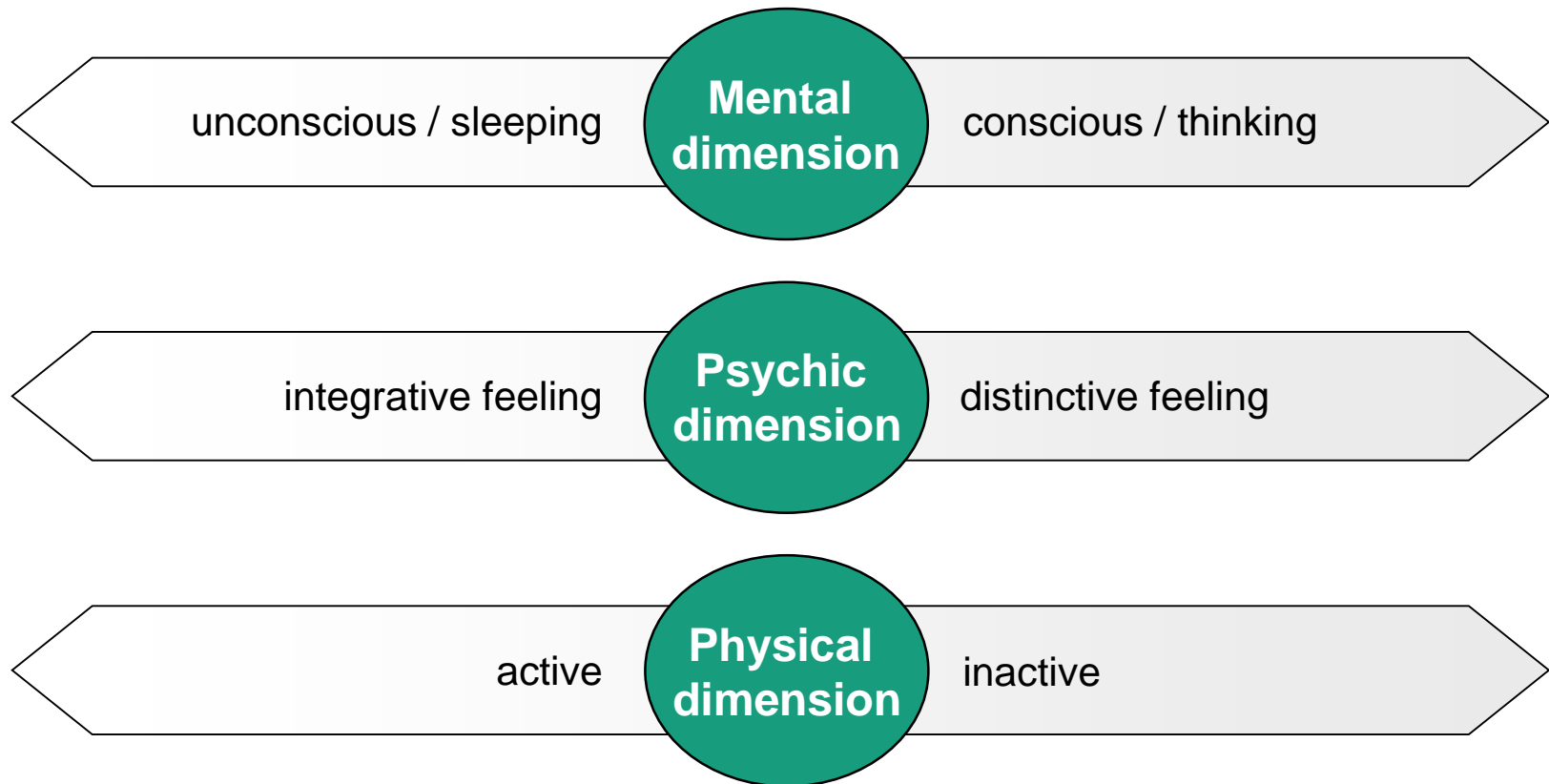




# The process of creativity



# Health as a 3-dimensional heterostatic balance (scheme)





# Health is like wire walking...

The person who doesn't keep his/her balance will fall down.



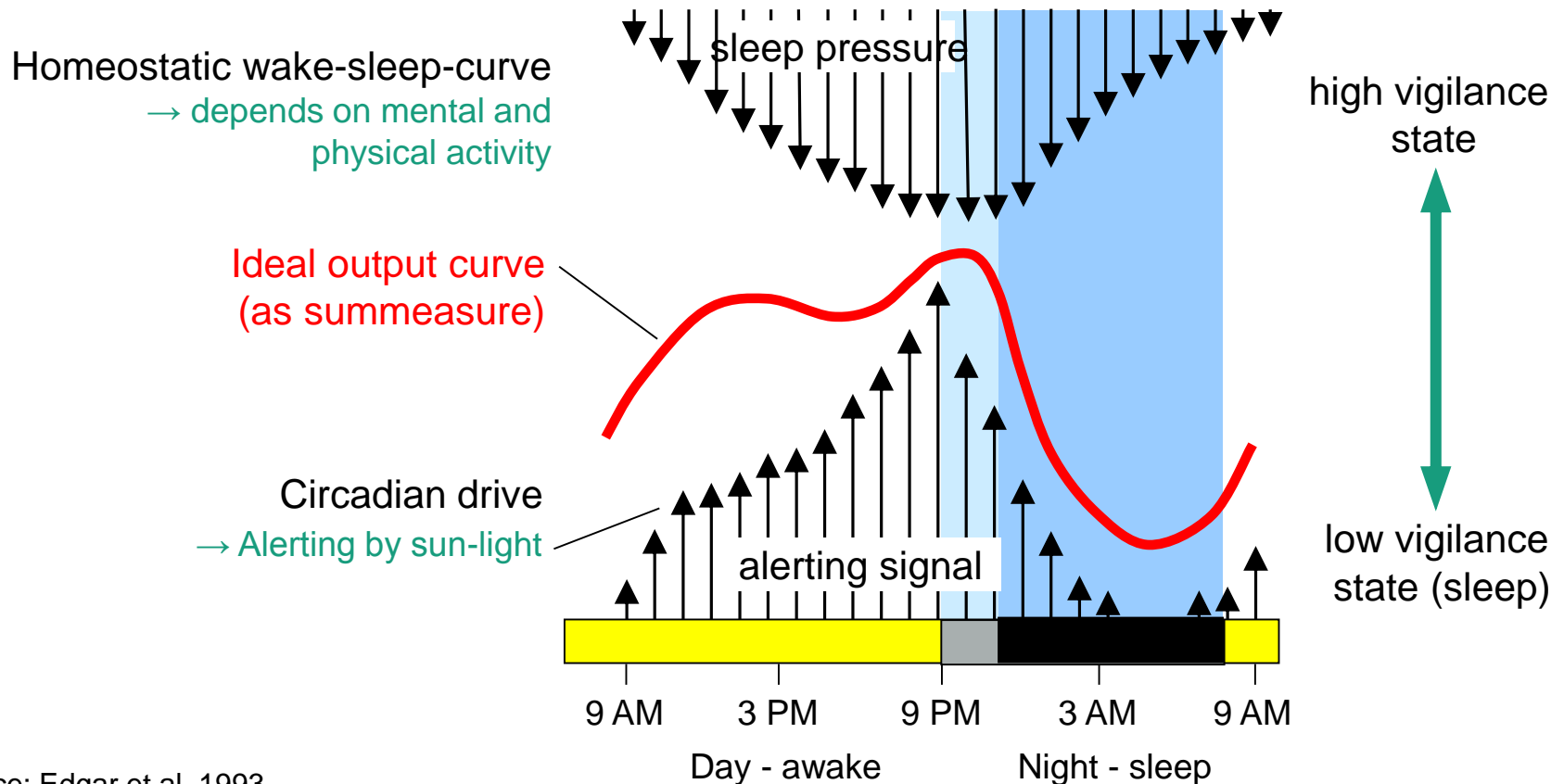
Characteristics of heterostasis:

- Balance
- Dynamic
- Inner impulse

The expression of dynamic balance is rhythmicity.

# Interdependence of circadian and homeostatic rhythms

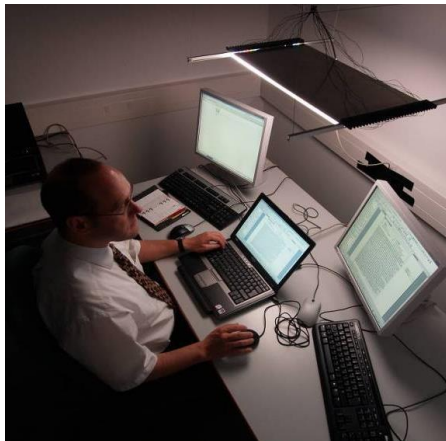
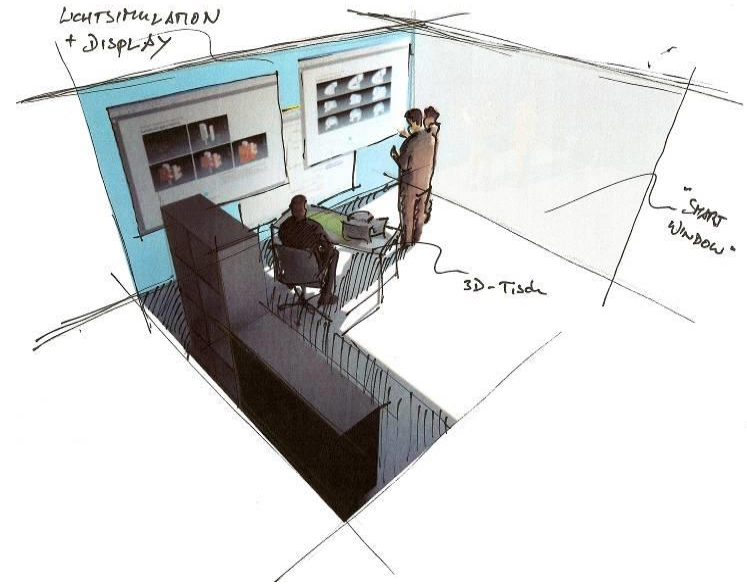
Mental and physical activities are subjected to rhythmical patterns of the organism, that are embedded in the rhythms of the natural environment (e. g. sun-light).



Source: Edgar et al. 1993

# An integrated research lab: nLightenend Workplace

- Convergence from lighting and display.
- Dynamic lighting to support circadian and rhythms – with effects on creativity, awareness and health.
- Adaptive lighting systems, depending on the working context.



- **»Heliosity«**: Investigation of dynamic light system (i. e. intensity, frequency, time structure) to mental performance and individual health (ongoing project).
- Preliminary study results: Dynamic light seems to improve mental work by both an activating and relaxing effect. All subjects (N=10) preferred dynamic to static lighting.

# Impulse for a human-centered office design

- Office is the place for mental work and communication.
- Mental work involve rhythmical phases of **outward orientation** (i. e. sensory perception, communication) as well as **inward orientation** (i. e. concentration, cognition).
- Beneath communication space effective mental work also considers **space and time** for physical inactivity and internalisation.
- Phases of activity and inactivity can effectively be supported by lighting.



Creativity Landscape at Fraunhofer OIC

# Conclusion

- We can only cope the challenges of the knowledge-based society if we have a better understanding of creativity and health.
- Health is not considered as an end in itself. Occupational health is much more an indicator for balanced working conditions that allow individual development and growth.
- Healthy (i. e. balanced) work does not only impact the **process** of information work (→ sustainability), but also its **results** (→ value of creativity).
- For promoting research and transfer activities in the field of occupational health we should emphasize its positive effects on the economic business situation.



# Thank you for your attention!



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