

Contribution of ergonomics to occupational, safety and health.

2nd Canary Island Conference on Prevention of
Occupational Risks

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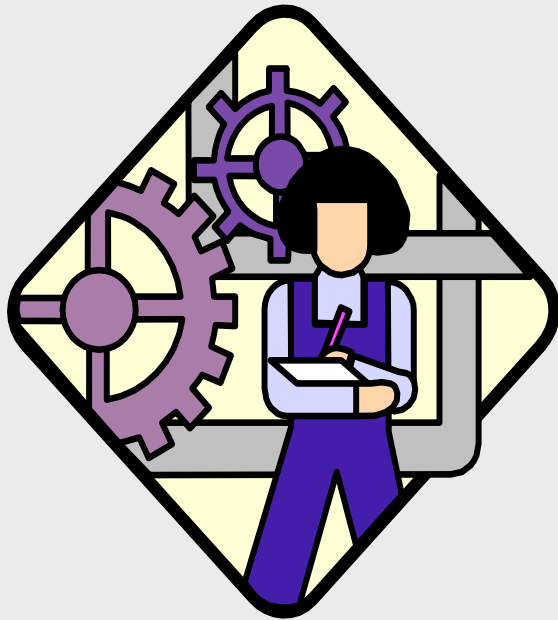
Prevent

- Institute for Occupational Safety and Health at Work, Brussels, Belgium
(www.prevent.be)
- PreventLux
(www.preventlux.lu)
- Prevent Academy (link with different universities)

Contribution of Ergonomics to OSH

1. What is ergonomics?
2. Ergonomics related to:
 - 2.1. MSD
 - 2.2. Fatigue
 - 2.3. Accidents
 - 2.4. Company Performance
3. New challenges for ergonomics in the changing world of work
4. Conclusions

1. What is Ergonomics?



- Ergonomics comes from the Greek words:
 - “Ergon” = work
 - “Nomos” = law, science

- “Science of work”

Ergonomics?



Ergonomics is about the fit between
people and their job

Ergonomics (human factors)

- relation between **human beings, their work and their work-life environment**
- better design of work systems, taken into account the **human physical and psychological abilities, limitations and needs**
- better **design** in order to **optimize human well-being** and overall **system performance**.

Ergonomics – different domains

1) Physical ergonomics :

human anatomical, anthropometric, physiological and biomechanical characteristics

2) Cognitive ergonomics:

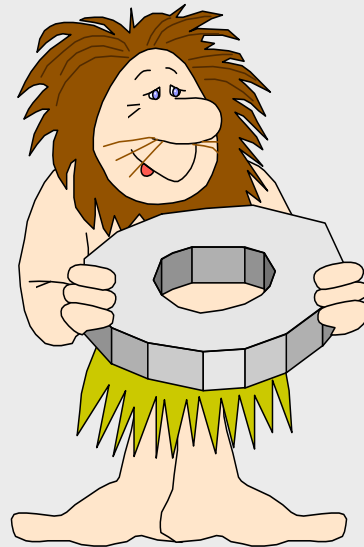
mental processes, such as perception, memory, reasoning, and motor response

3) Organizational ergonomics :

optimization of socio-technical systems, including their: organizational structures, policies, processes.

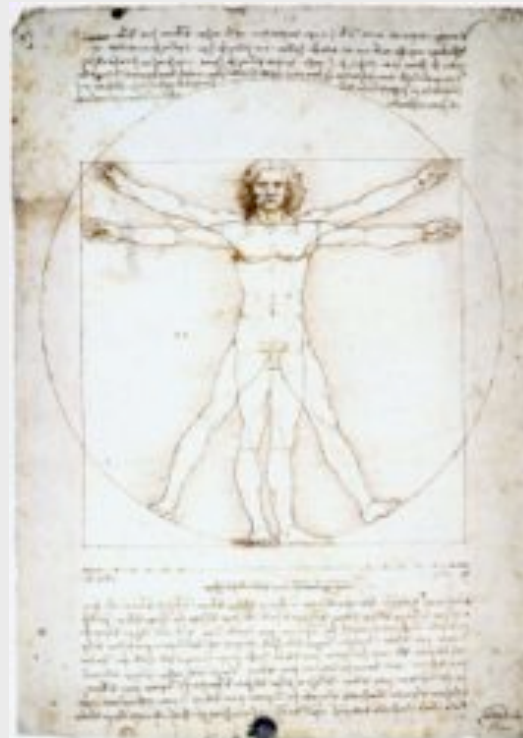
Ergonomics in an historical perspective

- First tools: witness of 'ergonomic design' to survive, to reduce fatigue and pain,...**human creativity**



Ergonomics in an historical perspective

- 15^o Century: L.Da Vinci: **abilities and limitations of people as the basis of good design...**



Ergonomics in an historical perspective

- World War II ... Royal Air Force (UK): Importance of ‘good’ design to avoid “**human errors**” of pilots.....
- **1949 Ergonomics Research Society**



Ergonomics approach

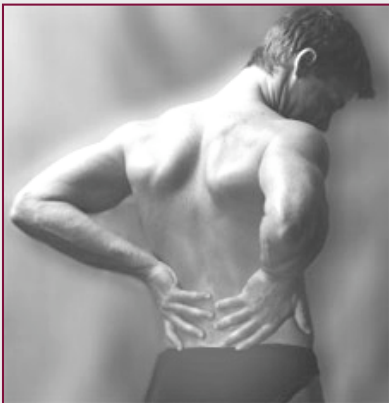
Better design of jobs, work places, equipment, tools, organisation,...

- **global** and **holistic** approach : consider the whole system
- **multidisciplinary** team
- **participation** of everybody involved in the work system

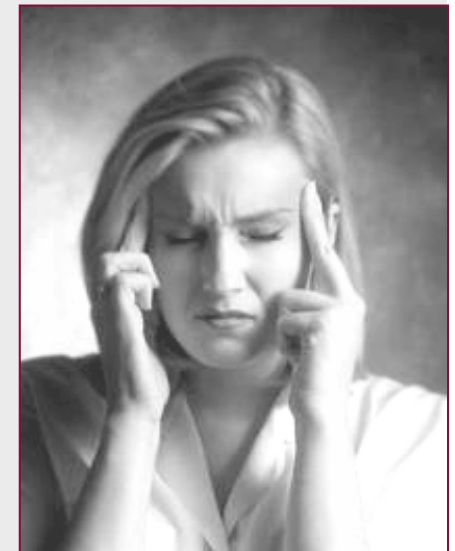
2.1. Ergonomics related to MSD

Main work related problems in Western countries:

- Musculoskeletal system (MSD) > 30 %



- Mental health stress > 30%



Self-reported work related problems.

- **European Survey on Working Conditions (ESWC, by European Foundation for the Improvement of Living and Working Conditions)**
- ***“Does your work affect your health in terms of ...?”***

Symptom	%
Backache	24.7
Muscular pain in shoulders, neck and/or upper, lower limbs	22.8
Fatigue	22.6
Stress	22.3
Headaches	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

Self-reported work related problems.

4th ESWC (2005):

- backache ($\pm 25\%$)
- muscular pain ($\pm 23\%$)
- fatigue ($\pm 22\%$)

are the most often reported symptoms by workers within the EU (31 MS)

- ~ 60 million workers

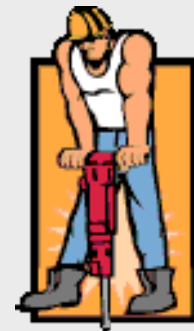
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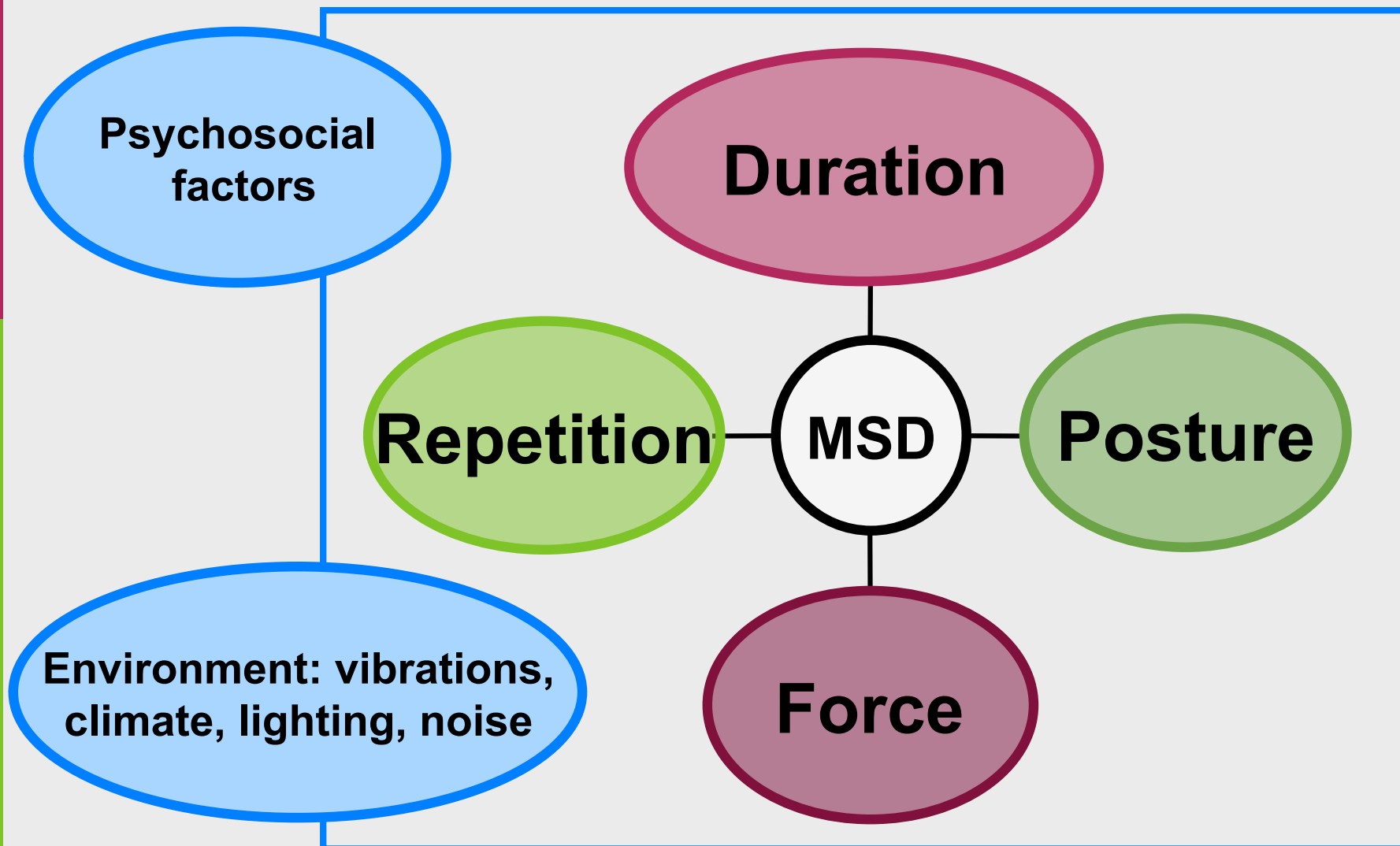
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Causes? Risk factors?

- Multifactorial problem: mixture of personal (genetic and behavioural) and work related factors
- Work-related risk factors:
 - **Physical (biomechanical) risk factors:**
 - Manual handling of loads
 - Forced/prolonged/awkward body positions (posture)
 - Tasks involving increased effort or force
 - Repetitive work
 - Exposure to vibrations
 - **Psychosocial risk factors:**
 - Psychological: time pressure, job insecurity, poor promotion prospects,...
 - Social: isolation, lack of social support from co-workers or supervisors, etc.



Ergonomic risk factors



Trends

- Self-reported WRMSDs: ESWC 2000 ⇨ 2005
 - Increase in Estonia, Greece, Ireland, Latvia, Lithuania, Poland, Slovenia
 - Status quo in Hungary
 - Decrease in other Member States
- Recognised WRMSDs: EODS 2000 ⇨ 2005
 - Increase of musculoskeletal diseases and neurological diseases (carpal tunnel syndrome)
 - Differences between Member States

Why do something about it?

Human aspect

- Reducing health problem
- Increasing comfort and job satisfaction
- Increasing quality of life

Economic aspects

Direct costs:

- Insurance
- Compensation
- Medical costs
- Administrative costs

Indirect costs:

- Hiring and training of new employees
- Negative social climat
- Losing the best people
- Reduced productivity levels
- Effects on quality of work
- Legal fines / claims

Cost

- Cost due to WRULDs ~ **0.5-2% of GNP**
(European Agency for Safety and Health at Work, 1999)
- Netherlands (Min SZW, 2005) : total yearly cost due to RSI ~ 2.1 billion euros
 - Sickness absence ~ 962 million euros
 - Productivity loss ~ 808 million euros
- Germany (BAuA) : productivity loss due to WRMSD ~ 0.4-0.6% of GNP in 2002-2004

Legal aspect

- Obligation to assess occupational health risks and to avoid or reduce them
- Manual Handling Directive
- Visual Display Unit Directive

Legal penalty / fine / claim...

(in some of EU MS a company can be closed based on ergonomic RA...)

Ergonomic prevention principles

- Avoid manual handling
- Automation and mechanisation

Ergonomic prevention principles

- Anthropometric design & lay out of the work place

Ergonomic prevention principles

- Work organisation: job rotation
 - job enlargement
 - job enrichment
 - shift / breaks / recuperation time
 - team work (+on the job training)

2.2. Ergonomics related to fatigue

Fatigue

Mental
Fatigue

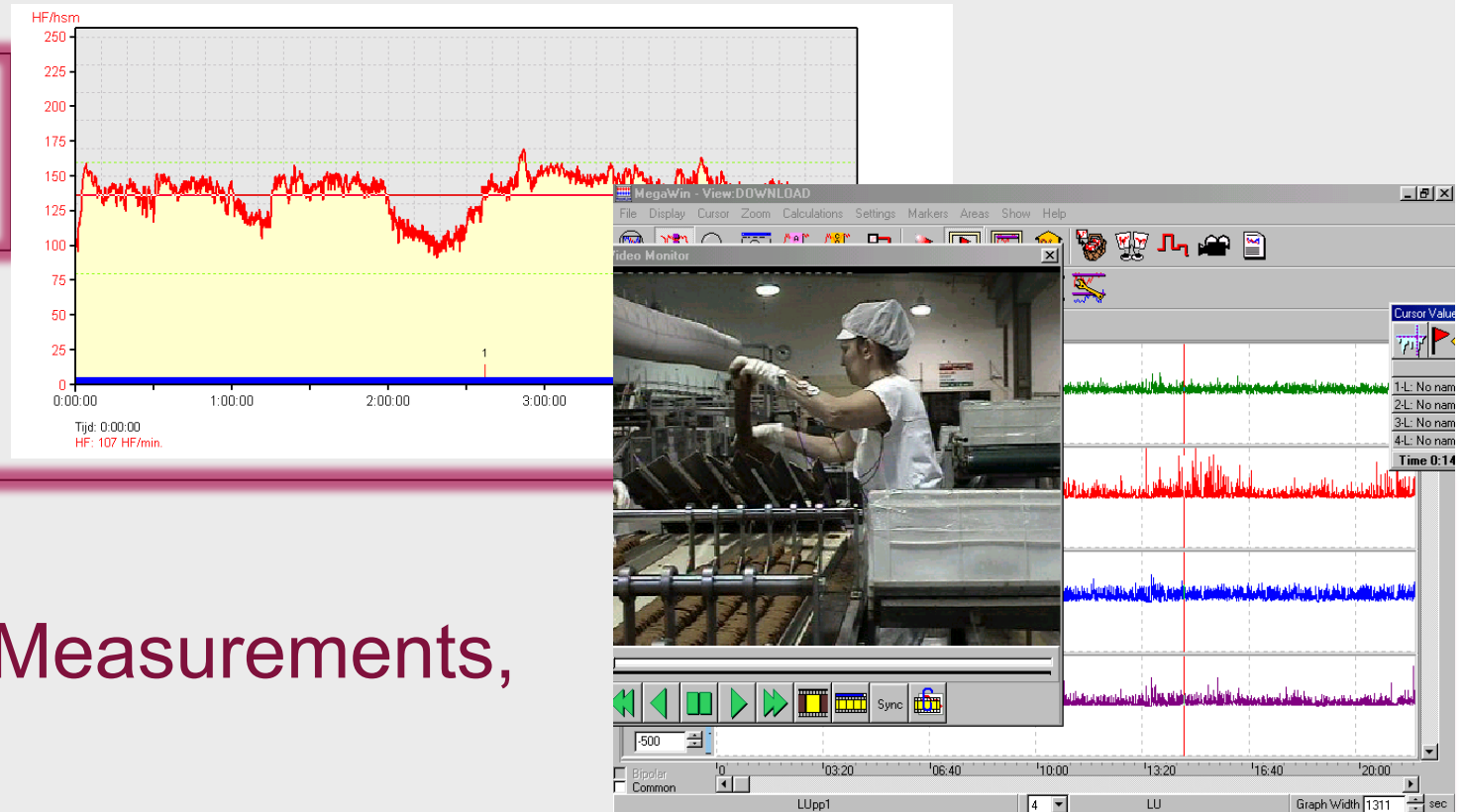


Local Muscular Fatigue
Static load

General Fatigue
Cardiovascular Load
Energy Consumption

2.2. Ergonomics related to fatigue

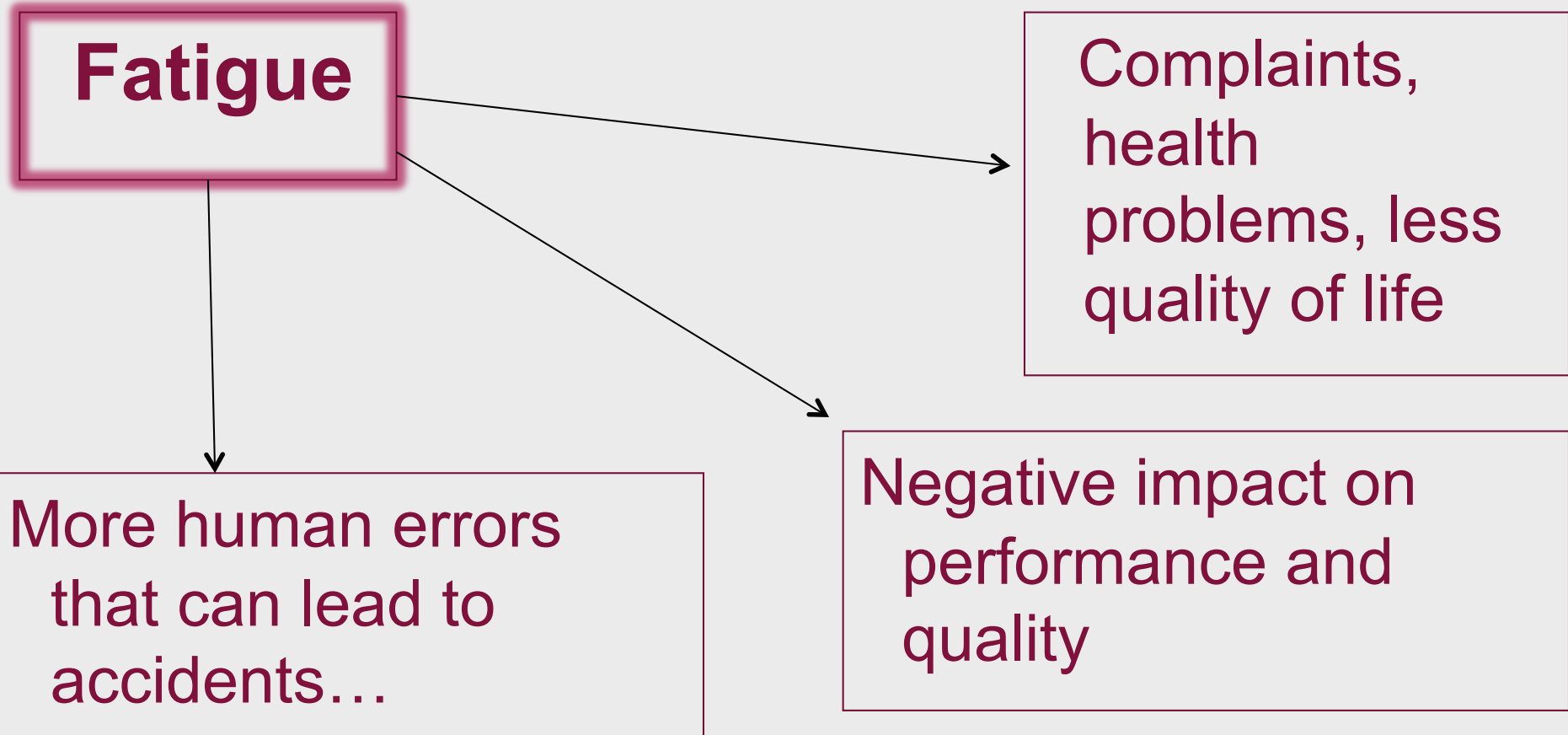
Fatigue



Ergonomics:

- Heart Rate Measurements,
- EMG,
- Subjective Rating & Questionnaires to study the work load and the fatigue

2.2. Ergonomics related to the prevention of fatigue



2.3. Ergonomic related to accidents

- **Accidents** related to poor and inadequate relationship between **operators** and their **task, machine, equipment, work organisation,.....**

2.3. Ergonomic related to the prevention of accidents

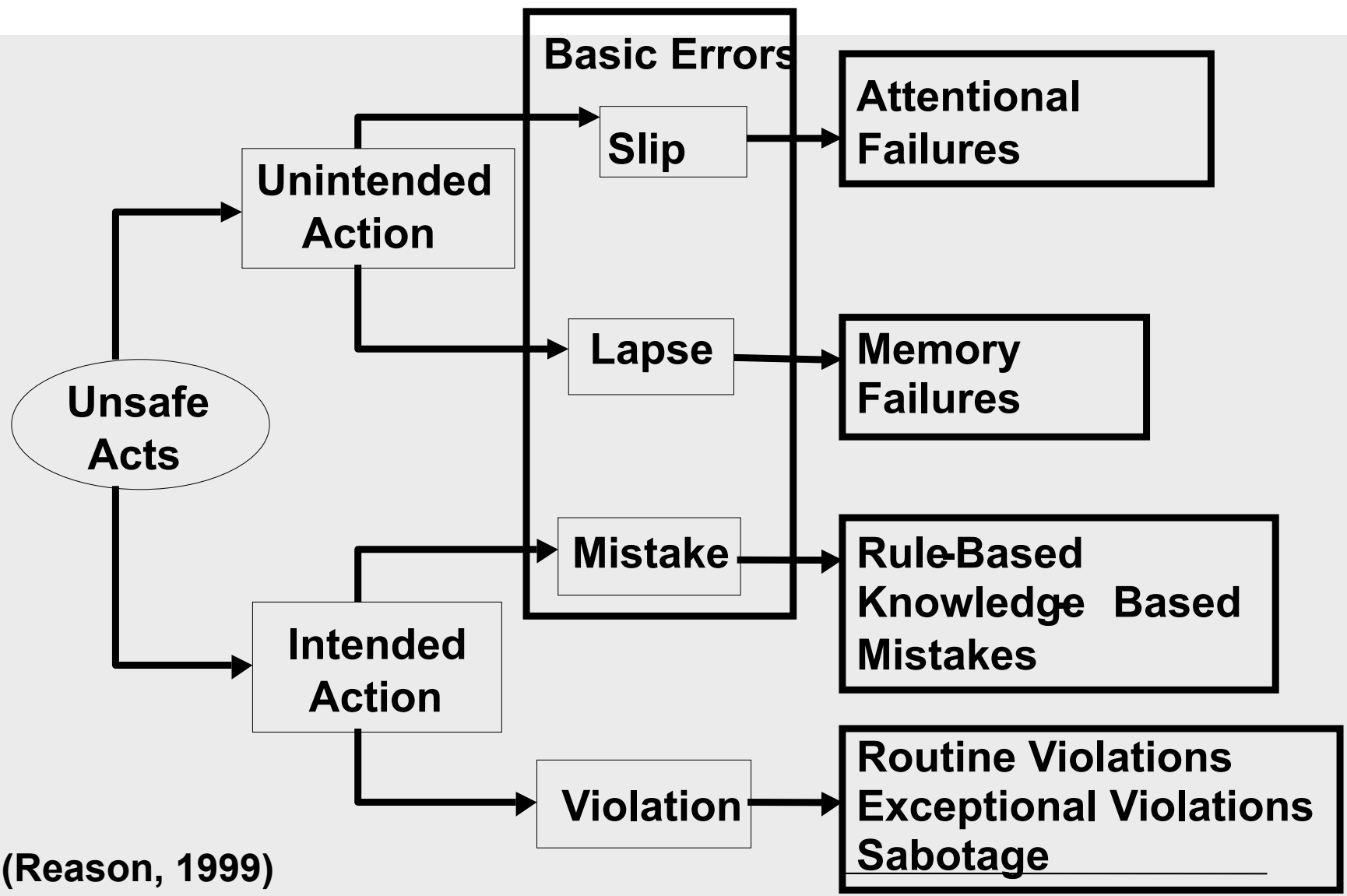
Abilities and limitations of the human computer:



- information detection / perception / selection
- interpretation / decision making / use of human memory
- action



Taxonomy of Human Error



(Reason, 1999)

“human errors” – possible impact

- Accidents with severe injuries, fatalities or serious material damage
- Environmental catastrophes
- Business impact by losing people and material / installation (continuity)
- Loss of image and local reputation

Ergonomic design: reduction of “human errors”

Ergonomics: avoid or reduce probability of human errors:

- design human-machine interface (displays – controls)
- adapted work environment
- ergonomic lay out & presentation of information
- correct communication
- adapted work organisation
- training & support

2.4. Ergonomics can contribute to general company performance.

- Reduce discomfort and increase work satisfaction, motivation, productivity and quality of work
- Reduce absenteeism
- Reduce human errors with less accidents and mistakes in production or quality as a consequence
- Better cooperation between employer and workers (participative ergonomics)

Challenges

- **Restructuring** is daily business (economic crisis)
- **Globalisation**

Challenges

- **Changing workforce:**
 - ageing: capacity?
 - immigration : new cultures,
other languages

Challenges

- **New technologies** occur everywhere in the production process and in the way we communicate

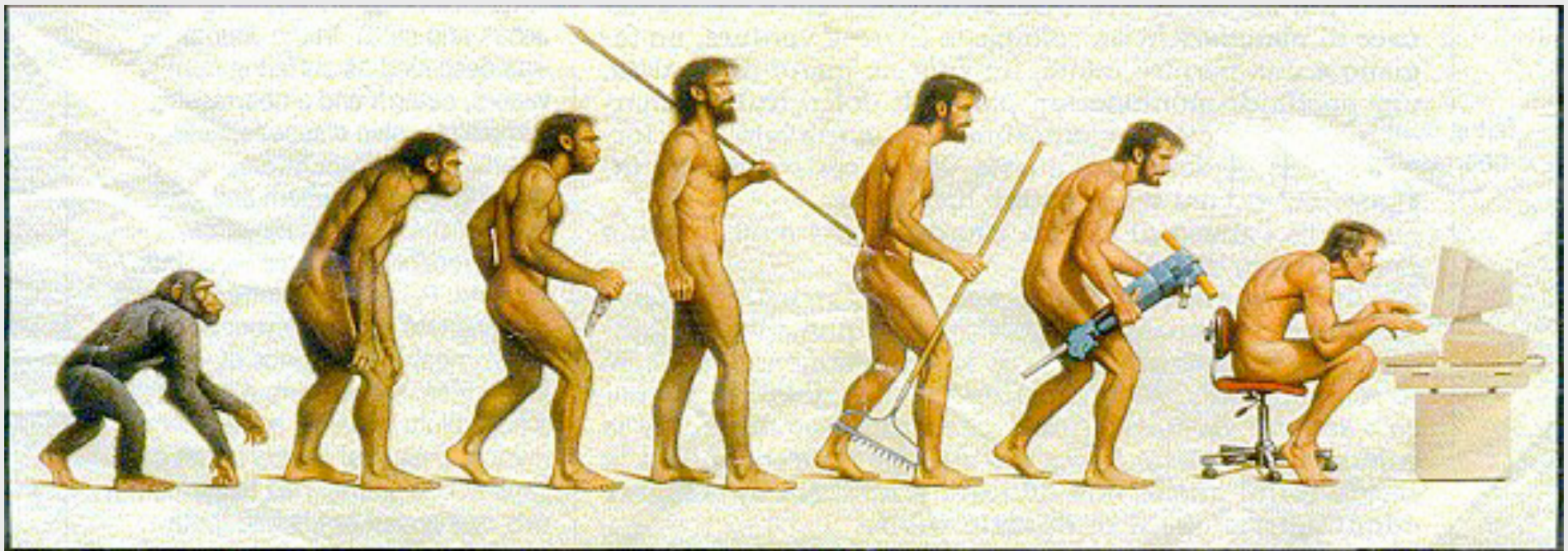
More technology

Technology may fail... human errors
can occur

Office environment

- More complex tasks / dead lines
- New software
- Long working hours
- Lack of space

We don't move anymore...



Communication changes...

- mobile telephone (call, messages)
- e-mail
- Tele / video conferences

Always and everywhere...

Work Life Balance



Take breaks and stretch!

Conclusions

- Ergonomics contributes to **health and safety**
- Ergonomics contributes to **company performance**
- **Challenges** are:- new work organisation
 - **globalisation, restructuring**
 - **changing work force**
 - **new technology**
 - **office** environment / lack of movement
 - new way of **communication** in a virtual world

Conclusions

- **Work Life Balance** : a matter of culture (ethics)
- Need for **Simple Legislation covering all risk factors** (not only manual handling, VDU work stations, Vibrations).. Also repetitive movements, static and awkward postures...
- Implementation of **ergonomics in Small & Medium Enterprises** is still a challenge

Conclusions

- Need for **reliable statistics** (harmonisation of recording and monitoring?)
- **Accident approach**, not focused on ‘the one who pulled the trigger’ (human error) but on the errors in the design of the system
- Train and provide tools for **Labour Inspectorates** to stimulate enterprises to improve their ergonomic status

Conclusions

- Extention of **ergonomics and safety culture in education, in family and at work**: experience has shown that, achieving significant improvements in workplace safety and health, is not only a matter of technology but of more of **culture**
- Instead of ‘prevention of MSD’ we have to go to the next ergonomic maturity step, which can be ‘promoting of **Musculo Skeletal Health**’: related to **work health promotion**
- **lack of movement = emerging risk!!!**

Conclusion

**Ergonomics is investing
in your company and
investing in your human
capital!**