



# Real-time Horse Welfare Monitoring

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KU Leuven

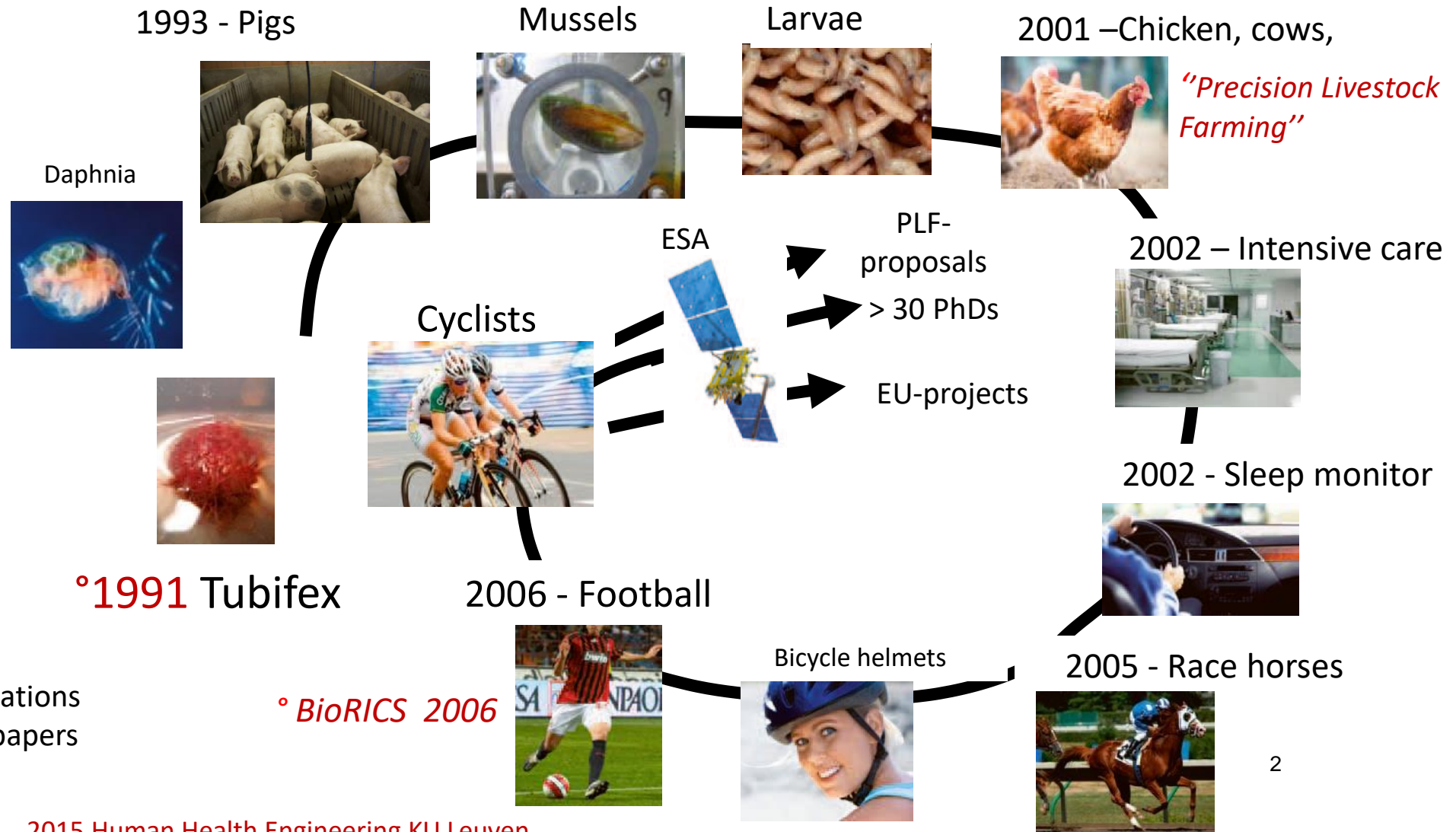
University of Tennessee

BioRICS NV

Equiforum Belgium 2024

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# Research on real-time monitoring of individual living organisms:



- 340 publications
- 450 Conf papers

° *BioRICS 2006*

2015 Human Health Engineering KU Leuven

# Scientific Principle behind the technology

“To live means *to produce and use metabolic energy* for 5<sup>(1)</sup> main components”

## 1. Basal metabolism



## 2. Immune system



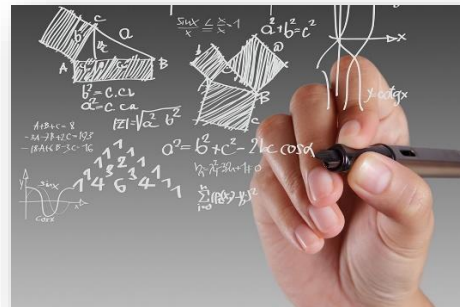
## 3. Control Body temperature



## 4. Physical performances



## 5. Mental performances



e.g., Stress, anxiety, happiness

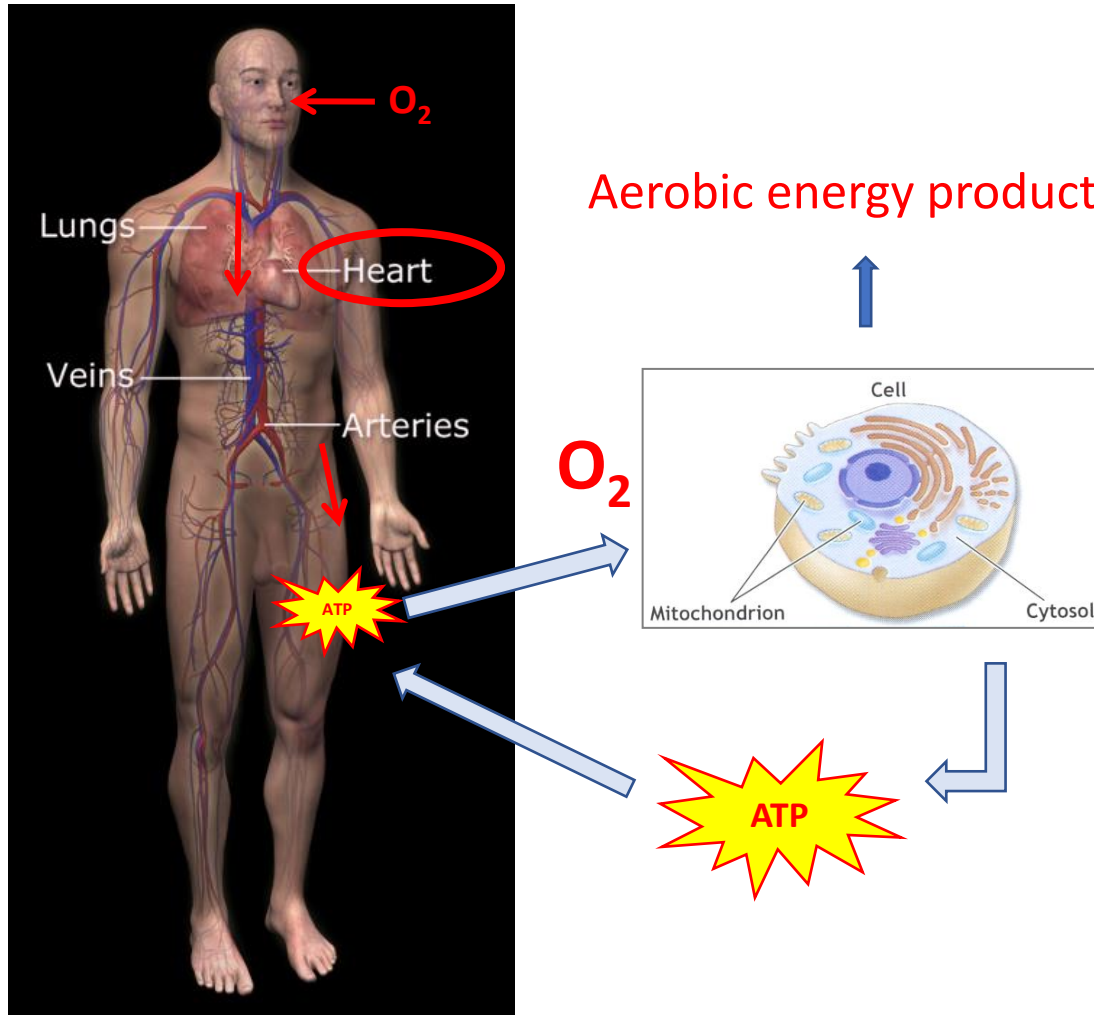


(1) When a production term is not considered



# Basic Principle of Mindstretch

Metabolic energy production in the body

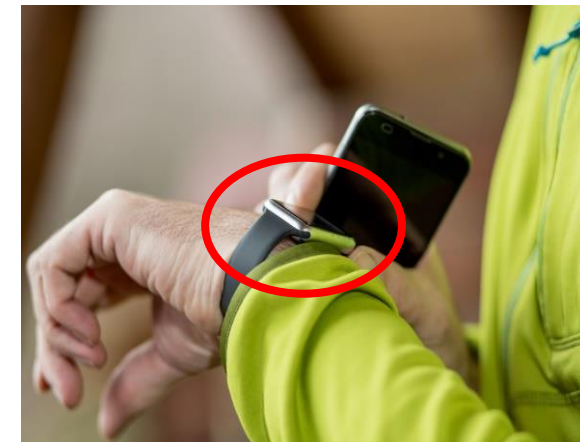


Measure **Movement & Heart rate**

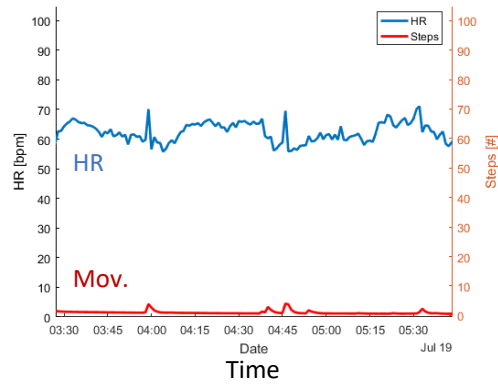
**Heart rate:**

- Basal metabolism
- Physical activity
- Thermal component
- Mental component

Algorithm

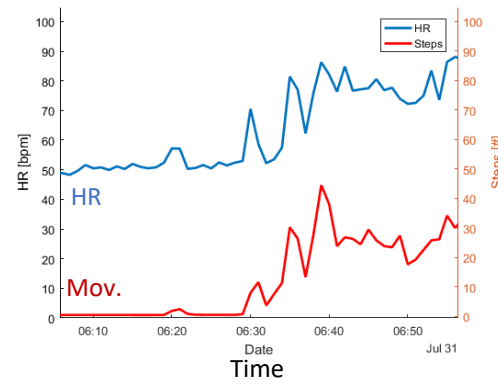


# How do we measure the metabolic energy use for mental tasks?



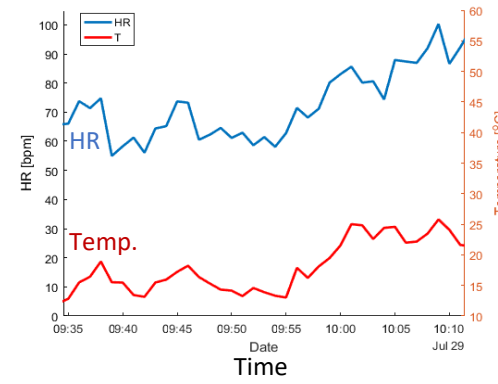
HR total = HR basal

+



HR physical

+



HR thermal

+



HR mental

# Real-time welfare monitoring of riders (and horses)



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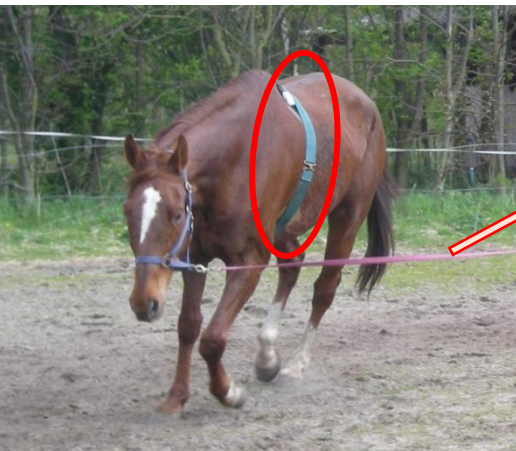


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A. Malisse – W. Laeremans

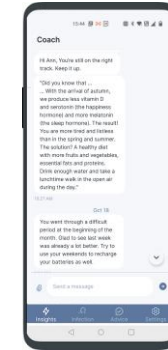
## Monitoring of the Belgian eventing team in preparation for the Olympic games



Biometric data



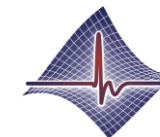
BioRICS server  
in cloud



Personalized  
feedback &  
advice to user



Anonymized Feedback to  
coach (optional)

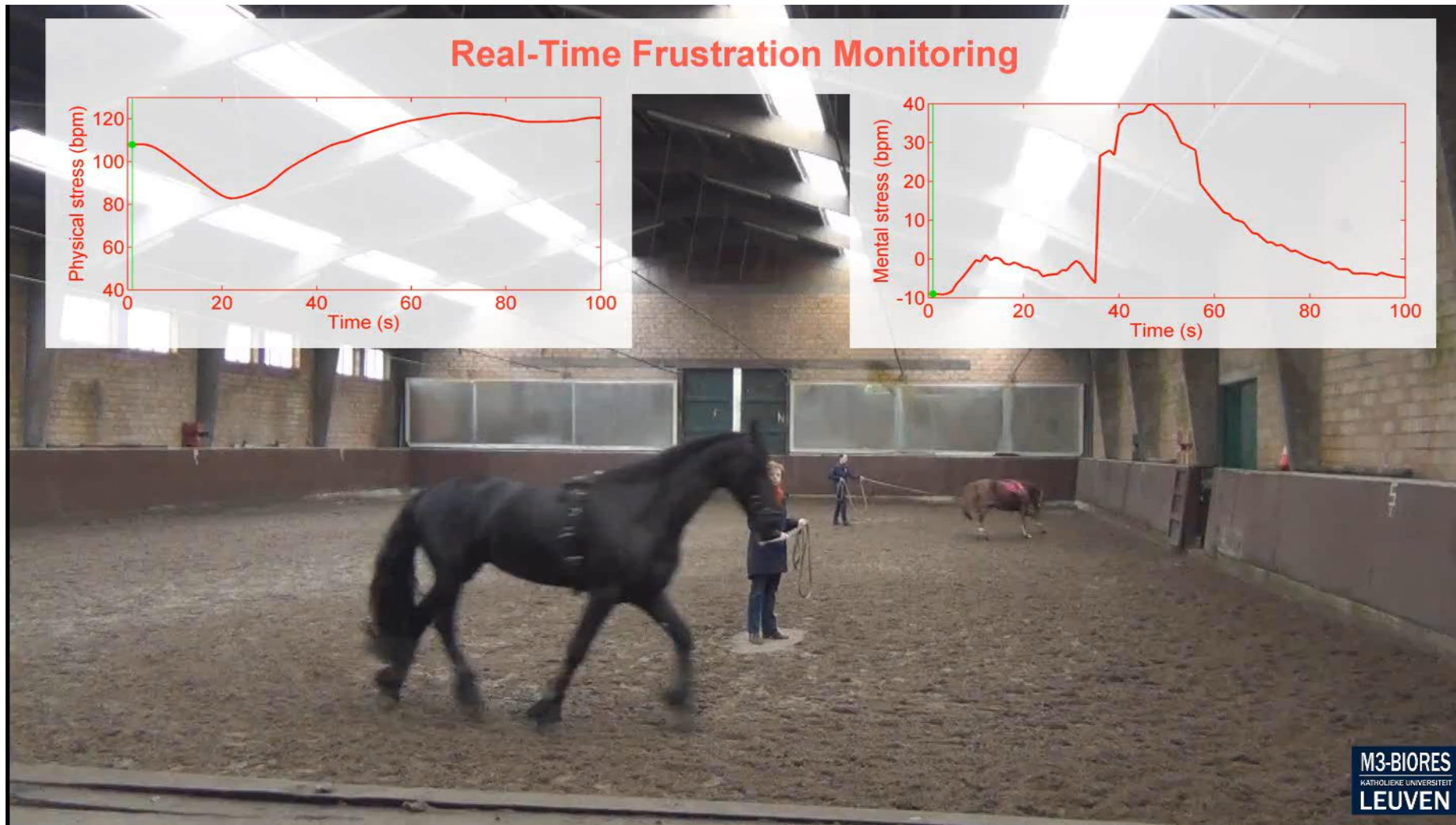


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Biological Responses In Complex Systems



# Example: Frustration monitoring



# THANKS FOR YOUR ATTENTION!

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