



# Real-time monitoring of pilot to improve FRMS

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# Phasya – Overview (since 2015)

PLUGANDPLAY

- **Software for monitoring/predicting physiological & cognitive states**
- Private company (capital of 451 k€)
- 10 years of expertise
- Engineering, human factors, neurology,...
- Spin-off of the University of Liège



**INNOVATORS  
UNDER 35**



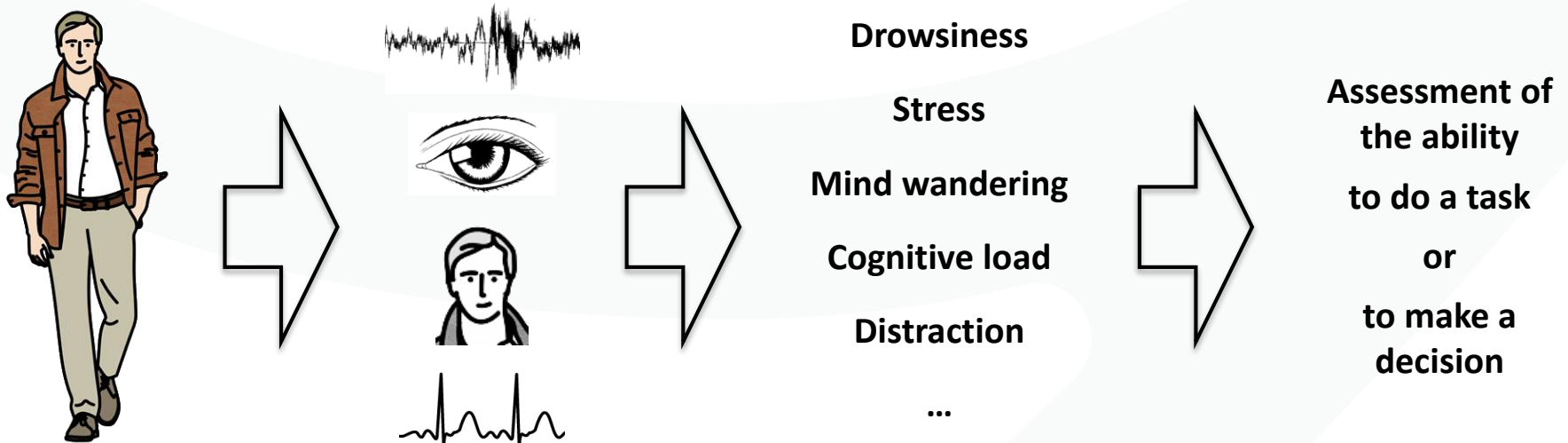
# Phasya – Mission & Vision

## OUR MISSION

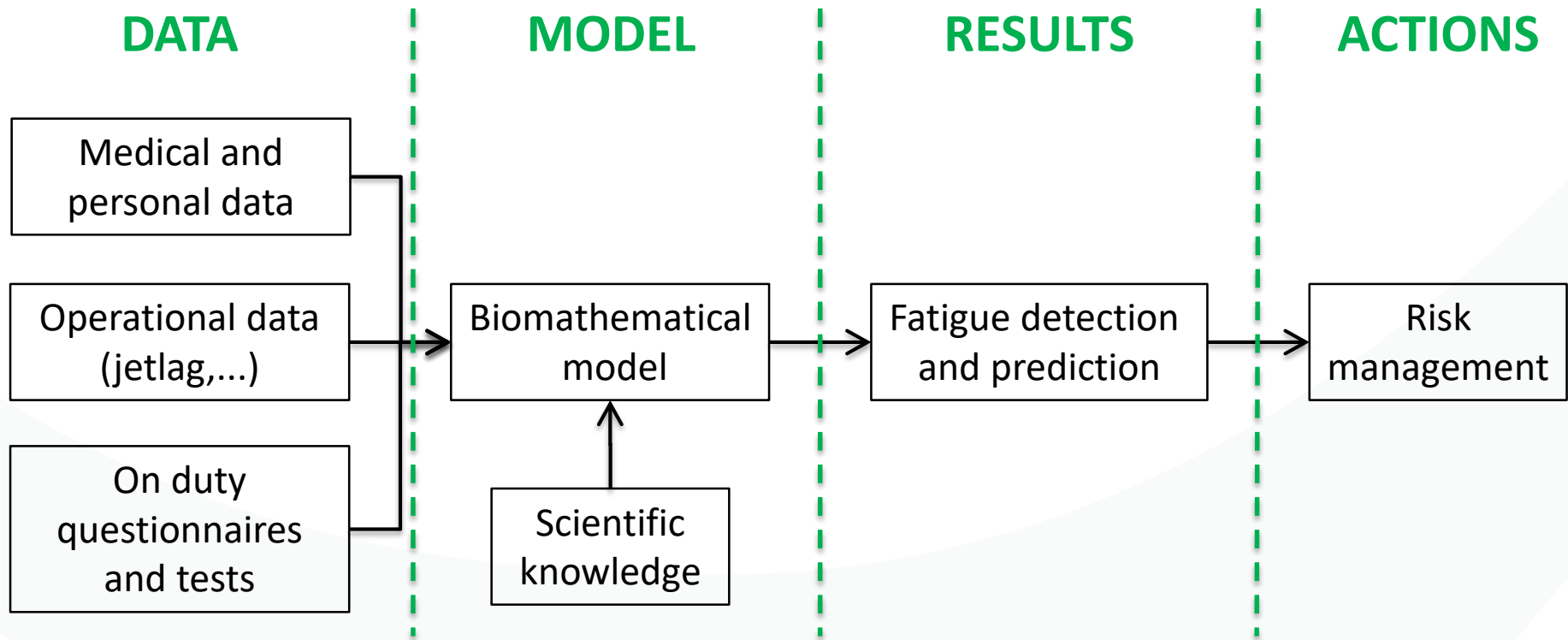
is to **improve safety, well-being, and user experience**

## OUR VISION

is to **become a global leader for the detection and prediction of physiological and cognitive states** that influence the human performances



# FRMS needs data



## Regulatory bases

- The FRM shall include a hazard identification and risk assessment process that allows managing the operational risk(s) of the operator arising from crew member fatigue on a continuous basis (**ORO.FTL.120 Fatigue Risk Management**)
- FRM processes are data driven. (**ICAO Doc 9966** )

# Fatigue/drowsiness factors

## MAIN UNDERLYING BIOLOGICAL FACTORS

**Circadian rhythm + Homeostatic process**

## AND MANY OTHERS

- Blue light and jetlag
- Workload and cognitive load
- Nutrition
- Medication
- External simulation / monotony
- Sleep pathologies
- Health factors
- Physical activity
- ...

**→ CHALLENGES: OBJECTIVE DATA ACQUISITION AND FATIGUE MODELLING !**

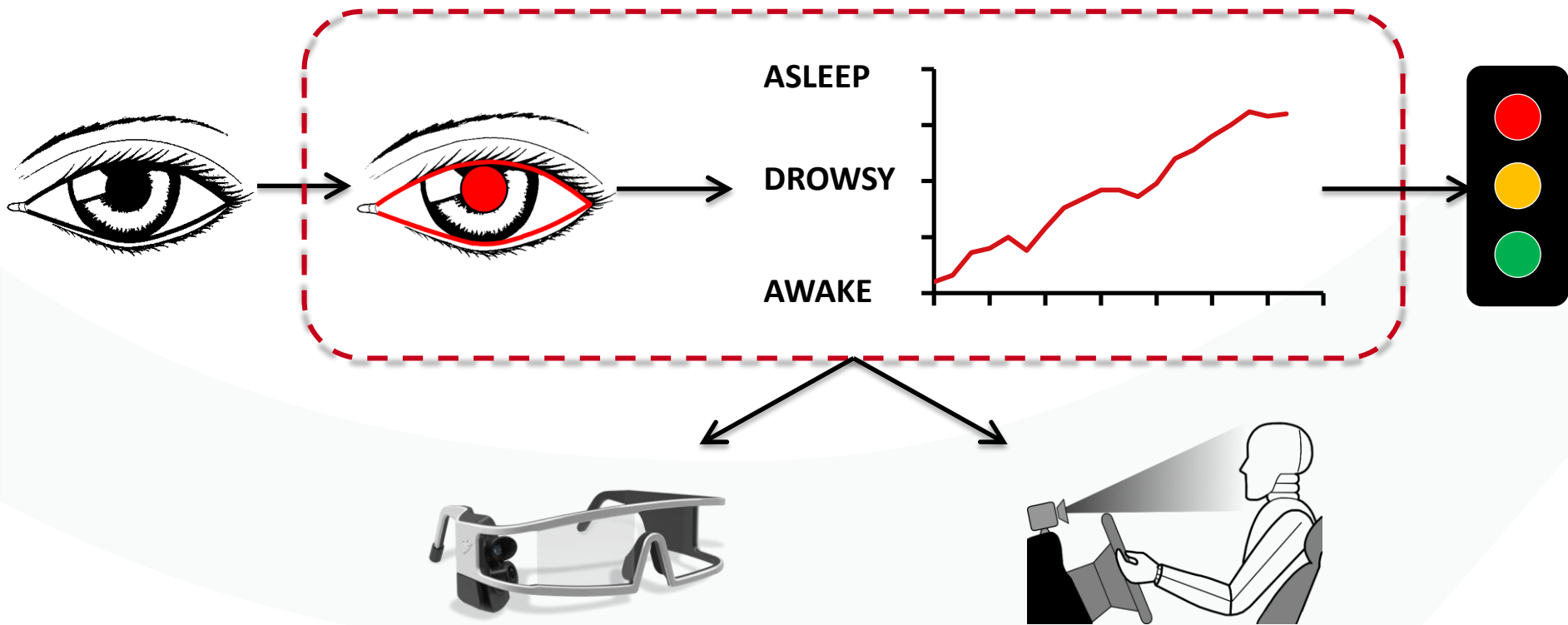
# Current FRMS – Fatigue detection/prediction

Data acquisition tool	Type of data	Objective	Real-time	Continuous	Non disturbing	Privacy respect
Clock	Time, time on duty, jetlag	V	V	V	V	V
Medical screening	Health status	V	X	X	V	X
Actimeter	Sleep history and activity	V	X	V	V	X
Reaction time test (PVT)	Performances	V	V	X	X	V
Rating scales (KSS)	Drowsiness / fatigue level	X	V	X	X	V

# Next FRMS – Fatigue detection/prediction

Data acquisition tool	Type of data	Objective	Real-time	Continuous	Non disturbing	Privacy respect
Clock	Time, time on duty, jetlag	V	V	V	V	V
Medical screening	Health statuts	V	X	X	V	X
Actimeter	Sleep history and activity	V	X	V	V	X
Reaction time test (PVT)	Performances	V	V	X	X	V
Rating scales (KSS)	Drowsiness / fatigue level	X	V	X	X	V
Based on physiological signals	Drowsiness / fatigue level	V	V	V	V	V

# Drowsiness monitoring – Our solution





# Drowsiness monitoring – Our solution

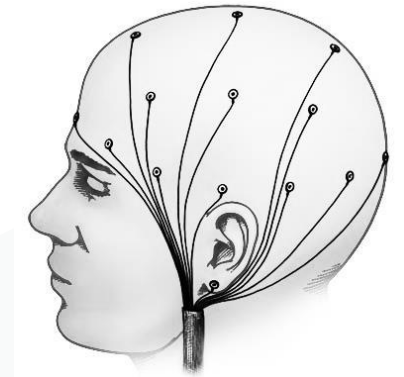
SCIENTIFICALLY VALIDATED !



PVT



Driving performances



EEG/EOG

## Publications

- François C., et al. (2016). Objective drowsiness monitoring to assess fitness for duty. *23<sup>rd</sup> Congress of the European Sleep Research Society*, Bologna, 2016
- François C., et al. (2016). Tests of a new drowsiness characterization and monitoring system based on ocular parameters. *International Journal of Environmental Research and Public Health*, 13(2), 174
- François C., et al. (2014). Evaluation of the performance of an experimental somnolence quantification system in terms of reaction times and lapses. *36<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Chicago, IL, 2014, pp. 5820-5823
- Wertz J., et al. (2014). Validation of a new automatic drowsiness quantification system for drivers. *5<sup>th</sup> International Conference on Applied Human Factors and Ergonomics (AHFE)*, Krakow, 2014.

# Drowsimeter R100

phasya

## Drowsimeter R100



Measurement of drowsiness  
and ocular parameters  
based on eye images @ 120 Hz

AUTOMATIC • OBJECTIVE • REAL-TIME

[www.phasya.com](http://www.phasya.com)

**Measurement of  
drowsiness & eye metrics**

**Dedicated to pilot projects and research  
purposes**

**Based on eye images @ 120 Hz  
from a head-mounted camera**

**Plug & play**

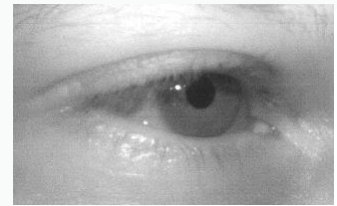
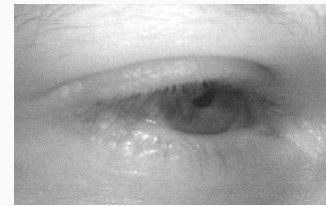
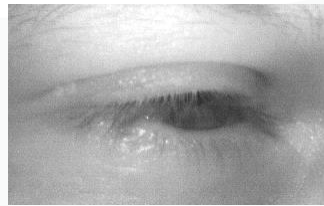
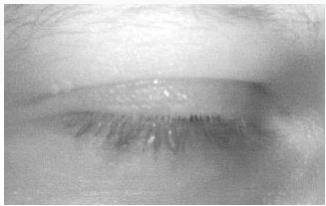
# Next generation of FRMS

**NEW VALUABLE DATA ARE ALREADY AVAILABLE  
TO IMPROVE FATIGUE/DROWSINESS DETECTION AND PREDICTION !**





[www.phasya.com](http://www.phasya.com)



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