



Metrology for wearable light loggers
and optical radiation dosimeters

WP 3

Recommendations for future technological development of wearable light loggers

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Problem

Since the photosensitive ganglion cells are located on the retina and the distribution of these cells is not uniform, the **direction-dependent radiance** would in principle be a better metric than the radiation incident on a surface.

Objective

To **evaluate the performance** of new portable devices able to **measure spatially resolved photobiological quantities** and to **compare them with spatially averaging devices**, to determine relevancy depending on use case. Additionally, to investigate the shortcomings of current devices regarding their use and to **investigate the benefits and drawbacks** of spatially-resolved devices.

Tasks of WP 3:

1. Investigate the **benefits and drawbacks** of switching from spatially-averaged measurements (as done in current wearable light loggers) to spatially-resolved measurements.
2. Development of a **prototype** for a spatially resolved device to ensure that such technology is compatible with recommendations from previous work packages.

Involved partners:



Task 1: Investigation of spatially-resolved devices

- Determine benefits and drawbacks of spatially resolved devices
- Recommendations for characterisation of spatially resolved devices
- Elaborating data methods for camera-based wearables
- List of requirements for specifications and parameters for spatially resolved devices
- Market survey of possible spatially resolved devices
- Identification of privacy issues and strategies for their mitigations



Picture from optics.org

by ams Osram

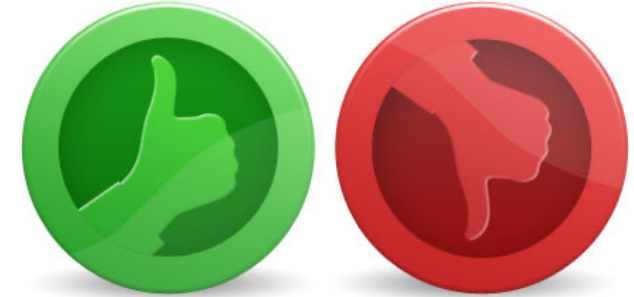


Picture from ray-ban.com

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Benefits and drawbacks of spatially resolved devices

- Area and/or line scan cameras
- Size of devices
- Practicality and portability
- Survey among experts



Recommendations for characterisation of spatially resolved devices

- Basis: state of the art devices and characterisation challenges in WP1
- Identification of key measurement aspects
- Investigation of new quality indices
- Identification of characterisation needs
- Guidance on camera calibration/characterisation as light dosimeter



Elaborating data methods for camera-based wearables

- Application of metrics from WP2
- Development of dedicated image analysis methods
- Spatial and statistical analysis of images

Requirements for specifications and parameters for spatially resolved devices

- Focusing on market-ready or almost-ready devices
- Minimum mandatory specifications
 - Size
 - Resolution
 - Dynamic range
 - Matrix filters
 - Firmware flexibility
 - Power consumption
 - Portability
 - Complexity
 - ...



Images cause privacy issues

Identification of privacy issues and strategies for their mitigations

- User and third party privacy shall be respected
- Investigation of solution of similar cases
- Focus on data analysis method and data preservation
 - Images shall not be saved after processing
 - Closed loop system, only relevant metrics are output
 - Access to camera data only during calibration/commissioning
- Evaluate existing or develop new strategies for mitigation of privacy issues



Task 2: Prototyping of spatially-resolved devices

- Evaluate performance of devices from the market survey
- Development of a proof of concept for spatially resolved device for non-image-forming applications
- Improving the proof of concept into a prototype
- Characterisation of the prototype device
- Comparison of the prototype device against state-of-the-art spatially averaging devices



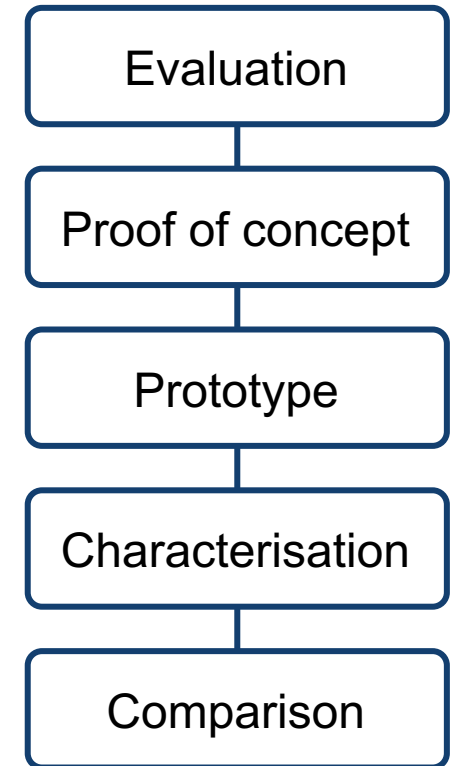
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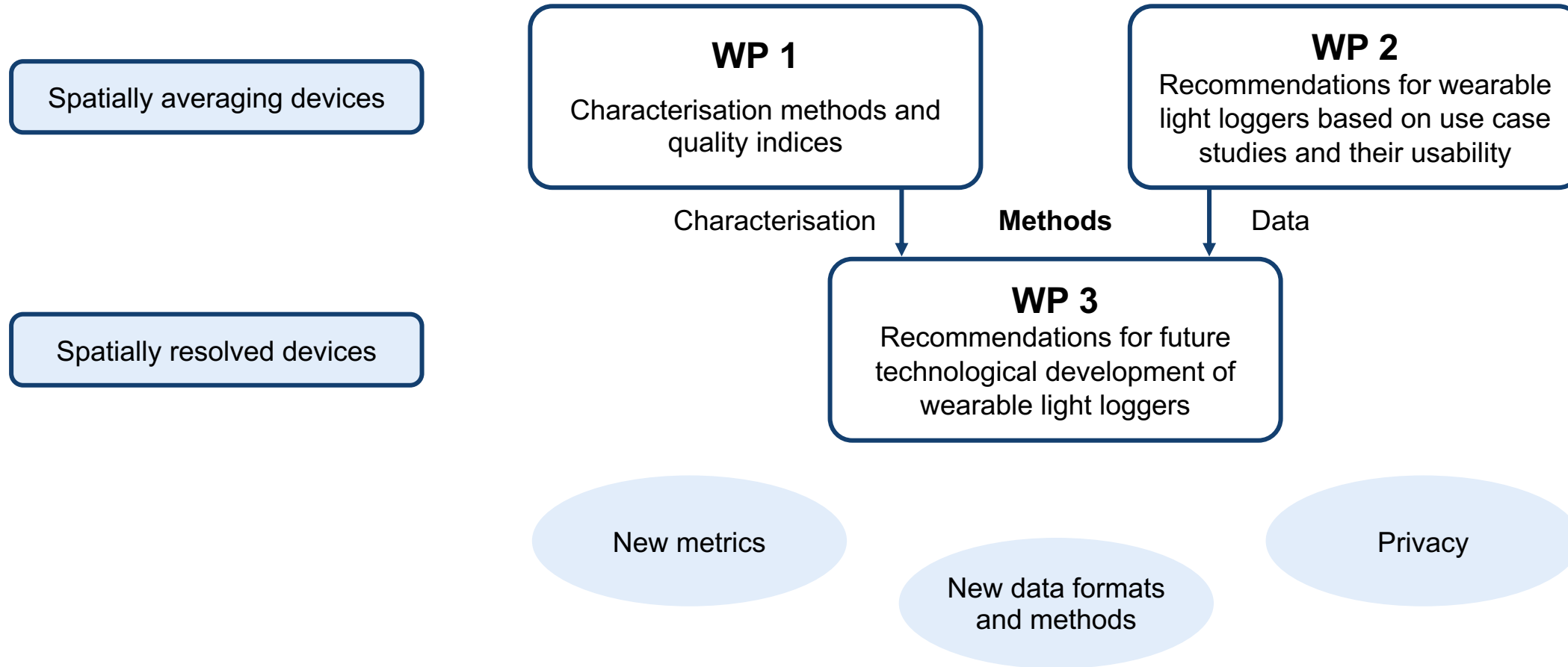
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light-dosimeter.ch







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