Human Factors integration in Augmented Reality Eyewear

EPIC Technology Meeting on Photonics for AR

POPULAR

Presented by : José Manuel Rojas, Instituto de Biomecánica de Valencia (Spain)

Funded by the European Union

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The POPULAR project

Develop a generic augmented reality eyewear (ARE) device that caters to the widest range of users, either in daily life or professional context, thanks to unobtrusive, lightweight, ordinary-looking and made-to-order prescription glasses. Demonstrate short-term implementation in real-usage environments . TRL 5

Human-Driven Design approach

- Promote active involvement of users and key stakeholders for incorporating human factors through the process of product development.
- Establishing a methodological and ethical framework for the detection of usability product requirements and validate their implementation in three sectors: healthcare, sports and logistics.

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Daily-wear AR depends on more than image quality

A technically impressive display can still fail as everyday eyewear.

Everyday fit →	Comfortable, wearable and compatible with real activities
Visual comfort →	Readable content without unnecessary strain or obstruction
System usability & usefulness →	Information appears when the user needs it and remains controllable
Ophthalmic inclusion →	Prescription needs belong in the core product concept

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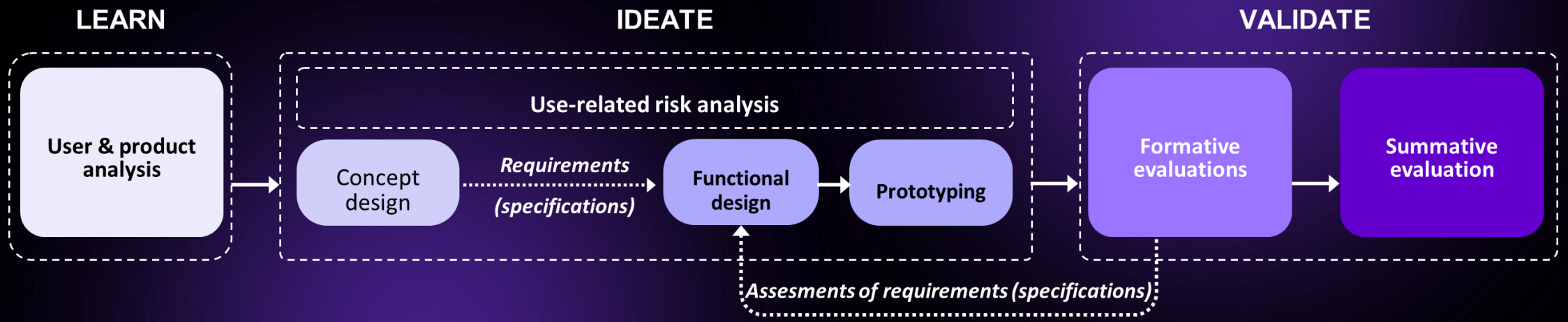
From Human Factors science to market acceptance



- Ethics, social acceptance and inclusivity ensured from technical laboratories to high-relevant real-world scenarios
- Data traceability makes human factors actionable for engineering teams

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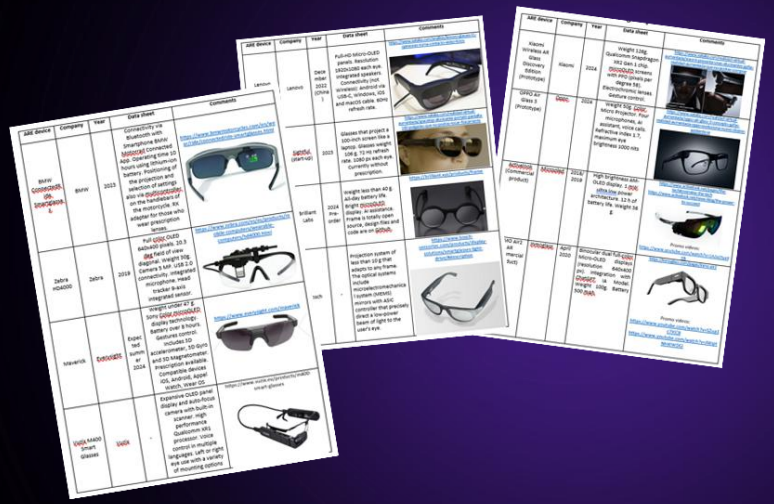
Learn. Evidence becomes design requirements

Qualitative analysis

Interviews and focus groups reveal where AR helps (benefits), where it distracts (challenges) and what people worry about (needs).



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850+

survey respondents

5

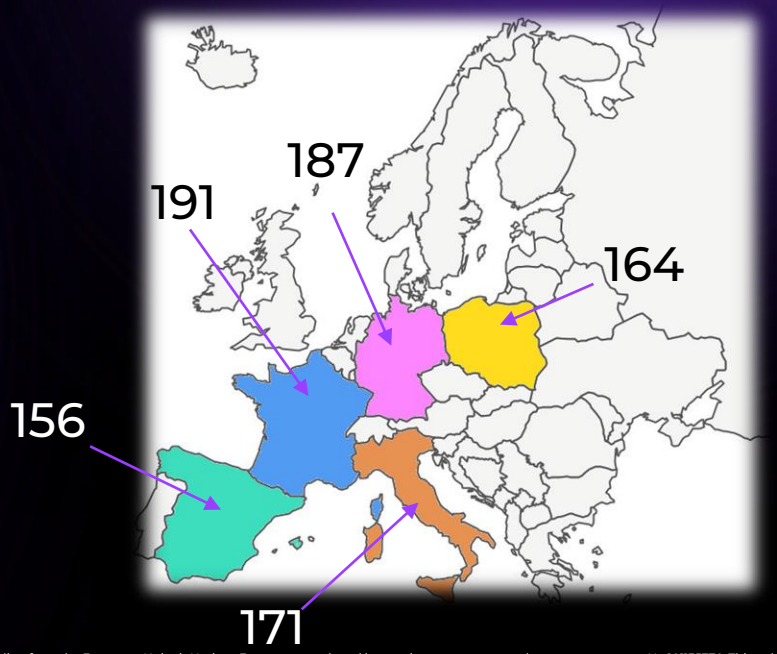
European countries

3

application domains

Quantitative analysis

Online EU survey to gather critical information from potential end-users.



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Outputs for engineering

User needs and contextual constraints
Definition of real-context workflows
Prioritizing the information to be projected

High-relevant scenarios

Training of medical procedures

Rowing practice

Order picking

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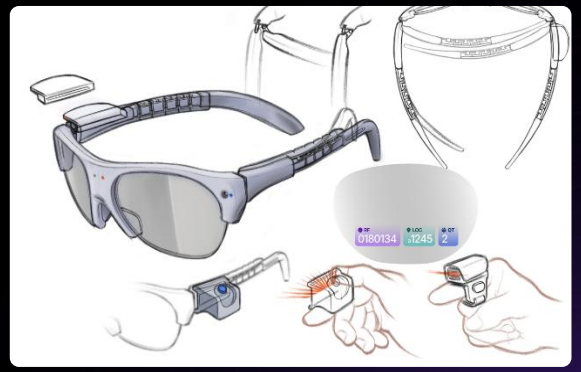
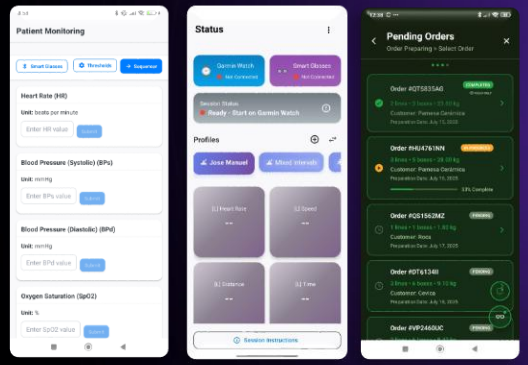
Ideate. 3 use cases make the system concrete



Conceptual designs

Components & functionalities



3 apps to manage projection

Current monochromatic projection

Physical mock-ups

Fit and physical interaction

Functional prototypes

Projection and system performance

Barcode scanner

Smartwatch

In-lab formative tests

Ergonomics, visual comfort and usability

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Validate. The whole experience is tested in real context

Training in medical procedures

Guidance and patient vital signs during a simulated procedure

Order picking

Hands-free information for locating and picking items

Rowing practice

Performance information within the athlete's field of view

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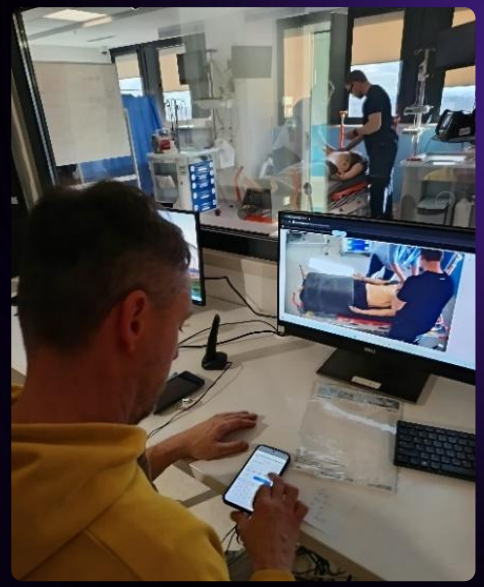
Validate. The whole experience is tested in real context

Ergonomic adaptation

Projection: visual comfort and cognitive load

System usability and usefulness

End-user acceptance and intention of use



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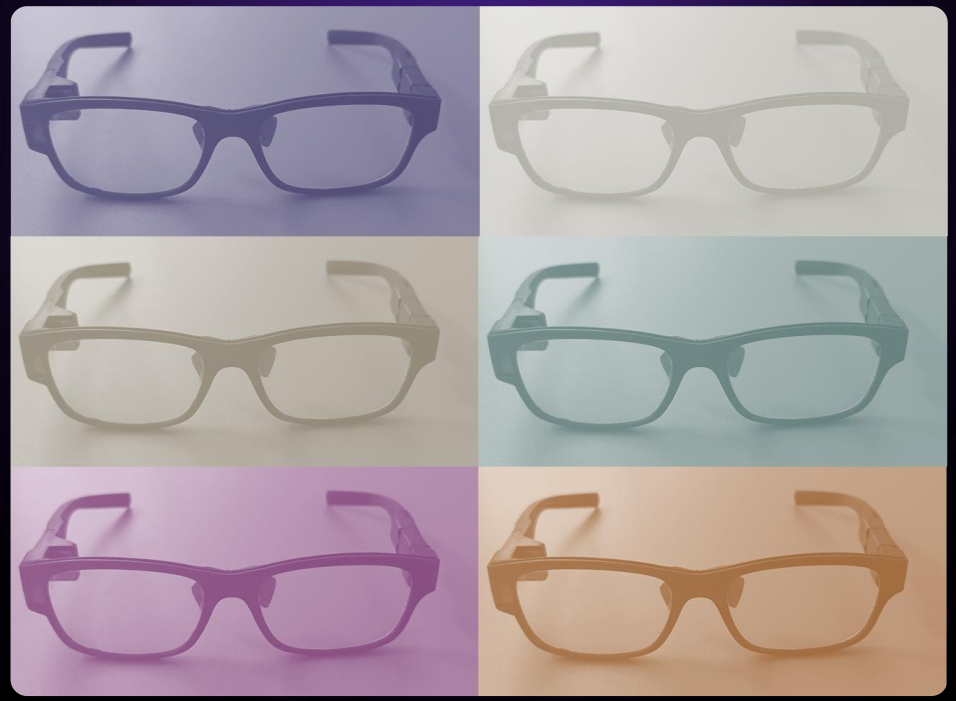
Human factors connect optical innovation with everyday acceptance

Progress to Date

- Frame design optimization
- Seamlessly integration of ARE into workflows and activities
- Improvement of operational processes in real-world scenarios



What's coming up

- Final validation of RGB prototypes

More about the POPULAR Project, coordinator Mathieu Feuillade from EssilorLuxottica this afternoon 17. 00 in SESSION 02

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