VoxelSensors

Voxelsensors contribution. European XR Chip Implementation Plan (v4 – Policy Brief Edition)

VoxelSensors – Strategic Contribution to the European XR Ecosystem
Date: November 2025 – V4
Author: Andre Miodezky, Public Sector Manager – Ward van der Temple CTO

Executive Overview

In our opinion Europe's technological sovereignty in wearable and XR computing depends on its ability to control the perception and sensor-fusion layer—the interface between the physical and digital world. This document presents VoxelSensors' recommendations to guide the European Union programs toward a realistic and impactful direction. Rather than attempting to replicate full-scale mobile SoCs dominated by global incumbents, Europe should invest in specialized, event-driven perception coprocessors leveraging existing regional strengths in SPAD/SPAES, ToF, RGB and neuromorphic architectures. This approach ensures industrial competitiveness, accelerates dual-use innovation, and strengthens Europe's position in next-generation XR, robotics, spatial computing and dual use.

1. Context and Rationale

Europe urgently needs to consolidate its leadership in XR and wearable hardware sovereignty. Current EU programs (e.g., Horizon Europe) fund fragmented subsystems, while global competitors—Qualcomm, Apple, Samsung, Sony, and Huawei—control end-to-end XR platforms. A European-made XR chip could serve as the technological anchor for a sustainable wearable ecosystem, linking semiconductor innovation to product-level integration and AI-driven applications. However, any such effort must extend beyond isolated IP blocks and instead fund the entire value chain (design → manufacturing → software → integration).

2. Strategic Assessment

Despite substantial research funding, Europe faces a persistent gap between R&D excellence and industrial-scale commercialization. EU initiatives typically support individual components or sub-systems rather than complete product ecosystems. This fragmented approach limits Europe's ability to compete globally in XR and AI hardware. To bridge this divide, a focused, sovereign XR

initiative must combine innovation in semiconductor design with manufacturing, software, and OEM integration capabilities.

The market context also demands realism. Replicating the business model of Qualcomm or Apple would require decades of accumulated IP, complex software ecosystems, and multi-billion-euro investments. These giant companies will also improve their current products with better and cheaper solutions. Europe currently lacks the industrial scale for such an undertaking. Therefore, it is strategically wiser to reinforce existing players by concentrating on next-generation, low-power, perception-focused architectures that can integrate with global platforms.

3. Recommended Technological Approach

Based on industry experience—including VoxelSensors' direct integration work with Qualcomm Snapdragon XR2—it is clear that the most viable path forward is the development of a European XR Sensor-Fusion + AI Coprocessor (Option A) before advancing to a full standalone XR SoC (Option B).

3.1 Option A — XR Sensor-Fusion + AI Coprocessor (Recommended)

- Purpose: Ultra-low-latency fusion of cameras (global shutter, ToF, SPAD/SPAES, event-based), IMU, RGB, eye and hand tracking, and SLAM/VIO pipelines.
- Node: 22FDX (FD-SOI) or 16/12 nm FinFET (EU-based manufacturing).
- Interfaces: 4–6× CSI-2 (2.5–4 Gbps/lane), 1–2× DSI/eDP, LPDDR4x/LPDDR5 (32-bit), PCIe Gen3 x1/x2, USB 3.x, I2C/SPI/UART; synchronized triggers and TSN-friendly time base.
- Accelerators: ISP pipeline (HDR, de-mosaic, denoise), DSP blocks for VIO, and small NPU (1–5 TOPS INT8) optimized for edge AI inference with peak efficiency per watt.
- Power: < 2 W active typical, < 50 mW idle.
- Form Factor: SiP / fan-out WLP options, with EVK reference design for OEM partners.

3.2 Option B — Full XR SoC (Application Processor + GPU/NPU + Perception)

- Purpose: A single-chip standalone XR platform (Qualcomm-class competitor).
- Node: 16/12 nm initially; 7 nm for Gen-2 (external foundry).
- Pros: Platform control and integration.
- Cons: Very high NRE, complex software stack, longer time-to-market, and uncertain ROI.

Option B should be considered only after validating market traction from Option A deployments.

4. Investment and Implementation Considerations

A realistic funding framework should be based on stage-gated financing aligned with design and tape-out milestones. The proposed structure includes:

- Core program (Option A coprocessor): ~€1 billion over 36–48 months.
- Integration and pilots with vendor hardware: €0.5 billion.
- Full wearable reference designs and industrial acceleration: €3 billion+.

This brings the potential total envelope to ~€4.5 billion, similar in scale to European Processor Initiative (EPI) investments in HPC.

Primary risks include market scalability, software ecosystem complexity, and fabrication yield. Mitigation strategies involve multi-vertical attachment (XR, robotics, industrial wearables, dual use) and early SDK and partner pilot programs.

Annex 1 shows main XR players investments table.

5. Strategic Implications and Policy Alignment

This initiative directly supports the objectives of the EU Chips Act, IPCEI , and Web 4.0 / Virtual Worlds strategies. It complements ongoing Horizon Europe projects (e.g., PERCEIVE, SPEAR) that emphasize human-centric computing, spatial AI, and ultra-efficient data fusion. By focusing on perception coprocessors, Europe can ensure that its know-how remains embedded in the core of global XR devices even when using foreign main processors.

This asymmetric strategy allows Europe to own the intelligence at the edge, ensuring technological sovereignty without duplicating massive industrial ecosystems already dominated by U.S. and Asian players.

6. Conclusion and Recommendations

Europe should pursue a leapfrog strategy based on neuromorphic and event-driven architectures —areas that match its strengths in RGB, Global Shuter, SPAD, SPAES, and ToF sensor innovation. Instead of replicating U.S. or Asian SoCs, Europe can establish global leadership in the perception layer of XR and AI systems. The approach not only enhances European autonomy but also creates a scalable industrial base for XR, robotics, dual use and Physical AI markets.

The recommended first step is the launch of a European XR Sensor-Fusion Coprocessor Program, co-funded under the EU Chips Act and national innovation agencies, targeting first silicon within 36 months. This initiative would secure Europe’s foothold in the next wave of spatial and empathic computing.

Annexe 1/ VR/XR/AR Investment Summary (2020-2025)

Major Company Investments

Company	Estimated 5-Year Investment (2020-2025)	Status
Meta	$80-100 billion	Ongoing, aggressive
Apple	$5-15 billion	Pausing upgrades, pivoting to smart glasses
Microsoft	$5-10 billion	Scaling back, HoloLens 2 discontinued
Snap	$3 billion+	Continuing, seeking outside funding
Google/Samsung	$2-5 billion (est.)	Ramping up with Android XR
Sony	$1-2 billion (est.)	Steady, focused on PlayStation ecosystem

Meta has invested more than all other companies combined:

- Meta: ~$80-100 billion
- All competitors combined: ~$15-30 billion