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Semiconductors for Defence: Key Insights from Industry Interviews

Executive Summary

This report synthesises insights from nine anonymised interviews conducted across the European defence and semiconductor ecosystem, including end users, defence industry actors, and semiconductor suppliers. The interviews reflect leading European perspectives and have been analysed collectively to identify recurring patterns, systemic challenges, and emerging trends.

A central conclusion is that **semiconductors have become a critical enabler of defence capability**, yet Europe remains structurally dependent on external ecosystems. This creates a fundamental tension between performance, sovereignty, and economic feasibility, which is expected to intensify in the coming years. Europe faces a dual dependency: reliance on US-controlled technologies (e.g. FPGA, GPU) and exposure to China-related supply chain risks.

Key messages

- **System-level performance dominates decision-making**
  Semiconductor choices are driven by overall system capability, integration, and lifecycle requirements, not by chip-level optimisation.
- **Strong structural dependency on non-European technologies**
  Critical reliance on US-based FPGA, GPU, and RF technologies remains a major vulnerability.
- **FPGA dependency is a key systemic risk**
  Widely used due to flexibility and low volumes, but creates concentration risk and vendor lock-in.
- **Defence demand is too small to influence semiconductor industry dynamics**
  Technology development is driven by high-volume civilian markets, not defence needs.
- **Europe faces persistent technology and ecosystem gaps**
  Weaknesses in AI chips, advanced logic, and memory limit strategic autonomy.
- **Clear structural trade-off: performance vs. sovereignty vs. cost**
  This trade-off is increasingly visible in procurement and policy priorities.

- **Diverging industry views on growth potential**
  Defence actors expect increased availability and production, while many suppliers remain cautious due to limited volumes. Some suppliers, however, see emerging growth opportunities.

1. Introduction and Scope

This report is based on structured interviews across three stakeholder groups: end users, defence industry, and semiconductor suppliers. The analysis focuses on identifying common themes and structural patterns that emerge across multiple perspectives.

Rather than presenting individual viewpoints, the aim is to distil **collective insights**, particularly those that recur across stakeholder groups and therefore indicate broader systemic issues.

2. Converging and Diverging Perspectives Across Stakeholders

While there is broad alignment on many themes, clear differences emerge between stakeholder groups, reflecting their positions within the ecosystem.

End users primarily focus on operational capability and system performance. Procurement decisions are typically driven by capability requirements, with limited emphasis on the underlying semiconductor origin as long as performance criteria are met. Geographic sourcing considerations are not always a primary driver at the operational level. Instead, stakeholders indicated that political guidance plays a key role in shaping procurement direction when regional or sovereignty-related objectives are prioritised. In this context, clearer policy-level direction is seen as important if European sourcing or supply chain autonomy is to be systematically strengthened.

Defence industry actors take a more nuanced view, recognising both the importance of semiconductors and the risks associated with dependency. These companies are highly aware of vulnerabilities in specific components and technologies, particularly where substitutes are limited.

Semiconductor suppliers, in contrast, approach the topic through an economic and industrial lens. Defence is typically seen as a low-volume, niche segment, making it difficult to justify dedicated production or significant investment without broader market alignment.

Key structural tension

A tension emerges between the expectations of defence industry actors and the economic realities faced by semiconductor suppliers. Defence industry stakeholders emphasise the need for increased European production capacity, improved supply security, and reduced dependency

on external technologies. At the same time, they show growing interest in alternative architectures and approaches, such as the use of RISC-V and other solutions that could reduce reliance on FPGA-based ecosystems and strengthen long-term autonomy and local supply.

In contrast, semiconductor suppliers highlight the fundamental constraints of the market. Defence demand is characterised by low and irregular volumes, estimated to be on the order of ~1% of the global semiconductor market, making it difficult to justify large-scale investment or dedicated production capacity. From an industrial perspective, semiconductor manufacturing requires high and stable utilisation, and therefore depends on alignment with larger civilian markets to remain economically viable.

This mismatch between the European semiconductor industry and defence industry expectations represents one of the most important structural challenges identified in the interviews.

A related observation is that some defence customers are beginning to place greater emphasis on supply chain resilience and origin, although this is not yet a dominant procurement driver. In these cases, customers may request greater transparency or European sourcing, but final decisions still reflect a trade-off between performance, cost, and resilience. This suggests an emerging but still evolving shift in customer behaviour, where resilience considerations are gaining importance but are not yet consistently prioritised across the market.

According to a recent policy analysis, “only about 20 percent of defence purchases since 2022 have been acquired from EU providers” (European Commission / High Representative, 2024, cited in Bruegel). [1] This highlights the strong reliance of European defence on non-EU suppliers at the system level.

While directly comparable data for semiconductors is limited, both the interviews and supporting analyses indicate that dependency is likely even more pronounced in critical semiconductor domains. Europe retains strengths in selected areas such as RF technologies, sensors, and power electronics, but relies heavily on external suppliers for advanced logic, AI processors, memory, and key components such as GPUs and FPGAs.

This suggests that the demand for European-produced semiconductors within the European defence sector remains relatively low today, particularly in high-performance and critical components. At the same time, it highlights a clear growth opportunity: increasing European sourcing and strengthening domestic semiconductor capabilities could significantly expand the role of European suppliers in defence-related value chains.

[1] Bruegel, What role do imports play in European defence?

Variation within supplier perspectives

The supplier perspective is not uniform, and a clear divergence in viewpoints can be observed. Some stakeholders adopt a cautious position, emphasising the limited scalability of defence-related demand and the economic risks associated with underutilised production capacity. From this perspective, defence remains a niche segment that is unlikely to drive significant industrial investment.

At the same time, other actors express a more optimistic outlook. These stakeholders identify potential growth opportunities driven by increasing defence spending and geopolitical developments, particularly in selected domains such as RF technologies, edge computing, and system integration. In some cases, this has already translated into investments in emerging capabilities, including open architectures such as RISC-V.

This divergence suggests that while the overall market remains challenging, **targeted growth opportunities are already being pursued by selected players**.

3. Semiconductor Technology Needs in Defence

Across all stakeholder groups, semiconductor requirements converge around a limited set of core domains. However, the key observation is that these technologies are valuable **only when integrated into system-level capabilities**.

Core technology domains

- RF and communication technologies
- Sensors, imaging, and situational awareness
- AI and edge processing
- Power electronics and energy efficiency
- Mixed-signal integration

These technologies support critical defence functionalities such as communication, targeting, autonomy, and data processing.

System-level integration as the defining requirement

A recurring theme is that performance is no longer driven by individual components, but by **how well technologies are integrated into cohesive systems**.

Key development directions include:

- Integration of sensing, processing, and communication
- Increasing use of edge computing within systems
- Modular architectures enabling upgrades over long lifecycles

- Software-driven functionality replacing hardware dependencies

This shift places increasing importance on system design, architecture, and integration capabilities.

4. FPGA Dependency and Emerging Alternatives

The role of FPGAs is one of the strongest recurring findings across the interviews. These components are widely used due to their flexibility and ability to support low-volume, highly specialised applications.

Why FPGAs dominate defence applications

- Flexibility for changing requirements
- Suitability for low production volumes
- Ability to update functionality after deployment
- Strong position in signal processing and communication systems

However, this widespread use creates significant challenges.

Key risks associated with FPGA dependency

- **Concentration risk**
  Limited number of suppliers globally
- **Geopolitical exposure**
  Dependency on non-European sources
- **Long-term lock-in**
  Proprietary ecosystems limit flexibility
- **Supply constraints**
  Limited alternatives in case of disruption

As a result, FPGA reliance is increasingly viewed as a **strategic vulnerability rather** than purely a technical choice.

Emerging alternatives

Several stakeholders highlight the need to reduce dependency on FPGAs through:

- RISC-V-based architectures
- Custom accelerators
- Software-defined systems
- Heterogeneous computing approaches

These alternatives are still evolving, but they represent a **key long-term pathway toward greater autonomy and flexibility**.

5. Structural Challenges: Supply Chain, Volume, and Capability Gaps

The challenges identified in the interviews are deeply interconnected and stem from structural characteristics of the semiconductor industry.

Global supply chain dependency

The semiconductor ecosystem is global, with dependencies spanning design tools, manufacturing, packaging, and raw materials. For European defence stakeholders, this results in strong reliance on external technologies, particularly from the United States, as well as dependence on manufacturing capacity located in Asia. This structure creates significant exposure to geopolitical developments and potential supply disruptions.

In addition, several stakeholders explicitly highlighted China and Taiwan as a distinct and growing risk within the supply chain. While Asia as a whole is critical for manufacturing, China and Taiwan are often treated separately due to geopolitical tensions, export controls, and industrial policy actions. In practice, some defence actors already avoid Chinese-origin components or are actively working to reduce their exposure. At the same time, dependency on US technologies creates a different type of risk, related to export control regimes and regulatory constraints. Together, these dependencies form a dual exposure to both US-controlled technologies and China-related supply chain risks.

Volume mismatch as a fundamental constraint

A central structural issue is the mismatch between defence demand and semiconductor industry economics. Semiconductor production requires high and stable volumes to remain cost-efficient, whereas defence demand is typically low-volume and irregular. As a result, suppliers have limited economic incentives to develop dedicated solutions, leading to reliance on commercially available components and making it difficult to establish defence-specific production capacity.

Technology capability gaps in Europe

Europe demonstrates clear strengths in areas such as RF technologies, sensing and imaging, power semiconductors, and photonics. However, significant gaps remain in critical domains including AI chips, advanced logic, memory technologies, and large-scale design ecosystems. These limitations constrain the ability to achieve full technological autonomy and reinforce dependence on external suppliers.

6. Emerging Trends Shaping the Market

Defence systems are undergoing rapid transformation, driven by both technological and operational changes.

Key trends

Several key trends are shaping semiconductor demand in defence applications. Artificial intelligence is becoming increasingly central, particularly in edge environments where systems require real-time processing and decision-making capabilities. At the same time, the growing use of autonomous and distributed systems, such as drones, is driving demand for scalable and cost-efficient semiconductor solutions.

In parallel, there is a broader shift toward greater system integration and miniaturisation, with increasing functionality embedded into more compact and efficient architectures. Another important trend is the rising emphasis on supply chain resilience and security. Stakeholders are placing increasing attention on component origin, traceability, and the ability to maintain supply under geopolitical disruption scenarios. While performance and cost continue to dominate procurement decisions, resilience considerations are becoming more visible, particularly in sensitive applications and long-term planning, although the shift remains gradual and uneven across the sector.

7. Strategic Opportunities for Europe

Despite structural challenges, the interviews highlight several realistic opportunity areas for Europe.

Focus on areas of strength

Europe's strategic opportunities in semiconductors for defence lie primarily in building on existing areas of strength and aligning them with broader industrial ecosystems. In particular, Europe has competitive capabilities in RF and communication technologies, sensing and imaging, power electronics, and photonics. These domains represent realistic starting points for strengthening both technological capability and supply chain resilience.

At a strategic level, stakeholders consistently emphasise that full semiconductor autonomy is neither realistic nor economically viable. Instead, a more targeted approach is required, focusing on critical technologies and security-sensitive applications where strategic impact is highest. This implies prioritising selected capabilities rather than attempting to replicate the entire global value chain.

A key enabler for such development is the effective utilisation of dual-use ecosystems. Sustainable progress depends on alignment with high-volume civilian markets, integration into broader industrial structures, and cross-sector collaboration. Without such alignment, it remains difficult to achieve the scale required for competitive semiconductor development.

Finally, Europe's strength in system-level design and integration provides an important opportunity for differentiation. Advanced system architectures, modular design approaches, and strong lifecycle management capabilities enable Europe to create value at the system level, even where limitations exist at the semiconductor manufacturing level.

8. Strategic Conclusions and Recommendations

The combined findings lead to a set of strategic conclusions that are consistent across stakeholder perspectives.

Key strategic priorities

- **Accept global industry dynamics**
  - defence alone cannot drive semiconductor innovation
  - collaboration with global ecosystems is essential
- **Reduce critical dependencies**
  - prioritise alternatives to FPGA reliance
  - expand use of open architectures (e.g. RISC-V)
- **Strengthen supply chain resilience**
  - improve traceability and security
  - diversify sources and suppliers
  - develop trusted capabilities in critical areas
- **Invest selectively in European capabilities**
  - focus on realistic strengths
  - align with dual-use markets
- **Bridge the industry expectation gap**
  - align defence demand with supplier economics
  - support long-term investment through policy and procurement

Final observation

A key overarching insight from the analysis is that the challenge is not technological alone, but **systemic and economic**.

Europe's ability to strengthen its position in defence semiconductors will depend not only on technological development, but also on effective alignment between policy objectives, industry incentives, and defence requirements. Without such alignment, the gap between strategic ambition and practical capability is likely to persist.