Operations strategy

Unleashing Semiconductor Superiority

Creating competitive advantages for one of the world's most powerful resources

Porsche Consulting

Strategic Vision. Smart Implementation.

INSIGHTS

//01

Organizations must develop a semiconductor strategy to ensure supply and resilience, while factoring in the ten main pitfalls during implementation.

//02

Successful semiconductor strategy implementation requires a Target Operating Model that links strategy to processes implemented by skilled workforce.

//03

Only with a shared vision, active collaboration and vertical integration into the semiconductor ecosystem can superiority truly be unleashed.

Introduction

The semiconductor crisis has had a major impact on the global economy, highlighting the critical role of microchips in today's industries and products. Demand for semiconductors in automotive, industrial, consumer electronics, computing, and communications applications is expected to grow by 65 % by 2030.[1] In response, leading economies and semiconductor manufacturers have moved quickly to invest billions of dollars to expand global production capacity across the semiconductor supply chain to meet ever-increasing demand. Given the current market dynamics, companies have been urged to develop an effective semiconductor strategy. As is highlighted in Porsche Consulting's latest Semiconductor Strategy Paper, companies can navigate this challenging landscape by focusing on eight fundamental fields of action as a basis for a holistic semiconductor strategy (see Figure 1).

Procurement, R&D, and operations executives must now focus on implementation and execution of this well-defined semiconductor strategy in order to master the increasing complexity of supply chain disruptions, economic fluctuations, and technological advances. Porsche Consulting's semiconductor Target Operating Model (TOM) ensures successful implementation of strategies and helps companies to adapt quickly and effectively to changing circumstances. Aligning and detailing strategic goals with feasible implementation plans, processes, and resources enables global companies to withstand future semiconductor challenges and achieve long-lasting competitive advantages.

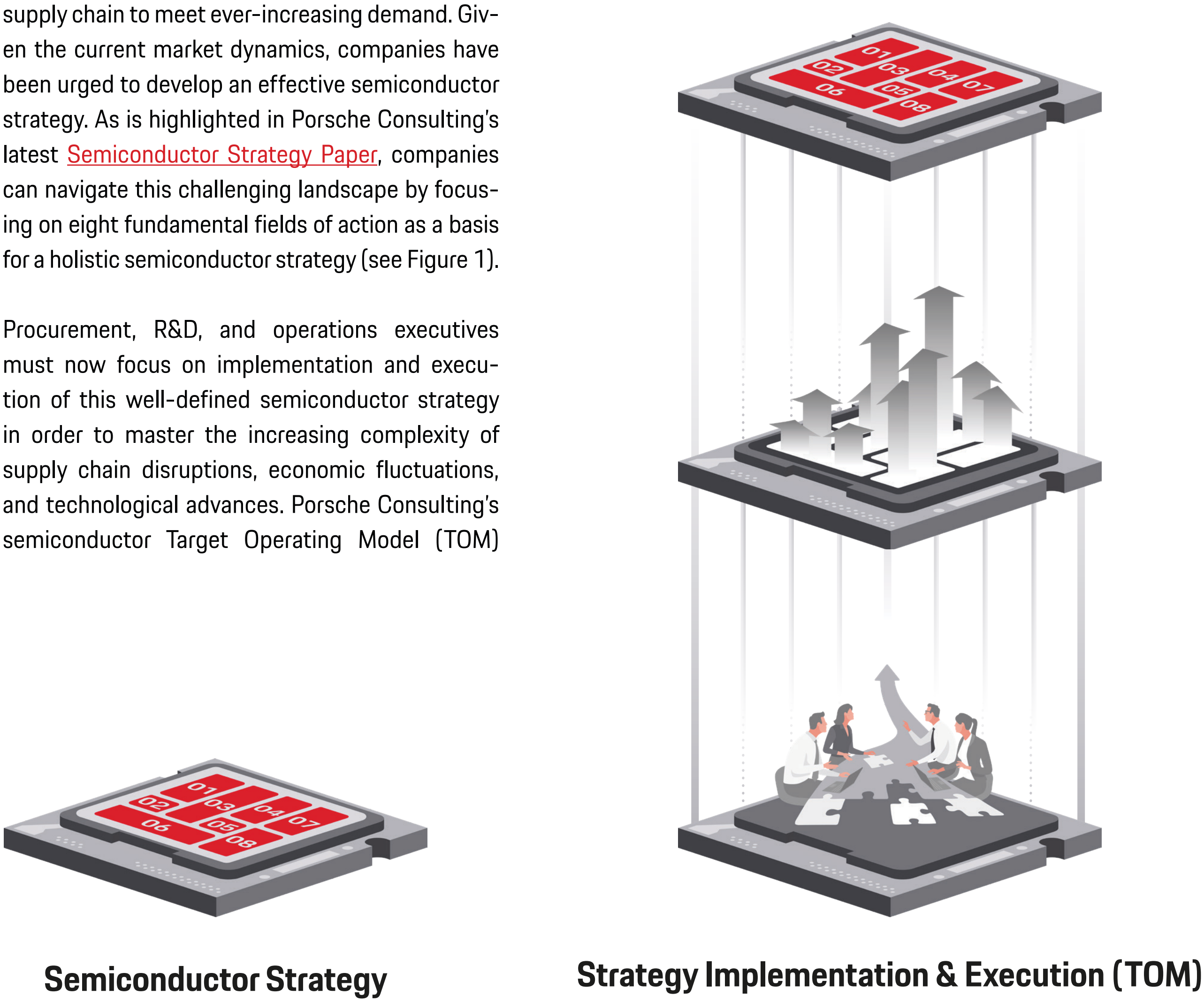


Fig. 1. Semiconductor strategy and execution approach

[1] Porsche Consulting Analysis, Omdia 2023

Advising companies from all levels of the semiconductor supply chain, Porsche Consulting has identified the major pitfalls preventing organizations from developing, implementing, and executing an impactful semiconductor strategy.

These issues include building adequate risk management capabilities, cross-functional involvement in strategy development, establishing flexible semiconductor sourcing and contract models, and mastering data quality.

A lack of governance and strategy compliance poses significant risks, particularly for large OEMs. Therefore, intra-company collaboration and supplier alignment are key to countering such risks.

Finally, companies must focus on people and processes. They must find ways to attract skilled semiconductor workforce for future product development and adapt their structures to help, and not hinder, innovation and resilience.

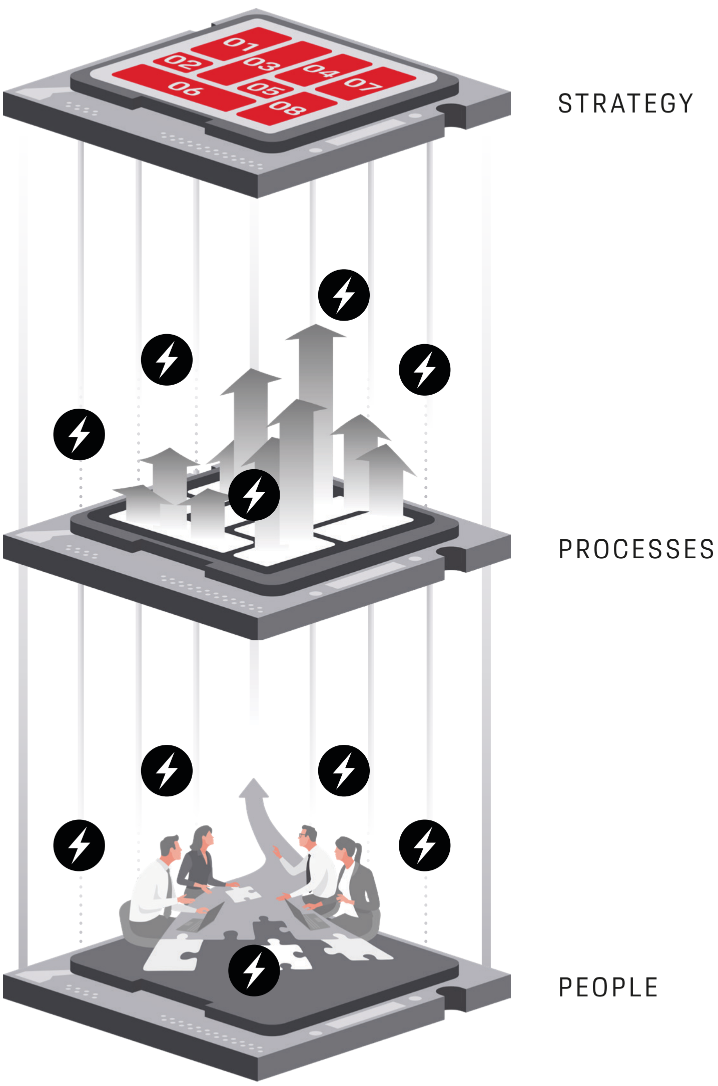


Fig. 2. Semiconductor Target Operating Model including implementation challenges

10 Pitfalls to avoid during semiconductor strategy implementation

To achieve semiconductor superiority, executives must prioritize the resolution of these obstacles, which have been assigned to five clusters, as they constitute the foundation for effective semiconductor management in a Target Operating Model.

DATA TRANSPARENCY & RISK MANAGEMENT

01 Insufficient transparency about integrated supplier products

02 Risk mitigation as an isolated firefighting approach

The complexity of the semiconductor supply chain can only be mastered with comprehensive database and integrated analytics. Supply chain transparency supports risk management, strategic decision making and long-term supply resilience.

CATEGORY MANAGEMENT

03 Missing toolset for cross-functional strategy development

04 Long, and few mandated decision-making paths

A wide variety of semiconductor products requires distinct strategies. Depending on the industry and product, different categories become decisive. Without category management, technical requirements, market situations, and development trends cannot be reconciled in a way that allows category-specific strategies to be derived.

SOURCING STRATEGY

05 Lack of cross-functional alignment in sourcing requirements

06 Deficits in sourcing model flexibility

Supply chain disruptions and resulting semiconductor shortages put pressure on procurement departments. Lack of sourcing diversification leads to cost spikes and financial strains. Reactive approaches result in production cuts, lost revenue, and declining market share. Resilient organizations need to shift between sourcing scenarios, and factor in all relevant requirements as vertical integration increases.

COLLABORATION MANAGEMENT

07 **Lack of internal harmonization of strategic activities**

08 **Too many faces to the semiconductor manufacturer**

Seamless two-way communication, resource sharing, and goal alignment are vital in managing collaborative activities within the semiconductor industry. Lack of dedicated collaboration management can hinder technological advancement, customer satisfaction, and revenue generation in a competitive environment.

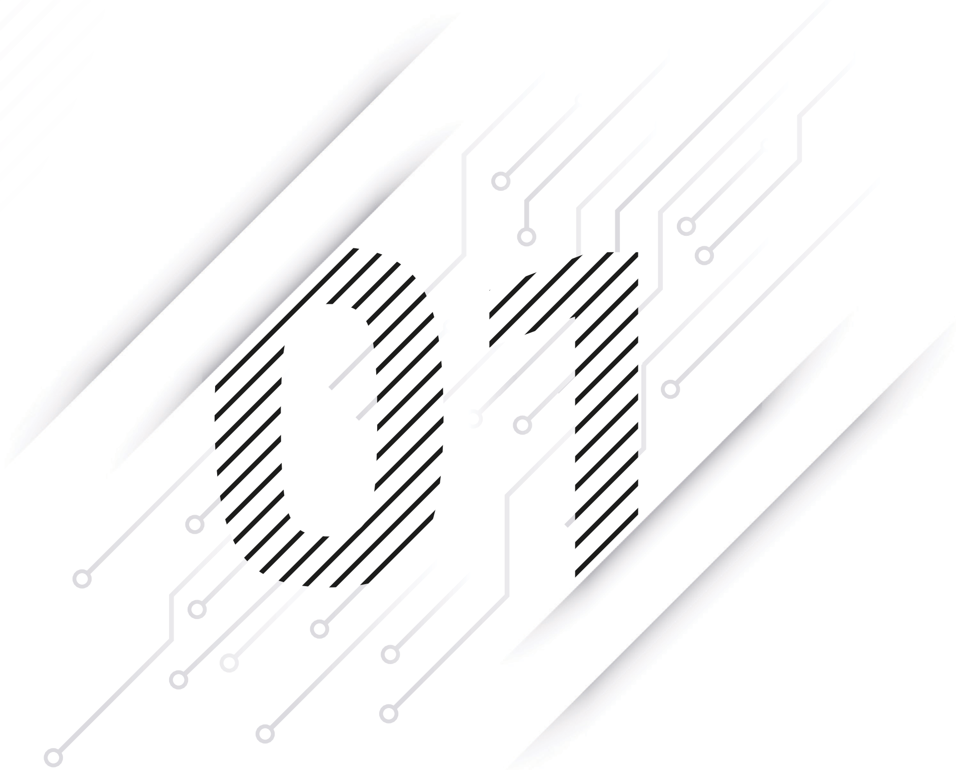
CHANGE MANAGEMENT

09 **Silicon stars are not attracted by OEMs**

10 **Yesterday's innovation processes for tomorrow's products**

Implementing semiconductor management involves organizational changes, such as introducing new governance structures, roles, responsibilities, processes, and ways of working. Building competencies to accommodate organizational changes in a competitive market, new hiring, and people development strategies must be implemented.

» All **10 pitfalls** will be closely examined in the following chapters, providing hands-on approaches for leading organizations.



Insufficient transparency about integrated supplier products

A fragmented data landscape along the supply chain in critical areas such as supplier, technology, demand, and risk-related data can be a breeding ground for biased forecasting, potentially causing organizations to overlook critical risks in their supply chain.

This results in inaccurate demand forecasts, leading to over- or understocking of products, affecting overall supply chain efficiency, and hindering the formulation of a comprehensive semiconductor strategy. Additionally, risks such as end-of-life or product shortages may go undetected, resulting in the need for ad-hoc product changes. Significant supply shortages are therefore often the rule rather than a short-term exception.

Despite the multitude of challenges, the lack of transparency is a consequence of inadequate data infrastructure, responsibilities, and processes to collect, centralize, and share data from various sources relevant to the organization's semiconductor strategy.

Insufficient data validation and maintenance at different stages of the process, performed by various stakeholders along the supply chain, leads to poor data quality and high levels of uncertainty in decision-making processes. This problem is exacerbated by poor integration and limited availability of relevant external data sources.

In Figure 3, a leading industry example illustrates how a comprehensive data repository can be interconnected within the supply chain, contributing to a single, centralized, and unified database. Implementing this approach with clearly defined processes for data collection, validation, and cleansing ensures a solid baseline for strategic decisions around related supply chain analytics and strategy formulation.

Three layers describe a customer's experience ensuring transparency along their integrated semiconductor portfolio.

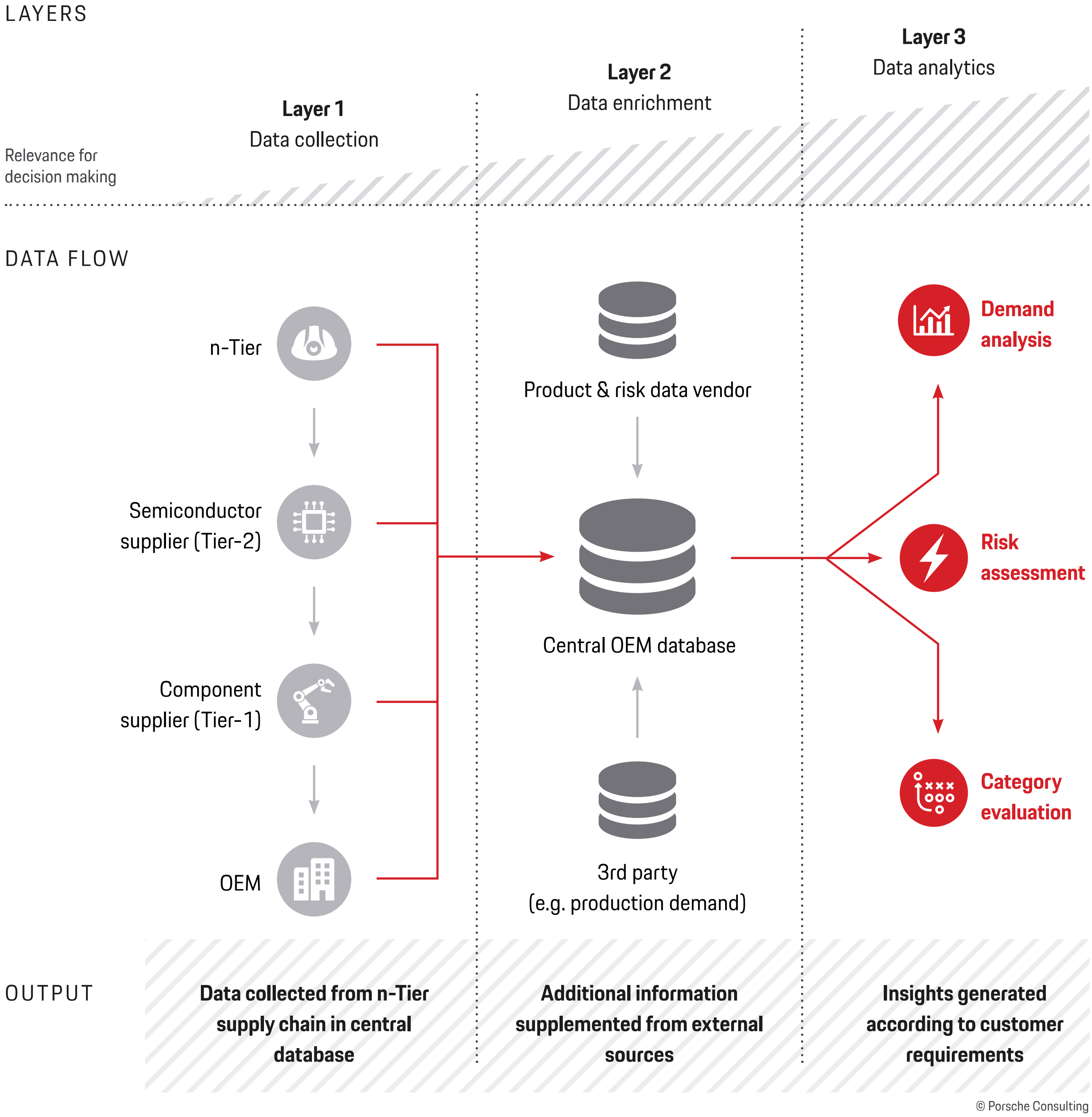


Fig. 3. Schematic semiconductor supply chain and data transparency

LAYER 1:

Collect business-critical product information within the n-Tier supply chain by providing interfaces for a seamless data collection process to suppliers and market partners. This is enabled by an organization-owned database, which is continuously developed with clearly defined responsibilities and processes.

LAYER 2:

Validate and enrich data points with external and internal data sources, such as supply risk and semiconductor product data, additional market insights, and production demand forecasts. This ensures a comprehensive and lean data foundation.

LAYER 3:

Define stakeholder-specific key requirements following the semiconductor strategy and implement the derived analyses within industry-grade analytics solutions. A semiconductor business intelligence cockpit is then integrated into business units to distribute the information among the organization, unlocking the full potential of the generated insights regarding demand, risk, and category analysis.

DATA TRANSPARENCY &
RISK MANAGEMENT

02

Risk mitigation as an isolated firefighting approach

In addition to the challenge of insufficient information transparency, many organizations struggle to identify, assess, and mitigate risks in their integrated semiconductor products. This prevents them from working proactively on mitigation plans, such as identifying supply alternatives, developing category strategies (see pitfall 03), or implementing technical redesigns.

Even when technical or business risks are identified, the information is often not shared centrally across all contributing stakeholders, and the consequences are not effectively addressed. A typical root cause of a lack of any proactive risk assessment and derivation of de-risking measures is that responsible persons, such as category managers, often lack standardized procedures, support from central risk departments, and specific competences to overcome these issues.

Organizations can bypass this pitfall by working on both ends. Firstly, by making information, methods, and tools available centrally (e.g. introducing a risk monitor to create transparency along product obsolescence risks or geopolitical influences). Secondly, by communicating and training employees within a comprehensive risk mitigation approach.

In this context, a holistic approach includes the definition of clear responsibilities (risk observer vs. risk mitigator), an action matrix (correlation between risk indicators and leading-practice measures), and good governance (rules how and when to intervene) for dealing with the risks that arise and the establishment of risk mitigation tools.

This allows the company to implement an effective mitigation plan at different points in time related to risk occurrence (see Figure 4). For example, long-term obsolescence risks can be identified by a central risk monitor to subsequently initiate a follow-up process for a technical redesign. However, mitigating actions can be derived from an action matrix by e.g. securing supply via brokers for short-term risks (e.g. induced by trade bans or natural disasters) as well as actual supply shortages.*

In summary, selected de-risking measures can be implemented both internally and at the suppliers. They occur at different times and affect operational as well as strategic processes, such as procurement e.g. portfolio management as part of the category strategy.

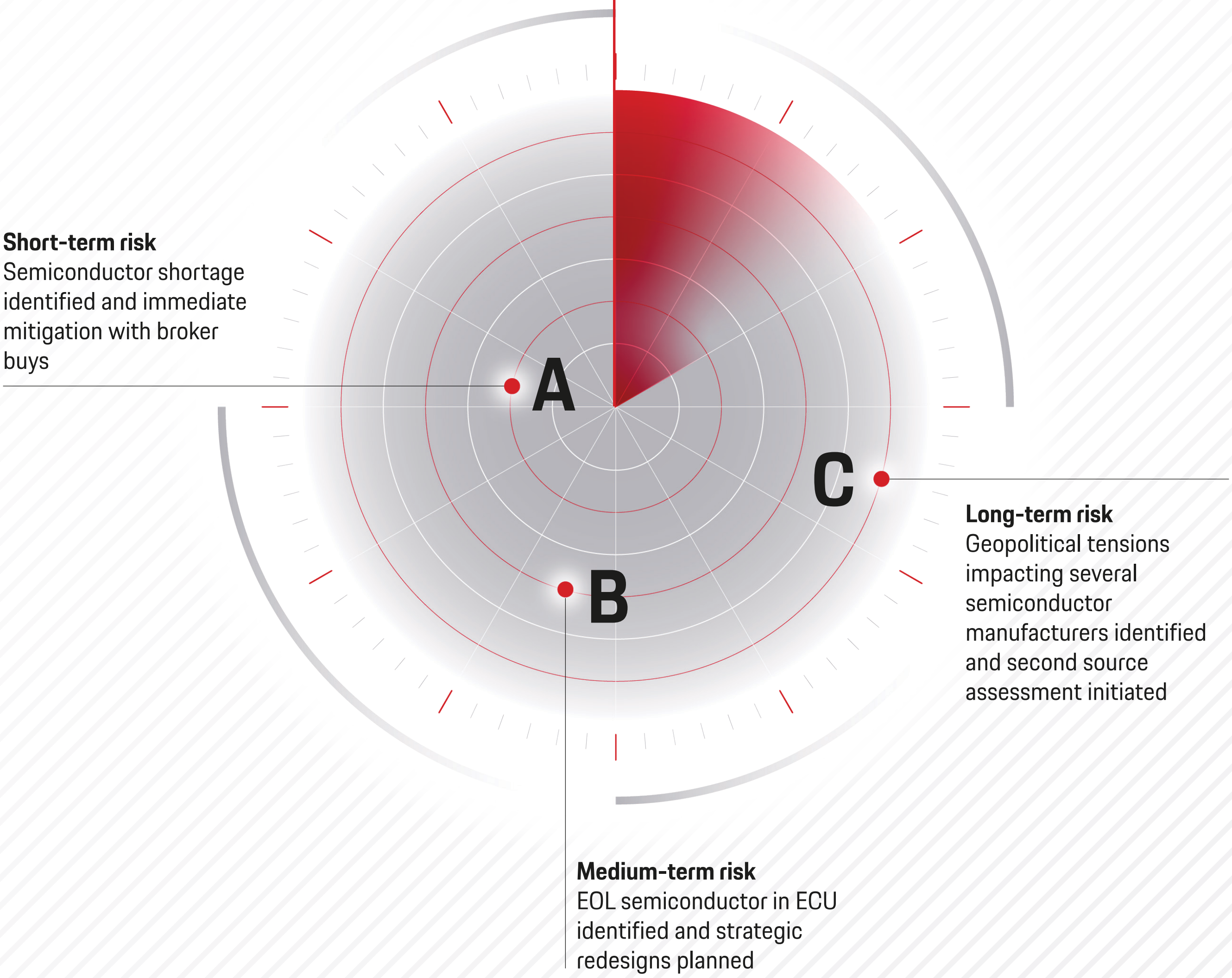


Fig. 4. Risk management segmentation

* A semiconductor broker is an intermediary that facilitates the buying and selling of semiconductor components between manufacturers and customers, helping to match supply with demand in the electronics industry.

CATEGORY
MANAGEMENT

03

Missing toolset for cross-functional strategy development

A major pitfall in establishing an overall semiconductor strategy can be the lack of continuity and consistency in objectives between R&D and procurement for future product creation and sourcing activities. While R&D is primarily focused on bringing innovative technologies into products, maintaining flexibility for the design-in-process and -timing, the procurement organization's objective is always to achieve the best prices and secure long-term supply. For example, entering long-term supply agreements for specific microchips with semiconductor vendors in response to supply shortages severely reduces flexibility for future product development.

In many cases, this is caused by the lack of a collaboration model between, and within, these two central functions involved in product development. It is a common problem that R&D is primarily involved at an early stage, developing concepts based on technical requirements, while procurement starts its work later, with very little interaction between the two, and then focuses on commercial requirements and objectives. This can lead to the sourcing of best-fit products from a commercial procurement perspective, but not from a technical R&D perspective. However, the problem may start even earlier, when requirements are defined in silos for certain product groups. To take an example from the automotive industry, without unified requirements for an infotainment system and a body control system, a common strategy for the application of microcontrollers or communication devices is not possible. However, by consolidating and aligning the different sets of requirements, a common strategy might be feasible, for what appear to be technically different components.

Therefore, it is essential to build a cross-functional organization across procurement and R&D that continuously monitors and aligns the multi-dimensional requirements of current and future products to develop a semiconductor strategy that is aligned with the overall product strategy (see Figure 5). Due to the variety and complexity of semiconductor products, the organization should be structured by semiconductor product categories, so that each category (e.g. microcontrollers) has experts who act as multipliers throughout the entire organization. Strategy development then becomes a category-specific issue, enabled by a toolset of overarching objectives that are adapted according to category-specific requirements. From this, category-specific strategies, such as supplier or product whitelists, technical standardization, or long-term supply agreements, are derived. These strategies are then implemented and tracked through continuous monitoring of internal category application, but also market developments, supplier product roadmaps and even new suppliers and new technology solutions entering the market.

This is no easy task, as it involves trade-offs between supply chain resilience, innovation drive and cost potential. Dedicated semiconductor category managers from both R&D and procurement should work in tandem, acting as an interface both internally (e.g. in the various areas of product development or sourcing) and externally with suppliers and the organization's key account (see pitfall 08), continuously aligning product roadmaps and requirements.

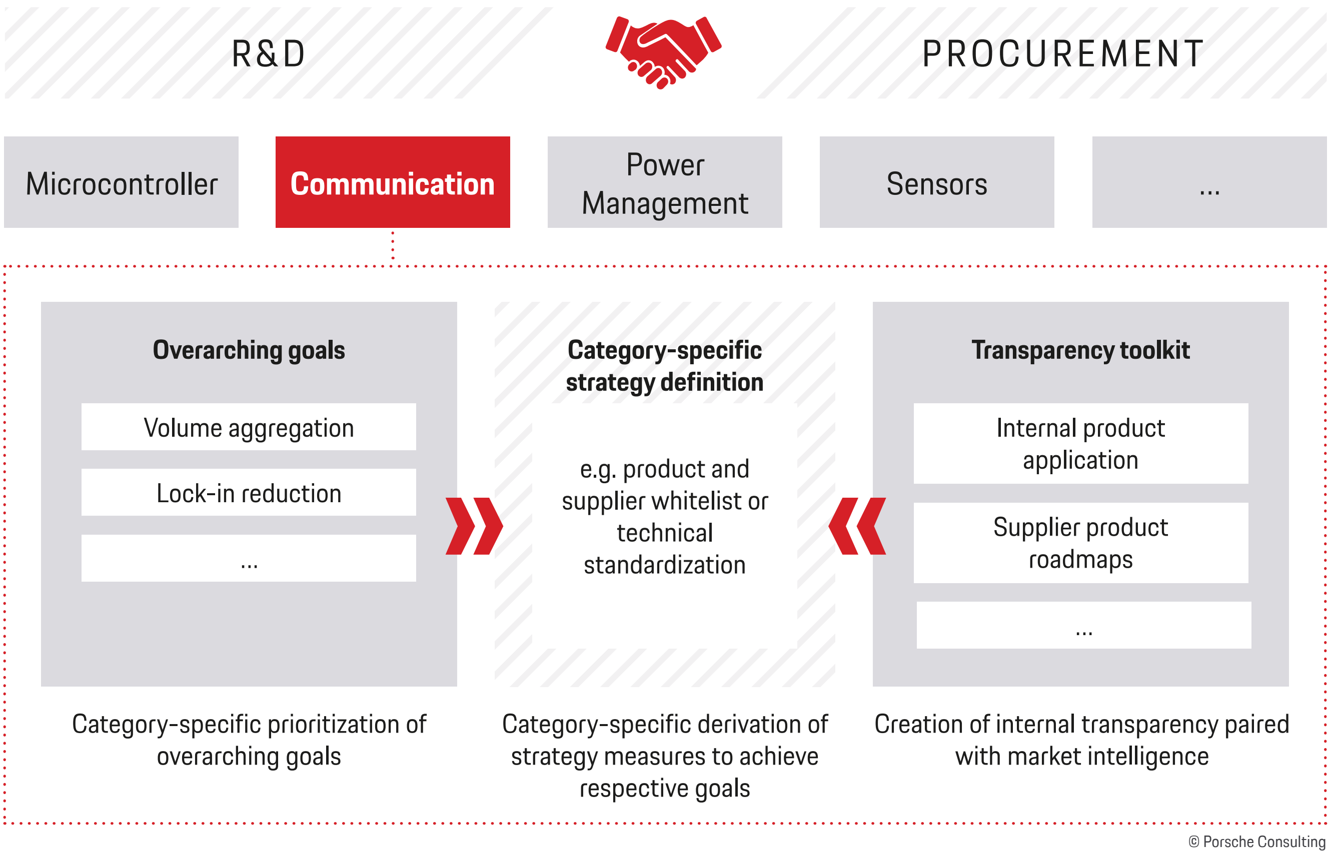


Fig. 5. Category specific strategy definition

CATEGORY
MANAGEMENT

04

Long, and few mandated decision-making paths

Developing strategies for semiconductor categories is one thing, ensuring that they are followed is another. In times of supply shortages, quick decisions about semiconductors are necessary and within the scope of each management board meeting. An easing of the supply crisis might lead to less attention and, therefore, fewer mandates for semiconductor decisions and strategies. Another challenge might arise by solely deciding and implementing category-specific strategies that neglect interfaces and peripherals on the printed circuit board (PCB). Consequently, two pitfalls arise for organizations and their semiconductor strategies, ensuring attention for the topic remains high and no-one resorts to a silo mentality.

Without a dedicated organizational body and the necessary decision-making competencies, it is difficult to enforce strategy conformity in sourcings against local optima in terms of technical solutions, timing, or costs. In many cases, discussing the technical concepts of sourced electronic components at semiconductor level has not been on a chief technology officer's (CTO's) agenda for a long time—suppliers have been awarded contracts without examining their PCB layouts.

To create this type of governance, a top management committee must be established which is responsible for both strategic decisions and their implementation in the product development and sourcing process for components with electronic content (see Figure 6).

Confirmation of this semiconductor-focused committee will be mandatory to enter the existing final stage of the sourcing process, making semiconductors an issue for top management.

This committee, however, should not only include R&D and procurement, but also other relevant business functions, such as quality, finance/controlling, value engineering, sales, after sales, production, and logistics. To ensure a system-oriented approach and high quality of decisions, an interface between the category-focused semiconductor category management and the components-oriented team responsible for electronic system development must be established. This team should have the best of both worlds. On the one hand, semiconductor-specific application knowledge, and on the other hand electronic system design competence with a focus on vehicle-level synergies. Ongoing sharing of knowledge and lessons-learned across these teams and across the organization is essential for effective semiconductor management. In this way, an OEM becomes more vertically integrated in the electronics supply chain by working together on best-in-class system solutions, both technically and commercially, at an early stage in the product development process.

By extending this approach from electronic systems to entire products, OEMs can proactively influence their product development by deciding their future semiconductors, thereby increasing their competitive advantage.

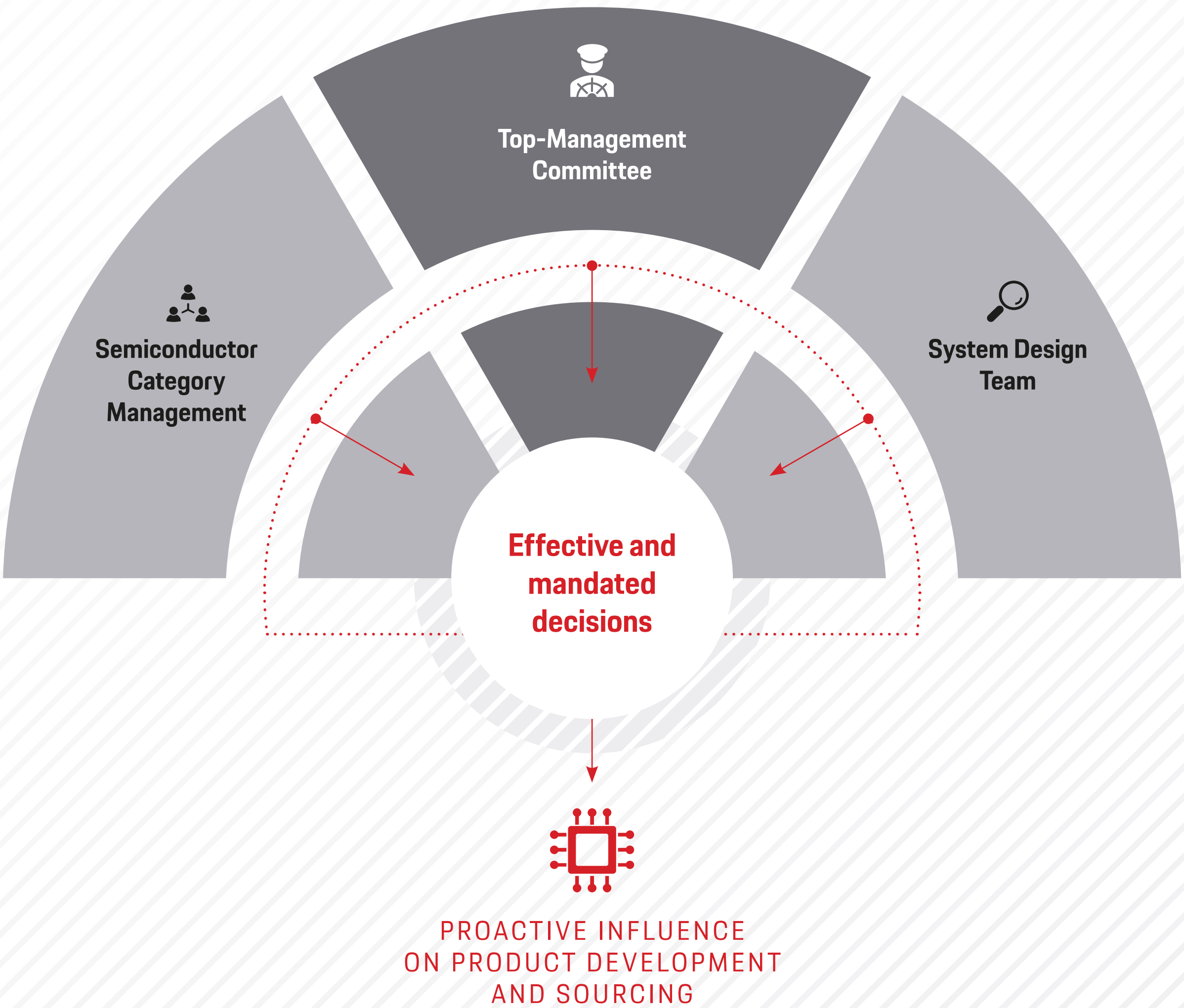


Fig. 6. Semiconductor governance

SOURCING
STRATEGY

05

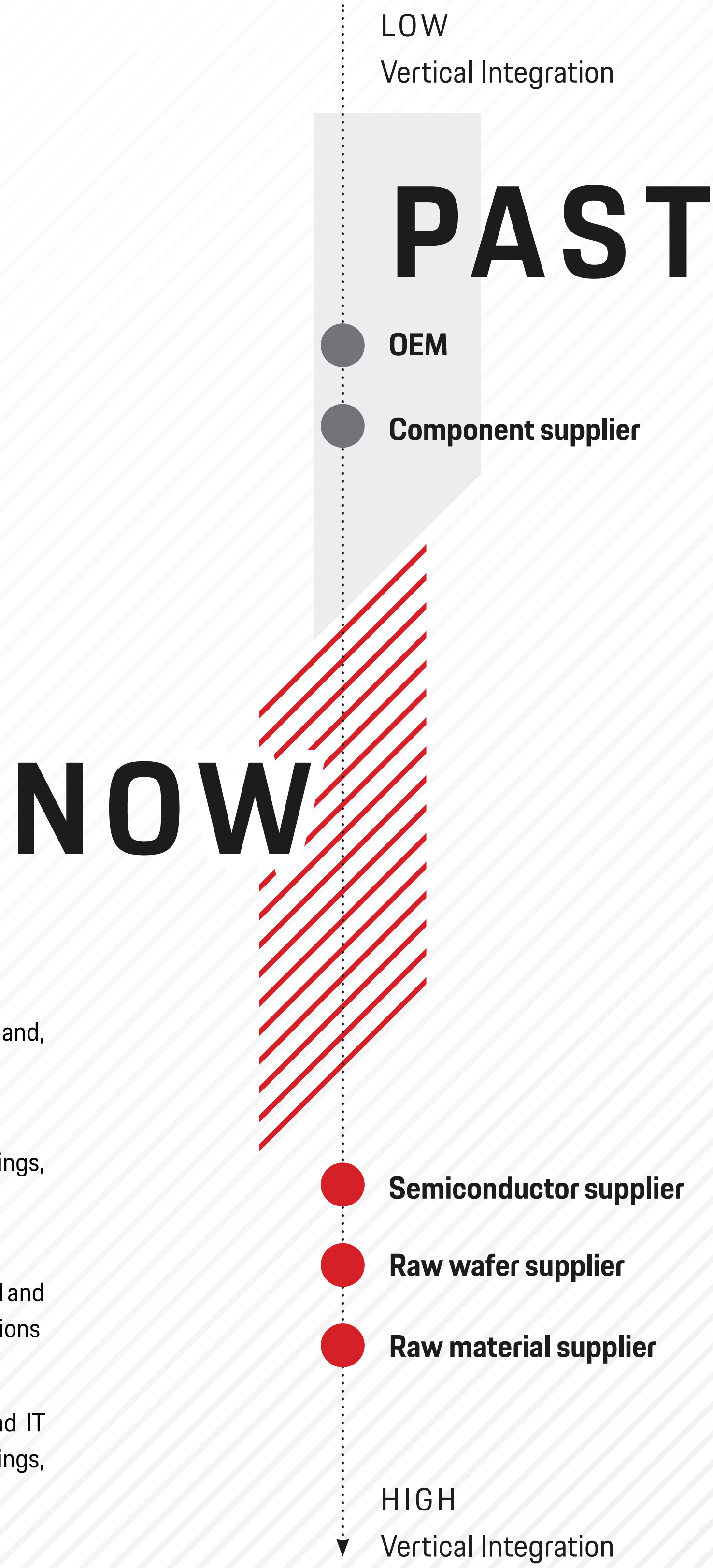
Lack of cross-functional alignment in sourcing requirements

When it comes to sourcing production materials or negotiating with suppliers, procurement departments traditionally take the lead. However, when organizations aim to further integrate their supply chain with semiconductor manufacturers, they must consider diverse interests. As the OEM moves into new territory and works with different suppliers, existing processes and structures may not apply, and may not be able to be used to integrate these suppliers.

Increasing the depth of sourcing activities with semiconductor manufacturers requires governance across procurement, legal, finance, logistics, information technology, and related departments. Without this coordinated effort, achieving organizational independence, flexibility, and resilience in the face of semiconductor supply chain disruptions becomes challenging. The extent of the control which companies desire in vertical integration will lead to new contracts with semiconductor industry-specific requirements, and potentially different ones to previous supplier relationships. As a result, organizations must establish new financial processes for direct payments, tax, customs reporting, and IFRS statements to meet internal and external audit requirements.

Moreover, due to the unique logistical requirements of handling semiconductors, organizations need to develop new processes and acquire suitable equipment for inbound and outbound logistics. Therefore, in addition to procurement-related activities, organizations must analyze and evaluate a range of new requirements in the solution landscape. Neglecting to assess the impact and department-specific requirements in detail may lead to significant challenges during the implementation of the sourcing approach, hindering the supply security being aimed for.

To address this, leading companies need to nominate experts from the departments concerned to identify requirements, assess impacts holistically, and create company-wide transparency. Aligning all departments is critical to overcoming initial obstacles and fostering a common understanding of the problem to solve (see Figure 7). Through cross-functional workshops, organizations can significantly improve their ability to align diverse perspectives and reach a consensus on critical decisions.



Functional requirements

Procurement
Long-term semiconductor supply and demand, strategic pricing agreements and penalties

Finance
Payment flows, tax and customs reportings, accounting and IFRS requirements

Legal
Liability and warranty, semiconductor control and allocation options, n-Tier contract modifications

Logistics
Inbound- & outbound logistics, call-offs and IT specific modifications for supplier onboardings, digital twin and inventory transparency

Fig. 7. Cross-functional requirements for vertical semiconductor supply chain integration

SOURCING
STRATEGY

06

Deficits in sourcing model flexibility

While collaborating across departments on the future semiconductor procurement strategy and vertical integration concepts, leading OEMs should evaluate the solution landscape for semiconductor purchasing from different perspectives. Activities can range from simple to very complex solutions. By not exploring different semiconductor procurement approaches, organizations risk choosing a single elaborate channel, such as directed buy, for their entire semiconductor portfolio, limiting their ability to respond to future supply shortages with resilience and flexibility.

One of the root causes of the too-narrow solution space in semiconductor sourcing is that companies tend to take shortcuts in solution development in order to speed up the process, and to address short-term challenges that seem more pressing at the time, rather than creating sustainable long-term solutions. The inherent complexity of the semiconductor landscape, unlike most other value chains, makes it difficult for organizations to assess which semiconductors should be sourced through a particular sourcing model, as shown in Figure 8.

This deficit is increasing, as the variety and strategic differences in a semiconductor portfolio can vary significantly when comparing several industries (e.g. automotive vs. consumer goods), which is why OEMs can't just replicate solutions and need to build up their own specific and unique solution.

To overcome these difficulties, leading organizations should focus on creating and deploying solution platforms for sourcing assessments and models. Each department should contribute its specific requirements according to the different sourcing models. Once the requirements have been captured and analyzed, companies need to conceptualize their target vision, including an OEM-specific semiconductor assessment that supports the decision on which sourcing approach to use.

By establishing a semiconductor sourcing solution platform, companies increase their flexibility in purchasing semiconductors and managing supply chain disruptions, thereby improving their supply chain resilience and security of supply.

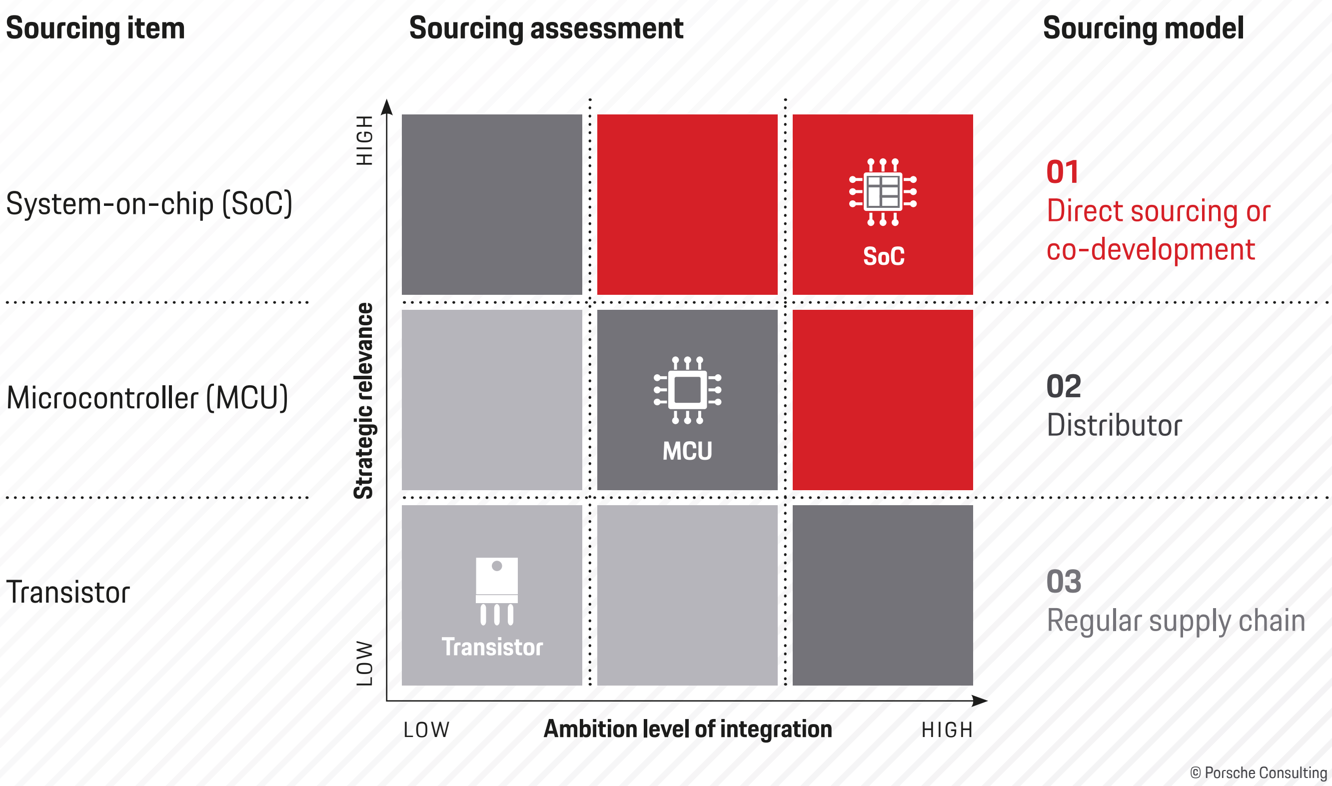


Fig. 8. Semiconductor category-specific attributes as the basis for sourcing models

COLLABORATION
MANAGEMENT

Lack of internal harmonization of strategic activities

A critical issue OEMs face when implementing collaborative activities with semiconductor companies is the lack of common internal understanding and alignment in relation to strategic semiconductor activities. This leads to internal inefficiencies and hinders overall effectiveness, especially for OEMs with complex product portfolios.

There are two main factors that contribute to companies failing to establish a common strategic understanding of semiconductor management. First, a lack of transparency and clear internal communication regarding the organization's vision, mission, and key strategic workstreams hinders the dissemination of critical information across teams and departments. This problem can worsen when information is delivered through inappropriate or excessive communication channels. Catalyzing relevant information becomes challenging when there is an information overload. Second, large organizations with siloed structures and high information asymmetries face challenges in achieving a coherent strategic approach. Knowledge and visibility are scattered throughout the organization, leading to misunderstandings and significant opacity. This is exacerbated when suborganizations prioritize their own goals ahead of the overarching corporate goal.

Isolated business functions hinder effective internal alignment and impede the seamless flow of critical knowledge necessary for collective strategic action. Leading companies can improve internal alignment in semiconductor management by adopting integrated solutions. Establishing a dedicated Semiconductor Management Office (SMO) enables OEMs to coordinate activities, communicate relevant information (strategic goals and progress) through dedicated channels, and engage all stakeholders at the right time after establishing a semiconductor strategy. The SMO acts as an interface between "strategy" and "operations", aligning both dimensions and providing the necessary information to key semiconductor operations departments (see Figure 9). Leading companies do not view this SMO approach as one-way communication. They recognize the importance of establishing processes and structures to receive important information from the organization, just as much as providing information. Actively engaging representatives from all relevant departments fosters a mutual commitment. Taking these strategic steps to improve internal alignment and communication promotes a common understanding of strategic goals, improves efficiency, and ultimately creates a strong foundation for external semiconductor collaboration among leading OEMs.

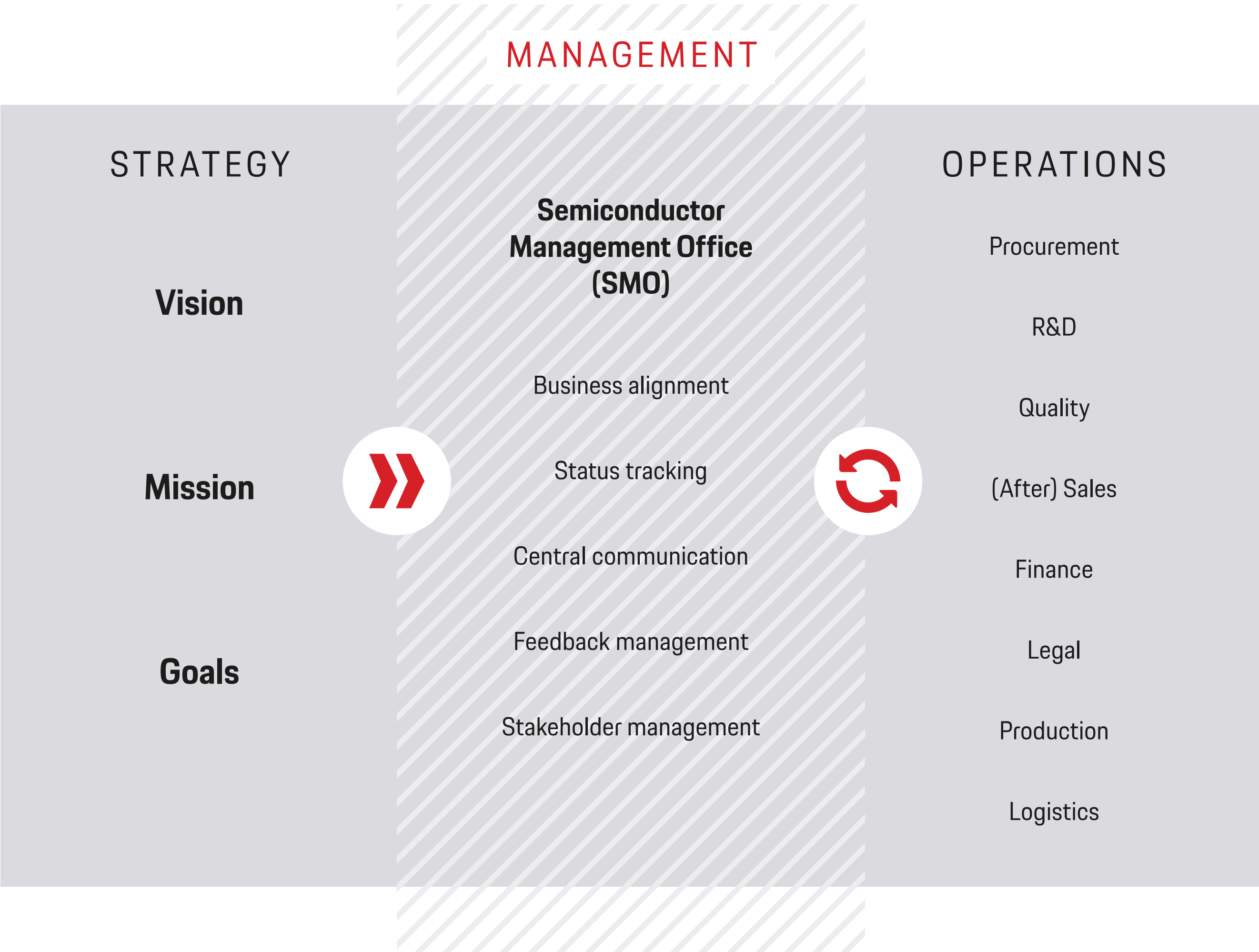


Fig. 9. Semiconductor Management Office

COLLABORATION
MANAGEMENT

08

Too many faces to the semiconductor manufacturer

In addition to the internal challenges of orchestrating interests, properly communicating the OEM's desire to collaborate with the semiconductor industry presents additional issues. Organizations often have multiple points of contact (e.g., R&D, procurement, or different subsidiaries) communicating with suppliers about operational or strategic approaches, leading to a lack of transparency and inconsistent goals for the supplier.

Difficulties in external collaboration stem from various factors. Lack of agreement on a clear vision and specific goals for joint activities hinders effective collaboration from the start. As a result, any allocated resources are used inefficiently. Additionally, unclear information paths and information sharing lead to frustration when working together. The lack of transparent communication channels between team members and/or new partners, regular updates and progress reports, and frequent information sharing makes it challenging to keep everyone on the same page and facilitate proper decision-making.

Moreover, the collaboration issues are reinforced when there are no clear escalation paths, and organizations fail to define the roles and responsibilities of each collaborator, leading to confusion and duplication of efforts.

To address these obstacles, leading organizations need to establish a single point of contact for all supplier-specific requests (see Figure 10). Key aspects of this approach include establishing a long-term relationship with semiconductor manufacturers, aligning strategic actions to achieve supply security, and ensuring the flow of information between internal and external stakeholders. In addition, regular top management review meetings must be established to assess the status quo of the overall situation and the progress of the collaboration partners in enhancing their partnership. These quarterly meetings may follow a standardized structure:

OPERATIVE Short-term:
Supply situation

TACTICAL Medium-term:
Capacity management, existing collaborations

STRATEGIC Long-term:
Technology roadmaps, investment plans, collaboration opportunities (e.g., sourcing models or co-developments)

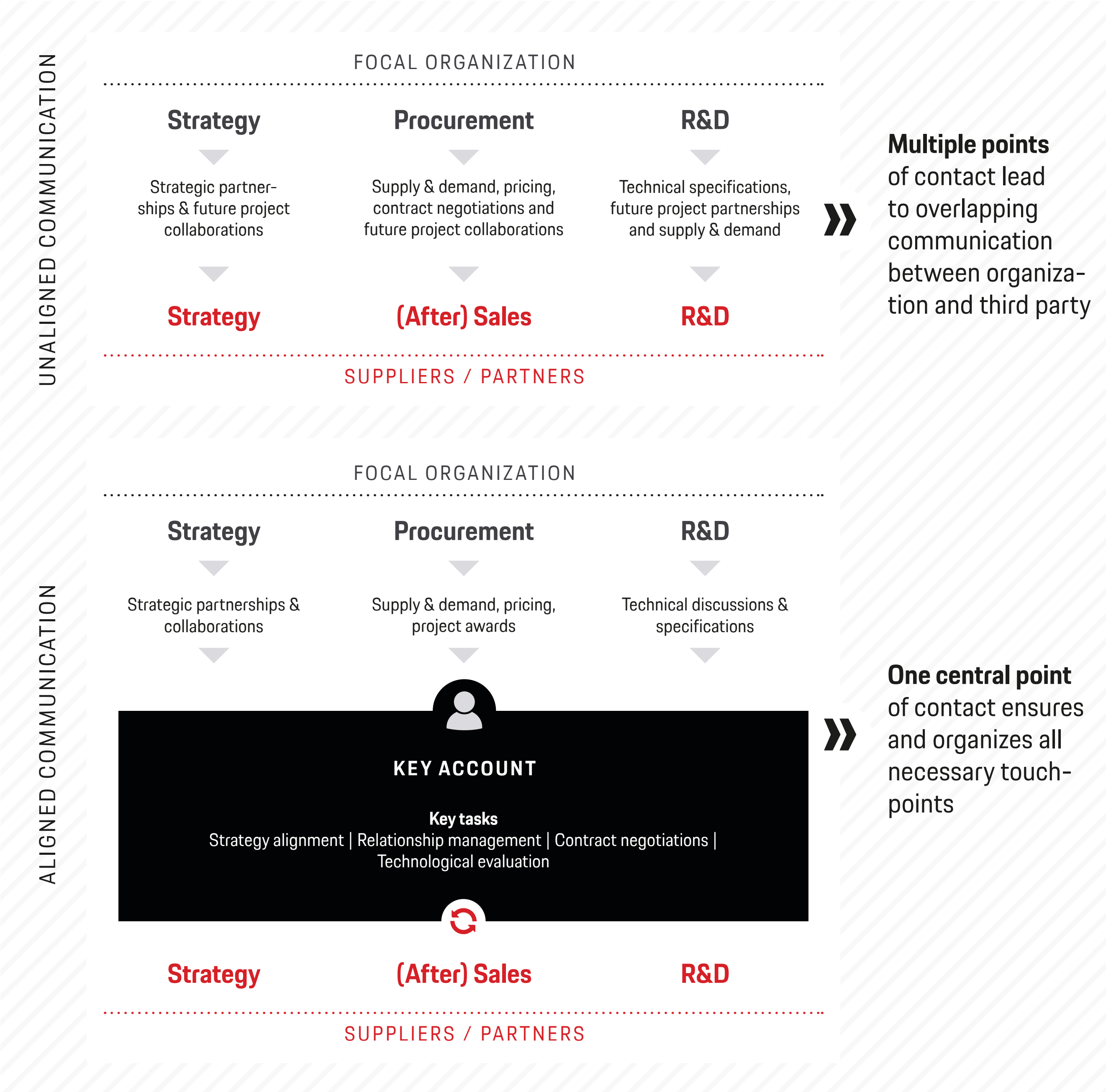


Fig. 10. Clear understanding of the organizations' position towards the supplier

CHANGE
MANAGEMENT

09

Silicon Stars are not attracted by OEMs

Attracting the right talent, especially within the semiconductor industry, is one of the most critical pitfalls to overcome during strategy implementation. The problems underlying the current difficulties in attracting and hiring the right talent are manifold. Firstly, there is a massive shortage of skilled workers. Secondly, OEMs and other manufacturing organizations are intensifying the competition for semiconductor labor due to the increased demand, further tightening an already constrained skilled labor market.

One of the main causes is the current educational infrastructure. Relevant university programs in electrical engineering and computer science are not properly set up and distributed across Europe's leading industries, making it challenging to actively recruit talent directly from universities upon graduation. Furthermore, the current development paths and management careers of OEMs are not as attractive as those in the semiconductor industry. Most of the development paths at OEMs favor management careers over expert careers, leaving an industry where most professionals are highly skilled experts with little appeal. Even an above-average salary cannot compensate for these extremely unfavorable factors.

A recommended solution during an OEM's strategy implementation is to analyze which core (e.g. electrical engineering, physics, material science, etc.) and enabling competencies (e.g. communication, teamwork, flexibility, etc.) are required to design, implement, or scale its semiconductor strategy.

An internal competency fit gap analysis helps to analyze which enabling and core competencies are required for the strategy. On top of that, current and future workforce demand is calculated which ultimately requires a demand-driven decision, whether semiconductor competencies should be borrowed, bought, or built as part of the organization's HR development, as depicted in Figure 11.

In addition, OEMs need to promote current and future recruiting and lobbying activities at the national level (for Germany e.g. Silicon Saxony, Verband der Automobilindustrie (VDA)) and at an international level (Semiconductor Equipment and Materials International (SEMI) and European Semiconductor Industry Association (ESIA)). This includes supporting ongoing initiatives for institutional investment in semiconductor education to fully cover the required skill set developed internally. Only by increasing transparency regarding internal demand and competencies, as well as taking defined actions on investments that support the development of know-how for the future workforce, can OEMs effectively address the current attraction gap.

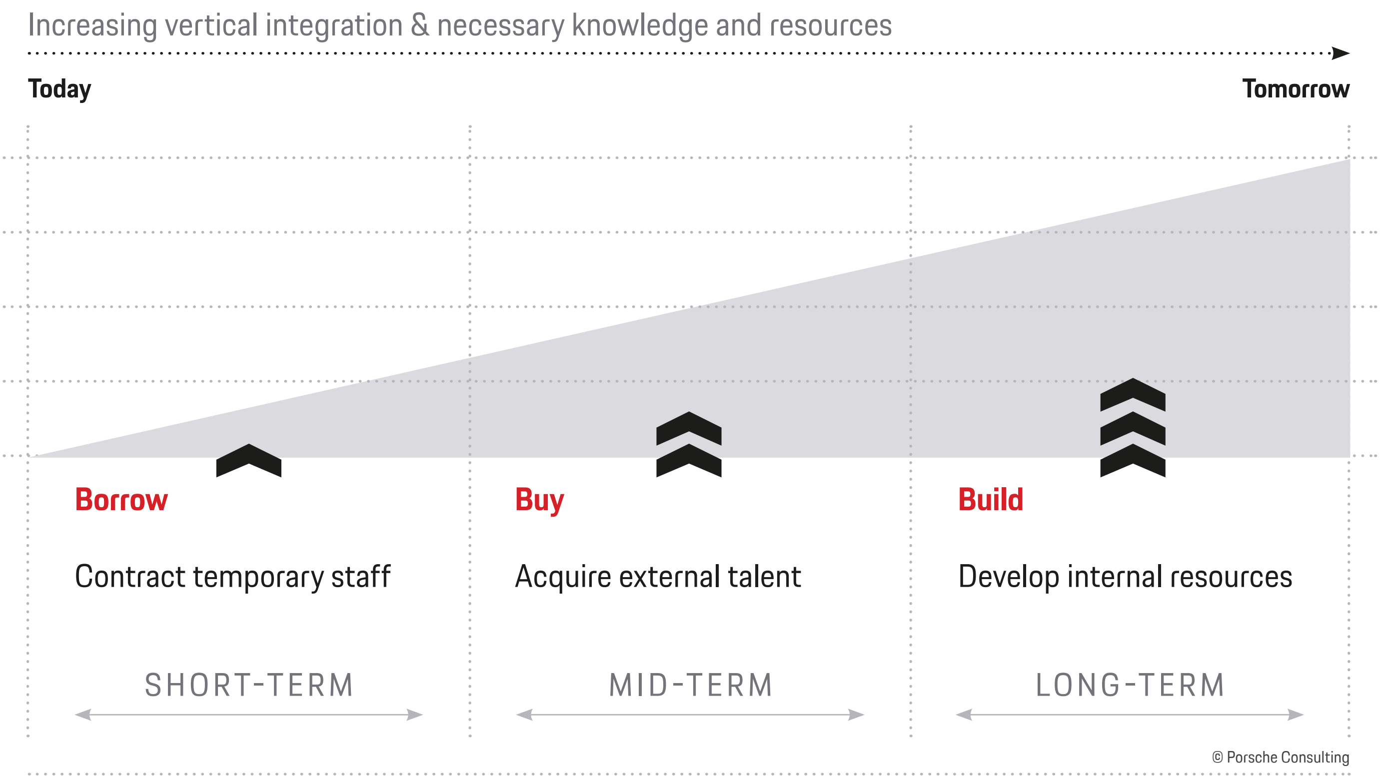


Fig. 11. Sustainable workforce transformation requires short-, mid- and long-term initiatives

CHANGE
MANAGEMENT

10

Yesterday's innovation processes for tomorrow's products

A major pitfall for several industries in effectively implementing strategic semiconductor management is an old-fashioned, historically grown way of working. Product development processes and innovation cycles in many industries are much slower than in the semiconductor industry, which tends to release new products on an annual or even more frequent basis.

In the automotive industry, for example, new models are typically developed and launched over a period of more than five years—beside minor product updates every three to four years. Therefore, in a traditional product development process, a microcontroller would be designed into an autonomous driving system for a vehicle that will enter production in no less than five years. The drawback, however, is that in five years' time, autonomous driving microcontrollers are likely to be even more powerful and capable since semiconductor companies are also working on developing next-level hardware to improve autonomous driving. This means that a vehicle on our roads today will likely have five-year-old microelectronics in it.

Many functional areas have legacy processes that are inherently incompatible with faster innovation cycles. For electronic components, requirements gathering is typically done in the early stages of development.

In the past, when vertical integration was low, requirements were handed off to suppliers, resulting in monolithic solutions with little flexibility throughout the product lifecycle. When it comes to the integration, verification and validation side, testing or homologation processes also require a lot of time and effort.

A paradigm-shift among OEM—not only in automotive industry—is needed (see Figure 12). To keep up with the pace of megatrends such as next-level automation, computing, AI, and connectivity, innovation cycles are becoming shorter and shorter. OEMs need to redesign product development processes or at least make them more flexible to adapt to shorter innovation cycles, but in some cases also to rethink today's product requirements. In this context, another important step is to synchronize projects and with them different development processes in the context of strategy development to make the best use of synergies, such as volume bundling effects or re-use and carry-over.

One possible approach to redesigning product development processes is to provide multiple design-in opportunities for innovative microelectronics within the development process for a new product. For example, an OEM can develop an autonomous driving system today, while proactively creating hardware-based headroom to release more powerful software in two years' time. In this approach of changing the way OEMs think, the overall decoupling of software and hardware design must also be on the CTO's agenda.

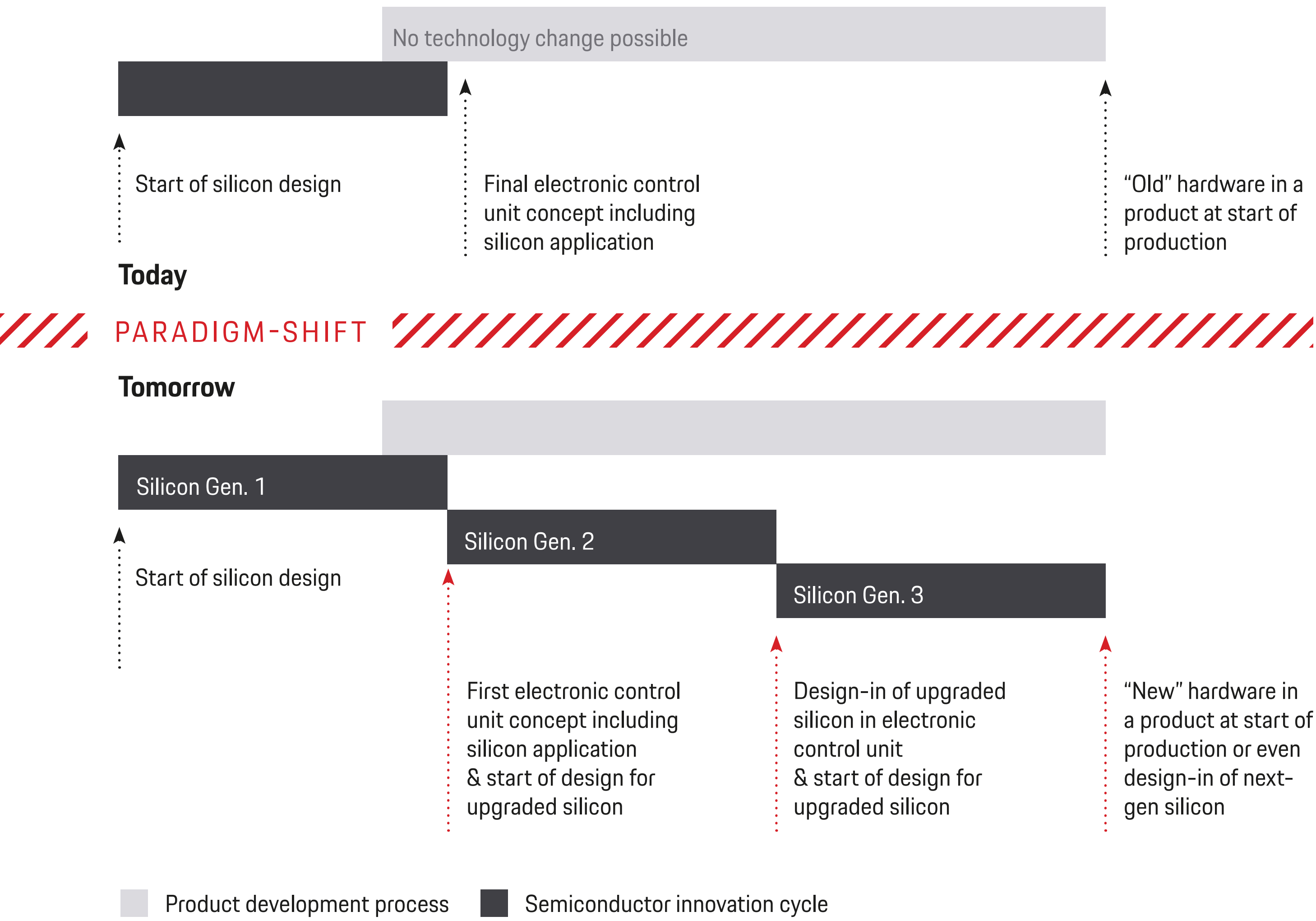


Fig. 12. Flexibilization of product development processes

Achieving superiority by implementing a semiconductor Target Operating Model

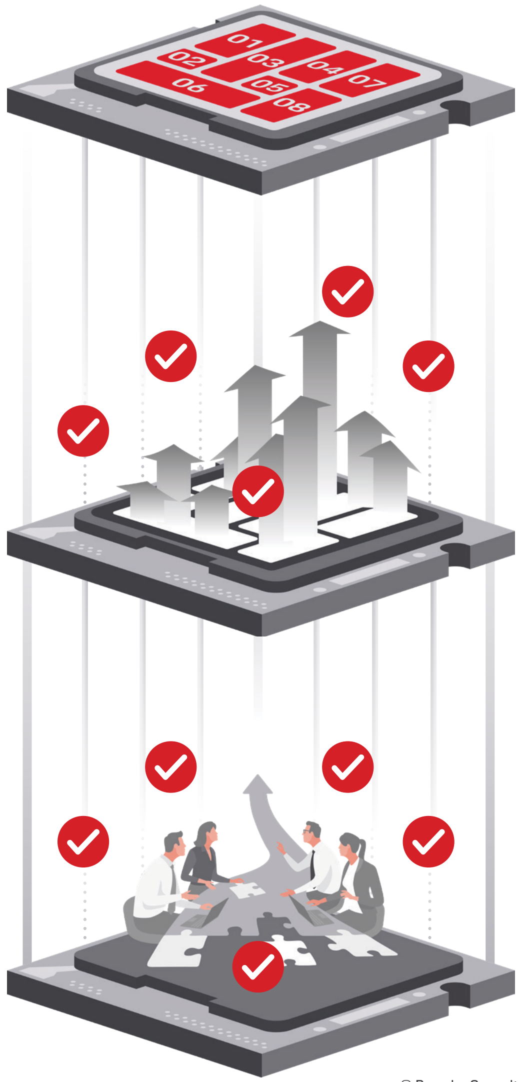


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Fig. 13. Target Operating Model implementation avoids pitfalls

In semiconductor management, a successful and sustainable organization depends on a holistic, unified, and well-integrated Target Operating Model. This fundamental model enables the seamless development, implementation, and execution of the semiconductor strategy across three interrelated layers—strategy, processes, and people—and fosters adaptability in a changing environment. However, the true potential of this model lies in its cohesive integration, demonstrated through use cases that illustrate how organizations build up strategic semiconductor management across business functions and their people.

The top layer of the TOM emphasizes the semiconductor strategy outlined in Porsche Consulting's previous white paper "Strategic Semiconductor Management". The Porsche Consulting strategy framework has eight key action areas to assist procurement, R&D, and operations executives in navigating the complexities of semiconductor management. The second layer shows all the necessary processes required to implement the semiconductor strategy. The key processes involved include the organization's development, production, sales, after sales and procurement processes. The foundation layer represents the "people" required to effectively execute the processes and strategies in the business functions and comprises all relevant competencies. The semiconductor management office (see Figure 9) acts as a gatekeeper to ensure consistency across functions and alignment with the overall semiconductor strategy. Operationalization of the TOM is accomplished through specific use cases defined across the three layers, as shown in Figure 14. During operationalization, OEMs must design, implement, and scale each use case while defining a clear problem statement. The impact should be measurable, for example by using key performance indicators (KPIs).

The strategic and process layers of the TOM need to be addressed during the use case design phase. During this phase, overall change needs are identified, desired contributions to overall strategic goals are assessed, and initial blueprints and concepts for implementing the use cases are created. Once a clear design blueprint has been established, use case implementation focuses primarily on the process and people layers to integrate the concepts into the organization. This includes revising existing quality gates, launching pilots, and introducing new ways of working. During scaling, the use case is rolled out across the organization for maximum impact.

Leaders should incorporate feedback loops to adapt strategy and implementation as needed. Finally, processes and organizational structures are fine-tuned, assumptions are tested for plausibility, and potential efficiencies are identified.

This approach, driven by use cases, ensures a strong alignment with overall business goals and enables the creation of well-defined implementation roadmaps throughout the organization. The latter is particularly important as it addresses the impact of semiconductor management on employees, including engineers and buyers.

Fig. 14. Maturity assessment for semiconductor management use cases

USE CASE:

Strategic redesign

The following strategic redesign of an electronic control unit use case provides an example of how organizations can implement use cases by means of a Target Operating Model. In general, the goal of strategic redesigns is to replace critical semiconductors with alternative products that are both technically and commercially viable, and not critical to long-term supply. The strategic redesign of an ECU starts with defining the overall strategic goals of what the organization needs to achieve (e.g. replace semiconductor risk to achieve 100 % supply assurance while reducing variety by 5 %). Based on the strategic goals, OEMs must design specific processes that are required to implement the strategic redesign.

As an initial step, semiconductors, which could potentially be critical, are identified in an early phase risk assessment and initially evaluated using several criteria (e.g. supply security, lifecycle & timeline, etc.). This visibility allows the OEM to prioritize ECU redesigns. Next, OEMs need to identify the relevant departments and stakeholders, such as R&D, purchasing, finance, and legal, which will support the implementation of the risk reduction measure from an organization-wide perspective. Finally, once organizations have established all relevant aspects of strategic redesign, from strategy to processes to people, they can begin to implement and integrate the use case across the organizations existing process landscape.

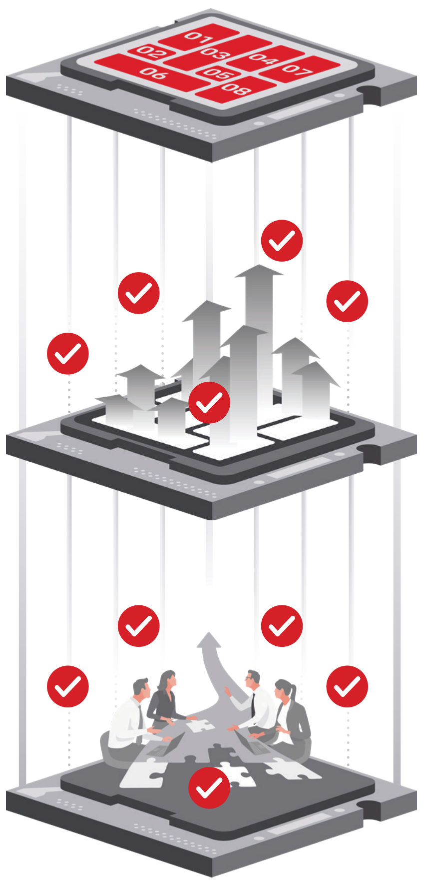

Fig. 15. Semiconductor Target Operating Model

The next big thing...

In an era where advanced products and technologies are revolutionizing entire industries and the demand for semiconductors continues to grow, OEMs find themselves at a crossroads, balancing future innovation potential with long-term supply security and product costs. The complexity of the semiconductor supply chain requires an efficient semiconductor organization with a mature target setting, operating model, and skilled personnel. This foundation provides a strong basis for mitigating emerging supply chain disruptions and potential material shortages.

By proactively embracing and seeking greater control over their technology supply chains, OEMs can extend their focus to the underlying critical raw materials. This strategic shift towards supply chain control enables companies to not only respond to growing market demands, but also to gain a comprehensive view of the entire product creation process, from the initial extraction of raw materials to the final delivery of the finished product. This extended control enables them to make informed decisions about responsible sourcing of key raw materials to ensure business continuity, while reducing exposure to and the impact of global tensions such as trade wars or export controls. To make this work, OEMs must foster an environment of shared innovation and mutual growth, including strong partnerships and collaborations with raw material suppliers. These collaborative efforts are critical to driving advancements in their products and technologies, and ultimately improving the overall strength of the supply chain, which is only as strong as its weakest link.

Fig. 16. Next-level resilience through raw material management

Conclusion

This study outlines 10 major pitfalls that OEMs may face when implementing a semiconductor strategy. They are structured into five clusters: Data Transparency & Risk Management, Category Management, Sourcing Strategy, Collaboration Management and Change Management. To overcome these challenges, OEMs can implement an effective semiconductor strategy, supported by a Target Operating Model, based on semiconductor management use cases. The Porsche Consulting approach illustrated here provides guidance for organizations in navigating future uncertainties and maintaining competitive advantages for one of the world's most powerful resources.

To further leverage supply chain control mechanisms and vertical integration, leading organizations move beyond the chip level, hedging critical raw materials, to ensure holistic and long-term resilience.

Although this paper primarily addresses the future organization of OEMs and their direct suppliers, semiconductor manufacturers themselves should also view this as a motivator to actively embrace closer collaboration and actively shape changes in the value chain.

IN BRIEF

01 Data Transparency & Risk Management
A central database with clear data owners and processes enables data-driven decision making and risk management.

02 Category Management
A cross-functional semiconductor strategy developed and endorsed by top management enables effective semiconductor category management.

03 Sourcing Strategy
Vertical integration into the semiconductor ecosystem is driven by strategic relevance and criticality, requiring cross-functional involvement.

04 Collaboration Management
Effective semiconductor management requires coordinated, joint efforts with streamlined communication, shared commitment, and clearly defined roles and responsibilities.

05 Change Management
Companies must improve their way of attracting talents, to a manifold build, buy or borrow hiring strategy, in the war for talent.

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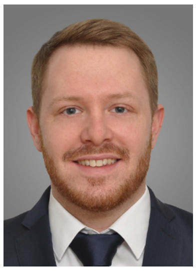

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