

TOWARDS A SILICON TO SYSTEMS INDUSTRIAL STRATEGY | AUGUST 2023

Report and Recommendations – Structured Dialogue on Electronics Manufacturing

EXECUTIVE SUMMARY

A resilient European electronics manufacturing industry requires globally competitive component manufacturers, electronic assemblers (EMS), and Printed Circuit Board (PCB) fabricators, as well as their equipment and materials suppliers. Despite its established presence, technical capabilities, and skilled workforce, the European electronics manufacturing industry faces challenges such as high production costs, lack of investment, an aging workforce, and international dependencies for supply chains. However, the industry can capitalize on growing demand and the trend towards advanced technology. To address these challenges investment support, R&D, training programs, and greater alignment with EU priorities are necessary.

INTRODUCTION

Electronics systems are at the heart of almost all modern technology. The performance and functionality of these systems have increased at breath-taking speed, chiefly as a result of advancements in semiconductor technology. Semiconductors do not function in isolation. They gain functionality through electronic interconnection with other components on printed circuit boards (PCBs). These electronics systems feature prominently in key sectors like defence, aerospace, space, automotive, medical, and high-performance computing, but electronics are vital to every industry and are central to a variety of EU priorities, including the twin digital and

green transitions and Europe's technological sovereignty.

There is near universal agreement on the importance of the European electronics manufacturing base among companies that manufacture and purchase electronics. A survey fielded in July 2023 by IPC and partners across market sectors indicates more than 95% of companies believe a robust European electronics ecosystem, including PCB and EMS industries, is critical to regional security, industrial resiliency, and economic competitiveness. Yet, a clear majority also believe the EU lacks key PCB (88%) and EMS (61%) capabilities. Survey respondents signalled a strong interest in new EU policy measures to strengthen the global competitiveness of the European PCB and EMS industries.

This paper draws on survey results, expert opinion, and cross-sectoral dialogue to assess the state of the PCB and EMS industries and lays out options for EU policymakers to pursue a silicon-to-systems industrial strategy. A silicon-to-systems industrial strategy is a government policy focused on cultivating a robust ecosystem of semiconductor, PCB, EMS, and supplier companies capable of producing electronics systems necessary for Europe's regional security and economic competitiveness.

REPORT BACKGROUND AND SURVEY RESULTS

The European Commission's Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW)

led a workshop and structured dialogue on June 23, 2023, focused on how to support the resilience of the electronics value chain. At the meeting, a working group of stakeholders was established and tasked with producing this industry report outlining the critical nature of the electronics assembly sector in European value chains; an analysis of PCB and EMS strengths, weaknesses, opportunities, and threats (SWOT); and policy recommendations for future actions and initiatives at the European level.

As part of this research, the working group fielded a survey to companies, associations, and other stakeholders. The survey received 122 responses from PCB companies (34% of respondents), EMS (34%), OEM (18%), and other stakeholders including Trade Unions (14%). Half (50%) of respondents employ more than 250 workers, and nearly a quarter (23%) report annual global revenue in excess of €500 million. The respondents collectively report having manufacturing operations in all EU member states.

View complete survey results [here](#).

DOWNSTREAM IMPLICATIONS

European companies were once market leaders in electronics manufacturing, but fierce competition from Asia and elsewhere has led them to specialize in higher-value, lower-volume production, including embedded systems found in medical technologies, industrial equipment, defence, space, aerospace and automobiles. But by ceding to Asia the volume manufacturing, largely associated with consumer products, European electronics manufacturers have seen their overall market share and profitability decline. This decline in profitability has significant implications for supply chain resiliency and technological sovereignty

Embedded systems are a growth market as electronics become integral to just about everything, fuelling industry's digital and green transitions. For Europe's global

leadership in key market segments – like clean energy, connected and autonomous mobility, industrial Internet of Things (IoT), Industry 4.0 and cybersecurity – it increasingly makes sense to locate related manufacturing activities in close proximity. These markets have specific production needs that can make interaction between customer and supplier important, if not essential. To meet regional defence and space requirements this becomes ever more critical, particularly as data protection and security are paramount in these industries. Global supply chain volatility, escalating trade wars, health crises and natural disasters underscore the importance of resilient, regional supply chains. Companies are increasingly taking steps to diversify and regionalise their supply chains because their existing supply chains have growing exposure to these risks.

The EU nonetheless has, and risks future, increasing international dependencies for PCB and EMS. The loss of volume, for PCB manufacturers, has led to insufficient capacity to reinvest in their businesses, their equipment and the latest technology shifts. PCB manufacturing has declined to 2% of the global market. In turn, EMS, while poised to partner to deliver on Europe's manufacturing needs, also face capacity constraints.

The grit and creativity that allowed many companies to survive over the last 20 years simply will not work over the next 20 years. Advancements in semiconductor technology are further placing daunting, stringent, and costly new demands on both PCB and EMS companies.

Demand for electronics globally is growing steadily driven by global megatrends. But this growth risks largely bypassing Europe, as OEMs seek greater capabilities and capacities from the most sophisticated manufacturing facilities in Asia. Without significant change, the electronics industry in Europe will experience limitations

in capacity and innovation capability, increased lead times, and higher prices on allocations for PCBAs in all modules and systems impacting semifinished and final products across all industries.

EUROPEAN PCB SWOT

PCB Industry Snapshot: PCB fabricators produce the boards that mechanically support and electrically connect components, including chips, using conductive copper traces, pads, and vias on laminates. Without PCBs, the hardware and software found in every electronic system cannot function. PCBs are becoming increasingly sophisticated to accommodate ever smaller, more powerful electronics.

Today, the PCB is no longer a passive base where components are placed, but an integral part of the final product. Michael Gasch of Data4PCB estimates annual PCB production in the EU is approximately €2B Euros or roughly 2% of global production. This is a steep decline from the 1990s when the EU commanded approximately 20% of global production. In the last 20 years, according to Data4PCB, the number of EU PCB fabricators has also decreased precipitously, falling two-thirds to fewer than 180 facilities and employing approximately 15,000 workers. Over this time, the EU has become highly dependent on China, which now accounts for some 65% of total EU PCB requirements.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Longstanding OEM-EMS-PCB relationships • Technical capabilities • Prototyping capabilities • Skilled workforce • Lead times • Data security 	<ul style="list-style-type: none"> • Cost • Manufacturing capacity • Regional supply chains for base materials • Engagement with the global supply chain • Regional supply chains for chemistries • R&D investment
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Economy-wide green transition • Product innovation • Process innovation • Smart manufacturing / Factory of the Future • Government industrial base support 	<ul style="list-style-type: none"> • Cost of Labour • Lack of skilled workforce • Supply chain disruptions • Weak domestic and/or regional electronics manufacturing ecosystems • Government regulation/compliance

PCB SWOT ANALYSIS – CONSENSUS VIEWS

Strengths. The European PCB industry has established a stable presence in the European market, backed by hard-earned and longstanding relationships with their EMS and OEM customers. Customers value the manufacturing quality and security associated with sourcing from a European PCB supplier, as well as simplified logistics that come with proximity. The

PCB industry has a small, but highly skilled workforce comprising individuals with strong backgrounds in engineering and manufacturing. A few European PCB companies have leveraged this workforce, along with investments in R&D and new equipment, to produce state of the art PCBs and integrated circuit (IC) substrates. Proximity to customer gives European PCB fabricators an advantage in prototyping, given the paramount importance of speed, IP protection, and technical support.

The European industry also has a strong customer base in the industrial, aerospace, space, defence, medical and automotive sectors.

Weaknesses. The erosion of the PCB industrial base is becoming increasingly dire. Since 2000, the number of European PCB companies has fallen from approximately 560 companies to fewer than 175 and total revenue has fallen by two-thirds. The industry is highly fragmented, comprising primarily small companies. Nearly 65% of European PCB companies had revenues in 2020 of less than €10M Euros. The decline in European PCB production is largely the result of the region's higher cost of manufacturing and lack of capital investment. Marketplace competition drove many OEMs to source lower cost electronics from Asia, which led the European PCB industry to focus increasingly on high-mix, low-volume production, including prototyping and specialist industries (e.g., aerospace and defence). The decline in volume relative to Asia has had a compounding effect on costs and ability to invest. Most suppliers of materials, chemistries, parts, and components moved offshore, saddling European PCB fabricators with the “low-volume disadvantage” offered from Asia. The unavailability of a strong regional supply chain for materials and chemistries remains a top concern.

The European PCB industry faces technical challenges as well. Most companies have limited resources to undertake R&D and few opportunities to partner with global materials and equipment manufacturers due to the lack of regional, high-volume production. Acquisition of new equipment is also challenging due to cost, lack of confidence in market demand and lack of medium to long term forecasts. Simply put, capital investment carries significant risk. The lack of sufficient investment in R&D

and capital investment is slowing down industry efforts to embrace technological advances. For example, a recent Eurospace [whitepaper](#) highlighted concerns about the systematic reliability of microvias in high density interconnect (HDI) PCB technology.

PCB companies continue to rank workforce dynamics as one of their top concerns. A significant percentage of the industry is at or nearing retirement; companies cannot hire sufficient numbers to replace those retiring and grow their businesses. The industry also faces high turnover, increasing training costs and lowering productivity. In the PCB industry, experience matters greatly on technical operations and business strategy given the sudden shifts in business cycles and technical requirements. Companies must respond to fluctuations in end-market demand by anticipating industry needs and adjusting their capabilities accordingly. Investment planning is difficult as most companies do not have long-term committed orders due to the focus on high mix, low volume orders. The U.S. PCB industry is weakened as well, but companies there can depend on big defence budgets for financial stability.

Opportunities. Heightened interest in the electronics supply chain among policymakers has spurred cautious hope across the PCB industry that the EU and Member States will dedicate new resources and policy support to help bolster the industry. Accordingly, survey participants ranked government industrial base support as one of the industry's top opportunities. This ranking reflects the industry's belief that government action is necessary and can be transformational over the long-term. The concluding section of this paper outlines policy options that governments can pursue to strengthen the PCB industry. These policy options bring into alignment top industry and EU priorities. For example, the green and digital transitions will

necessarily create increased European demand for electronics. This increasing demand is largely being met by foreign suppliers but the EU has an opportunity to promote European made electronics as a key enabler of these transitions.

Likewise, the EU should engage the broader technology community about how to leverage the Chips Act to support broad-based growth across the electronics sector. It is not enough to support the fabrication of silicon in Europe. The region should also ensure through implementation of the Chips Act that silicon can be packaged in Europe and that the resulting semiconductor component can be assembled onto European-made PCBs. This goal should be implemented in the interest of regional industrial resiliency and economic competitiveness, while still acknowledging that, in many commercial applications, PCBs will continue to be manufactured offshore.

European PCB companies are also focused on process innovation and the migration to the factory of the future. Underlying these opportunities is the recognition the PCB industry must modernize their manufacturing operations to bring costs down and productivity up, while offering customers greater capabilities, quality, and transparency. This innovation also creates new opportunities to advance important environmental goals as the industry is both energy and water intensive.

With greater government support and industry investment in the factory of the future, the cost of European PCB fabrication is likely to become more globally competitive, but European PCBs will generally remain more expensive than imported boards. There are opportunities to promote greater price tolerance among PCB customers by strengthening the European industry's value proposition in the context of risk managed sourcing. This can be done through the development of industry-driven, voluntary commercial trusted supply

chain standards for PCBs and PCBAs.

Threats. A few European PCB fabricators are growing and competing globally, but the European PCB industry, as a whole, is on a downward trajectory. Only a small number of European companies can meet the technological requirements driven by semiconductor advancements. Even though the industry's total revenue is expected grow modestly over the next few years, the total number of fabricators will decline.

Electronics is a cost-sensitive business that requires continual investment in equipment and talent. Survey participants identify cost of labour as the top threat to the PCB industry. The PCB industry in Europe is particularly sensitive to increased labour costs because, unlike modern PCB manufacturing in other parts of the world, European PCB fabrication remains a labour-intensive manufacturing process due to lack of investment. Increased labour costs make European PCB fabricators less competitive. Stakeholders also voice concern about supply chain disruptions and the unavailability of equipment, materials, parts, and components regionally.

European PCB companies report that they are disadvantaged by EU customs tariffs. Companies pay tariffs on the import of base materials used to produce PCBs, but there are no tariffs on bare PCBs that are imported for assembly. Base materials must be imported as local supply chains cannot fulfill the demand. Government regulation remains a concern. Participants expressed a desire for greater regulatory restraint and greater harmonization of regulations. Other participants volunteered that energy costs constitute a serious threat to their business.

Final Note. EU action to support the industry must address supply and demand. Support to bolster capacity will be unsustainable unless demand increases concurrently.

EUROPEAN EMS SWOT

EMS Industry Snapshot: EMS companies mount, connect, and assemble electronic components on bare PCB boards to make printed circuit assemblies. Increasingly EMS companies further provide additional services and expertise along the whole product lifecycle, design and industrialisation, acting as pivotal partners in the digitalization process. Some European original equipment manufacturers (OEMs) assemble their own electronics, but many outsource their production to EMS companies, making them crucial players in the electronics value chain. According to Dieter Weiss at in4ma, the EU EMS

ecosystem accounts for roughly €52B in revenue each year, which representing about 8.2% of global production. His research shows 2,197 EMS facilities in the EU belonging to 1,881 companies. Some 80% of all EMS companies in Europe have less than €10M Euro in revenues and have a market share of the total European revenues of 11.2%. Germany, Czech Republic, Hungary, France and Poland are the top five EMS producing countries in the EU. Despite solid growth in recent years, the EU imports roughly 90% of required EMS products and services, and this proportion reaches 97% for consumer applications and telecommunications.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • OEM-EMS-PCB relationships • Technical capabilities • Skilled workforce • Prototyping capabilities • Lead times 	<ul style="list-style-type: none"> • Cost • Manufacturing capacity • Regional supply chains for base materials • Skilled workforce • Engagement with the global supply chain
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Smart manufacturing / Factory of the Future • Process innovation • Economy-wide green transition • Product innovation • Economy-wide digital transition 	<ul style="list-style-type: none"> • Supply chain disruptions • Cost of labour • Lack of skilled workforce • Geopolitical tensions • Cost of materials, parts, and/or components • Government Regulation/compliance

EMS SWOT ANALYSIS – CONSENSUS VIEWS

Strengths. Much like European PCB fabricators, EMS companies also enjoy strong relationships with their customers and suppliers in Europe. These relationships lend to trust and longstanding business activity, in turn leading to continuous product innovation and global competitiveness. Importantly, the EMS industry represents about 41% of electronics goods manufacturing in Europe; OEMs

manufacture the remaining 59%. While OEMs are responsible for a greater share of electronics manufacturing than EMS companies, the trend is toward greater reliance on EMS companies. As a result, EMS companies have seen nearly 5% annual growth and an increasing expansion into activities normally undertaken by OEMs or other third parties. These activities include product development, design services, component sourcing, system manufacturing, final system assembly, logistics, and after sales services.

The European EMS industry also boasts a skilled workforce and prototyping capabilities, but unlike the PCB industry, many stakeholders believe Europe has sufficient state of the art electronics assembly capabilities. Stakeholders would like greater capacity but the market demand must exist to justify investments. Notably, the EMS sector is far more interconnected with the global supply chain than their PCB counterparts. This is not surprising as EMS companies of all sizes must have global supply chains to source components, parts, and chemistries.

Weaknesses. European EMS companies continue to specialize in high-mix and low-volume orders. This focus helps to explain the European EMS industry's revenue relative to competitors in Asia. According to in4ma, 80% of European EMS companies have annual revenues of less than €10M Euro. Among the global Top 20 EMS, there is not a single European company. Volume is important in the EMS industry as profit margins are notoriously thin; volume offers a path to greater profits that can be reinvested in the business. Today, only the larger EMS companies are well-positioned to invest in new technologies, further vertical integration, and higher capacity. Most companies lack sufficient cash as well as skilled labour to buy and leverage the latest equipment. The financial picture is further complicated by prime rates, inflation, and labour cost increases. Whereas in the past, most companies have been able to compensate labour cost increases of about 2% annually with productivity increases, this is nearly impossible with wage increases averaging 5% to 5.5% today.

Opportunities. Similar to the PCB industry, EMS companies are welcoming the renewed interest in supply chain resiliency and are keen to see the EU and Member States take action to bolster the electronics manufacturing ecosystem. Survey participants selected government

support for industrial resiliency just outside the top five opportunities. The top five opportunities, however, shared a common theme: transition. All five speak to significant changes taking place in the electronics industry and across the economy. The EMS industry, for example sees significant opportunities in the transition to the factory of the future which is critical to its globally competitiveness. As discussed earlier, the factory of the future—comprising a suite of technologies, processes, and talent—offers tremendous operational and capability benefits for EMS companies and their customers. The factory of the future promises to increase productivity and quality, while reducing costs. It also empowers manufacturers to strengthen collaboration with their customers to ensure the product is meeting specifications.

Investments in the factory of the future are also helping to drive product and process innovation, both of which EMS companies cite as top opportunities. On the product side, companies report that semiconductor advancements are placing daunting, new requirements on EMS companies. Electronic assemblies must incorporate increasingly sophisticated chips with greater functionality, performance, and security—often in smaller packages. The design and manufacturing obstacles are challenging every segment of the industry, but EMS companies, leveraging their technical expertise and global supply chains, are increasingly well positioned to partner with their OEM customers to ensure that product requirements are achieved using the latest technologies. Process innovation is critical to product innovation to ensure that the products can be manufactured at a price point and with the quality and reliability that customers expect.

The migration to the factory of the future is also aligned with the EU's drive for economy-wide digitization and for an

ambitious set of environmental goals. Factories will increasingly integrate automation, sensors, big data, and AI and the result will be a greater stewardship of natural resources. These twin transitions will also create a need for greater use of electronics across the economy which European EMS companies are eager to meet with the right government incentives.

Threats. The low-volume disadvantage, coupled with other economic realities, are making it more difficult for many small EMS companies to remain solvent. As a result, the industry is seeing a wave of closures, as well as consolidation through acquisition. In4ma reports 100 fewer European EMS companies over the last 8 years. This trend is likely to continue as EMS companies face a host of external pressures, many of which are driven by their reliance on global supply chains. Although the shortage of chips has been most acute, companies report shortages in many components, parts, and materials. This led to a hoarding of supplies which might have to be devaluated as prices have fallen for several of these components. Moreover, measuring true demand and supply remains a challenge, making European EMS companies heavily reliant on global sources and especially vulnerable to supply chain disruptions.

The industry is concerned about workforce shortages. Aging workers are retiring, and companies cannot attract new workers in sufficient numbers to replace those retiring and to facilitate the growth of their businesses. Cost pressures weigh heavily on hiring and labour costs are much higher in Europe than low-cost regions in Asia and the Americas.

Companies are also concerned about the breadth and scope of government regulations. They are especially burdened by reporting obligations related to their global supply chains. Companies, in particular, are worried by the patchwork of regulatory requirements across the EU

and the way the EU's laudable, but broad drive toward the circular economy may disadvantage the region's manufacturers. The green transition necessitates a stronger and more integrated industrial strategy for the electronics industry. Otherwise, the semiconductor fabrication spurred by the Chips Act will lead to chips being sent offshore for assembly, thereby lengthening and weakening European supply chains.

RECOMMENDATIONS

By any metric, Europe is highly dependent on electronics produced offshore for end-systems critical to Europe's security, vitality, and strategic goals, including the dual transition. This dependency poses a serious risk to Europe's strategic autonomy given that a massive global supply chain disruption could deplete inventories for critically needed goods and bring manufacturing across most economic sectors to a standstill. Europe would not be able to meet existing demand for electronics and manufacturing capacity and infrastructure are not built overnight.

Industry has identified a number of initial recommendations to strengthen the EMS and PCB industries in Europe. These options address the issues raised in the SWOT analysis and reflect the industry's view that both government funding support and policies that drive demand for EU-produced electronics are required to strengthen European electronics manufacturing. In addition to these immediate recommendations, the industry also outlines next steps to expand on the empirical research and pursue longer-term goals.

1. Declarations of Strategic Importance –

The industry is seeking from the EU and Member States clear, affirmative declarations that electronics manufacturing is strategically important for Europe and that bolstering Europe's PCB and EMS sectors is essential to European strategic autonomy. This can take the following shape:

- Highlighted as strategic dependencies in the EU's Industrial strategy and upcoming industrial communications due to the critical nature of the sectors for all industries incorporating electronics
- Highlighted for capacity building as part of the EU's Digital Decade under the secure and sustainable digital infrastructure pillar, and the EU's Long term competitiveness focus

2. Strategic Alignment with Chips

Initiatives - As part of the European Chips Act implementation, the industry stakeholders encourage the European Commission to leverage the Act to help support growth and innovation across the electronics industry. This could be achieved by helping the PCB and EMS industries increase the capabilities and capacities to place chips on European-made boards. The up-coming Chips Joint Undertaking offers an immediate opportunity to include this objective in scope.

3. Supporting Factory Modernization -

The industry recommends public sector financial support to help PCB and EMS companies purchase advanced machinery and equipment to increase production capabilities, capacities, efficiency and innovation and to support the EU's digital and green transitions.

- For PCB Companies, this means enabling and supporting up-front investment in equipment needed to meet technological shifts. The investment in equipment will respond to the current lack of sufficient production capacity and capabilities in a continuously growing market and stimulate market demand.
- For EMS Companies, significant investments are required to keep pace with developments in manufacturing technologies. Government loan programmes will support the acquisition of equipment in response to increase market demand, but support is necessary

to accelerate process innovation and the migration to the factory of the future, which promises to further stimulate regional demand.

4. Ensuring a Skilled Workforce -

Supporting the existing workforce needs while also preparing the next generation workforce is a significant challenge across Europe's manufacturing base. There is a need to address the potential shortage of skilled employees in EMS and PCB manufacturing:

- To increase the visibility and the attractiveness of these fields while at the same time kick-starting new initiatives to attract both technicians and graduates in these industries;
- To develop and implement training programs to provide students and workers with in-depth knowledge of the manufacturing processes required to achieve complex designs and to keep up with new technologies and processes;
- To have lifelong training, up-skilling and reskilling of the workforce in order to make full use of workforce availability.

5. Ensuring a Level Playing Field in Global Trade -

European PCB companies report that they are disadvantaged by EU customs tariffs. Companies pay tariffs on the import of base materials used to produce PCBs, but there are no tariffs on bare PCBs that are imported for assembly. Base materials must be imported as local supply chains cannot fulfill the demand. This disparity makes it even more difficult for European PCB companies to compete with foreign competitors on price. This disparity could be addressed by consideration of a:

- Tariff Suspension with End Use for PCB manufacturing for the import of base materials necessary for PCB production:
 - 7409190000 Copper clad epoxy impregnated glass fabric base material: Tariff 4.80%
 - 74102100 - Copper clad: Tariff 5.2%

- 3921190099 Rolls of epoxy impregnated glass fabric (prepreg): Tariff 6.5%

Further dialogue among industry and government leaders is needed to find solutions that will provide a more level playing field in a competitive global marketplace and enable sustainable re-industrialisation of the EU. Many governments offer subsidies and domestic sourcing requirements that disadvantage European companies.

6. RD&I – In addition to equipment/ machinery there will be increasing need for investments in RD&I to ensure that European PCB and EMS companies can continue to accommodate advancements in semiconductor fabrication and other technological advancements. Dedicated programmes for PCB and EMS are required. This RD&I should focus on:

- Ultra high density interconnect (uHDI) PCBs;
- IC substrates, IC substrate-like PCBs & advanced packaging;
- Ultra high density electronic assemblies;
- Next generation materials; and
- Ecodesign.

NEXT STEPS

The stakeholder group also underscores the importance of a follow-up meeting of the Electronics Dialogue this Autumn to further build on initial policy recommendations and finalize private sector commitments and policy recommendations. Specifically, the meeting and industry’s work in advance should serve to :

1. Set Targets for the European Share of Global EMS and PCB Production – The Chips Act sets an ambitious and much-needed European goal of fabricating within the region 20% of global production by 2030. These chips will largely be sent offshore unless Europe strives to increase EMS and PCB production in similar fashion.

To complement the EU’s chips goal, industry recommends the establishment of targets for European PCB and EMS by 2035 (which will also include the projected demand of European OEM partners).

2. Determine a Trusted Supply Chain for Critical Systems – Industry recommends government and the industry work closely together to cultivate trusted supply chains for PCBs and electronics assemblies integrated into critical electronics systems

3. Further Data Collection on End-Market Needs – More data is needed to quantify and assess the strategic relationship between European PCB and EMS industry and European OEM partners. This will be in light of the identified critical systems and projected European demand.

4. Initiate an industry Roadmap That Aligns EMS and PCB Capabilities/ Capacities – The electronics industry is dynamic with technological innovation taking place constantly. A technical roadmap, led by industry, should be completed to help guide EU investments in R&D for the EMS and PCB industries.

5. Establish a Standing Mechanism for Industry/Government Dialogue on Electronics Manufacturing – The issues electronics manufacturing faces are challenging and there are no quick and easy solutions. An ongoing commitment on the part of industry and government to strengthen European electronics manufacturing is key to meeting EU goals related to security, resiliency, and innovation. For this reason, the industry recommends the establishment of a standing dialogue between industry and government to ensure that both can be responsive to the concerns raised by the other.

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