

Six Decades of Consolidation in the European Defence Industry (1960-2022)

– Online Appendices –

Mitja Kleczka, Caroline Buts, and Marc Jegers

These online appendices offer supplementary material to our main document titled ‘*Six Decades of Consolidation in the European Defence Industry (1960-2022)*’. Primarily, they provide the country studies on consolidation in the 20 investigated subsectors¹ from 1960 to 2022, on which the findings of our article are based.

In Appendix A, the industrial restructuring of the aircraft, naval and land systems sectors (as defined in our article²) until 2022 is briefly presented for all European countries that have been home to important producers since the 1960s. These country studies are divided into three regions: Western Europe (A.1), East-Central-Europe (A.2) and Former Yugoslavia (A.3).

In Appendix B, we combine the findings from our country studies to chart consolidation at the European level, separated by industrial sector (aircraft, naval, land). Appendix B therefore offers more than a mere summary of the findings of Appendix A – rather, the figures presented in Appendix B provide a better overview of cross-border developments and allow (1) to identify pan-European trends in defence industry restructuring and (2) to assess the long-term impact of consolidation in the aircraft, naval and land systems sectors. The combined information from Appendices A and B deliver the sectoral findings presented in the article ‘*Six Decades of Consolidation in the European Defence Industry (1960-2022)*’.

Appendix C provides additional information to the section ‘*Comparing Today’s Major Suppliers*’ of our main document. Whereas the section ‘*Comparing Today’s Major Suppliers*’ compares Europe’s leading firms in the aircraft, naval and land systems sectors, Appendix C lists additional companies which, while usually not considered as leading firms in the respective sectors, may nevertheless play important roles in the European defence industry.

¹ Aircraft sector: strategic bomber aircraft, advanced combat aircraft, light combat and jet trainer aircraft, rotary-wing aircraft, heavy transport or tanker aircraft, medium transport or tanker aircraft, light transport aircraft, and piston/turboprop trainer aircraft. Naval sector: nuclear-powered submarines, conventionally powered submarines, aircraft carriers and large amphibious ships, destroyers, frigates, corvettes and offshore-patrol ships, and mine-countermeasure vessels (offshore or coastal). Land systems sector: main battle tanks and assault guns, other tracked armoured fighting vehicles, other wheeled armoured fighting vehicles, guns and howitzers (self-propelled or towed), and turrets or weapon stations (major suppliers only).

² See footnote 1.

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Appendix A Country-Level Assessment

In Appendix A, the industrial restructuring of the aircraft, naval and land systems sectors until 2022 is briefly presented for all European countries that have been home to important producers since the 1960s. This presentation is divided into three regions, namely Western Europe (A.1), East-Central-Europe (A.2) and Former Yugoslavia (A.3). Countries which have not been home to system integrators in the observed time period are briefly discussed in A.4.³ We apply a broad definition of ‘Western Europe’ which is not restricted by geographical terms (i.e., it also reflects political and economic association). To account for different Western European subregions, we further divide our assessment into West-Central Europe and the British Isles (A.1.1), Southern Europe (A.1.2) and Northern Europe (A.1.3).

A.1 Western Europe

A.1.1 West-Central Europe and the British Isles

A.1.1.1 Austria

The production of armoured vehicles in Austria has been closely intertwined with the corporate history of *Steyr-Daimler-Puch*, which had been the sole supplier of indigenous types since the takeover of *Österreichische Saurerwerke* in the late 1950s. In 2003, the company’s armoured vehicle activities (which had earlier spun off into *Steyr-Daimler-Puch Spezialfahrzeug*) were acquired by *General Dynamics*⁴ and integrated into *GDELS* together with *Santa Bárbara Sistemas* of Spain and *Mowag* of Switzerland. Under the control of its US parent company, *Steyr-Daimler-Puch Spezialfahrzeug* (now *GDELS-Steyr*) continues to produce its *Pandur* range of armoured vehicles, albeit on a much-reduced scale after a restructuring and downsizing of the plant. While some other Austrian firms (such as *STI Steyr* and *Achleitner*) also participate to a varying extent in the supply of armoured vehicles, these companies largely focus on the conversion of existing vehicle types and/or depend on foreign strategic partners.⁵ The latter is also true for Austria’s sole aircraft producer, *Diamond Aircraft Industries*, which now builds its range of small training and reconnaissance types under Chinese ownership.⁶ As of 2022, the activities of Austria’s leading firms in the land and aircraft sectors have thus come under the control of much larger foreign corporations.

³ Only the 31 European countries included in our main document titled ‘*Six Decades of Consolidation in the European Defence Industry (1960-2022)*’ are covered by these accompanying appendices (these are the EU27 plus Iceland, Norway, Switzerland, and the United Kingdom). For example, this means that only Croatia and Slovenia are addressed with respect to the ‘Former Yugoslavia’ region.

⁴ (Pöcher, 2016, p. 49), (Surry & Baumann, 2004, p. 430).

⁵ *Achleitner*, for example, supplies the *Survivor* range in a joint venture with *Rheinmetall* (Connors, 2014).

⁶ *Diamond Aircraft Industries* was acquired by *Wanfeng Aviation Industry* in late 2017 (Staudacher, 2017).

A.1.1.2 Belgium

While several Belgian system integrators have engaged in the production of armoured fighting vehicles, naval vessels and military aircraft during the second half of the 20th century, most of these activities have been discontinued (see Figure 1 on the restructuring of the Belgian defence industry). *SONACA* and *SABCA*, Belgium's historical aircraft manufacturers, have not engaged in the supply of military aircraft since the conclusion of the *F-16* co-production programme (the so-called 'deal of the century'⁷) in the early 1990s. Except for the small-scale production of piston-engine trainer aircraft by *SONACA* (which was unexpectedly halted in mid-2022), both firms now focus on the supply of aerostructures, components and services rather than complete aircraft systems. In the naval realm, the last Belgian yards which had been active in the construction of surface naval vessels closed in the 1990s. The domestic production of armoured vehicles has likewise ceased, although *John Cockerill* (until 2022 known as *Cockerill Maintenance & Ingénierie*), one of Europe's leading producers of turrets and weapon stations,⁸ continues to assemble foreign vehicle types procured by the armed forces of Belgium.⁹ In 2017, *John Cockerill* aimed to further strengthen its position in the land systems sector by purchasing *Renault Trucks Defense*, whose range of armoured vehicles was seen as complementary to its own portfolio, from the Swedish *Volvo Group*.¹⁰ While the latter ultimately decided not to sell its French subsidiary,¹¹ this attempt revealed *John Cockerill*'s ambition to become an armoured vehicle producer in its own right again, an aim which might be further pursued in the future.

A.1.1.3 France

During the second half of the 20th century, the French aircraft sector was progressively shaped towards a distribution of roles among its two leading entities: whereas the state-owned *Aérospatiale* (created via consolidation of eight aircraft manufacturers between the mid-1950s and 1970, see Figure 2) focused on rotary-wing and transport aircraft, *Groupe Dassault* (which had purchased its competitor *Breguet Aviation* in 1967) emerged as the sole domestic producer of combat aircraft.¹² Collaborative projects with other Western European aircraft producers paved the way for transnational consolidation in the shape of *Eurocopter* (1992) and, ultimately,

⁷ (Kapstein, 1992, p. 665). See also (Struys, 1996, pp. 91-95) on the *F-16* co-production programme.

⁸ Since the 2000s, a second Belgian arms manufacturer – *Fabrique Nationale Herstal*, historically known as *Fabrique Nationale d'Armes de Guerre* – also offers its own designs of remote-controlled weapon stations.

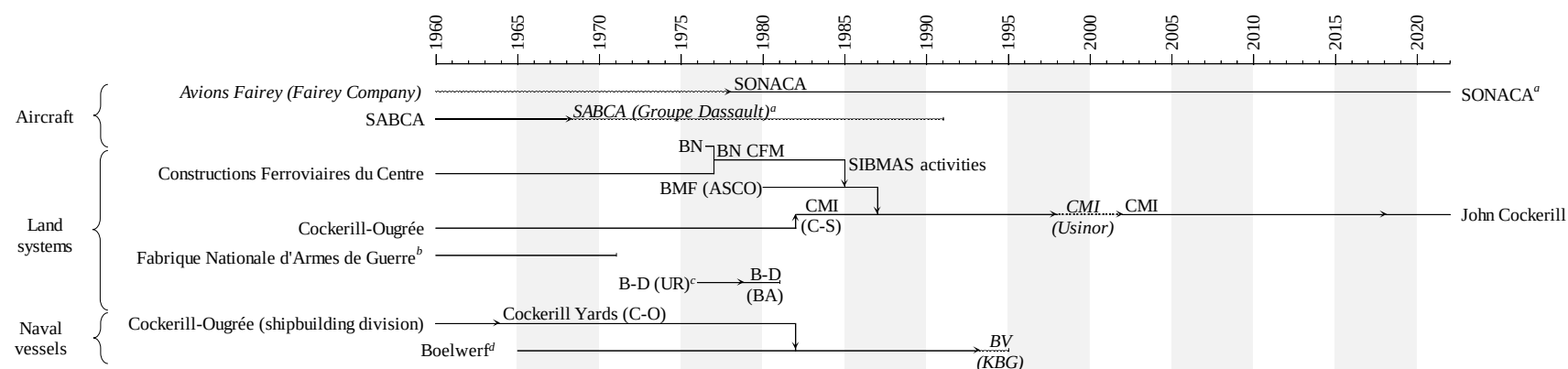
⁹ For example, *John Cockerill* had participated in the assembly of the *Pandur* and *Piranha* vehicles operated by the Belgian Army. Most recently, it has partnered with *Nexter* to supply the Belgian Army with the French *EBRC Jaguar* and *VBMR Griffon* vehicles under the *Capacité Motorisée (CaMo)* programme.

¹⁰ (Bauer, 2017a), (Bauer, 2017b).

¹¹ (Bauer, 2018), (Bauer, 2017a), (Bauer, 2017b).

¹² (Quinet, 1997, p. 109), (Hébert & de Penanros, 1995, p. 208).

Figure 1: Restructuring of the aircraft, naval and land systems sectors of Belgium, 1960-2022



Source: Authors' illustration.

Notes:

- i Only firms involved in the manufacture of aircraft, naval vessels and land systems as defined in our article are displayed. Suppliers of other products and services related to the defence industry (such as ammunition, electronics, engines, R&D, sensors and small arms) are not included. Overhaul and repair facilities are only included if they engage in significant manufacturing activities.
- ii Parent companies are listed in parentheses behind the manufacturer's name (except for manufacturers owned by public or private holdings or investment firms without own operational activities). Dashed horizontal lines and italicised designations signify that a company is under foreign ownership.
- iii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilder *Mercantile-Béliard* and the armoured vehicle specialist *OIP Land Systems*) are not regarded as major suppliers by the authors and have therefore not been included.
- iv BA=Beherman Auto; B-D=Beherman-Demoen; BMF=Belgian Mechanical Fabrication; BN=La Brugeoise et Nivelles; BN CFM=BN Constructions Ferroviaires et Métalliques; BV=Boelwerf Vlaanderen; CMI=Cockerill Mechanical Industries (from 2004: Cockerill Maintenance & Ingénierie); C-O=Cockerill-Ougrée; C-S=Cockerill-Sambre; KBG=Koninklijke Begemann Groep; SABCA=Société Anonyme Belge de Constructions Aéronautiques; SIBMAS=Société Industrielle Belge de Matériel Automobile Spécial; SONACA=Société Nationale de Construction Aérospatiale; UR=Usines Raghenno.
- ^a While SABCA and SONACA remain important tier suppliers of aerostructures and other components as well as aircraft-related services, both companies ceased the supply of entire aircraft systems after the completion of the *F-16* co-production programme in the early 1990s. SABCA (which was transferred from the French *Groupe Dassault* to the Belgian *Blueberry Group* in 2020) has not re-established these activities. SONACA, on the other hand, entered the market for small piston-engine trainer aircraft. After delivering several units of the *Sonaca 200*, however, production was unexpectedly halted in mid-2022. While the future of this project remains unclear, Figure 1 still lists SONACA as a (potentially) important aircraft manufacturer as of 2022.
- ^b To the authors' knowledge, *Fabrique Nationale d'Armes de Guerre* (now *Fabrique Nationale Herstal*) ceased the production of armoured vehicles after 1971, although it continues to supply ammunition, small arms, light/medium weapon stations and other related products that do not constitute major land systems as defined in our article. Thus, the company is only listed until 1971.
- ^c The authors' research suggests that *Beherman-Demoen* was only involved in the production of armoured vehicles between 1976 and 1981. The company is thus only included for this period.
- ^d Whereas the *Cockerill* shipyard had engaged in the supply of major naval vessels during earlier periods, *Boelwerf* had only built smaller types (such as mine-countermeasure vessels) prior to the launch of the fishery protection ship *Godetia* in the mid-1960s. For this reason, Figure 1 only displays *Boelwerf* as an important naval shipbuilder from 1965 onwards.

EADS (2000, now *Airbus*).¹³ Whereas *Aérospatiale*'s rotary-wing and transport aircraft activities are now maintained on a trans-European basis by *Airbus*, *Dassault Aviation* remains one of only two European companies which still produce advanced combat aircraft on a national basis (the other being *Saab* of Sweden). However, *Dassault Aviation* has stated that the independent production of French combat aircraft designs will no longer be feasible with the next generation,¹⁴ and in 2018 an agreement was signed with *Airbus* to develop the *FCAS* on a Franco-German basis (Spain has joined in early 2019).¹⁵ Some companies of more modest size, most notably *Daher*, remain active in the markets for small piston/turboprop aircraft for training, light transport and specialised purposes.

In the naval sector, the supply of major surface ships and submarines to the French Navy had historically been secured by the state-owned naval dockyards and by several privately-held companies (which built both naval and non-naval vessels).¹⁶ In the late 1950s and early 1960s, however, the government decided (1) to stimulate consolidation by significantly reducing the subsidies granted to private shipbuilders¹⁷ and (2) to entrust future contracts for major naval vessels exclusively to the public dockyards.¹⁸ These decisions, which coincided with the onset of the 'shipbuilding crisis',¹⁹ dramatically altered the structure of the French naval industry. While several private shipyards continued to build naval vessels for the export market for some years, most of them either merged into larger entities which focused on non-naval activities or ceased their operations altogether. In the 1990s, *Chantiers de l'Atlantique* – the sole remaining shipbuilder of the private group – re-emerged as a producer of major surface naval vessels.

Direction des Constructions Navales (DCN), the governmental agency tasked with the coordination of the naval dockyards' activities, was transformed into an operating company under public ownership in 2003 and – after acquiring the naval activities of the *Thales Group* – took the name *DCNS* in 2007. Today known as *Naval Group*, it remains the French 'national champion' for the supply of conventional and nuclear-powered submarines, aircraft carriers, destroyers and frigates. Besides being the main supplier of the French Navy, the *Naval Group*

¹³ For an overview of major transnational aircraft programmes with French participation since the 1960s, see (Braddon & Hartley, 2013, pp. 2-3). A summary of bi- and multilateral European cooperation in the rotary-wing sector prior to the creation of *Eurocopter* is provided by (Droff, 2017, pp. 21-22).

¹⁴ (*Dassault Aviation*, 2018).

¹⁵ (Jennings, 2019a).

¹⁶ In the early 1960s, these were the following eight private shipbuilders (of which some were the result of earlier mergers): *Anciens Chantiers Dubigeon*, *Ateliers et Chantiers Augustin Normand*, *Ateliers et Chantiers de Bretagne*, *Ateliers et Chantiers de Dunkerque et Bordeaux*, *Ateliers et Chantiers de la Seine-Maritime*, *Chantiers de l'Atlantique*, *Chantiers Réunis Loire-Normandie* and *Forges et Chantiers de la Méditerranée*.

¹⁷ (Bourque, 1996, p. 246). See also (Espérandieu, 2017), (Lebailly & Bidaux, 2017, pp. 294, 296, 305-306, 328) and (Domenichino, 1991, pp. 53-57) on the recommendations of the 1959 White Paper.

¹⁸ (Espérandieu, 2017), (Lebailly & Bidaux, 2017, p. 305).

¹⁹ See pp. 83-84 on the European 'shipbuilding crisis'.

is also one of Europe's leading naval exporters. *Chantiers de l'Atlantique*, whose takeover by the Italian shipbuilder *Fincantieri* was thwarted in 2021, offers frigates and large amphibious ships. Some additional shipbuilders are active in the markets for other types of naval vessels, most notably *Constructions Mécaniques de Normandie* (which engages in the construction of corvettes as part of the Lebanese *Privinest Group*) and *Piriou* (which builds offshore-patrol ships together with the *Naval Group* via the *Kership* consortium). While the Franco-Italian rapprochement between the *Naval Group* and *Fincantieri* has sparked speculations on the emergence of a 'naval Airbus',²⁰ the 2020 creation of the joint venture *Naviris* has yet to be followed by a serious alignment of its parent firms' activities. The *European Patrol Corvette*, proposed in 2021, could pose a first step towards this direction.

In the land systems sector, the cessation of armoured vehicle construction by *Hotchkiss-Brandt* and *Forges et Chantiers de la Méditerranée* in the 1960s, the formation of *GIAT* from the state arsenals in 1971, and the takeover of *Mécanique Creusot-Loire* in 1992 consolidated the French capabilities to supply tracked armoured vehicles, artillery systems and turrets within a single operating company.²¹ In 2015, *Nexter* (which had been created from *GIAT Industries* in 2006) merged with its German rival *Krauss-Maffei Wegmann* into *KNDS*.²² The Franco-German rapprochement may proceed further in the coming years, as both governments have initiated a cooperation to realise a next-generation main battle tank (the *MGCS*). On the other hand, the attempted partial takeover of *KNDS* by *Rheinmetall*,²³ Germany's largest land systems manufacturer, has thus far remained unsuccessful. Furthermore, *Nexter* constitutes one of two remaining French suppliers of wheeled armoured vehicles – the other being *Arquus* (until 2018 known as *Renault Trucks Defense*), which builds on the heritage of the French military vehicle producers *ACMAT*, *Auverland*, *Berliet*, *Panhard* and *SAVIEM*.²⁴ From 2016 to 2017, *KNDS* attempted to acquire *Renault Trucks Defense* from the Swedish *Volvo Group*.²⁵ While the *Volvo Group* ultimately opted to retain *Renault Trucks Defense* and to rebrand the company as *Arquus*, it may not be ruled out that a merger between the two leading French land systems producers (which currently cooperate in the modernisation of the French armoured capabilities as part of the *Scorpion* programme), could take place in the future.

²⁰ See, for example, (Segreti & Neely, 2018), (Guillermard, 2017), (Taylor, 2017). Both companies have already cooperated in the realisation of the *Horizon* and *FREMM* class destroyers.

²¹ For further information on the creation and evolution of *GIAT*, see (Aubert & Smagghe, 2007, pp. 23-26) and (Andersson, 2001, pp. 14-16). On the takeover of *Mécanique Creusot-Loire*, see (Gay, 1996, pp. 203, 206).

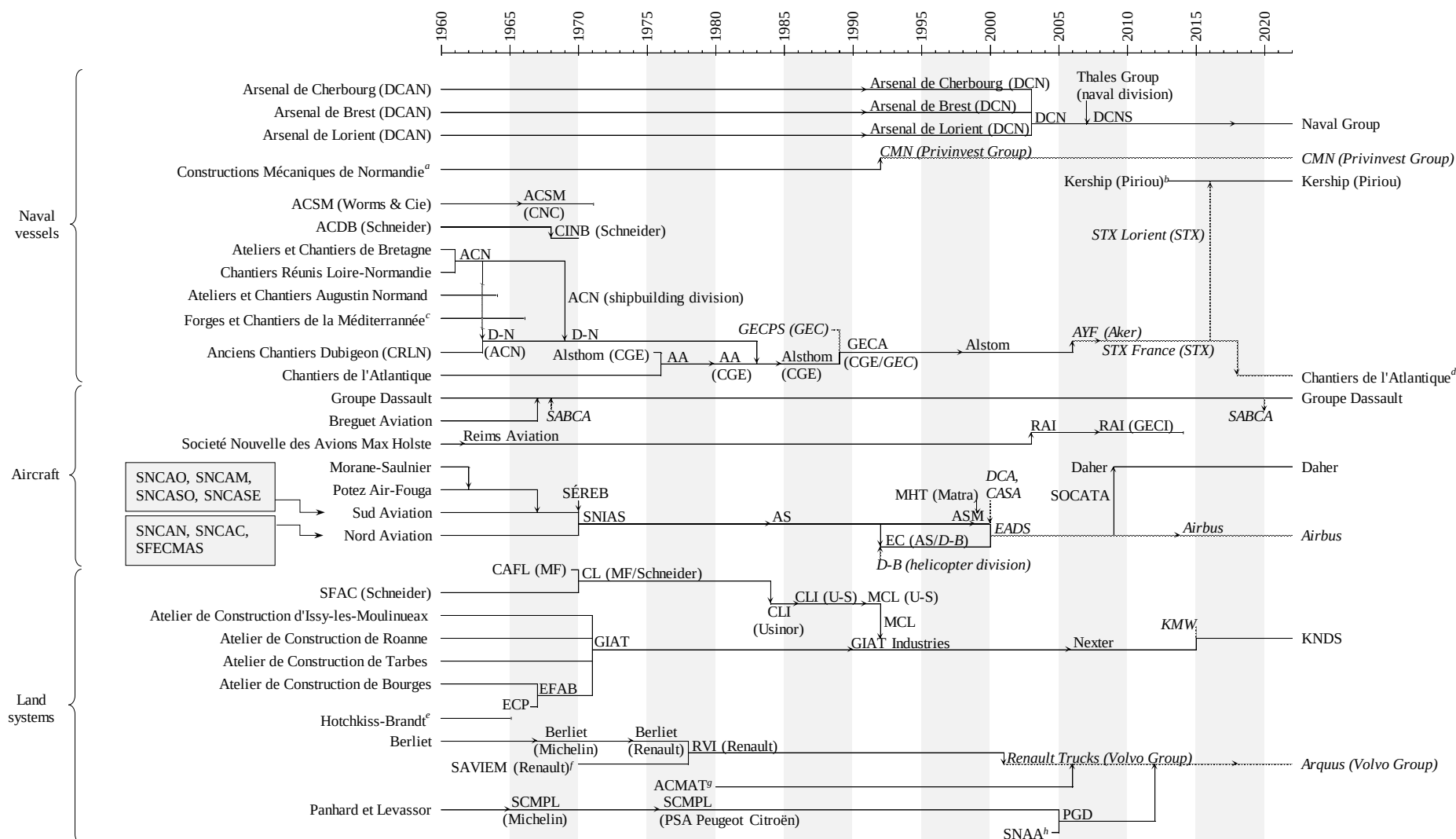
²² (Caralp, 2017, p. 16).

²³ (Handelsblatt, 2018), (Rheinmetall, 2018).

²⁴ Arguably, one might regard the defence electronics and systems supplier *Thales Group*, which cooperates with *Nexter* and *Arquus* in the *Scorpion* programme while also producing armoured vehicles via *Thales Australia* (formerly *Australian Defence Industries*), as a third major French armoured vehicle manufacturer.

²⁵ (Bauer, 2018), (Bauer, 2017a), (Bauer, 2017b).

Figure 2: Restructuring of the aircraft, naval and land systems sectors of France, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilder *Socarenam*, the aircraft manufacturers *Issoire Aviation* and *Robin Aircraft*, the industrial vehicle producer *UNAC*, the vehicle armouring specialist *Centigon France*, the military engineering company *CEFA* and *Constructions Industrielles de la Méditerranée*, whose product range includes landing craft and bridging systems) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AA=Alsthom-Atlantique; ACDB=Ateliers et Chantiers de Dunkerque et Bordeaux; ACMAT=Ateliers de Construction Mécanique de l'Atlantique; ACN=Ateliers et Chantiers de Nantes; ACSM=Ateliers et Chantiers de la Seine-Maritime; AS=Aérospatiale; ASM=Aérospatiale-Matra; AYP=Aker Yards France; CAFL=Compagnie des Ateliers et Forges de la Loire; CASA=Construcciones Aeronáuticas S.A.; CGE=Compagnie Générale d'Électricité; CINB=Constructions Industrielles et Navales de Bordeaux; CL=Creusot-Loire; CLI=Creusot-Loire Industrie; CMN=Constructions Mécaniques de Normandie; CNC=Chantier Naval de La Ciotat; CRLN=Chantiers Réunis Loire-Normandie; D-B=Daimler-Benz; DCA=DaimlerChrysler Aerospace; DCAN=Direction des Constructions et Armes Navales; DCN=Direction des Constructions Navales; D-N=Dubigeon-Normandie; EADS=European Aeronautic Defence and Space; EC=Eurocopter; ECP=École Centrale de Pyrotechnie; EFAB=Établissement d'Études et de Fabrication d'Armement de Bourges; GEC=General Electric Company; GECA=GEC Alsthom; GECI=Groupe d'Études et Conseils en Ingénierie; GECPS=GEC Power Systems; GIAT=Groupement Industriel des Armements Terrestres; KMW=Krauss-Maffei Wegmann; KNDS=KMW+Nexter Defense Systems; MCL=Mécanique Creusot-Loire; MF=Marine-Firminy; MHT=Matra Hautes Technologies; RAI=Reims Aviation Industries; PGD=Panhard General Defense; RVI=Renault Véhicules Industriels; SABCA=Société Anonyme Belge de Constructions Aéronautiques; SAVIEM=Société Anonyme de Véhicules Industriels et d'Équipements Mécaniques; SCMPL=Société de Constructions Mécaniques Panhard et Levassor; SÉREB=Société d'Études et de Réalisation d'Engins Ballistiques; SFAC=Société des Forges et Ateliers du Creusot; SFECMAS=Société Française d'Étude et de Constructions de Matériel Aéronautiques Spéciaux; SOCATA=Société de Construction d'Avions de Tourisme et d'Affaires; SNAA=Société Nouvelle des Automobiles Auverland; SNCAC=Société Nationale de Constructions Aéronautiques du Centre; SNCAM=Société Nationale de Constructions Aéronautiques du Midi; SNCAN=Société Nationale de Constructions Aéronautiques du Nord; SNCAO=Société Nationale de Constructions Aéronautiques de l'Ouest; SNCASE=Société Nationale de Constructions Aéronautiques du Sud-Est; SNCASO=Société Nationale de Constructions Aéronautiques du Sud-Ouest; SNIAS=Société Nationale Industrielle Aérospatiale; U-S=Usinor-Sacilor.
- iv The largest French defence firm, the *Thales Group*, became a supplier of complete armoured vehicle systems with the takeover of *Australian Defence Industries* in 2006 (now known as *Thales Australia*). However, as the production facilities of *Thales Australia* are located in Australia, the *Thales Group* is not listed among the major French land systems manufacturers.
 - ^a *Constructions Mécaniques de Normandie*, which has in recent years diversified into the construction of larger and/or more capable types such as corvettes and offshore-patrol ships, mostly built smaller patrol craft during the second half of the 20th century. Generally, shipyards that do not supply naval vessels larger than patrol craft are not considered as major naval shipbuilders in this dissertation. However, as many of its types were much more heavily armed than most other patrol craft of comparable size, and since the company acted as a significant exporter of these types to various foreign nations, an exception is made for *Constructions Mécaniques de Normandie*, which is listed as an important naval shipbuilder for the entire period displayed in Figure 2.
 - ^b While *Piriou* has been active as a shipbuilder since the 1960s, the company's engagement in the production of large naval vessels only commenced with the establishment of *Kership* (in which the *Naval Group* holds a minority share of 45%). For this reason, *Piriou/Kership* is only included from 2013 onwards.
 - ^c In 1966, the activities of *Forges et Chantiers de la Méditerranée* were taken over by *Constructions Navales et Industrielles de la Méditerranée*. While the company remains active in the land and naval sectors, the construction of warships and armoured fighting vehicles was discontinued after the takeover. Therefore, *Forges et Chantiers de la Méditerranée/Constructions Navales et Industrielles de la Méditerranée* is only included until the year 1966.
 - ^d The attempted acquisition of a 50% stake in *Chantiers de l'Atlantique* by *Fincantieri* (plus 1% borrowed from the French State) was suspended in 2021.
 - ^e In 1966, *Hotchkiss-Brandt* merged into *Compagnie Française Thomson-Houston-Hotchkiss-Brandt* (which would later become *Thomson-Brandt*). Although the company remained active as an defence manufacturer, the production of armoured fighting vehicles (to the authors' knowledge) ceased in the mid-1960s. Because of this, *Hotchkiss-Brandt* is only included until 1965.
 - ^f The truck manufacturer *SAVIEM* did not engage in the delivery of armoured fighting vehicles prior to the development of the *VAB* in the 1970s.
 - ^g *ACMAT*, a manufacturer of military transport and utility vehicles, did not produce armoured types prior to the 1980s and is therefore only included from this decade onwards.
 - ^h *Socété Nouvelle des Automobiles Auverland* largely focused on the production of non-armoured vehicles prior to the acquisition of *Panhard* and is therefore only included from 2005 onwards.

A.1.1.4 Germany

The consolidation of the German aircraft sector progressed gradually during the second half of the 20th century. A first wave of national mergers left three leading companies in the market by the late 1960s: *Dornier*, *Vereinigte Flugtechnische Werke (VFW)* and *Messerschmitt-Bölkow-Blohm (MBB)* (see Figure 3). Following the takeover of VFW by MBB in 1981, a ‘national champion’ was created when *Daimler-Benz* (which had previously acquired *Dornier*) also took control of MBB in 1989.²⁶ Besides these national developments, Germany’s aircraft sector also experienced an ongoing process of Europeanisation²⁷ which culminated in the integration of *DaimlerChrysler Aerospace* (formerly *Daimler-Benz Aerospace*, known as *DASA*) into *EADS* in 2000.²⁸ The development and production of rotary-wing, combat and military transport aircraft in Germany is now conducted by *Airbus*, and the few remaining independent German aircraft manufacturers (most notably *Grob Aircraft*, which competes in the market for piston/turboprop trainer aircraft) focus on the supply of comparatively small and inexpensive types.

The German naval sector has experienced a prolonged consolidation process which began in the 1960s and lasted well into the 2000s (see Figure 3). This process saw the integration of significant production capacities for major surface vessels and submarines into *Thyssen* and *Howaldtswerke-Deutsche Werft (HDW)*, while other important naval yards (including *Bremer Vulkan* and *AG Weser*) ceased their activities. *ThyssenKrupp* ultimately acquired HDW in 2005 and thereby became the undisputed leader in the German naval sector. Since then, however, *ThyssenKrupp* divested its surface shipbuilding facilities in Germany and its two major foreign shipyard subsidiaries, *Hellenic Shipyards* of Greece and *Kockums* of Sweden.²⁹ In parallel with this rationalisation process, two other German shipbuilders, *Fr. Lürssen Werft* (historically a supplier of small and medium-sized types) and *German Naval Yards Kiel* (part of the Lebanese *Prinvest Group*), have entered the market for major surface naval vessels.³⁰ Besides these three leading firms, some other German shipbuilders are active in certain subsectors of the naval industry, including *Fr. Fassmer* (which builds offshore-patrol ships) and *Abeking & Rasmussen* (a specialised supplier of mine-countermeasure vessels).

²⁶ See (Schmitz, 1990, pp. 565-570) on the restructuring of the German aircraft sector from the 1960s to 1990. For additional information on its integration into *Daimler-Benz*, see (Kirchner, 1998, pp. 289-293).

²⁷ Bi- and multilateral projects with German participation included the *Airbus* consortium and the *Alpha Jet*, *Tornado*, *Typhoon*, *NH90* and *Tiger* programmes (Droff, 2017, pp. 21-22), (Braddon & Hartley, 2013, p. 2).

²⁸ Earlier plans had envisaged a rapprochement between *DaimlerChrysler Aerospace* (also known as *DASA*) and *British Aerospace*, but when the latter merged with *Marconi Electronic Systems* into *BAE Systems* in 1999, the German firm instead merged with *Aérospatiale-Matra* of France and *CASA* of Spain into *EADS* (Smith, 2013, p. 19), (Hartley, 2012, p. 333).

²⁹ For an assessment of *Kockums’* sale to *Saab*, which saw the Swedish company re-emerge as a competitor to *ThyssenKrupp’s* submarine activities, see (Lundmark, 2014a, pp. 7-8), (Lundmark, 2014b, p. 11).

³⁰ It might be argued that *ThyssenKrupp’s* sale of *HDW-Gaarden* (to the *Prinvest Group*) and *Blohm+Voss* (which now belongs to *Fr. Lürssen Werft*) has supported the emergence of these two new competitors.

Whereas *ThyssenKrupp* remains one of the leading European suppliers of conventionally powered submarines and the largest German naval shipbuilder in terms of defence sales,³¹ the construction of frigates and destroyers is now largely conducted at the facilities of *Fr. Lürssen Werft* and *German Naval Yards Kiel*, which both aim to increase their presence on the domestic and foreign markets. It was often conjectured that *ThyssenKrupp* could withdraw from the naval sector (with *Rheinmetall*, *Fincantieri* and *Naval Group* named as potential buyers of its naval division³²). These speculations were fuelled by export setbacks³³ and *ThyssenKrupp*'s exclusion from the *MKS 180* tender,³⁴ but the divestment plans were put on hold after the 2022 Russian invasion of Ukraine. While *German Naval Yards* and *Fr. Lürssen Werft* would likely maintain Germany's capabilities to build major surface vessels, one could only hypothesise how a divestment would affect Germany's competitive position in the submarine segment.

In the land systems sector, an initial consolidation process took place in the 1960s.³⁵ A second, more profound process from 1990 onwards left Germany with two leading companies whose operations are closely connected: *Rheinmetall* and *Krauss-Maffei Wegmann*.³⁶ Besides their independent activities, both firms are involved in several national and transnational consortia for the supply of wheeled and tracked armoured vehicles, of which they offer a complete range. In addition to delivering the *Leopard 2* (the most widely used main battle tank in Europe), *Rheinmetall* and *Krauss-Maffei Wegmann* share the responsibility for the *PzH 2000*, the *Puma* and the Dutch/German *Boxer*.³⁷ They also operate in other defence industry segments – particularly *Rheinmetall*, which produces military trucks, turrets, weapon stations, air defence systems and defence electronics. Since 2015, *Krauss-Maffei Wegmann* forms part of the *KNDS* holding. Together with its French sister company *Nexter*, *Krauss-Maffei Wegmann* intends to develop the next-generation *MGCS* on a Franco-German basis. Partly in response to these developments, *Rheinmetall* entered negotiations on a partial takeover of *KNDS* and, when these

³¹ (Stockholm International Peace Research Institute, 2021a).

³² See, for example, (Weber, 2017, p. 475), (Gotkowska, 2015, p. 3) and (Lundmark, 2014b, p. 11).

³³ Notably by *ThyssenKrupp*'s failure to secure a contract for the delivery of twelve submarines to Australia, which was instead won by the French *Naval Group* (then *DCNS*) in 2016 (Weber, 2017, pp. 469-478).

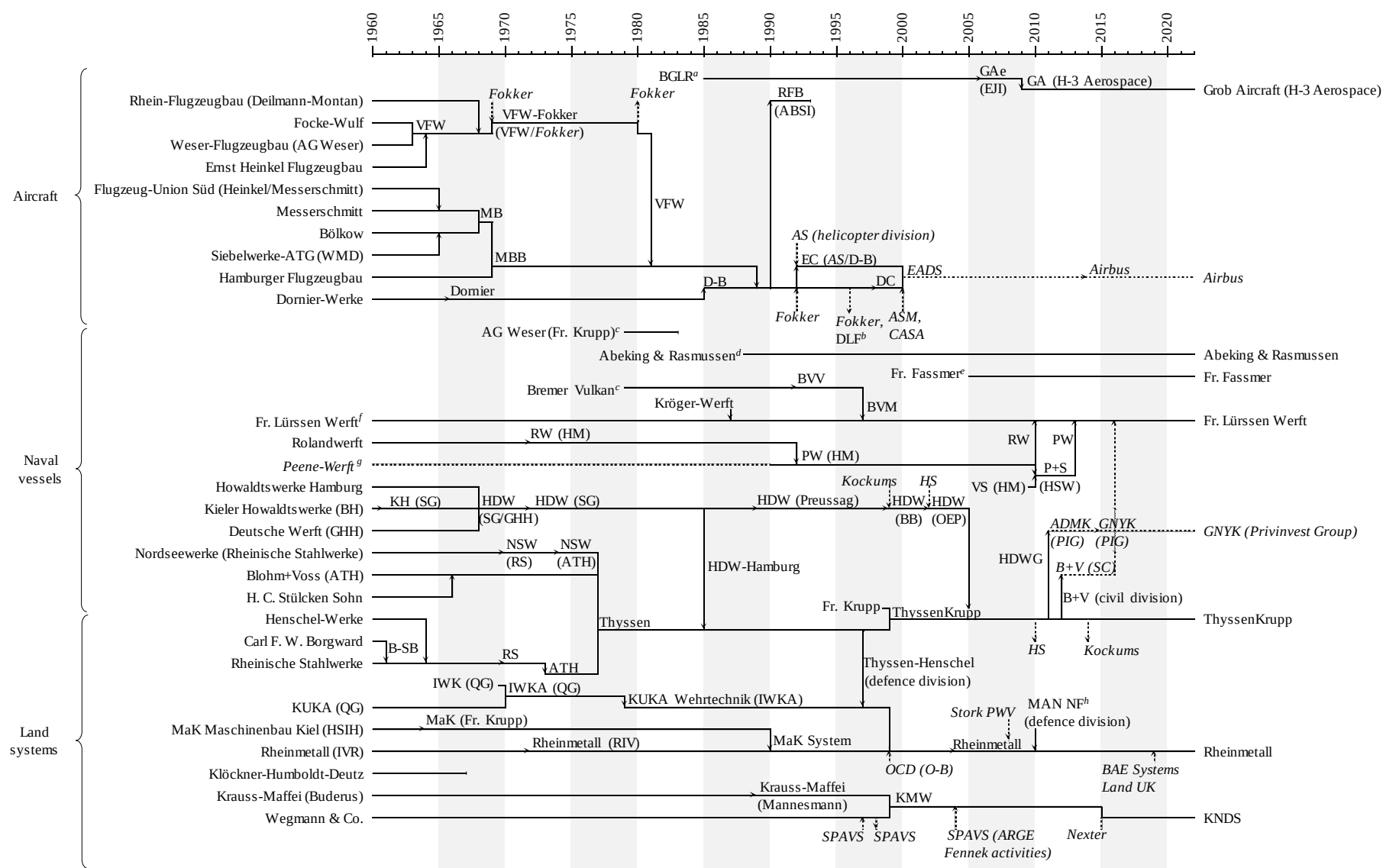
³⁴ (Bulkeley, 2018). The *MKS 180* may become the largest naval project ever initiated by the Federal Republic of Germany. The decision to block *ThyssenKrupp* (and its consortium partner, *Fr. Lürssen Werft*) was allegedly related to substantial delays in the deliveries of the *F125 Brandenburg* class (Murphy, et al., 2018). *ThyssenKrupp* has since re-entered the tender as a subcontractor to *German Naval Yards Kiel* (Schulte, 2018).

³⁵ These years saw the integration of *Henschel-Werke* and *Carl F. W. Borgward*'s military vehicle activities into *Rheinische Stahlwerke* and the cessation of armoured vehicle production by *Klöckner-Humboldt-Deutz*.

³⁶ Historically a producer of artillery systems, *Rheinmetall* broadened its portfolio during the 1990s by acquiring the armoured vehicle manufacturers *MaK System* and *Henschel Wehrtechnik* and the turret supplier *KUKA Wehrtechnik* (Andersson, 2001, pp. 10-11). In 2010, it combined its wheeled military vehicle activities with those of *MAN Nutzfahrzeuge* into *Rheinmetall MAN Military Vehicles*, in which *Rheinmetall* holds a majority stake (Masson, 2010, p. 95). *Krauss-Maffei Wegmann* was created in 1999 from the defence activities of *Krauss-Maffei* and *Wegmann & Co.* (Andersson, 2001, p. 11).

³⁷ (Gotkowska, 2015, p. 3).

Figure 3: Restructuring of the aircraft, naval and land systems sectors of Germany, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the naval auxiliary shipbuilder *Flensburger Schiffbau-Gesellschaft* as well as *Mercedes-Benz*, which offers a wide range of non-armoured logistics and specialised vehicles for military applications) are not regarded as major suppliers by the authors and have therefore not been included. The engineering company and armoured vehicle conversion specialist *FFG Flensburger Fahrzeugbau Gesellschaft* is likewise not displayed: while it has developed the tracked armoured vehicle *PMMC G5*, it has not yet received any serial production contract for this system.
- iii ABSI=ABS International; ADMK=Abu Dhabi MAR Kiel; AS=Aérospatiale; ASM=Aérospatiale-Matra; ATH=August Thyssen-Hütte; BB=Babcock Borsig; BGLR=Burkhart Grob Luft- und Raumfahrt; BH=AG für Bergbau und Hüttenbetrieb; B-SB=Bremen-Sebaldsbrück Plant; B+V=Blohm+Voss; BVM=Bremer Vulkan Marineschiffbau; BVV=Bremer Vulkan Verbund; CASA=Construcciones Aeronáuticas SA; D-B=Daimler-Benz; DC=DaimlerChrysler; DLF=Dornier Luftfahrt; EADS=European Aeronautic Defence and Space; EC=Eurocopter; EJI=Executive Jet Investments; Fr. Krupp=Friedrich Krupp; GA=Grob Aircraft; GAe=Grob Aerospace; GHH=Gutehoffnungshütte; GNYK=German Naval Yards Kiel; HDW=Howaldtswerke-Deutsche Werft; HDWG=HDW Gaarden; HM=Hegemann Group; HS=Hellenic Shipyards; HSIH=Hugo Stinnes Industrie und Handel; HSW=HSW Treuhand- und Beteiligungsgesellschaft; IVR=Industrie Verwaltung Röchling; IWK=Industrie-Werke Karlsruhe; IWKA=Industrie-Werke Karlsruhe-Augsburg; KH=Kieler Howaldtswerke; KMW=Krauss-Maffei Wegmann; KNDS=KMW+Nexter Defense Systems; MaK=Maschinenbau Kiel; MAN NF=MAN Nutzfahrzeuge; MB=Messerschmitt-Bölkow; MBB=Messerschmitt-Bölkow-Blohm; NSW=Nordseewerke; O-B=Oerlikon-Bührle; OCD=Oerlikon-Contraves Defence; OEP=One Equity Partners; P+S=P+S Werften; PIG=Prininvest Group; PW=Peene-Werft; QG=Quandt Group; RFB=Rhein-Flugzeugbau; RIV=Röchling Industrie Verwaltung; RS=Rheinstahl; RW=Rolandwerft; SC=Star Capital; SG=Salzgitter AG; SPAVS=SP Aerospace & Vehicle Systems; Stork PWV=Stork Pantser Wiel Voertuig; VFW=Vereinigte Flugtechnische Werke; VS=Volkswerft Stralsund; WMD=Waggon- und Maschinenbau Donauwörth.
- ^a *Burkhart Grob Luft- und Raumfahrt* largely focused on the development and production of gliders before entering the market for light trainer and utility aircraft in the mid-1980s. For this reason, the company is not displayed prior to the year 1985.
- ^b *Dornier Luftfahrt*, which was sold to *Fairchild Aircraft* of the United States in 1996, comprised the regional aircraft activities of *Dornier*.
- ^c While both *AG Weser* and *Bremer Vulkan* had engaged in the construction of major naval vessels during earlier periods of their existence, both shipyards had ceased these activities at the end of the Second World War and only resumed them with the construction of the *Bremen* class frigates. For this reason, both shipyards are only displayed from the year 1979 onwards.
- ^d Although *Abeking & Rasmussen* had supplied large numbers of mine-countermeasure vessels since the 1930s, these types mostly resembled smaller patrol boats (comparably small types were also built by other shipbuilders, including *Kröger-Werft* and *Burmester Werft*). With the construction of the *Type 343 Hameln* class, which commenced in 1988, *Abeking & Rasmussen* began to build significantly larger and technologically more advanced mine-countermeasure vessels. Consequently, the company is displayed as an important naval shipbuilder only from this year onwards.
- ^e *Fr. Fassmer* only supplied smaller naval vessels until it was selected to design a new class of offshore-patrol ships for Chile in 2005. The resulting *OPV 80* was subsequently procured by Chile and Colombia (whereas local yards were tasked with the construction), and three slightly larger ships were ordered by the German Coast Guard in 2016. Although only the latter ships are built in Germany, the authors consider *Fr. Fassmer* as an important naval shipbuilder from 2005 onwards, as this year saw the entry of *Fr. Fassmer* into the market for offshore-patrol ships.
- ^f Prior to its enlargement and restructuring during the recent decades, which has led to its entry into the market for major surface naval vessels, *Fr. Lürssen Werft* mainly focused on the supply of smaller types (such as patrol craft). However, in a trait that is shared with *Constructions Mécaniques de Normandie* of France (see note ^a below Figure 2), these vessels were often much more heavily armed than most other patrol craft of comparable size. *Fr. Lürssen Werft* also acted as a significant exporter of these types. For these reasons, *Fr. Lürssen Werft* is listed as an important naval shipbuilder for the entire period displayed in Figure 3, even though firms that only supply patrol craft and similar types are otherwise not regarded as major shipbuilders in this dissertation.
- ^g *Peene-Werft* was located within the German Democratic Republic until the year 1990.
- ^h While *MAN Nutzfahrzeuge* had acted as an important supplier of military trucks for logistics and specialised purposes in the past, it did not engage in the production of armoured fighting vehicles until the integration of its military activities into *Rheinmetall MAN Military Vehicles*. Therefore, *MAN Nutzfahrzeuge* is not listed as a significant land systems manufacturer prior to 2010.

attempts were unsuccessful, unveiled a competing main battle tank design in 2022 (the *KF51 Panther*). While *Rheinmetall* and *KNDS* account for the larger share of Germany's land systems sector, other German firms also remain active in this defence-industrial segment (a notable example being the engineering plant *FFG Flensburger Fahrzeugbau Gesellschaft*, which aims to establish itself as a supplier of tracked armoured vehicles³⁸).

A.1.1.5 Ireland

The construction of naval vessels in Ireland has ceased more than three decades ago with the closure of *Cork Dockyard*, the country's sole shipyard which had built offshore-patrol ships. In the land systems sector, on the other hand, *Timoney Technology* remains active in the supply of major components for armoured vehicles, in the development and small-scale production of entire armoured vehicle systems, and in the provision of services associated with their introduction. Among other recent projects, it has participated in the realisation of the Australian *Bushmaster* armoured utility vehicles, the *CM-32 Yunpao* family of the Republic of China and the Singaporean armoured personnel carrier *Terrex AV-81*. *Timoney Technology* thus remains an important entity in the land systems sector, even though the serial production of its designs is conducted by its foreign partner firms. Since the 1970s, *Timoney Technology* has been the only Irish company which engaged in the export of major types of armaments.³⁹

A.1.1.6 Netherlands

During most of the second half of the 20th century, the Netherlands maintained significant capabilities in the aircraft, naval and land systems sectors. Whereas *Fokker* engaged in the development and production of transport aircraft and in the licensed manufacture of combat aircraft, *DAF* supplied armoured vehicles (which were largely built under license as well), and four shipbuilders constructed indigenously designed frigates, destroyers and conventionally powered submarines (see Figure 4). Following an extensive process of consolidation and rationalisation, the country's defence industry has lost a substantial share of these capabilities.

Fokker, which had already formed a union with *VFW* between 1969 and 1980,⁴⁰ was taken over by *Daimler-Benz* in 1992. Only four years later, the German company opted to divest its indebted Dutch subsidiary, resulting in *Fokker's* bankruptcy.⁴¹ Although some of its operations

³⁸ (Foss, 2018c).

³⁹ (Stockholm International Peace Research Institute, 2021b).

⁴⁰ (Schmitz, 1990, p. 567). One of the major reasons for the demerger of *VFW-Fokker* had been the failure of the *VFW-614* regional airliner programme (Kirchner, 1998, pp. 288-289).

⁴¹ (Steenhuis, 2016, pp. 45-46), (Heerkens, et al., 2010, p. 78), (Heerkens & Uljin, 1999, pp. 297-298, 300-304).

are maintained by *Fokker Technologies* (now part of *GKN Aerospace*), the development and production of entire aircraft systems has ceased. In the land systems sector, the dissolution of *DAF NV* in 1993 led to the transfer of its defence activities to a Dutch/Swiss consortium.⁴² In 1998, after a brief period of majority ownership by *Wegmann*, these assets became part of the *RDM Holding*, which went bankrupt in 2004. The participation of the Netherlands in the Dutch/German *Fennek* and *Boxer* programmes has since been taken over by *Rheinmetall* and *Krauss-Maffei Wegmann* in a process of “transnational consolidation that [...] [has seen] the small Dutch military vehicle industry being integrated into its German neighbor.”⁴³ While some Dutch companies remain active in the land systems sector (such as *Van Halteren Defence*, which engages in the partial assembly of foreign-made land systems procured by the Dutch armed forces), the country is no longer home to important system integrators in this segment.

In the naval sector, a consolidation process between 1966 and 1971 integrated the four largest Dutch naval yards into the *Rijn-Schelde-Verolme (RSV)* shipyards group.⁴⁴ After the dissolution of *RSV* in 1983, the construction of principal naval vessels became concentrated in just two shipyards: (1) *Rotterdamsche Droogdok Maatschappij (RDM)*, which was tasked with building submarines, and (2) *Koninklijke Maatschappij De Schelde (KMS)*, which focused on major surface vessels.⁴⁵ While *RDM* ceased its activities in 2004 due to a lack of orders, the Vlissingen yard of *KSM* (then known as *Koninklijke Schelde Groep, KSG*) was taken over by the *Damen Shipyards Group* in 2000, which thereby became the sole Dutch supplier of major surface naval vessels.⁴⁶ As of 2022, the *Damen Shipyards Group* – which now owns more than 20 shipyards in the Netherlands and abroad – remains the largest Dutch defence firm.⁴⁷ Besides being the main supplier of the Royal Netherlands Navy, it actively competes with its designs (including amphibious ships, destroyers, frigates, corvettes and offshore-patrol ships) on foreign markets and has thereby established itself as one of Europe’s leading naval exporters. Many of its larger naval vessels are partly built in Romania, where the *Damen Shipyards Group* owns the Galați shipyard.⁴⁸ Besides its activities in the supply of surface naval vessels, the company has also entered a cooperation with *Saab* of Sweden to re-establish the Dutch submarine production capabilities under the *Walrus Replacement Programme*.⁴⁹

⁴² (van Oosterhout & Smit, 1997, pp. 173, 184). A majority stake was held by the *Van Halteren* group.

⁴³ (Caralp, 2017, p. 18).

⁴⁴ (van der Velden, 2017, pp. 229-230, 245), (Lemmers, 2015, p. 274), (Smit, 2010, pp. 36-37).

⁴⁵ (Smit, 2010, p. 38). See also (Lemmers, 2015, pp. 274-275).

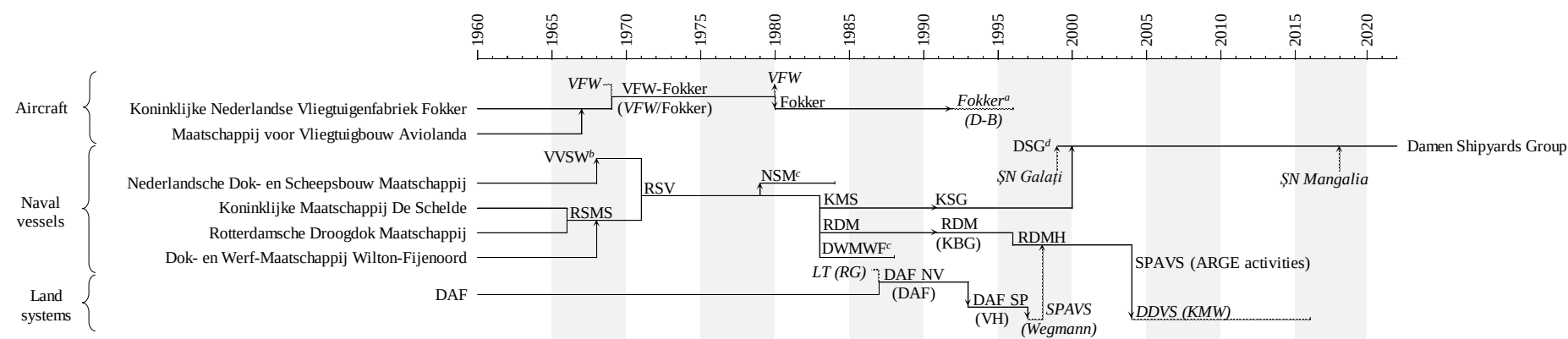
⁴⁶ (Smit, 2010, p. 38). See also (Lemmers, 2015, pp. 283-285).

⁴⁷ According to (de France, et al., 2016, p. 10), the *Damen Shipyards Group* has also become the last Dutch “original equipment manufacturer” (i.e., the last producer of major domestically designed armaments).

⁴⁸ A second large Romanian yard in Mangalia also came under the group’s partial ownership in 2018.

⁴⁹ (Scott, 2019a), (Stevenson, 2018b).

Figure 4: Restructuring of the aircraft, naval and land systems sectors of the Netherlands, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as *Van Halteren* and the management company *Stork PWV* in the land systems sector or the shipbuilder *Van der Giessen-de Noord*, which delivered the *Tripartite* class minehunters) are not regarded as major suppliers by the authors and have therefore not been included.
- iii D-B=Daimler-Benz; DAF SP=DAF Special Products; DDVS=Dutch Defence Vehicle Systems; DSG=Damen Shipyards Group; DWMWF=Dok- en Werf-Maatschappij Wilton-Fijenoord; KBG=Koninklijke Begemann Groep; KMS=Koninklijke Maatschappij De Schelde; KMW=Krauss-Maffei Wegmann; KSG=Koninklijke Schelde Groep; LT=Leyland Trucks; NSM=Nederlandse Scheepsbouw Maatschappij; RDM=Rotterdamsche Droogdok Maatschappij; RDMH=RDM Holding; RG=Rover Group; RSMS=Rijn-Schelde Machinefabrieken en Scheepswerven; RSV=Rijn-Schelde-Verolme Machinefabrieken en Scheepswerven; ŞN Galaţi=Şantierul Naval Galaţi; SPAS=SP Aerospace & Vehicle Systems; VFW=Verenigde Flugtechnische Werke; VH=Van Halteren; VVS=Verolme Verenigde Scheepswerfen.
- ^a Although several of *Fokker's* former operations are maintained by *Fokker Technologies* (part of *GKN Aerospace* of the United Kingdom), the production of entire aircraft systems ceased with *Fokker's* bankruptcy in 1996. Therefore, *Fokker* is only displayed until the year 1996.
- ^b The Rotterdam yard of *Verolme Verenigde Scheepswerfen*, which today operates as a ship repair yard under the ownership of the *Damen Shipyards Group* (as *Damen Verolme Rotterdam*), has historically engaged in some naval projects (such as the conversion of the *Minas Gerais* aircraft carrier for the Brazilian Navy). In addition, *Verolme* had owned several foreign shipyards which were involved in the supply of naval vessels. However, since the Dutch facilities of *Verolme* have not built any major naval vessels during the period observed in Figure 4, the company is only included for those years during which it owned the naval shipbuilder *Nederlandsche Dok- en Scheepsbouw Maatschappij*.
- ^c Some of the ship repair activities of the former naval shipbuilders *Nederlandsche Dok- en Scheepsbouw Maatschappij* and *Dok- en Werf-Maatschappij Wilton-Fijenoord* are today maintained by the *Damen Shipyards Group* (as *Damen Shiprepair Amsterdam* and *Damen Shiprepair Rotterdam*). However, as the shipbuilding activities of *Nederlandse Scheepsbouw Maatschappij* and *Dok- en Werf-Maatschappij Wilton-Fijenoord* ceased in 1984 and 1988, respectively, these companies are no longer displayed beyond these years.
- ^d While the *Damen Shipyards Group* had been active as a shipbuilding company during earlier decades, it only emerged as a supplier of major naval vessels after the takeover of the *Koninklijke Schelde Groep* in the year 2000. Many of its major naval vessels are built in cooperation with the company's Romanian shipyard in Galaţi, which was acquired in 1999. Therefore, the *Damen Shipyards Group* is listed as a naval shipbuilder from this year onwards.

A.1.1.7 Switzerland

Historically, a large share of the Swiss defence industry was concentrated in six state-owned Federal Armament Plants, among them the armoured vehicle and artillery plant *Eidgenössische Konstruktionswerkstätte Thun* and the aircraft plant *Eidgenössisches Flugzeugwerk Emmen*.⁵⁰ While these plants remained important suppliers throughout the second half of the 20th century, the licensed production of foreign designs gradually replaced the development and production of indigenous military aircraft (from the 1950s)⁵¹ and main battle tanks (after the 1970s).⁵² In a two-stage consolidation and rationalisation process from 1996 to 1999, the Federal Armament Plants (together with several state-owned maintenance and repair plants) were merged into the operating company *RUAG Suisse* (later *RUAG Holding*).⁵³ After diversifying into various other segments of the defence industry, *RUAG Holding* – then the largest Swiss defence firm – was separated into two entities between 2019 and 2022. The first, *RUAG MRO*, focuses on the support of the armed forces of Switzerland. While it continues to engage in the partial assembly of foreign military aircraft and armoured vehicles procured by Switzerland, it is no longer active in the large-scale serial production of such systems. The second firm, *RUAG International*, was created as a globally active aerospace and defence firm (it has since divested many of its former core activities, including its large ammunition business).

Besides the Federal Armament Plants, several privately-owned Swiss companies acted as important system integrators in the aircraft and land systems sectors during the second half of the 20th century. Towards the end of the Cold War, the three most important firms were the air defence specialist *Oerlikon-Contraves*, the aircraft producer *Pilatus Flugzeugwerke* (both part of the *Oerlikon-Bührle* group) and the armoured vehicle manufacturer *Mowag*.⁵⁴ Whereas the aircraft and land systems activities of the Federal Armament Plants at that time largely focused on the supply of license-built equipment to the armed forces of Switzerland, the privately-owned companies produced their own designs and successfully competed with them on various foreign markets. As of 2022, the three major privately-owned firms maintain their activities within the Swiss defence industry, albeit under different ownership. *Pilatus Flugzeugwerke*, which operates under its own management since the year 2000, remains the sole Swiss producer

⁵⁰ The respective activities of the six plants are concisely summarised by (Hübner, 1985, pp. 19-20) and (Beldi & Müller, 1988, pp. 46-47).

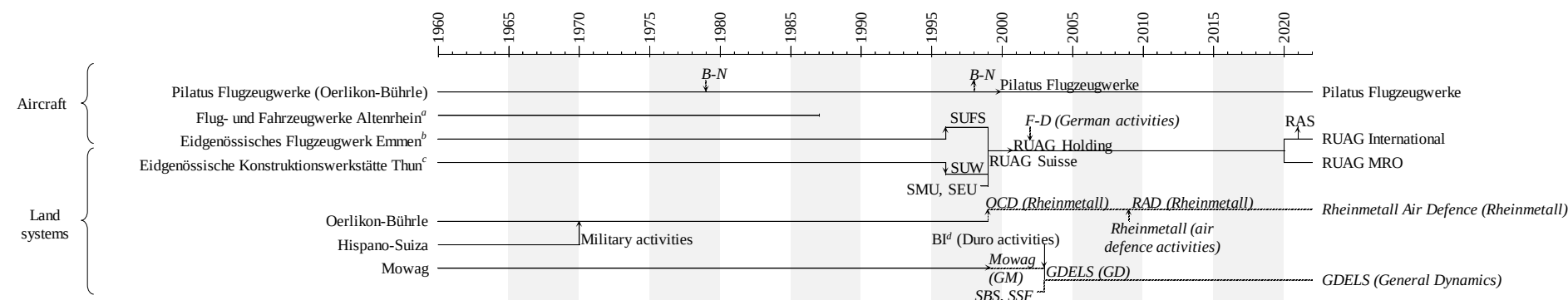
⁵¹ (Markwalder, 2010, pp. 10-11), (Landolt, 1993, p. 247).

⁵² (Sturzenegger, 1987, p. 20), (Wanner, 1981, pp. 785-786).

⁵³ (Schmidlin, 2003, pp. 20-22).

⁵⁴ A second privately-owned Swiss aircraft manufacturer, *Flug- und Fahrzeugwerke Altenrhein*, had ceased the production of entire aircraft systems in the late 1980s.

Figure 5: Restructuring of the aircraft and land systems sectors of Switzerland, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed.
- iii BI=Bucher Industries; B-N=Britten-Norman; F-D=Fairchild-Dornier; GD=General Dynamics; GDELS=General Dynamics European Land Systems; GM=General Motors; OCD=Oerlikon-Contraves Defence; RAD=Rheinmetall Air Defence; RAS=RUAG Aerospace Services (inkl. Dornier); SBS=Santa Bárbara Sistemas; SEU=SE Schweizerische Elektronikunternehmung; SMU=SM Schweizerische Munitionsunternehmung; SSF=Steyr-Daimler-Puch Spezialfahrzeug; SUFS=SF Schweizerische Unternehmung für Flugzeuge und Systeme; SUW=SW Schweizerische Unternehmung für Waffensysteme.
- ^a From 1987 onwards, *Flug- und Fahrzeugwerke Altenrhein* experienced several changes of ownership. The company continued to produce aircraft parts and components for some years, and its aircraft repair and maintenance activities are maintained to this date (now under the ownership of *Pilatus Flugzeugwerke*). However, to the authors' knowledge, *Flug- und Fahrzeugwerke Altenrhein* abandoned the production of entire aircraft systems after 1987. Therefore, the company is no longer displayed as an aircraft manufacturer beyond this year.
- ^b While *Eidgenössisches Flugzeugwerk Emmen* largely ceased the serial production of indigenous aircraft after the 1950s, it continued to manufacture and assemble numerous foreign types of fixed- and rotary-wing aircraft. For this reason, *Eidgenössisches Flugzeugwerk Emmen* is still displayed as an important aircraft manufacturer from the year 1960 onwards. Its successor company, the *RUAG Holding*, maintained considerable assembling facilities and briefly re-entered the market for light transport aircraft after the purchase of *Fairchild-Dornier's* German assets in 2002.
- ^c Like *Eidgenössisches Flugzeugwerk Emmen* in the aircraft sector, *Eidgenössische Konstruktionswerkstätte Thun* ceased the serial production of indigenous armoured vehicles during the second half of the 20th century in favour of the assembly and licensed production of foreign systems. Although the *RUAG Holding* does currently not engage in the serial production of armoured vehicles or artillery systems, it maintains significant manufacturing capabilities in both segments and participated in a wide range of activities within the land systems sector during recent years (including the assembly of the *CV90* family, the development and production of the armoured engineer vehicle *Kodiak*, the design of the vehicle-mounted mortar system *Cobra* and the implementation of various upgrade packages). Therefore, the authors still regard the *RUAG Holding* as an important company within the land systems sector.
- ^d Prior to selling its *Duro* range to *Mowag* in 2003, *Bucher Industries* had supplied several thousand of these vehicles. The *Duro* has since been integrated into the portfolio of *General Dynamics European Land Systems*, which continues to produce various armoured and non-armoured variants of this range. To the authors' knowledge, the more heavily armoured variants of the *Duro* were not manufactured until *Bucher Industries* divested these activities. For this reason, *Bucher Industries* is not listed as an important land systems manufacturer prior to the year 2003.

of indigenous aircraft designs as well as a major competitor on the export markets for civil and military light transport and piston/turboprop trainer types. *Oerlikon-Contraves Defence* (which comprised the air defence activities of *Oerlikon-Contraves*) was purchased by *Rheinmetall* of Germany in 1999 and became the core of the *Rheinmetall Air Defence* division in 2009. *Mowag* was sold to *General Motors* in 1999 and came under the control of *General Dynamics* in 2003,⁵⁵ which subsequently integrated it with *Steyr-Daimler-Puch Spezialfahrzeug* of Austria (an important competitor to *Mowag*) and *Santa Bárbara Sistemas* of Spain into *GDELS*. Under the ownership of its US parent firm, *GDELS-Mowag* remains active in the production and further development of its successful *Piranha*, *Eagle* and *Duro* ranges.

A.1.1.8 United Kingdom

During the last six decades, the defence industry of the United Kingdom has arguably experienced the most extensive consolidation process among all European states. At the onset of the 1960s, the country had been home to about 15 aircraft manufacturers, to about 25 shipbuilders with experience in the supply of major surface naval vessels or submarines, and to six producers of armoured vehicles and/or artillery systems. As of 2022, these activities are concentrated within *BAE Systems* (the largest European defence producer by a wide margin⁵⁶ as well as the only European company that acts as a major system integrator in all three sectors) and a handful of other companies (see Figure 6).

In the aircraft sector, governmental pressure had consolidated most producers of military fixed-wing types within the *British Aircraft Corporation* and the *Hawker Siddeley Group* from 1959 to 1960.⁵⁷ *Handley Page*, which chose to retain its independence, no longer received vital governmental contracts and ultimately ceased its operations.⁵⁸ The *Aircraft and Shipbuilding Industries Act* of 1977 nationalised the *British Aircraft Corporation*, *Scottish Aviation* (which also upheld some of the activities of *Handley Page* and *Beagle Aircraft*) and the aircraft and missile divisions of the *Hawker Siddeley Group* and merged them into *British Aerospace*.⁵⁹ The new entity, which had become the sole British producer of combat and jet trainer aircraft,⁶⁰ was

⁵⁵ (Caralp, 2017, p. 16).

⁵⁶ (Stockholm International Peace Research Institute, 2021a).

⁵⁷ (Nuttall, et al., 2011, pp. 1289-1291), (Hartley, 2012, p. 332), (Hartley, 2010, pp. 172-173). For further information on the background and the formation of the two groups, see (Hayward, 2012, pp. 3-22).

⁵⁸ (Hayward, 2012, p. 21), (Field, 1970, pp. 700-702).

⁵⁹ (Nuttall, et al., 2011, pp. 1289-1290). See also (Hartley, 2012, p. 332). Two producers of fixed-wing aircraft were not integrated into *British Aerospace*: *Short Brothers*, which became part of *Bombardier* in 1989 and ceased the production of entire aircraft systems in the mid-1990s, and *Britten-Norman*.

⁶⁰ Although *BAE Systems* remains active in the combat aircraft segment to this date, the design and production of purely indigenous types in the United Kingdom was largely abandoned after the 1960s in favour of transnational collaborative programmes (Nuttall, et al., 2011, p. 1289). See also (Young, 2018).

privatised in the early 1980s and progressively entered further sectors of the defence industry (see below).⁶¹ In 1999, it acquired *Marconi Electronic Systems* (which comprised the defence activities of the *General Electric Company*) and was transformed into *BAE Systems*, thereby abandoning earlier plans to merge with *DaimlerChrysler Aerospace* of Germany.⁶²

As of 2022, *BAE Systems* remains one of the leading European suppliers of combat and jet trainer aircraft. While it still partners with *Airbus* in the *Eurofighter* consortium, the company's future *Tempest* concept, which is intended to rival the *FCAS* pursued by *Airbus* and *Dassault Aviation*.⁶³ The *Tempest* is part of a wider strategy aimed at preserving the United Kingdom's capabilities in the combat aircraft segment (also in light of the pending 'Brexit'),⁶⁴ although its success will likely rely on the participation of international partners (Sweden and Italy have signed a Memorandum of Understanding, and Japan presently considers joining the project⁶⁵). Besides *BAE Systems*, only the *B-N Group* (a comparatively small producer of light transport and multirole types) continues to build fixed-wing aircraft in the United Kingdom.⁶⁶

Whereas most of the United Kingdom's fixed-wing aircraft industry was integrated into the *British Aircraft Corporation* and the *Hawker Siddeley Group* in 1959-1960, the rotary-wing sector was simultaneously consolidated into *Westland Aircraft*, which thereby emerged as the country's sole producer of civil and military helicopters.⁶⁷ In 1966, the company's rotary-wing activities were combined into *Westland Helicopters*, which came under majority ownership of *GKN* in 1994. In 2001, *GKN* and *Finmeccanica* (then the largest Italian defence firm) merged their rotary-wing divisions into *AgustaWestland*, which became a wholly-owned subsidiary of *Finmeccanica* three years later.⁶⁸ As a result, the development and production of rotary-wing aircraft in the United Kingdom is today maintained by *Leonardo*, which has firmly integrated the assets of the former *Westland Helicopters* into its subsidiary *Leonardo Helicopters*.

In the naval segment, the United Kingdom experienced a restructuring process in the 1960s and 1970s which culminated in the nationalisation and integration of the remaining naval yards into *British Shipbuilders* under the *Aircraft and Shipbuilding Industries Act* of 1977.⁶⁹ Within

⁶¹ While the company also entered various civil sectors, a divestment process was initiated in the 1990s which ultimately led to the withdrawal from most civil markets. As part of this process, *BAE Systems* divested its civilian aircraft business in the early 2000s (Hartley, 2012, pp. 332-333). See also (Steenhuis, 2016, pp. 47-51) and (Heerkens, et al., 2010, pp. 70-80) on *BAE Systems'* retreat from the regional/transport aircraft market.

⁶² (Smith, 2013, p. 19), (Hartley, 2012, p. 333).

⁶³ (Hoikkala, 2018), (Young, 2018).

⁶⁴ (Ministry of Defence of the United Kingdom, 2018, pp. 4-5, 15).

⁶⁵ (Kadidal, 2022), (Peruzzi, 2021).

⁶⁶ The *B-N Group*, whose predecessor company *Britten-Norman* had been owned by the Swiss aircraft producer *Pilatus Flugzeugwerke* from 1979 to 1998, now operates under the control of the *Zawawi* group of Oman.

⁶⁷ (Droff, 2017, p. 21), (Hartley, 2010, p. 172), (Uttley, 2001, pp. 160, 183-188).

⁶⁸ (Droff, 2017, p. 22).

⁶⁹ (Murphy, 2017, p. 97), (Hartley, 2001, p. 3), (Johnman & Murphy, 2001, p. 120), (Daniel, 1980, p. 72).

British Shipbuilders the production of major surface warships and submarines was concentrated in five companies,⁷⁰ which were re-privatised in 1985-1986⁷¹ and subsequently witnessed yet another consolidation process. *Yarrow Shipbuilders* was acquired by the *General Electric Company*, which also took *Vickers Shipbuilding and Engineering Limited (VSEL)* in 1995 (both shipbuilders were then operated as *GEC-Marconi Marine*).⁷² The Birkenhead yard of *Cammell Laird* (since 1986 a subsidiary of *VSEL*) was partially divested after having closed in 1993.⁷³ In 1999, *British Aerospace* absorbed the defence activities of the *General Electric Company* (including *GEC-Marconi Marine*) and the Govan yard (which had participated in the production of the large amphibious ship *HMS Ocean*).⁷⁴ Following the closure of *Swan Hunter (Tyneside)* in 2006 and the takeover of the *VT Group*'s shipbuilding activities in 2009,⁷⁵ *BAE Systems* had become the sole British supplier of nuclear-powered submarines, principal amphibious ships, destroyers and frigates as well as a major competitor on the export market.

While *BAE Systems* remains the leading British naval shipbuilder, the British Government – aiming at the (re-)emergence of additional domestic suppliers – amended its procurement process for the *Type 31* frigate in 2107 with the aim to foster competition for the contract.⁷⁶ Two other naval shipbuilders, namely the *Babcock International Group* (controlling several yards in the United Kingdom⁷⁷ and already supplying offshore-patrol ships) and *Cammell Laird Shiprepairers & Shipbuilders* (the partial heir to *Cammell Laird*) attempted to capitalise on this by competing for the *Type 31*. As part of the *Aircraft Carrier Alliance*, both shipbuilders had already participated in constructing the *Queen Elizabeth* class aircraft carriers (under industrial leadership of *BAE Systems*). In 2019, the *Type 31* tender was won by the *Babcock International Group*, thus establishing a second producer of major surface warships in the British naval sector⁷⁸ (furthermore, *Babcock* has since become an active naval exporter).

⁷⁰ *Vosper Thornycroft*, *Yarrow Shipbuilders* and the *Vickers Shipbuilding Group* were designated as specialised 'lead' yards for surface warships and submarines, whereas the naval and commercial yards of *Swan Hunter Shipbuilders*, *Cammell Laird Shipbuilders* and *Scott Lithgow* became 'follow-on' yards for naval construction (Johnman & Murphy, 2001, p. 118), (Daniel, 1980, p. 72). *Scott Lithgow* left the naval sector after the 1970s. Some other yards continued to supply patrol vessels (notably *Hall, Russell & Company*, which built offshore-patrol ships, and *Brooke Marine*, which focused on smaller types) (Daniel, 1980, pp. 72, 75).

⁷¹ (Johnman, 1996, pp. 29-30).

⁷² (Murphy, 2017, pp. 108, 113), (Hartley, 2001, pp. 2-3). See also (Johnman, 1996, pp. 17, 30).

⁷³ (Murphy, 2017, p. 113). Parts of the Birkenhead yard remained in operation for ship repair and conversion activities. After several ownership changes, the yard (now under the name *Cammell Laird Shiprepairers & Shipbuilders*) resumed its shipbuilding activities (Murphy, 2017, p. 113).

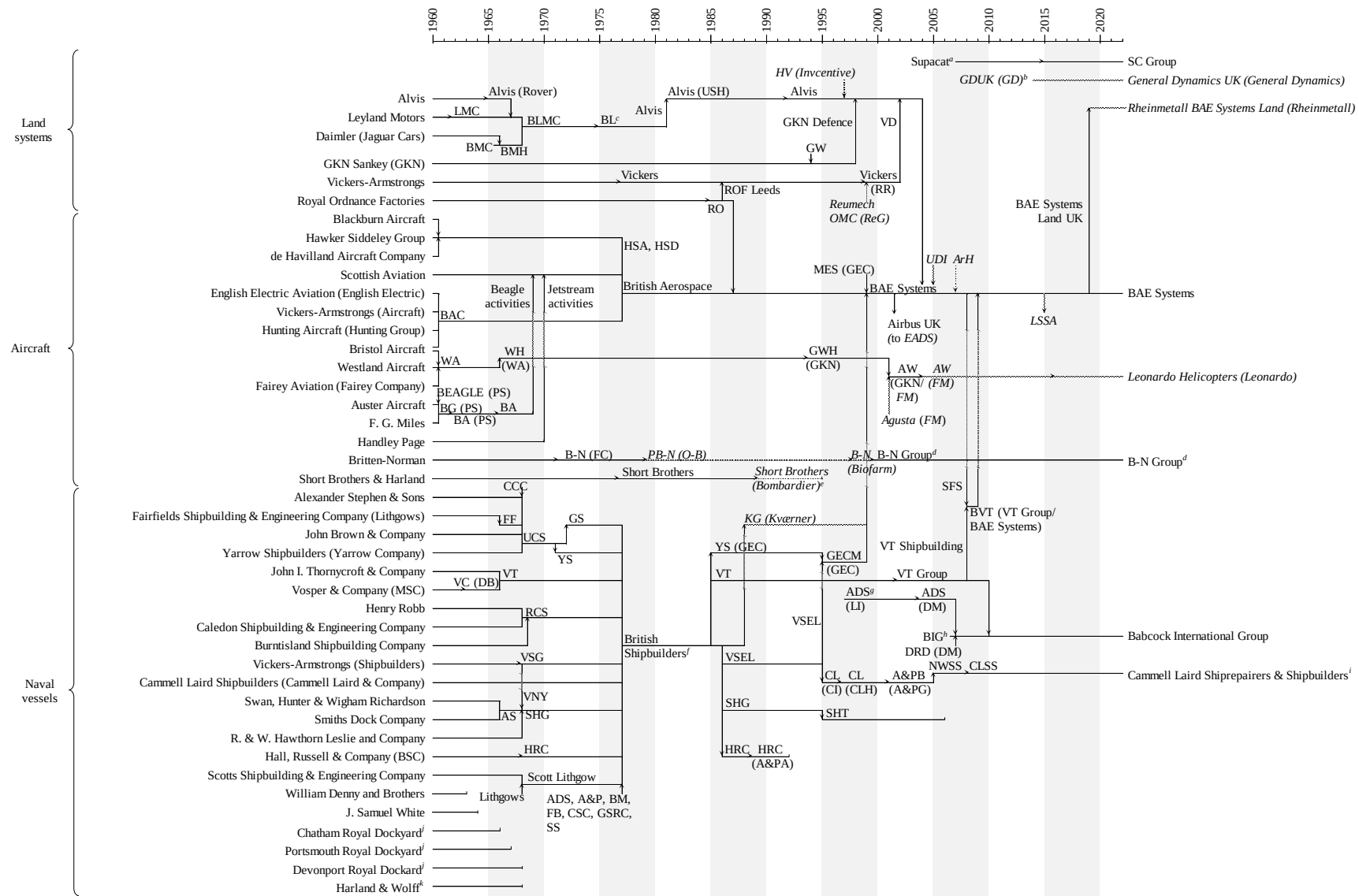
⁷⁴ (Hartley, 2001, p. 3). See also (Murphy, 2017, p. 113).

⁷⁵ *Swan Hunter (Tyneside)* had spun off from the *Swan Hunter Group* in 1995. The *VT Group* (formerly *Vosper Thornycroft*) and *BAE Systems* had combined their surface shipbuilding activities into the joint company *BVT Surface Fleet* in 2008, which became a wholly-owned subsidiary of *BAE Systems* in the following year. (Ministry of Defence of the United Kingdom, 2017, pp. 23, 33, 53).

⁷⁷ The *Babcock International Group* had acquired the *Rosyth Royal Dockyard* in 1997, the *Devonport Royal Dockyard* and *Appledore Shipbuilders* in 2007 and the remainder of the *VT Group* in 2010.

⁷⁸ (Scott, 2019b).

Figure 6: Restructuring of the aircraft, naval and land systems sectors of the United Kingdom, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilders *Griffon Hoverwork* and *Ferguson Marine Engineering*, the armoured vehicle manufacturers *OVIK* and *Ricardo* as well as the demining vehicle specialist *Aardvark Clear Mine*) are not regarded as major suppliers by the authors and have therefore not been included.
- iii ADS=Appledore Shipbuilders; A&P=Austin & Pickersgill; A&PA=A&P Appledore; A&PB=A&P Birkenhead; A&PG=A&P Group; ArH=Armor Holdings; AS=Associated Shipbuilders; AW=AgustaWestland; BAC=British Aircraft Corporation; BA=Beagle Aircraft; BEAGLE=British Executive and General Aviation Limited; BG=Beagle Group; BIG=Babcock International Group; BL=British Leyland; BLMC=British Leyland Motor Corporation; BM=Brooke Marine; BMC=British Motor Corporation; BMH=British Motor Holdings; B-N=Britten-Norman; BSC=Burntisland Shipbuilding Company; BVT=BVT Surface Fleet; CCC=Charles Connell & Company; CI=Coastline Industries; CL=Cammell Laird; CLH=Cammell Laird Holdings; CLSS=Cammell Laird Shiprepairers & Shipbuilders; CSC=Clelands Shipbuilding Company; DB=David Brown Corporation; DM=Devonport Management; DRD=Devonport Royal Dockyard; EADS=European Aeronautic Defence and Space; FB=Ferguson Brothers; FC=Fairey Company; FF=Fairfields; FM=Finmeccanica; GD=General Dynamics; GEC=General Electric Company; GECM=GEC-Marconi Marine; GKN=Guest, Keen and Nettlefolds (prior to 1986); GS=Govan Shipbuilders; GSRC=Goole Shipbuilding & Repairing Company; GW=Glover Webb; GWH=GKN Westland Helicopters; HRC=Hall, Russell & Company; HSA=Hawker Siddeley Aviation; HSD=Hawker Siddeley Dynamics; HV=Häggglunds Vehicle; KG=Kværner Govan; LMC=Leyland Motor Corporation; LI=Langham Industries; LSSA=Land Systems South Africa; MES=Marconi Electronic Systems; MSC=Mineral Separation Company; NWSS=Northwestern Shiprepairers & Shipbuilders; O-B=Oerlikon-Bührle; PB-N=Pilatus Britten-Norman; PS=Pressed Steel Company; RCS=Robb Caledon Shipbuilders; ReG=Reumech Group; RO=Royal Ordnance; ROF Leeds=Royal Ordnance Factory Leeds; RR=Rolls-Royce; SFS=Surface Fleet Solutions; SHG=Swan Hunter Group; SHT=Swan Hunter (Tyneside); SS=Sunderland Shipbuilders; UCS=Upper Clyde Shipbuilders; UDI=United Defense Industries; USH=United Scientific Holdings; VC=Vosper & Company; VD=Vickers Defence; VNY=Vickers Naval Yard; VSEL=Vickers Shipbuilding and Engineering Limited; VSG=Vickers Shipbuilding Group; VT=Vosper Thornycroft; WA=Westland Aircraft; WH=Westland Helicopters; YS=Yarrow Shipbuilders.
- iv Besides shipbuilders which supplied major naval vessels after 1960, Figure 6 also includes companies with extensive naval shipbuilding experience that had delivered their last major naval vessel prior to 1960. However, companies of the latter group are only included if they were later integrated into *British Shipbuilders* in 1977. Those companies of the second group which had ceased their shipbuilding activities prior to 1977 are not displayed (most notably, this refers to *Charles Hill & Sons*, *Fleming & Ferguson* and the *Blyth Dry Docks & Shipbuilding Company*).
 - ^a *Supacat* (now *SC Group*) is only displayed as an important land systems supplier from 2007 onwards (the year in which it was contracted to deliver the infantry fighting vehicle *HMT 400/Jackal*). Due to its limited manufacturing capabilities, the *SC Group* supplies its military vehicles in partnership with the *Devonport Royal Dockyard* (a subsidiary of the *Babcock International Group*).
 - ^b *General Dynamics UK* is only listed from 2014 onwards (the year in which it received the production contract for 589 armoured vehicles under the *Scout SV* programme, now known as *Ajax*).
 - ^c Although *British Leyland*, later known as *Rover Group*, continued to deliver military vehicles after the divestment of *Alvis* (most notably the military range of the *Land Rover* brand), the supply of heavier, armoured wheeled or tracked types was not continued. For this reason, the company is only included until the sale of *Alvis* to *United Scientific Holdings* in 1981.
 - ^d Despite being majority-owned by the *Zawawi* investment group of Oman since 2000, the *B-N Group* operates largely independent from its owners (Sherwood, 2006), which is further underlined by the *B-N Group*'s claim to be the United Kingdom's "*only independent civil aircraft manufacturer*" (B-N Group, 2022). Thus, the company is displayed as if it were under domestic ownership.
 - ^e Although *Short Brothers*' facilities in Northern Ireland continue to produce aerostructures and other aircraft components as part of the Canadian *Bombardier* group, the supply of entire aircraft systems has ceased after the discontinuation of the *Short Tucano* production line. For this reason, *Short Brothers* is not listed as a major aircraft manufacturer beyond the mid-1990s.
 - ^f While *British Shipbuilders* continued to operate beyond 1988, all major naval shipbuilders had left the group by this year. The privatisation of additional yards controlled by *British Shipbuilders* (including suppliers of smaller naval vessels, most notably *Brooke Marine*) is not presented in Figure 6.
 - ^g *Appledore Shipbuilders*, which has supplied smaller naval vessels during earlier stages of its history, is only listed as an important naval shipbuilder from the year 1997 onwards (the year in which the company won a contract for the offshore-patrol ships of the *Róisín* class, which later led to the development of the larger *Samuel Beckett* class).
 - ^h Although it had already purchased the *Rosyth Royal Dockyard* (which is today used for naval construction) in 1997, the *Babcock International Group* did not engage in major naval shipbuilding activities until its takeover of *Devonport Management* (which owned *Appledore Shipbuilders* and the *Devonport Royal Dockyard*). It is therefore only included from 2007 onwards.
 - ⁱ While *Cammell Laird Shipbuilders* had folded in 1993, parts of its Birkenhead yard (known as *Cammell Laird Shiprepairers & Shipbuilders* after several ownership changes) participated in the construction of the *Queen Elizabeth* class aircraft carriers and also competed in the recent *Type 31* tender (as prime contractor in a consortium with *BAE Systems*). Therefore, the company is still listed as a (potentially) important naval shipbuilder despite the original yard's closure in the year 1993.
 - ^j Although they remained active as suppliers of services such as ship repair, conversion and maintenance, the naval shipbuilding activities at the Royal Dockyards of Chatham, Devonport and Portsmouth ceased between 1966 and 1968. Therefore, these yards are only included until the year in which they have launched their respective last naval vessel.
 - ^k *Harland & Wolff* launched its last major naval vessel in the late 1960s. While it continued to operate as an important supplier of commercial vessels (and, in more recent years, offshore platforms and systems), the construction of warships was not resumed. Like the Royal Dockyards (see above), *Harland & Wolff* is thus not included beyond the launch of its last major naval vessel.

In the land systems sector, an initial consolidation process from 1966 to 1968 integrated three armoured vehicle producers – *Alvis*, the *Leyland Motor Company* and *Jaguar Cars’ Daimler* division – into the *British Leyland Motor Corporation*.⁷⁹ From the early 1970s, the group’s armoured vehicle activities were concentrated within *Alvis*, which thus remained one of the country’s major land systems manufacturers besides *Vickers*, *GKN Sankey* and the state-owned *Royal Ordnance Factories*. The latter were incorporated as *Royal Ordnance* in 1985 and subsequently split between *Vickers* (which obtained the Leeds factory and its main battle tank programme) and *British Aerospace* (which took the remainder of *Royal Ordnance*, including its tank guns and artillery activities, and thus entered the land systems sector).⁸⁰ *Alvis*, which had been sold by *BL* in 1981,⁸¹ became the sole British producer of armoured vehicles via its takeover of *GKN Defence* (in 1998) and *Vickers Defence* (in 2002). The consolidation process was completed when the leading British naval and aircraft manufacturer *BAE Systems*, which had already absorbed the artillery activities of *VSEL*, purchased *Alvis* in 2004 and thus united the country’s capabilities to supply armoured vehicles and artillery systems under its control.⁸²

Over the following years, further takeovers broadened *BAE Systems’* land systems portfolio and increased its presence in various foreign countries (most notably in the United States, where it is now the largest armoured vehicle producer besides *General Dynamics*⁸³). Via *BAE Systems Bofors* and *BAE Systems Hägglunds*, *BAE Systems* also controls most of Sweden’s land systems sector.⁸⁴ However, its British facilities were rationalised since the acquisition of *Alvis*, and the production of the various types of armoured vehicles and artillery systems marketed by *BAE Systems* is now principally conducted by its US and Swedish subsidiaries and in cooperation with other foreign partners. At the same time, the United Kingdom’s land systems sector has seen the emergence of new competitors: in 2010, *General Dynamics UK* defeated *BAE Systems* in a major tender for the supply of almost 600 tracked armoured vehicles to the country’s armed forces.⁸⁵ As a result, the British subsidiary of *BAE Systems’* US competitor *General Dynamics* is currently the only firm which engages in the serial production of tracked vehicles in the United Kingdom. In the field of wheeled armoured fighting vehicles, *Supacat* (now part of the

⁷⁹ See also (Nuttall, et al., 2011, pp. 1290-1292) on the creation of the *British Leyland Motor Corporation*.

⁸⁰ (Parker, 2009, pp. 232-239).

⁸¹ Its new parent company *United Scientific Holdings* adopted the name *Alvis* in 1992 (Andersson, 2001, p. 12).

⁸² The acquisition of *Alvis* by *BAE Systems* has been labelled as “a case of home market protection”, as it would otherwise have been sold to the US land systems manufacturer *General Dynamics* (Caralp, 2017, p. 17).

⁸³ *BAE Systems’* principal acquisitions in the US land systems sector were *United Defense Industries* (in 2005) and *Armor Holdings* (in 2007) (Caralp, 2017, p. 16), (Hartley, 2012, p. 334).

⁸⁴ Prior to the divestment of *BAE Systems Land Systems South Africa* (now *Denel Vehicle Systems*) in 2015, *BAE Systems* had also maintained a strong foothold in the South African land systems sector.

⁸⁵ Now known under the designation *Ajax*, the programme is “the biggest single order for armoured vehicles for the British Army in three decades” (Ministry of Defence of the United Kingdom & Dunne, 2016).

SC Group) has entered the market as a domestic producer as well.⁸⁶ The coming years might see a partial re-emergence of *BAE Systems*' domestic armoured vehicle production activities, as the United Kingdom – after 15 years of absence – re-joined the *Boxer* programme in 2018.⁸⁷ While its participation is still under negotiation, it is expected that the United Kingdom will eventually procure about 500 vehicles and that a large share of the production will be conducted by local partner firms. To this end, *BAE Systems* transferred its UK-based armoured vehicle activities into the British/German joint venture *Rheinmetall BAE Systems Land* in mid-2019 (in which *Rheinmetall* holds a majority).⁸⁸

A.1.2 Southern Europe

A.1.2.1 Greece

Although the Greek defence industry maintains some industrial capabilities in the land and naval sectors, the leading firms in these segments – *Hellenic Shipyards*, *Elefsis Shipyards* and *ELVO* – largely focus on the licensed production of foreign equipment.⁸⁹ Most of the major projects of the recent decades (including the procurement of the armoured personnel carrier *Leonidas*, the *Leopard 2 Hel* main battle tank, the *Hydra* class frigates, the *Papanikolis* class submarines and the *Roussen* class corvettes) were conducted in cooperation with foreign partners, with Greek companies being responsible for the supply of subsystems and components and for the assembly of the armaments under offset/local content deals.⁹⁰ With few exceptions (such as the infantry fighting vehicle *Kentaurus*, which was not adopted by the Hellenic Army), the technology transfers from these programmes were not followed by the development of indigenous systems.

As of 2022, the outlook of Greece's leading firms from the land and naval sectors remains unclear. *ELVO*, which had been in liquidation since 2014, was finally privatised via sale to the Israeli firms *SK Group* and *Plasan* in 2021, although it is unclear when (and to what extent) *ELVO* will resume its military vehicle activities. *Hellenic Shipyards* (Greece's largest shipyard, and also the only yard which has engaged in the supply of frigates and submarines) was put into

⁸⁶ The *SC Group*, which lacks large-scale serial production capabilities, supplies its armoured vehicles in an alliance with the *Devonport Royal Dockyard* (owned by the *Babcock International Group*).

⁸⁷ (Stevenson, 2018a).

⁸⁸ (Stevenson, 2019).

⁸⁹ *ELVO*, established in 1972 as *Steyr Hellas* (a subsidiary of the Austrian land systems producer *Steyr-Daimler-Puch*), was majority-owned by the Greek State since 1986. *Hellenic Shipyards* came under the control of the German shipbuilder *HDW* in 2002, but in 2010 *ThyssenKrupp* sold a majority stake to *Abu Dhabi MAR* (part of the Lebanese *Prinvest Group*, which also owns *Constructions Mécaniques de Normandie* in France as well as *German Naval Yards*). *Elefsis Shipyards* operates under the control of the *ONEX* group.

⁹⁰ See also (Kollias & Rafailidis, 2003, pp. 318-319) on the participation of the Greek defence industry in selected licensed production programmes.

administration in 2018,⁹¹ and a suitable buyer has not yet been found. *Elefsis Shipyards*, which has built the *Roussen* class corvettes (a British design), also faces an unclear future after filing of bankruptcy. In the aircraft sector, Greek defence manufacturers do not engage in the supply of entire aircraft systems, although *Hellenic Aerospace Industry* partakes in some major collaborative trans-European programmes (including the *nEUROn* technology demonstrator project, which might eventually lead to a Greek participation in the delivery of a future unmanned European combat aircraft).

A.1.2.2 Italy

Throughout the second half of the 20th century, the Italian defence industry was characterised by a high degree of state control. Via the *Istituto per la Ricostruzione Industriale (IRI)*, most of the country's naval shipyards as well as the land systems manufacturer *OTO Melara* operated under public ownership by the early 1960s.⁹² Governmental control was soon extended to the aircraft sector, where a leading entity was created when *Finmeccanica* (which formed part of *IRI*) and *Fiat* merged their aircraft production activities into *Aeritalia* in 1969.⁹³ In 1973 a second public holding, *Ente Partecipazioni e Finanziamento Industrie Manifatturiere (EFIM)*, took control of the rotary-wing manufacturer *Agusta*,⁹⁴ and in 1976 *Finmeccanica* became the sole owner of *Aeritalia*. In the late 1980s, *Finmeccanica* began to rationalise its activities with a focus on the “technologically advanced defence sector.”⁹⁵ In 1994, it absorbed the defence-related firms held by the liquidated *EFIM* holding and subsequently “controlled about three-quarters of the Italian defence industry, playing a [national] monopoly role in aerospace, radar and defence systems, and a major role in defence electronics.”⁹⁶ After its partial privatisation in 2000, *Finmeccanica* further broadened its portfolio and geographical reach in the aircraft sector by acquiring (1) the jet trainer manufacturer *Aermacchi* in 2003, (2) *GKN*'s 50% stake in *AgustaWestland* in 2004 (which gave *Finmeccanica* control over most of the British rotary-wing industry)⁹⁷ and (3) the Polish rotary-wing producer *WSK “PZL-Świdnik”* in 2010.

⁹¹ (Bellos, 2018).

⁹² See (Felice, 2010, pp. 601-604) and (Bianchi, 1987, pp. 269-276) on the creation of *IRI* and its evolution up to the creation of *Finmeccanica*.

⁹³ *Finmeccanica*, which had been created as a sub-holding to *IRI*, was tasked with the management of companies from a wide range of different military and civil engineering sectors. For additional information on its establishment and subsequent development, see (Felice, 2010, pp. 604-625).

⁹⁴ In the same year, *OTO Melara* was transferred from *Finmeccanica* to *EFIM* (Graziola, et al., 1997, p. 148).

⁹⁵ (Caruso & Locatelli, 2013, pp. 94-95). For further detail on *Finmeccanica*'s restructuring process, see (Caruso & Locatelli, 2013, pp. 94-99), (Felice, 2010, pp. 619-627).

⁹⁶ (Graziola, et al., 1997, p. 148). A similar view is expressed by Felice (2010), who states that *Finmeccanica* “became the Italian national champion in aerospace and defense” during the 1990s (Felice, 2010, p. 622).

⁹⁷ In 2001, *GKN* of the United Kingdom (which owned *GKN Westland Helicopters*) and *Finmeccanica* had merged their helicopter activities into *AgustaWestland* (Droff, 2017, p. 22), (Caruso & Locatelli, 2013, p. 98).

As of 2022, *Leonardo* (as *Finmeccanica* is known since 2017) remains the sole European supplier of helicopters besides *Airbus*. Likewise, *Leonardo* and *Airbus* are the only European firms that produce medium-sized military transport and multi-mission aircraft. *Leonardo* also ranks among the few European developers and manufacturers of their own jet trainer and light combat aircraft designs. In the market for advanced combat aircraft, *Leonardo* (which forms part of the *Eurofighter* consortium) has joined *Team Tempest* (led by *BAE Systems*), aimed at developing a next-generation design in competition to the *FCAS* pursued by *Dassault Aviation* and *Airbus*.⁹⁸ In 2019, Italy agreed to become a partner nation in the British-led venture,⁹⁹ and a Memorandum of Understanding was signed with the United Kingdom and Sweden in 2021.¹⁰⁰ Besides *Leonardo*, other Italian aircraft producers – notably *Piaggio Aerospace*, *Costruzioni Aeronautiche Tecnam* and *Vulcanair* – compete in the markets for piston/turboprop trainer, light transport, maritime patrol and reconnaissance aircraft.¹⁰¹ While these firms are rather small as compared to *Leonardo*, some of them show ambition to diversify into additional segments of the aircraft industry: *Piaggio Aerospace*, for example, attempts to establish itself as a supplier of UAV systems, and *Costruzioni Aeronautiche Tecnam* has contemplated entering the market for jet trainer aircraft (with its *P-Jet* concept).

In the land systems sector, *Leonardo* – which maintains the operations of *OTO Melara* and *Breda Meccanica Bresciana* – produces artillery systems, turrets and weapon stations. It also remains the sole Italian integrator of tracked armoured vehicles. Together with *Iveco Defence Vehicles* (the country's leading producer of wheeled military vehicles, since 2013 part of *CNH Industrial*),¹⁰² *Leonardo* forms the *Società Consortile Iveco – Oto Melara* (CIO), which acts as Italy's main supplier of armoured vehicles and self-propelled artillery systems since its creation in 1985. While *CIO* offers a wide range of indigenously developed types, it predominantly supplies the armed forces of Italy and (with few exceptions) has not been very active on the export market. *Iveco Defence Vehicles*, on the other hand, offers various armoured vehicle types besides its involvement in *CIO* and has sold these designs to many foreign customers. In 2021, *Leonardo* stated its intent to sell *OTO Melara* (as of mid-2022, no agreement has been reached despite reputed interest of *Rheinmetall*, *KNDS* and *Fincantieri*¹⁰³).

⁹⁸ (Jennings, 2019a), (Davies, 2018).

⁹⁹ (Jennings, 2019b).

¹⁰⁰ (Peruzzi, 2021).

¹⁰¹ *Piaggio Aerospace*, by far the largest of these three firms, had been majority-owned by the *Mubadala Development Company* of the United Arab Emirates since 2014. While its owners placed the company into receivership in late 2018, the Italian Government attempted to save *Piaggio Aerospace* by brokering a transfer under new ownership (Forrester, 2019). As of mid-2022, the firm's outlook still remains unclear.

¹⁰² *Iveco* had been formed in 1975 via merger of *Fiat*'s various commercial and military vehicle subsidiaries. Its current parent company, *CNH Industrial*, is a trans-European firm incorporated in the Netherlands.

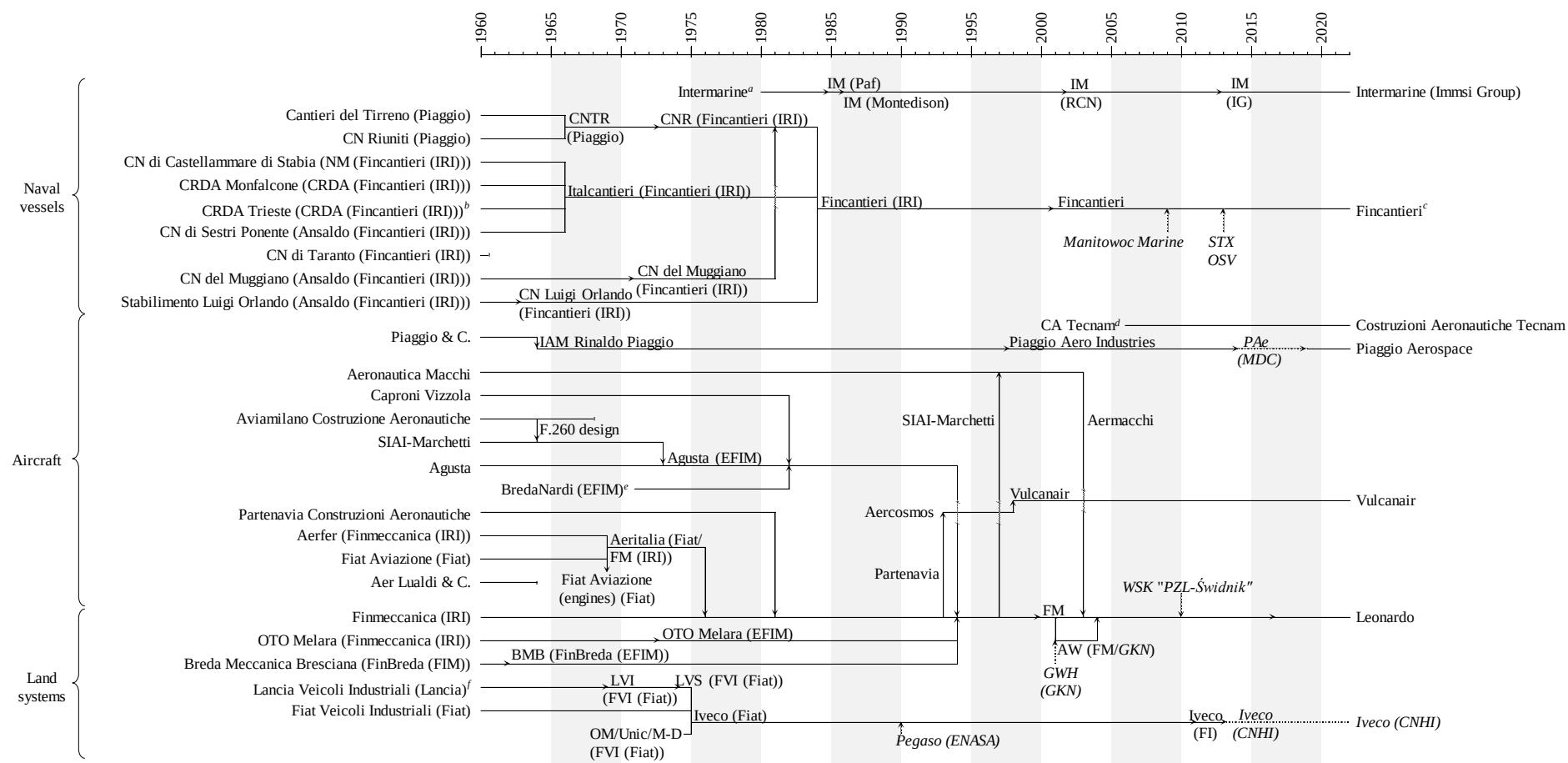
¹⁰³ (Murphy, 2022).

In the naval sector, Italy was home to nine shipbuilders capable of supplying submarines or major surface vessels in the early 1960s (see Figure 7). Except for the yards owned by the *Piaggio* group, they were controlled by *IRI* via the *Fincantieri* holding.¹⁰⁴ In 1984, following two decades of restructuring, all naval yards became divisions of *Fincantieri*, which was transformed into an operating company and has since acted as Italy's 'national champion' in the naval sector. While other Italian shipbuilders are also active in the naval realm (such as *Intermarine*, which is specialised in the supply of mine-countermeasure vessels), *Fincantieri* remains the sole Italian company which engages in the development and production of conventionally powered submarines and major surface naval vessels (aircraft carriers, principal amphibious ships, destroyers and frigates). In the last decade, *Fincantieri* also brought several foreign shipbuilders with naval activities under its control, most notably (1) *Marinette Marine* in the United States, which gave *Fincantieri* a major participation in the *Littoral Combat Ship* programme, and (2) *STX OSV*, then comprising ten shipyards in Norway, Romania, Brazil and Vietnam. *Fincantieri* also attempted to take over *STX France/Chantiers de l'Atlantique* (the largest French naval yard which does not belong to the *Naval Group*), but these plans had to be suspended in 2021. In 2020, *Fincantieri* and its French competitor, *Naval Group*, established the joint venture *Naviris*. Among the first projects of this new firm was the proposal for the *European Patrol Corvette*, which has sparked interest among other European countries as well (Spain, Greece).¹⁰⁵ However, it remains to be seen whether this alliance between the Italian and French 'national champions', which both rank among Europe's largest suppliers of naval vessels, will constitute a major step towards consolidation of the European naval sector.

¹⁰⁴ Originally, *Fincantieri* had been created as a sub-holding to manage the shipyards held by *IRI* (thus, its initial purpose was comparable to that of *Finmeccanica* in the engineering sectors) (Bianchi, 1987, p. 276). Further information on the background of *Fincantieri*'s creation is provided by (Fragiacomo, 2012, pp. 133-148) and (Galisi, 2011, pp. 36-61). On its transformation into an operating company, see (Sasco, 2017, pp. 35-44).

¹⁰⁵ (Groizeleau, 2021).

Figure 7: Restructuring of the aircraft, naval and land systems sectors of Italy, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilders *Cantieri Navali Megaride*, *Cantiere Navale Vittoria* and *Ferretti Group*, the armoured vehicle designer *TEKNE*, the military vehicle conversion specialist *ARIS*, the commercial vehicle manufacturers *Bremach* and *Astra* as well as the *FAE Group*, whose portfolio includes demining vehicles) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AW=AgustaWestland; CA Tecnam=Costruzioni Aeronautiche Tecnam; BMB=Breda Meccanica Bresciana; CN=Cantiere Navale/Cantieri Navali; CNHI=CNH Industrial; CNR=Cantieri Navali Riuniti; CNTR=Cantieri Navali del Tirreno e Riuniti; CRDA=Cantieri Riuniti dell'Adriatico; EFIM=Ente Partecipazioni e Finanziamento Industrie Manifatturiere; ENASA=Empresa Nacional

de Autocamiones S.A.; FI=Fiat Industrial; FIM=Fondo per il Finanziamento dell'Industria Meccanica; FM=Finmeccanica; FVI=Fiat Veicoli Industriali; GWH=GKN Westland Helicopters; IAM Rinaldo Piaggio=Industrie Aeronautiche e Meccaniche Rinaldo Piaggio; IG=Immsi Group; IM=Intermarine; IRI=Istituto per la Ricostruzione Industriale; LVI=Lancia Veicoli Industriali; LVS=Lancia Veicoli Speciali; M-D=Magirus-Deutz; MDC=Mubadala Development Company; NM=Navalmecanica; OM=Officine Meccaniche; PAe=Piaggio Aerospace; Paf=Partecipazioni Finanziarie; RCN=Rodriguez Cantieri Navali; STX OSV=STX Offshore & Specialized Vessels; WSK “PZL-Świdnik”=Wytwórnia Sprzętu Komunikacyjnego “PZL-Świdnik”.

- ^a To the authors’ knowledge, only significantly smaller types had been built by *Intermarine* prior to the *Lerici* class in the 1980s, after which *Intermarine* became an important supplier of mine-countermeasure vessels to the Italian Navy and to various foreign customers. For this reason, *Intermarine* is only included from the year 1980 onwards.
- ^b *CRDA Trieste*, a major historical supplier of surface naval vessels, ceased its military activities after the Second World War. However, by the time *Italcantieri* was formed, *CRDA Trieste* was still a large shipyard with significant experience in naval construction and could have resumed these activities. Therefore, Figure 7 still includes *CRDA Trieste* prior to the creation of *Italcantieri*.
- ^c The attempted acquisition of a 50% stake in *Chantiers de l’Atlantique* by *Fincantieri* (plus 1% borrowed from the French State) was suspended in 2021.
- ^d Although *Costruzioni Aeronautiche Tecnam* was established in 1986, the company primarily engaged in the construction of small ultralight aircraft prior to the development and introduction of the *P2006T*. For this reason, *Costruzioni Aeronautiche Tecnam* is only included from the year 2006 onwards.
- ^e In the late 1960s, *Nardi SA per Costruzioni Aeronautiche* obtained a license for the production and marketing of *Hughes* helicopter types. These helicopters were subsequently supplied by the joint company *BredaNardi* (established in 1971), which was majority-owned by *EFIM*. While *Nardi* had already engaged in the supply of helicopters during earlier years, these activities had been restricted to the assembly of aircraft from US-built kits delivered by the *Hughes Tool Company*. Therefore, *Nardi* is not displayed as an important aircraft manufacturer prior to the 1970s.
- ^f The military activities of *Lancia*, which had manufactured armoured vehicles during the first half of the 20th century, focused on trucks and other non-armoured types after the Second World War. However, its Bolzano plant was an important supplier of automotive parts for the armoured vehicles built by *OTO Melara* and later became a major assembling facility for armoured vehicles after the integration of *Lancia Veicoli Speciali* into *Iveco*. Therefore, *Lancia* is included during the 1960s even though the company did not produce armoured vehicles during this decade.

A.1.2.3 Portugal

Portugal's naval sector has seen major structural changes in the preceding decades. In the 1960s, *Estaleiros Navais de Viana do Castelo (ENVC)* and *Lisnave – Estaleiros Navais de Lisboa* engaged in the supply of frigates and thus maintained some domestic capacities to build larger surface warships. However, the Portuguese Navy subsequently relied on foreign shipbuilders for the supply of its most important assets. During the following decades, *Lisnave – Estaleiros Navais de Lisboa* was transformed into a repair yard while *ENVC* focused on the production of non-naval vessels. In the early 2000s, *ENVC* re-entered the naval sector and became the primary supplier of offshore-patrol ships to the Portuguese Navy (particularly after the initiation of the *PRAN* procurement programme). Since 2014, this position is occupied by *West Sea – Estaleiros Navais*, which has taken over the operations of the loss-making *ENVC*. The shipyard will supply several additional units during the following decade and may even engage in the construction of an amphibious ship.¹⁰⁶ As of 2022, the production of larger naval vessels in Portugal – which had been discontinued after the 1960s – has thus been re-established.

In the land systems sector, Portugal's capabilities to produce indigenous armoured fighting vehicles disappeared when *Bravia* (which had been established in 1967 to supply the *Chaimite* family¹⁰⁷) ceased its activities in the late 1980s.¹⁰⁸ When the Austrian *Pandur II* was chosen to succeed the *Chaimite*, offset agreements permitted the “semi-trailer company” *Fabrequipa* to assemble most of the vehicles locally from 2007 onwards.¹⁰⁹ However, the technology transfers have not led to a lasting presence of *Fabrequipa* in the land systems sector, as the company has not engaged in further military projects following the premature termination of the *Pandur II* procurement in 2012. In contrast to the supply of larger naval vessels, the domestic production of armoured vehicles has thus not been re-established within the Portuguese defence industry.

A.1.2.4 Spain

Until the 1990s, Spain's defence industry had been “dominated by the public sector”.¹¹⁰ The naval shipbuilder *Empresa Nacional Bazán*, the land systems manufacturers *Empresa Nacional de Autocamiones (ENASA)* and *Empresa Nacional Santa Bárbara* as well as *Construcciones Aeronáuticas (CASA)*; the sole remaining aircraft producer after the conclusion of the domestic consolidation process in 1971) were controlled by the *Instituto Nacional de Industria (INI)*,¹¹¹

¹⁰⁶ (Barreira, 2018).

¹⁰⁷ (Machado, 2009, pp. 43-44).

¹⁰⁸ (Machado, 2009, p. 52).

¹⁰⁹ (Steyr-Daimler-Puch Spezialfahrzeug, 2007).

¹¹⁰ (Casellas, 2003, p. 55). See also (Molas-Gallart, 1995, p. 148).

¹¹¹ (Molas-Gallart, 1992a, pp. 52-53). See also (Molas-Gallart, 1995, p. 148).

a large holding company whose subsidiaries were responsible for “*more than three quarters of Spanish military production*”.¹¹² From the mid-1980s onwards, the Spanish Government strove to increase the competitiveness of its major defence producers by means of modernisation and privatisation.¹¹³ INI was dissolved in 1995 and succeeded by two new public holdings: *Sociedad Estatal de Participaciones Industriales (SEPI)* took responsibility for the potentially profitable companies, whereas *Agencia Industrial del Estado (AIE)* obtained the unprofitable firms.¹¹⁴ From 1996, the privatisation process was accelerated¹¹⁵ (which, among other measures, led to the takeover of AIE by SEPI in 1997)¹¹⁶ and Spain’s leading land systems and aircraft producers were subsequently transferred under foreign ownership (see Figure 8).

CASA was merged into EADS in the year 2000 and has since been firmly integrated into Airbus. While the Spanish aircraft sector no longer develops purely indigenous systems, Spain remains an important home market to Airbus, whose Spanish facilities engage in the production and development of various fixed- and rotary-wing types marketed by their trans-European parent company. Some of the transport aircraft introduced by CASA also remain in production with Airbus. Furthermore, following its involvement in the Eurofighter programme, Spain has opted in 2019 to develop a next-generation combat aircraft system in conjunction with France and Germany.¹¹⁷ Spain’s entry thereby marked the first (and thus far the only) enlargement of the Franco-German FCAS programme.

Empresa Nacional Santa Bárbara (the heir to the Spanish army arsenals¹¹⁸) was sold to General Dynamics in 2001.¹¹⁹ This transaction included the military activities of the armoured and commercial vehicle manufacturer ENASA, which had been transferred to *Empresa Nacional Santa Bárbara* when Iveco of Italy took full control of ENASA in 1992.¹²⁰ In 2003, General Dynamics merged its Spanish subsidiary into GDELS together with Mowag of Switzerland and Steyr-Daimler-Puch Spezialfahrzeug of Austria. While other Spanish companies also compete

¹¹² (Molas-Gallart, 1995, p. 148). See also (Molas-Gallart, 1997, pp. 200-201). The INI holding was modelled after the Italian IRI group (Molas-Gallart, 1992a, p. 46).

¹¹³ (Molas-Gallart, 1995, pp. 148-149). See also (Comín 2008, 698, 710-713), (Carreras, et al., 2000, pp. 215-220), (Newton & Donaghy, 1997, pp. 171-172).

¹¹⁴ (Comín, 2008, p. 699), (Sköns, et al., 1998, p. 266). The potentially profitable firms, including the aircraft manufacturer CASA, had previously been transferred to Teneo, a sub-holding of INI. *Empresa Nacional Bazán* and *Empresa Nacional Santa Bárbara* belonged to the ‘unprofitable’ group (Newton & Donaghy, 1997, pp. 172-174), (Fischer, 1994, p. 72).

¹¹⁵ (Comín, 2008, pp. 698, 700, 713-714), (Casellas, 2003, p. 58).

¹¹⁶ (Comín, 2008, pp. 699, 713-714), (Sköns, et al., 1998, p. 266).

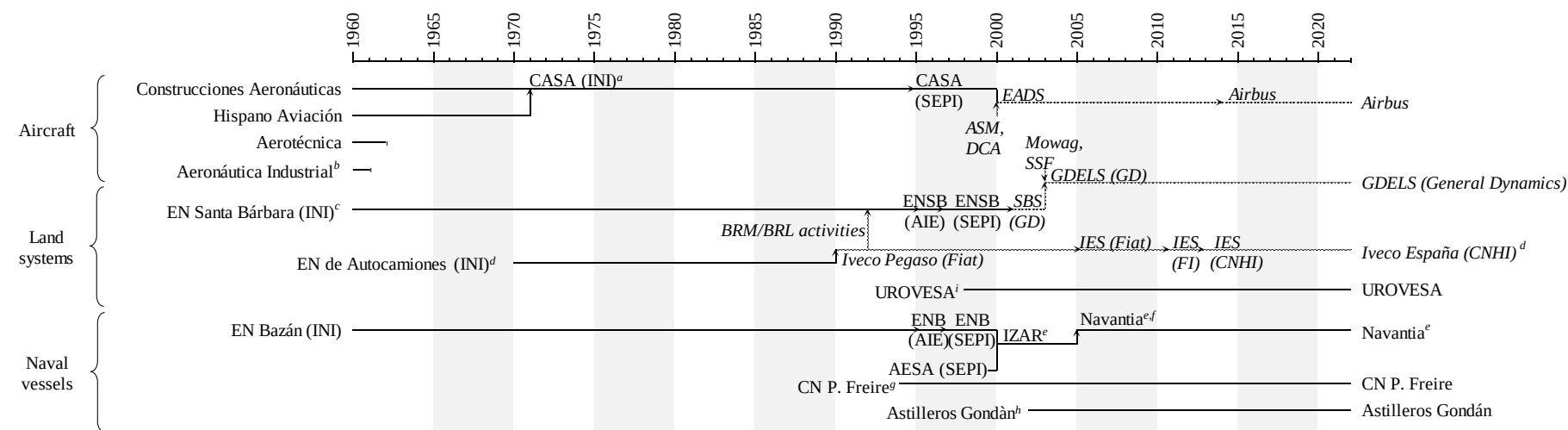
¹¹⁷ (Jennings, 2019a).

¹¹⁸ *Empresa Nacional Santa Bárbara* had obtained “*all the manufacturing facilities [...] under the direct control of the Army [...] from 1960 to 1987*” (Molas-Gallart, 1992b, p. 159), see also (Molas-Gallart, 1997, p. 206) and (Molas-Gallart, 1992a, pp. 50-51).

¹¹⁹ (Caralp, 2017, p. 16).

¹²⁰ (Fischer, 1994, pp. 58, 71). Iveco had already held a majority in the share capital of ENASA since 1990.

Figure 8: Restructuring of the aircraft, naval and land systems sectors of Spain, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as *Tecnove Security*, *SAPA Placencia* or the naval shipbuilders *Astilleros Armon*, *Rodman Group* and *Grup Aresa Internacional*) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AESA=Astilleros Españoles S.A.; AIE=Agencia Industrial del Estado; ASM=Aéropatiale-Matra; BRM/BRL=armoured vehicle programmes of ENASA; CASA=Construcciones Aeronáuticas S.A.; CN P. Freire=Construcciones Navales P. Freire; CNHI=CNH Industrial; DCA=DaimlerChrysler Aerospace; EADS=European Aeronautic Defence and Space; EN=Empresa Nacional; ENB=Empresa Nacional Bazán; ENSB=Empresa Nacional Santa Bárbara; FI=Fiat Industrial; GD=General Dynamics; GDELS=General Dynamics European Land Systems; IES=Iveco España; INI=Instituto Nacional de Industria; SBS=Santa Bárbara Sistemas; SEPI=Sociedad Estatal de Participaciones Industriales; SSF=Steyr-Daimler-Puch Spezialfahrzeug; UROVESA=URO Vehículos Especiales S.A.
- ^a While the *INI* holding had already entered the share capital of *CASA* in the 1940s, it did not obtain a majority until the year 1971 (Wilken, 2001, p. 49).
- ^b *Aeronáutica Industrial* remained active in the aircraft sector until its takeover by *CASA* in 1995. However, to the authors' knowledge, the company ceased the large-scale production of entire aircraft systems in the early 1960s and is thus not listed as a major aircraft manufacturer during later periods.
- ^c Whereas the consolidation of the Spanish army arsenals, which began in 1960, was only concluded in 1987 (Molas-Gallart, 1992b, p. 159), the authors could not determine with certainty during which years the separate arsenals were absorbed by *Empresa Nacional Santa Bárbara*. Accordingly, this consolidation process is not displayed in detail.
- ^d While *ENASA* had already produced military trucks during earlier decades, the development and supply of armoured vehicles (to the authors' knowledge) was not initiated until the 1970s. For this reason, *ENASA* is only included from the year 1970 onwards. Despite the transfer of its armoured vehicle production lines to *Empresa Nacional Santa Bárbara* in 1992, the truck producer (now part of *Iveco España*) continues to supply armoured vehicles on occasion in subcontract to its Italian parent company.
- ^e SIPRI's revised publication on the 100 largest arms-producing and military services companies no longer includes the *SEPI* holding and instead lists *IZAR* (and later *Navantia*) as independent companies, even though *Navantia* remains controlled by *SEPI* until the present day (Stockholm International Peace Research Institute, 2021a). While it is unclear what prompted SIPRI to revise its categorisation of *SEPI*, Figure 8 follows this classification and no longer displays *SEPI* as an arms-manufacturing parent company after the establishment of *IZAR*.
- ^f In late 2004, the naval shipbuilding operations of *IZAR* were spun off into a new company under the provisional designation *New IZAR*. Less than three months later, *Navantia* was established (Surry, et al., 2007, p. 382). Due to the short period of its existence, *New IZAR* is not displayed in Figure 8.

- ^g *Construcciones Navales P. Freire* was established in 1895. However, to the authors' knowledge, the shipyard did not engage in the supply of naval vessels prior to the construction of the *Chilreu/Alborán* class (which commenced in 1994). For this reason, the company is only included from this year onwards.
- ^h To the authors' understanding, *Astilleros Gondàn* only built smaller types of naval vessels prior to the offshore-patrol ships of the *Bisma* class. The yard is thus only included from 2002 onwards.
- ⁱ UROVESA is only included from 1998 onwards (the year in which serial production of the URO Vamtac commenced).

in specific segments (such as the light armoured vehicle producer *URO Vehículos Especiales* and the engineering plant *SAPA Placencia*), *GDELS-Santa Bárbara Sistemas* – as the sole supplier of artillery systems and heavy armoured vehicles – remains the leading entity in the Spanish land systems sector.

In the naval sector, *Navantia* – the successor company of *Empresa Nacional Bazán* – has emerged from the short-lived union of Spain's state-owned naval and civil shipyards, which had jointly operated as *IZAR Construcciones Navales* from 2000 to 2004.¹²¹ *Navantia* ranks among the few remaining European shipbuilders which not only build frigates and destroyers, but also principal amphibious ships and submarines. While other Spanish shipyards engage in the production of patrol vessels of all sizes (most notably *Astilleros Gondàn* and *Construcciones Navales P. Freire*, which have entered the market for offshore-patrol ships), *Navantia* is the undisputed leader in the Spanish naval sector. Besides acting as the main supplier of the Spanish Navy, the company is also a major competitor on various export markets for naval vessels. As of 2022, it remains the largest Spanish defence firm under public ownership.

A.1.3 Northern Europe

A.1.3.1 Denmark

Denmark has a notably rich history in the naval sector, which was maintained well into modern times: by the 1960s, seven Danish shipbuilders were active in the supply of major naval vessels (see Figure 9).¹²² *Orlogsværftet*, the sole domestic producer of submarines, was transformed into a repair yard after 1970.¹²³ The six remaining naval shipbuilders, which were dependent on revenues from the commercial shipbuilding markets, subsequently came under increasing pressure during the European 'shipbuilding crisis'.¹²⁴ Various attempts to restructure and diversify achieved only mixed success, and although Danish yards prevailed somewhat longer than their competitors in many other European countries,¹²⁵ all six shipyards which had engaged in naval activities ceased their shipbuilding operations between 1983 and 1999.¹²⁶ In the late 1990s, *Odense Staalskibsværft* entered the naval sector with the aim to establish itself as a supplier of submarines and major surface naval vessels. While the ambitious *Viking* project (the

¹²¹ (Surry, et al., 2007, p. 382). See also (Bellais, 2017, p. 8).

¹²² Besides *Orlogsværftet* (the Danish Navy's main yard), these were *Aarhus Flydedok og Maskinkompagni*, *Aalborg Værft*, *Frederikshavn Værft & Tørdok*, *Helsingør Skibsværft og Maskinbyggeri*, *Nakskov Skibsværft* and *Svendborg Skibsværft*.

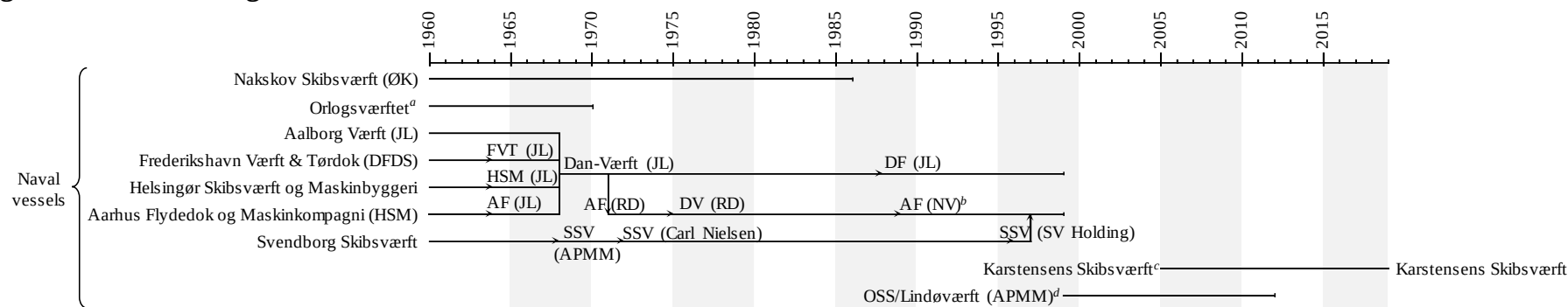
¹²³ (Rasmussen, 2009, p. 214).

¹²⁴ (Poulsen, 2013, pp. 57, 59-63, 69-70), (Poulsen & Sornn-Friese, 2011, pp. 557-562).

¹²⁵ (Poulsen, 2013, pp. 62-63), (Poulsen & Sornn-Friese, 2011, pp. 562-565).

¹²⁶ Further information on the reasons for the demise of most large Danish shipyards from the 1970s onwards is provided by (Olesen, 2013, pp. 78-87), (Poulsen, 2013, pp. 57, 59-63, 67-70), (Bruun, 2012, pp. 62-68), (Olesen, 2012, pp. 1-14) and (Poulsen & Sornn-Friese, 2011, pp. 557-560, 562-565, 569, 575-579).

Figure 9: Restructuring of the naval sector of Denmark, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilders *Danyard Aalborg*, *Danish Yachts*, *Faaborg Værft* or *Søby Værft*) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AF=Aarhus Flydedok; APMM=A.P. Møller-Mærsk; DF=Danyard Frederikshavn; DFDS=Det Forenede Dampskibs-Selskab; DV=Dannebrog Værft; FVT=Frederikshavn Værft & Tørdok; JL=J. Lauritzen; HSM=Helsingør Skibsværft og Maskinbyggeri; NV=Nordsøværftets Holding; ØK=Østasiatisk Kompagni; OSS=Odense Staalskibsværft; RD=Rederiaktieselskabet Dannebrog; SSV=Svendborg Skibsværft.
- ^a Although *Orlogsværftet* remained active as a repair yard until the 1990s, its shipbuilding activities ceased in 1970. The company is therefore only included until this year.
- ^b Following the bankruptcy of *Aarhus Flydedok* in 1999, some parts of its yard area remained in use for shipbuilding operations (Bruun, 2012, p. 69). However, since the production of naval vessels was not resumed, these successor companies are not included in Figure 9.
- ^c While *Karstensens Skibsværft* was established in 1917, the company was specialised in the supply of fishing vessels during most of its history and did not engage in naval shipbuilding activities prior to constructing the offshore-patrol ships of the *Knud Rasmussen* class. Thus, the company is only displayed from 2005 onwards.
- ^d To the authors' knowledge, *Odense Staalskibsværft* did not produce major naval vessels prior to the construction of the *Absalon* class. Nevertheless, the company had already entered the *Viking* consortium in 1999 with the aim to develop and supply submarines to Denmark, Norway and Sweden. For this reason, *Odense Staalskibsværft* is included from this year onwards. Prior to the yard's closure, several activities of *Odense Staalskibsværft* were spun off into the maritime design and advisory firm *Odense Maritime Technology (OMT)*. This successor company remains active in the design of major naval vessels (notably, it belonged to the winning consortium for the British Royal Navy's *Type 31* frigate, which is derived from the *Iver Huitfeldt* class). *OMT* has stated its intent to play a leading role in the governmental plans (announced in August 2022) for the modernization of the Royal Danish Navy and the revitalization of Denmark's naval shipbuilding capabilities. However, it remains to be seen at which yard, and in which industrial framework, Denmark's future naval vessels will be delivered.

planned realisation of a new submarine class in conjunction with Norway and Sweden) was abandoned in 2004,¹²⁷ five large warships of the *Absalon* and *Iver Huitfeldt* classes were built for the Danish Navy until 2011, after which *Odense Staalskibsværft* also ceased its activities.¹²⁸ As of 2022, some Danish shipbuilders remain active in the naval realm (notably *Karstensens Skibsværft*, which has added offshore-patrol ships to its portfolio), but they are rather small as compared to the country's historical naval yards. However, this development could partly be reversed since the Danish Government announced its intent in August 2022 to modernise its navy and to substantially invest in Denmark's domestic naval shipbuilding capabilities.¹²⁹

A.1.3.2 Finland

Until the end of the Cold War, the major entities in the Finnish land systems and aircraft sectors were *Sisu Auto* (a truck manufacturer that also produced wheeled armoured vehicles since the early 1980s), the aircraft plant *Valmet Lentokoneteollisuus* (part of the *Valmet* group), as well as the artillery producers *Tampella* and *Vammaskosken Tehdas* (which combined their military activities into *Vammas* in 1991).¹³⁰ *Sisu*'s defence division, *Valmet Lentokoneteollisuus* and *Vammas* were merged in 1996 with the ammunition producer *Lapua* and the explosives supplier *Vihtavuori* into the state-owned *Patria Group* (see Figure 10),¹³¹ which has since remained the 'national champion' of the Finnish defence industry. Its focus lies on the land systems sector, specifically on the supply of wheeled armoured vehicles and turreted mortar systems. Besides its domestic sales, the *Patria Group* has also been successful on the export market (notably due to its *Patria AMV* range). With the recent introduction of the *Sisu GTP*, *Sisu Auto* currently aims to re-enter the market for armoured vehicles as well,¹³² although it remains to be seen whether it will succeed in challenging the *Patria Group*'s position as the sole supplier of indigenous systems. In the aircraft sector, the *Patria Group* remains a supplier of aerostructures, a provider of maintenance and upgrading services, and a project partner for the assembly of foreign-made types. The development and production of indigenous military aircraft, on the other hand, was abandoned in the 1990s. In 2016, a Nordic defence-industrial alliance was forged when *Kongsberg Gruppen*, the leading entity in the Norwegian defence industry, took a 49.9% stake in the *Patria Group* (with the Finnish Government holding the balance).¹³³

¹²⁷ (Eliasson, 2017, pp. 174, 188). *Odense Staalskibsværft*'s partner companies in the Nordic endeavour had been *Kockums* of Sweden and *Kongsberg Gruppen* of Norway (Eliasson, 2017, p. 182), (Ikegami, 2013, p. 444).

¹²⁸ (Poulsen, 2013, pp. 57, 67-68), (Poulsen & Sornn-Friese, 2011, p. 579).

¹²⁹ (Rasio & Lye, 2022).

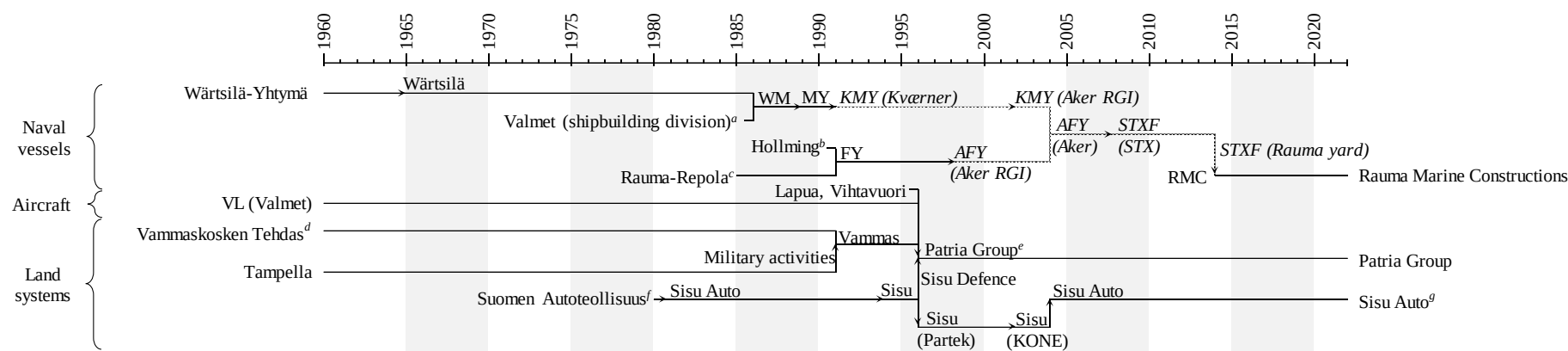
¹³⁰ (Caralp, 2018, pp. 27-30).

¹³¹ (Caralp, 2018, p. 30). The *Patria Group* was known as *Suomen Puolustusväline* until 1997.

¹³² (*Sisu Auto*, 2018).

¹³³ (Caralp, 2018, pp. 27, 32-33). See also (Caralp, 2017, p. 17).

Figure 10: Restructuring of the aircraft, naval and land systems sectors of Finland, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilders *Marine Alutech* and *Uudenkaupungin Työvene*, whose portfolios include smaller vessels for military applications) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AFY=Aker Finnyards; FY=Finnyards; KMY=Kværner Masa-Yards; MY=Masa-Yards; RCM=Rauma Marine Constructions; STXF=STX Finland; VL=Valmet Lentokonetehtas (from 1974: Valmet Lentokonetehtaat; from 1989: Valmet Lentokoneteollisuus); WM=Wärtsilä Meriteollisuus (also known as Wärtsilä Marine Industries).
- ^a While the shipyards of the *Valmet* group built significant numbers of commercial vessels (including tankers and cargo ships) and specialised vessels (such as oceanographic research ships), their historical naval shipbuilding activities were largely restricted to the occasional supply of small minesweepers or patrol boats. *Valmet* is thus not displayed prior to its merger with *Wärtsilä*.
- ^b While *Hollming* had delivered several naval vessels prior to the formation of *Finnyards*, those had been smaller types (such as patrol boats and 'missile boats') which are not considered as major naval assets in this dissertation. Accordingly, *Hollming* is not included prior to its rapprochement with *Rauma-Repola* in 1991.
- ^c To the authors' knowledge, *Rauma-Repola* did not engage in the construction of larger naval vessels prior to the mid-1980s.
- ^d *Vammaskosken Tehdas* largely engaged in non-military production activities between the end of the Second World War and the creation of *Vammaskosken Tehdas* in 1991. The authors were unable to determine to which extent it remained active in military production during this period, but (Caralp, 2018, p. 29) states that the plant produced artillery systems during the second half of the 20th century.
- ^e During the first year of its existence, the *Patria Group* was known as *Suomen Puolustusväline*.
- ^f Although the company had produced substantial numbers of military trucks during earlier periods, *Suomen Autoteollisuus* only became a manufacturer of armoured vehicles when it introduced the XA-180 ('Pasi') family in the early 1980s. Consequently, *Suomen Autoteollisuus* is only listed as an important land systems manufacturer from the year 1980 onwards.
- ^g After the transfer of its armoured vehicle activities to *Suomen Puolustusväline* (today *Patria Group*) in 1996, *Sisu*'s defence-related operations focused on producing off-road trucks for various logistics and specialised purposes. However, with the introduction of the *Sisu GTP* (which was unveiled in 2018), *Sisu Auto* currently aspires to re-establish itself as a manufacturer of armoured vehicles. While it remains to be seen whether this venture will be successful, *Sisu Auto* is displayed as a land systems manufacturer beyond the year 1996.

In the naval realm, Finland's small domestic industry witnessed a process of consolidation and rationalisation of its main yards after the mid-1980s.¹³⁴ The remaining naval shipyards came under the control of the Norwegian *Aker* and *Kværner* groups during the 1990s and were sold to the South Korean *STX Corporation* in 2008.¹³⁵ While *STX* closed Finland's last naval yard in Rauma in 2014, the yard was partly re-established by *Rauma Marine Constructions* in the same year.¹³⁶ In 2019, the new firm was contracted with supplying four frigates to the Finnish Navy under the *Squadron 2020* programme (the *Pohjanmaa* class, to be delivered by 2026),¹³⁷ which will likely re-establish Finland's capabilities to produce major surface warships.

A.1.3.3 Norway

As of 2022, a significant share of Norway's defence industry remains concentrated within its largest defence firm *Kongsberg Gruppen* (the heir to the defence-related activities of *Kongsberg Våpenfabrikk*). Although primarily active in the supply of electronics, missile systems and other high-technology solutions, *Kongsberg Gruppen* also competes in the land systems sector with its *Protector* range of weapon stations and turrets. Since 2016, the company holds a 49.9% stake in the *Patria Group* (Finland's largest defence firm).¹³⁸

Besides the operations of *Kongsberg Gruppen*, some Norwegian firms remain active in the naval sector. Historically, Norway had been home to a specialised naval shipbuilder (*Marinens Hovedverft*), but after 1968 the yard largely focused on other activities until its closure in 1987. From the 1960s onwards, the occasional demand of the Norwegian Navy for offshore-patrol ships and mine-countermeasure vessels was thus satisfied by shipyards which mainly engaged in non-naval operations. Until the 1990s, most of them were either closed or integrated into the *Aker* and *Kværner* groups, which also acquired some foreign companies with naval activities (including *Govan Shipbuilders* in the United Kingdom as well as *Masa-Yards* and *Finnyards* in Finland). Following a rationalisation of their activities, the integration of *Kværner* into *Aker* and further takeovers (including the major French naval shipbuilder *Chantiers de l'Atlantique*), the shipbuilding division *Aker Yards* was sold to the South Korean *STX Corporation* in 2008. It subsequently became *STX Europe* and was restructured, with the Norwegian shipyards being

¹³⁴ *Wärtsilä*, then the only company that built naval vessels larger than patrol craft, combined its shipbuilding activities with those of *Valmet* in 1986 to form *Wärtsilä Meriteollisuus* (succeeded by *Masa-Yards* in 1989). In 1991, *Rauma-Repola* merged with *Hollming* into *Finnyards* (Teräs, 2017, p. 215). Since 1990, all major domestically-built naval vessels were delivered by the Rauma yard (Rauma Marine Constructions, 2019a).

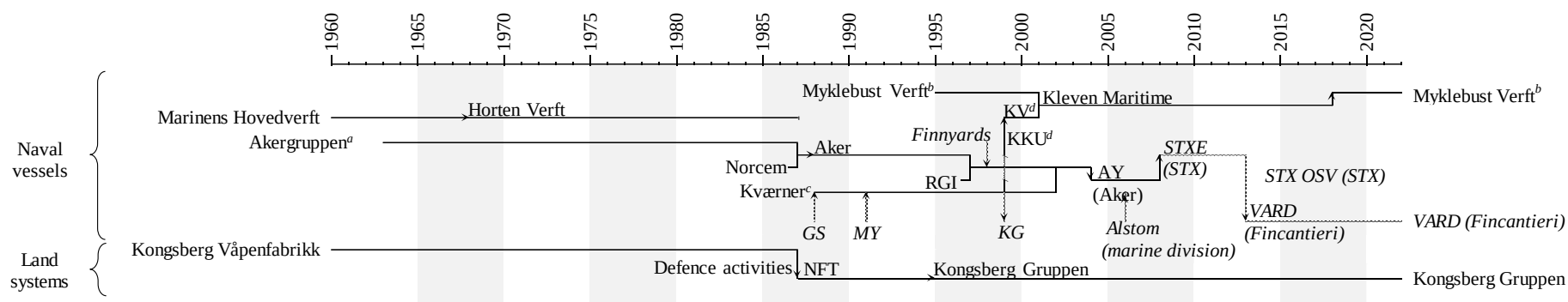
¹³⁵ (OECD, 2018, pp. 11-12), (Teräs, 2017, pp. 215-216).

¹³⁶ (OECD, 2018, p. 12), (Teräs, 2017, pp. 216-217).

¹³⁷ (Rauma Marine Constructions, 2019b), (Ministry of Defence of Finland, 2019).

¹³⁸ (Caralp, 2018, pp. 27, 32-33). See also (Caralp, 2017, p. 17).

Figure 11: Restructuring of the naval and land systems sectors of Norway, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilders *Bergen Mekaniske Verksted*, *Haugesund Mekaniske Verksted*, *Mjøllem & Karlsen Verft*, *Umoie Mandal* and *Westermoen Båtbyggeri*) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AY=Aker Yards; GS=Govan Shipbuilders; KG=Kværner Govan; KKV=Kværner Kleven Ulsteinvik; KV=Kleven Verft; MY=Masa-Yards; NFT=Norsk Forsvarsteknologi; RGI=Resource Group International; STXE=STX Europe; STX OSV=STX Offshore & Specialized Vessels.
- ^a To the authors' knowledge, the shipyards consolidated within *Akergruppen* did not engage in the supply of naval vessels prior to the construction of the *Sleipner* class corvettes in the 1960s.
- ^b *Myklebust Verft* (to the authors' knowledge) only began to build naval vessels for coast guard duties in the mid-1990s. As all larger naval vessels delivered by *Kleven Maritime* since 2001 were built at the facilities of *Myklebust Verft*, the *Kleven* group is no longer listed as a naval shipbuilder following the independence of *Myklebust Verft* in 2018.
- ^c *Kværner* only engaged in the supply of major naval vessels after the takeover of *Govan Shipbuilders* of the United Kingdom. It is therefore not listed as a naval shipbuilder during earlier years.
- ^d The *Kleven* group had operated as a family-owned corporation prior to its acquisition by *Kværner* in the year 1990. However, to the authors' knowledge, the company only became involved in the supply of larger naval vessels after the formation of *Kleven Maritime*. Therefore, *Kleven Verft* is only included for the years following its independence from *Kværner*.

integrated into *STX Offshore & Specialized Vessels (STX OSV)*.¹³⁹ In 2013, *STX OSV* (which then comprised five yards in Norway and five additional yards in Romania, Brazil and Vietnam) came under the control of the Italian shipbuilder *Fincantieri* (see Figure 11).¹⁴⁰ Now known as *VARD*, the former *STX OSV* is one of two Norwegian shipbuilders that remain active in the supply of large offshore-patrol ships (the other being *Myklebust Verft*, which formed part of the *Kleven* group until 2018). The companies share two similarities: first, they are not specialised in naval shipbuilding. Second, both have outsourced some of the most labour-intensive tasks of the naval construction process (particularly the production of the hull) to shipyards in Romania. While it remains yet to be seen whether *VARD* and *Myklebust Verft* will establish themselves in the naval sector in the long run, the *VARD* group might be in a more favourable position due to its larger size, its possession of shipyards which are located in low-cost foreign countries and the fact that its parent firm *Fincantieri* ranks among the leading European naval shipbuilders. Besides building naval vessels for the armed forces of Norway, *VARD* already cooperates with *Fincantieri* in several foreign naval tenders.¹⁴¹

A.1.3.4 Sweden

As of 2022, Sweden – via its leading defence firm *Saab* – is the only remaining European country besides France which produces advanced combat aircraft on a national basis (in contrast to transnational ventures such as the *Eurofighter* consortium). However, the long-term outlook of *Saab*'s position within the market for combat aircraft will be tied to the decision made on the succession of the *JAS 39 Gripen*.¹⁴² Besides its activities in the combat aircraft sector, *Saab* has re-entered the market for advanced jet trainer aircraft in partnership with *Boeing* of the United States,¹⁴³ jointly winning the large-scale *T-X* tender of the US Air Force in 2018. The production of transport aircraft in Sweden, on the other hand, has ceased in the late 1990s.¹⁴⁴

In a significant step towards further consolidation of Sweden's defence industry, *Saab* took control of the country's leading naval shipbuilder *Kockums* in 2014. *Kockums*, a company with extensive historical experience in the supply of conventionally powered submarines and small-

¹³⁹ The development of the Norwegian shipbuilding sector from the creation of the *Aker* and *Kværner* groups to the takeover of *Aker Yards* by the *STX Corporation* is described by (Ågotnes & Heiret, 2017, pp. 178-187).

¹⁴⁰ According to (Strippoli, et al., 2017, p. 279), *Fincantieri* "doubled its size" with the takeover of *STX OSV*.

¹⁴¹ For example, *Fincantieri* has competed for the Romanian and Brazilian corvette replacement programmes in partnership with *VARD*'s local shipyards (Scott & Peruzzi, 2018), (Stevenson, 2018c).

¹⁴² *Saab* had considered joining the *Tempest* and *FCAS* consortia in the past, although the British-led *Tempest* venture was seen as the more attractive option (Jennings, 2019c), (Hoikkala, 2018). In 2021, Sweden signed a Memorandum of Understanding concerning the *Tempest* with Italy and the United Kingdom. In mid-2022, however, *Saab* described Sweden's participation as being in "a hibernation period" (Jennings, 2022).

¹⁴³ (Host, 2018), (Jennings, 2018a).

¹⁴⁴ (Steenhuis, 2016, pp. 51-52), (Heerkens, et al., 2010, pp. 65-66, 74).

to medium-sized surface naval vessels (such as corvettes and mine-countermeasure ships), has witnessed several changes of ownership since the 1970s. In 1979, it had been transferred into *Svenska Varv*,¹⁴⁵ a state-owned shipyards group that had already incorporated Sweden's other naval yards two years prior (see Figure 12).¹⁴⁶ In 1989, the naval activities of *Svenska Varv* (since 1987 known as *Celsius Industrier*) were merged into a new company which retained the name *Kockums*.¹⁴⁷ Between 1991 and 1992, *Celsius Industrier* acquired the public *FFV* group and *Swedish Ordnance*¹⁴⁸ and was thus transformed from a shipyards group into a diversified defence holding.¹⁴⁹ In 1999, *Kockums* was sold to the German shipbuilder *HDW*. As *HDW* (which was itself absorbed by *ThyssenKrupp* in 2005) and *Kockums* competed on the global markets for conventionally powered submarines, it has been suggested that the German control of *Kockums* might in part have been aimed at removing a major rival from this segment.¹⁵⁰ To preserve the Swedish submarine industry, *ThyssenKrupp* was finally coerced into selling *Kockums* to *Saab*.¹⁵¹ As of 2022, *Saab Kockums* is building the first units of its new A26 class and – as the success of its submarine activities will also depend on export contracts – has entered the A26 in various foreign tenders. Besides having re-emerged as a competitor in the submarine segment, the company is developing new types of mine-countermeasure vessels and corvettes (of which some might be large enough to be classified as frigates).

In the land systems sector, the two leading Swedish entities towards the end of the Cold War were *Bofors* and *Hägglund & Söner*.¹⁵² Whereas both engaged in the supply of armoured vehicles (a field in which the firms cooperate since the 1980s), *Bofors* also produced artillery systems, missiles, defence electronics, small arms and ordnance.¹⁵³ When *Hägglund & Söner* was split into various successor firms in 1988, its military vehicle activities were grouped into *Hägglands Vehicle*, which was sold to the British armoured vehicle producer *Alvis* in 1997.¹⁵⁴ *Bofors* merged with *FFV Ordnance* into *Swedish Ordnance* in 1991 and came under full control of *Celsius Industrier* in 1992 (afterwards, *Swedish Ordnance* was renamed *Bofors*).¹⁵⁵ When

¹⁴⁵ (Karlsson, 2017, pp. 146, 149). See also (Government of Sweden, 2018, p. 89).

¹⁴⁶ For an overview of the shipyards incorporated into *Svenska Varv* (which also comprised yards without naval activities), see (Government of Sweden, 2018, p. 89).

¹⁴⁷ (Lundmark, 2014a, p. 7).

¹⁴⁸ When *Celsius Industrier* absorbed *FFV* in 1991, it obtained 50% of *Swedish Ordnance* (comprising *Bofors* and *FFV Ordnance*). The remaining 50% were taken from *Nobel Industrier* in 1992 (Hagelin, 1997, p. 256).

¹⁴⁹ (Andersson, 2007, p. 150). See also (Government of Sweden, 2018, p. 89).

¹⁵⁰ (Lundmark, 2014a, pp. 7-8). See also (Bellais, 2017, p. 7) on the conflicting interests in the *Kockums* takeover.

¹⁵¹ (Bellais, 2017, p. 7), (Eliasson, 2017, p. 177), (Lundmark, 2014a, pp. 7-8), (Lundmark, 2014b, p. 11).

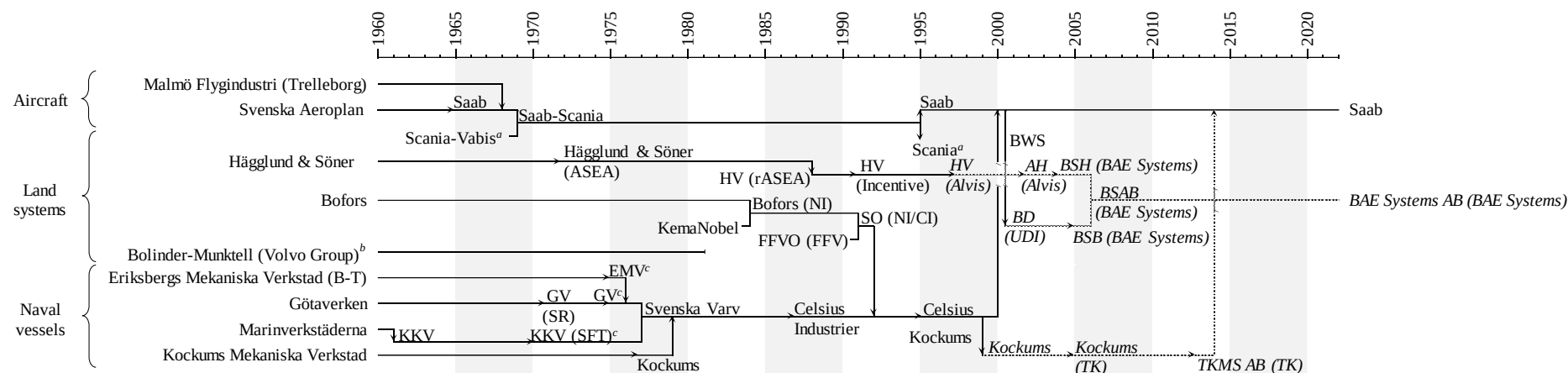
¹⁵² While other companies (most notably *Bolinder-Munktell* and *Landsverk*) had also maintained important land systems activities in earlier decades, they had either ceased or significantly reduced them by the late 1980s.

¹⁵³ (Anthony, Allebeck & Wulf, 1990, pp. 65, 68). For a detailed overview of the historical and recent activities of *Bofors* and *Hägglund & Söner/Hägglands Vehicle*, see (Eliasson, 2017, pp. 117-122, 127-131).

¹⁵⁴ (Eliasson, 2017, p. 128). See also (Ikegami, 2013, p. 442), (Andersson, 2001, pp. 8, 12-13).

¹⁵⁵ (Hagelin, 1997, p. 256).

Figure 12: Restructuring of the aircraft, naval and land systems sectors of Sweden, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the truck manufacturers *Volvo Group* and *Scania* as well as the *Swede Ship* group, which builds small naval vessels) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AH=Alvis Hägglunds; ASEA=Allmänna Svenska Elektriska Aktiebolaget; BD=Bofors Defence; BSAB=BAE Systems AB; BSB=BAE Systems Bofors; BSH=BAE Systems Hägglunds; B-T=Broström-Tirfing; BWS=Bofors Weapon Systems; CI=Celsius Industrier; EMV=Eriksbergs Mekaniska Verkstad; FFV=Försvarets Fabriksverk; FFVO=FFV Ordnance; GV=Götaverken; HDW=Howaldtswerke-Deutsche Werft; HV=Hägglunds Vehicle; KKV=Karlskronavarvet; NI=Nobel Industrier; rASEA=rest-ASEA; SFT=Statsföretag; SO=Swedish Ordnance; SR=Salén-rederierna; TK=ThyssenKrupp; TKMS=ThyssenKrupp Marine Systems; UDI=United Defense Industries.
- iv Besides producing military trucks and other vehicles for logistics and support roles via its subsidiary *Volvo Defense*, the *Volvo Group* also controls *Arquus* (one of the major European suppliers of wheeled armoured vehicles). However, as the production facilities of *Arquus* are located in France, the *Volvo Group* is not listed among the major Swedish entities in the land systems sector.
- ^a Like the *Volvo Group*, the commercial vehicle manufacturer *Scania* engages in the supply of trucks for military and security purposes. As these vehicles are not regarded as major land systems in this dissertation, *Scania* is only included for the period in which it formed part of *Saab-Scania*.
- ^b To the authors' knowledge, *Bolinder-Munktell* no longer engaged in the production of military vehicles after the deliveries of the *Bandvagn 202* were completed in the early 1980s.
- ^c While the Swedish naval shipyards *Götaverken*, *Eriksbergs Mekaniska Verkstad* and *Karlskronavarvet* had already operated under public ownership prior to the formation of *Svenska Varv*, only *Karlskronavarvet* was majority-owned by the *Statsföretag* holding (while *Statsföretag* also held shares in *Götaverken*, most of the company's shares were directly owned by the Swedish State). For this reason, *Statsföretag* is only listed as the parent company in the case of *Karlskronavarvet*.

Celsius was integrated into *Saab* in 2000, *Bofors Weapon Systems* (which comprised *Bofors*’ land systems activities) was sold to the US manufacturer *United Defense Industries* and became *Bofors Defence*.¹⁵⁶ Finally, *BAE Systems* of the United Kingdom brought both *Alvis Hägglunds* and *Bofors Defence* under its control when it acquired *Alvis* (in 2004) and *United Defense Industries* (in 2005).¹⁵⁷

Thus, whereas Sweden’s industrial capabilities in the aircraft and naval sectors are today concentrated within *Saab*, the leading companies from the land systems sector now operate under British ownership. As of 2022, *BAE Systems Hägglunds* and *BAE Systems Bofors* (which are consolidated within *BAE Systems AB* since 2006) remain active in the development and production of armoured vehicles (most notably the *CV90* range), artillery systems, turrets and weapon stations. Besides these companies, the *Volvo Group* also plays an important role in the land systems sector via its ownership of the French wheeled armoured vehicle producer *Arquus*. However, the *Volvo Group* is a somewhat special case among Europe’s land systems suppliers insofar as most of its land systems activities are concentrated within a foreign-based subsidiary.

A.2 East-Central Europe

A.2.1 Bulgaria

Three decades after the end of the Cold War, the armed forces of Bulgaria largely remain equipped with Soviet-era designs, and only few Bulgarian companies engage in the supply of modern major weapon systems. An example of the latter group is *MTG Dolphin*, which aims to establish itself as a producer of large surface naval vessels and has entered strategic partnerships with several leading Western European defence firms in the pursuit of this aim.¹⁵⁸ *Bulyard Shipbuilding Industry* has also aspired to enter this market as a production partner of the French shipbuilder *DCNS* (now *Naval Group*), but its ambitions have not yet come to fruition. Of the two companies, *MTG Dolphin* appears to be in a better position to establish itself as a regional naval shipbuilder, as it has won the Bulgarian Navy’s tender for supplying two modular patrol vessels in 2020 (in partnership with *Fr. Lürssen Werft* of Germany¹⁵⁹) and also presented some other modern warship designs (notably the *K-90* class frigate). In the land systems sector, most of Bulgaria’s production and repair facilities remain under the control of *TEREM*, which continues to provide maintenance, upgrades and other related services for armoured fighting

¹⁵⁶ (Andersson, 2001, p. 21). See also (Eliasson, 2017, p. 120), (Ikegami, 2013, p. 443).

¹⁵⁷ (Eliasson, 2017, pp. 118, 120, 128), (Andersson, 2007, p. 152).

¹⁵⁸ These firms include *Rheinmetall*, *Diehl Defence*, *Leonardo*, *MBDA* and the *Thales Group* (Mihaylov, 2017).

¹⁵⁹ After having won the initial tender, *MTG Dolphin* withdrew from the contract in late 2017. The tender was subsequently re-launched, with *MTG Dolphin* competing again (Tanev, 2020).

vehicles but is currently not involved in the serial production of newer systems. *TEREM* might have participated as a local partner in the planned procurement of 150 new armoured fighting vehicles,¹⁶⁰ but this tender has been cancelled in 2021.

A.2.2 Czech Republic and Slovakia

While Czechoslovakia had been “*the second largest military producer* [of the Warsaw Pact] [...], *after the Soviet Union*”,¹⁶¹ the decline in demand in the aftermath of the Cold War and the country’s 1992 dissolution posed a major challenge to the defence industries in both successor states.¹⁶² The Czech Republic inherited the more technology-intensive parts of Czechoslovakia’s defence industry (including most of the aircraft sector), but was left without significant means to produce heavy equipment (such as armoured vehicles and artillery systems). Slovakia, on the other hand, found itself with huge heavy machinery plants whose military production lines could hardly be sustained given the existing demand.¹⁶³ Whereas both defence industries further suffered from the loss of cross-border industrial ties,¹⁶⁴ Kiss (1997) states that the overall outlook was much less favourable for Slovakia.¹⁶⁵ Following an extended transformation process, the defence industries in both countries have now partially adjusted to the new realities, although their size and structure differ substantially from the late 1980s.

In the land systems sector, most of Czechoslovakia’s state-owned production plants and R&D facilities had been consolidated within the *VHJ ZTS* organisation since the 1970s.¹⁶⁶ The three leading plants (*ZTS Martin*, *ZTS Dubnica nad Váhom* and *ZTS Detva*) engaged in the large-scale supply of artillery, main battle tanks and other types of armoured vehicles (mainly under Soviet license).¹⁶⁷ In the late 1980s, a public conversion programme was initiated to ease their transition towards civilian production,¹⁶⁸ but after Czechoslovakia’s dissolution the Slovak Government ended this programme and grouped its major defence producers into a new state-

¹⁶⁰ On the envisaged tender, see (Mladenov & Grozev, 2019) and (Bozinovski, 2018).

¹⁶¹ (Kiss, 1997, p. 13). See also (Said, 1998, p. 265): “*In the initial blueprints of the Eastern alliance, which later became the [Warsaw Pact] [...], Czechoslovakia was designated a key role as an arms supplier.*”

¹⁶² (Kiss, 2014, pp. 200-201, 205, 243-245, 248-249), (Kiss, 1997, pp. 18-37, 56-60, 64-71), (Kiss, 1993, pp. 1048-1050). According to Kiss (1997), “[t]he breakup of the Czechoslovak Federation caused a serious setback for both of the new states” (Kiss, 1997, p. 35).

¹⁶³ (Kiss, 1997, pp. 15-17, 30-31, 34-37, 57, 70-71). See also (Kiss, 2014, pp. 200-201, 243), (Kiss, 1999, pp. 8-9, 12) as well as (Smith, 1994, p. 411) (with reference to Fučík, 1991).

¹⁶⁴ (Kiss, 1997, pp. 35-37).

¹⁶⁵ (Kiss, 1997, pp. 30-31, 34, 56-59).

¹⁶⁶ For an overview of the organisational structure of *VHJ ZTS* by the 1980s, see (Smith, 1994, p. 408).

¹⁶⁷ (Kiss, 1997, pp. 16-17), (Kiss, 1993, p. 1048). See also (Kiss, 1999, pp. 8-9, 18, 22, 24), (Smith, 1994, pp. 409-411). Together with *ZVS Dubnica nad Váhom*, these three plants formed part of the so-called “*Slovak military triangle*” (Kiss, 2014, pp. 261-263), (Kiss, 1997, p. 17), (Kiss, 1993, p. 1048), (Smith, 1994, p. 410).

¹⁶⁸ (Kiss, 2014, pp. 201, 243, 261), (Said, 1998, pp. 271-274), (Kiss, 1997, pp. 18-30, 64-69), (Smith, 1994, pp. 412-414, 418), (Kiss, 1993, pp. 1050-1067).

owned armaments group, the *DMD Holding* (today *DMD Group*).¹⁶⁹ Further restructuring led to (1) the partition of *ZTS Martin* into many smaller firms¹⁷⁰ (whereas “*Vývoj Martin took over military production*”¹⁷¹), (2) the cessation of armoured vehicle production by the *PPS Group* (formerly *ZTS Detva*) and (3) the breakup of *ZTS Dubnica nad Váhom*.¹⁷² As of 2022, only *ZTS-Špeciál* (the successor to the artillery activities of *ZTS Dubnica nad Váhom*), the associated R&D plant *Konštrukta-Defence* and 50% of the ammunition producer *ZVS* remain within the *DMD Group*. Some other R&D facilities and defence producers (including *Vývoj Martin* in 2016) were progressively integrated into the *MSM Group*, which also continues to develop and produce armoured vehicles. Besides the *DMD Group* and the *MSM Group*, several additional R&D plants and specialised niche manufactures with products ranging from turrets and weapon stations to mine-clearing systems remain active in Slovakia’s land systems sector.

In the Czech Republic, the recent years have seen the re-emergence of some capabilities to supply heavy military equipment (particularly armoured vehicles). From 2014 onwards, the integration of *Excalibur Army*, *Tatra Defence Vehicle*, *Tatra Trucks* and several other defence-related companies into the *Excalibur Group* (now *Czechoslovak Group*) has created a leading entity in the Czech land systems sector (see Figure 13).¹⁷³ Strong ties with Slovakia were forged with the takeover of the *MSM Group* in 2015. Via its subsidiaries, the *Czechoslovak Group* has entered licensed production partnerships with *GDELS* and *Nexter*¹⁷⁴ and now uses the insights gained from these programmes to bring its own designs to the market.¹⁷⁵ However, the company is not without domestic competition, as other Czech manufacturers (notably *VOP CZ*, *SVOS* and *Zetor Tractors*)¹⁷⁶ also aim to increase their presence in the armoured vehicle segment.

In the aircraft sector, the Czech Republic has witnessed many structural alterations since the mid-1990s (including several bankruptcies and ownership changes) as the leading historical manufacturers *Aero Vodochody*, *Moravan* and *LET*, which had operated as subsidiaries of the

¹⁶⁹ (Kiss, 2014, pp. 200-201, 243-244, 251). See also (Behr & Siwiecki, 2004, p. 42).

¹⁷⁰ (Kiss, 2014, pp. 245, 261). Many of its non-military assets had already spun off into separate companies in the early 1990s (Kiss, 1999, pp. 18-19), (Said, 1998, pp. 273-274), (Smith, 1994, pp. 416-417, 420).

¹⁷¹ (Kiss, 2014, p. 261).

¹⁷² (Kiss, 2014, pp. 263-264).

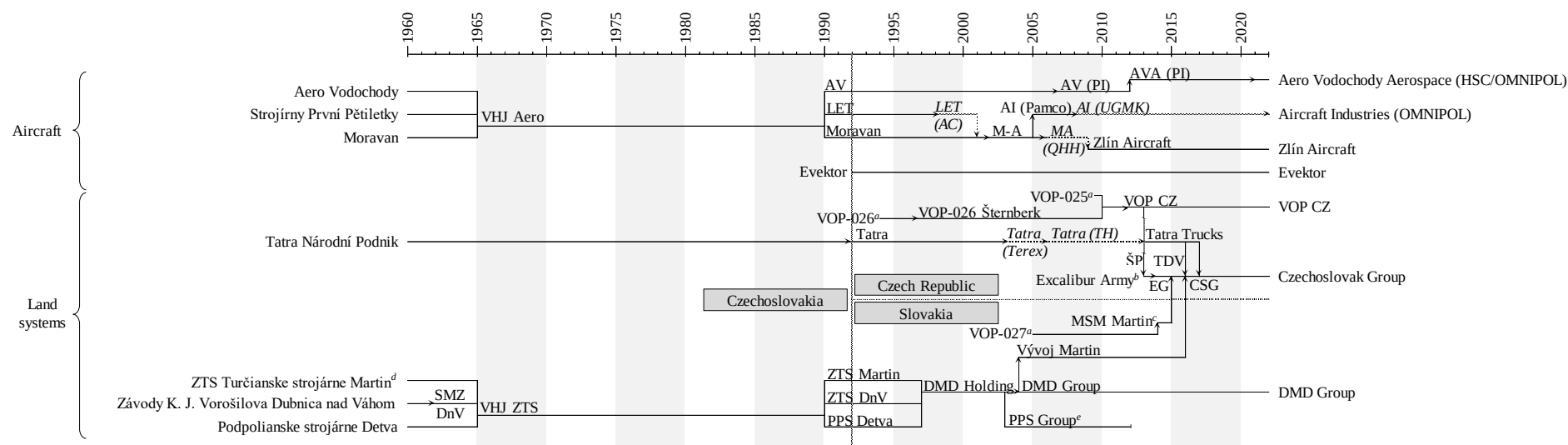
¹⁷³ See also (Chovančík, 2018, pp. 274-275) on the development of the *Czechoslovak Group*.

¹⁷⁴ (Chovančík, 2018, pp. 274-275).

¹⁷⁵ For example, its subsidiary *Excalibur Army* has developed the *T815 Patriot/Medium Armoured Tactical Multi-Mission Vehicle (MATMMV)* (Foss, 2018a), (Foss, 2018b). See also (Chovančík, 2018, pp. 274-275).

¹⁷⁶ Besides assembling armoured vehicles under offset agreements, the military repair plant *VOP CZ* also became the regional manufacturing partner of *NIMR Automotive* (United Arab Emirates) in 2017 (VOP CZ, 2017). *SVOS* unveiled a domestic armoured vehicle, the *Vega*, in 2011 (Kiss, 2014, p. 213). Continuing development activities resulted in upgraded variants (Foss, 2015) and, more recently, in the *Perun* (Zdobinsky, 2018). *Zetor Tractors* engages in the development of armoured vehicles since 2014 via its Czech/Slovak subsidiary *Zetor Engineering* (its most recent development, the *Gerlach*, was presented in 2018) (Komínek, 2018).

Figure 13: Restructuring of the aircraft and land systems sectors of the Czech Republic and Slovakia, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the Czech armoured vehicle supplier SVOS, the Czech agricultural machinery producer *Zetor Tractors*, the Czech aircraft manufacturers *Letov* and *Czech Sport Aircraft*, the Slovak electronics and mechanical engineering companies *ZTS VVÚ Košice* and *EVPÚ* or the Slovak mine-clearing specialist *Way Industries*) are not regarded as major suppliers by the authors and have therefore not been included.
- iii AC=Ayres Corporation; AI=Aircraft Industries; AV=Aero Vodochody; AVA=Aero Vodochody Aerospace; CSG=Czechoslovak Group; DnV=Dubnica nad Váhom; EG=Excalibur Group; M-A=Moravan-Aeroplanes; MA=Moravan Aviation; PI=Penta Investments; PPS=Podpolianske strojárne; QHH=QucomHaps Holdings; SMZ=Strojárske a metalurgické závody; ŠP=Šternberk plant; TDV=Tatra Defence Vehicle; TH=Tatra Holdings; UGMK=Uralskaja Gorno-Metallurgitscheskaja Kompanija; VJH=Výrobně hospodářskou jednotku; VOP-025/026/027=Vojenský Opravárenský Podnik 025/026/027; ZTS=Závody těžkého strojířtva.
- ^a While the military repair plants VOP-025, VOP-026 and VOP-027 had been active in the repair, maintenance, modernisation and/or conversion of armoured vehicles during earlier periods, they are only displayed for those years during which they engaged in production activities. To the authors' knowledge, these activities commenced after 1994 at VOP-026 (i.e., following its restructuring), in 2005 at VOP-027 (i.e., with the production of the *Aligator*) and after 2010 at VOP-025 (i.e., following its merger with VOP-026 Šternberk).
- ^b Although *Excalibur Army* was established in 1995, its armoured vehicle activities only commenced after the acquisition of the Šternberk repair plant in 2013. For this reason, *Excalibur Army* is not displayed during earlier years.
- ^c *MSM Martin*, which was established in 1993, did not act as a major supplier of land systems prior to its enlargement in 2013/2014 (specifically, prior to the lease of the VOP-027 plant in 2014). Consequently, *MSM Martin* is only included from 2014 onwards (in the following year, it was integrated into the *MSM Group*, which became majority-owned by the *Excalibur Group*).
- ^d In the literature, it is sometimes stated that *ZTS Turčianske strojárne Martin* (also known as *ZTS TEES Martin* or simply as *ZTS Martin*) only joined the VJH ZTS conglomerate at a later date. (Smith, 1994, p. 415), for example, states that the company was not integrated into VJH ZTS until 1975. The authors have not been able to verify this information with certainty.
- ^e Whereas the financial statements of the *PPS Group* do not report any defence-related revenues after 2011, the company was still listed as a producer of armoured vehicles (the *Tatrapan* family) by the Security and Defence Industry Association of the Slovak Republic until 2012. It is therefore assumed that the *PPS Group* withdrew from the land systems sector after the year 2012.

VHJ Aero organisation from 1965 to 1990,¹⁷⁷ pursued different strategies to adjust to the new market environment. However, the three companies (or, to be precise, their privatised successor firms) continue their operations to this date. With the creation of *Evektor*, a new competitor has even emerged in the industry. After having survived the critical post-Cold War decades by means of restructuring and diversification,¹⁷⁸ *Aero Vodochody Aerospace* (the country's largest aircraft manufacturer) has shifted its focus once again towards the markets for jet trainer and light combat aircraft.¹⁷⁹ The other major firms remain active in the markets for light transport aircraft (*Aircraft Industries* and possibly *Evektor*)¹⁸⁰ as well as small piston/turboprop trainer and utility aircraft (*Evektor* and *Zlín Aircraft*)¹⁸¹ for civilian and military applications.

A.2.3 Hungary

The domestic production of armoured vehicles has ceased about four decades ago following the restructuring of Hungary's defence industry.¹⁸² *Rába Automotive Holding*, which had delivered the *D-442 FÚG* and *PSZH D-944* families in the 1960s and 1970s,¹⁸³ continues to supply armoured and non-armoured military off-road trucks. While offering solutions to convert its trucks into more heavily armoured systems (such as protected troop carriers), *Rába Automotive Holding* does currently not show ambition to re-engage in the production of armoured fighting vehicles. The CBRN equipment supplier *Gamma Műszaki*, on the other hand, has developed the wheeled armoured vehicle *Komondor* (a first prototype was unveiled in 2012)¹⁸⁴ and now offers the system in several different variants besides its original configuration as a CBRN defence and reconnaissance vehicle (including as armoured personnel carrier). While it remains to be seen to which extent the *Komondor* range will be procured, its introduction could re-establish the production of indigenous armoured vehicles within Hungary's defence industry.

¹⁷⁷ (Bochniarz, et al., 2016, pp. 323-324).

¹⁷⁸ For an overview of the evolution of the Czech aircraft sector since the year 1990, see (Bochniarz, et al., 2016, pp. 324-328). For a detailed assessment of *Aero Vodochody*'s development, see (Kiss, 2014, pp. 228-233).

¹⁷⁹ *Aero Vodochody Aerospace* (which maintains *Aero Vodochody*'s aircraft manufacturing activities) currently develops modernised variants of its *L-39 Albatros* (the *L-39NG*) and *L-159 ALCA* (the *F/A-259 Striker*, in cooperation with *Israel Aerospace Industries*) (Jennings, 2018b), (Jennings, 2018c).

¹⁸⁰ In 2017, the development of *Evektor*'s *EV-55 Outback* transport aircraft was “temporarily put [...] on hold” due to “some uncertainties [...] [with *Evektor*'s] Malaysian investor” (*Evektor*, 2017). The current project status of the *EV-55* programme is unclear. *Aircraft Industries*, the successor company of *LET*, operated under Russian ownership between 2008 and 2022.

¹⁸¹ In 2009, *Zlín Aircraft* acquired the assets of the bankrupt *Moravan Aviation*. Whereas the new company offers modernised versions of *Moravan*'s aircraft types, production seems to take place on a relatively small scale.

¹⁸² An overview of this process, which shifted the focus of Hungary's defence industry from military vehicles, weapons and ammunition towards technologically more sophisticated segments (telecommunications, R&D, electronics, precision instruments), is given by (Kiss, 2014, pp. 139-140, 147-149), (Kiss, 1997, pp. 80-83).

¹⁸³ See (Germuska & Honvári, 2014, pp. 131-132, 139-141, 144-146) on the armoured vehicle production of *Rába Automotive Holding* (historically known as *Magyar Vagon és Gépgyár, MVG*).

¹⁸⁴ (Kiss, 2014, pp. 168-169, 197). See also (Kovácsházy, 2014, pp. 342-344) for information on the *Komondor*.

A.2.4 Poland

Until the end of the Cold War, Poland had been “*the third largest military producer of the [...] [Warsaw Pact], after the Soviet Union and Czechoslovakia.*”¹⁸⁵ In addition to the country’s large aircraft and armoured vehicle industries, Polish companies also supplied naval vessels, small arms, ammunition, electronics and other defence-related products.¹⁸⁶ Like in other former Warsaw Pact countries, the fall in demand from its national government and the loss of the Soviet export market led to severe difficulties for Poland’s defence industry from the late 1980s onwards.¹⁸⁷ During the 1990s and 2000s, different governmental strategies were implemented to support the defence industry.¹⁸⁸ Among the most important measures was the creation of two state-owned holding companies in 2002: (1) an ‘ammunitions, rockets and armour’ group (the *Bumar Group*) and (2) an ‘aviation and radio-electronics’ group under the control of *Agencja Rozwoju Przemysłu (ARP)*.¹⁸⁹ While the major aircraft manufacturers of the ARP holding were subsequently acquired by Western companies (see below), the *Bumar Group* was progressively enlarged until, in 2014/2015, it was integrated into the newly-established holding group *Polska Grupa Zbrojeniowa (PGZ)* together with several other companies from the defence industry.

PGZ now holds more than 60 state-owned companies¹⁹⁰ and thus constitutes the ‘national champion’ of the Polish defence industry. Besides most major land systems manufacturers and R&D institutes, these firms include naval shipbuilding and repair yards, aircraft maintenance plants, facilities for the modernisation of armoured vehicles and missile systems as well as suppliers of various other defence-related products and services.¹⁹¹ While the formation of *PGZ* has significantly consolidated the Polish defence industry, the implications of this process vary among the different segments. The largest impact can be observed in the land systems sector, as most Polish capabilities to produce wheeled and tracked armoured vehicles, artillery systems, turrets, weapon stations, anti-aircraft systems and military trucks are now consolidated under a single roof (see Figure 14).¹⁹² Only in the wheeled armoured vehicle segment a second major

¹⁸⁵ (Kiss, 1997, p. 107).

¹⁸⁶ For an overview of Poland’s largest arms manufacturers in 1991, see (Kiss, 2014, p. 44), (Kiss, 1997, p. 108).

¹⁸⁷ (Kiss, 2014, pp. 41-43), (Kiss, 1997, pp. 111-113). See also (Wieczorek & Zukrowska, 1996, pp. 8-9), (Nelson, 2003, pp. 85-87) and (Klimek, 2018, p. 150).

¹⁸⁸ (Kiss, 2014, pp. 45-59). See also (Nelson, 2003, pp. 87-91) and (Kiss, 1997, pp. 113-122) on the initial defence-industrial policy responses after the end of the Cold War.

¹⁸⁹ (Klimek, 2018, pp. 150-151), (Kiss, 2014, pp. 49-53), (Behr & Siwiecki, 2004, pp. 35-36).

¹⁹⁰ (Klimek, 2018, p. 151), (Terlikowski, 2017, p. 4).

¹⁹¹ (Klimek, 2018, pp. 151-153).

¹⁹² In 2002, *Zakłady Mechaniczne "Tarnów"* (a producer of air defence systems) as well as the main battle tank manufacturer *Zakłady Mechaniczne "Bumar-Łabędy"* were integrated into the *Bumar Group* (Kiss, 2014, p. 52). *OBRUM* and *OBRSM* (two R&D and engineering plants with a focus on the land systems sector) followed in 2010 (Kurczek, 2018, p. 129), (Kiss, 2014, p. 195). In 2014 the artillery manufacturer *Huta Stalowa Wola* (including the previously acquired truck producer *Jelcz*), the armoured vehicle supplier *Wojskowe Zakłady Mechaniczne* (subsequently renamed *Rosomak*) and the engineering plant *Wojskowe Zakłady Motoryzacyjne*

domestic competitor is found with *AMZ-Kutno* (which has entered the market in 2004¹⁹³). Thus, the consolidation of the Polish land systems sector has largely been concluded.

In the naval segment, two shipyards had historically served as the main domestic suppliers of the Polish Navy: *Stocznia Północna* and *Stocznia Marynarki Wojennej*. The first yard, now known as *Remontowa Shipbuilding*, maintains its naval operations under the ownership of the *Remontowa Holding*. *Stocznia Marynarki Wojennej*, having been in liquidation since 2011,¹⁹⁴ became part of *PGZ* (which already owned two other shipbuilding and repair yards) in 2018. While both *Remontowa Shipbuilding* and the *PGZ* yards currently engage in the construction of surface naval vessels,¹⁹⁵ it may not be ruled out that the Polish Government might ultimately settle for one main supplier given the relative scarcity of important domestic contracts. The work share agreements under the *Miecznik* and *Czapla* programmes (which envisage the local construction of several large surface naval vessels) and the *Orka* project (which could lead to the construction of conventionally powered submarines in Polish shipyards in cooperation with *ThyssenKrupp*, *Saab* or the *Naval Group*¹⁹⁶) might serve as an indication for this development.

In the aircraft sector, Poland's leading manufacturers have been privatised and now operate under the ownership of Western aerospace firms (see Figure 14).¹⁹⁷ *Polskie Zakłady Lotnicze* (formerly *WSK "PZL-Mielec"*) no longer designs or builds jet trainer aircraft but continues to offer fixed-wing types for light transport and specialised purposes. As part of the US *Sikorsky Aircraft Corporation* (belonging *Lockheed Martin*), it now also participates in the construction of helicopters. *WSK "PZL-Świdnik"*, today part of *Leonardo*, remains Poland's sole producer of indigenous rotary-wing aircraft. Besides its own types, it engages in the production of several other helicopter families on behalf of its Italian parent firm. Furthermore, *WSK "PZL-Świdnik"* also partakes in some important research projects (such as the development of the unmanned helicopter *SW-4 Solo*). *PZL "Warszawa-Okęcie"*, the third Polish aircraft producer, continues to supply upgraded turboprop trainer aircraft under the ownership of *Airbus*.

were absorbed by *PGZ*. In the same year, the *Bumar Group* (known since 2013 as *Polski Holding Obronny, PHO*) transferred most of its defence-industrial subsidiaries to *PGZ* (*Zakłady Mechaniczne "Tarnów"*, which had previously merged with *OBRSM*, joined *PGZ* in 2015).

¹⁹³ (Kiss, 2014, pp. 76-77).

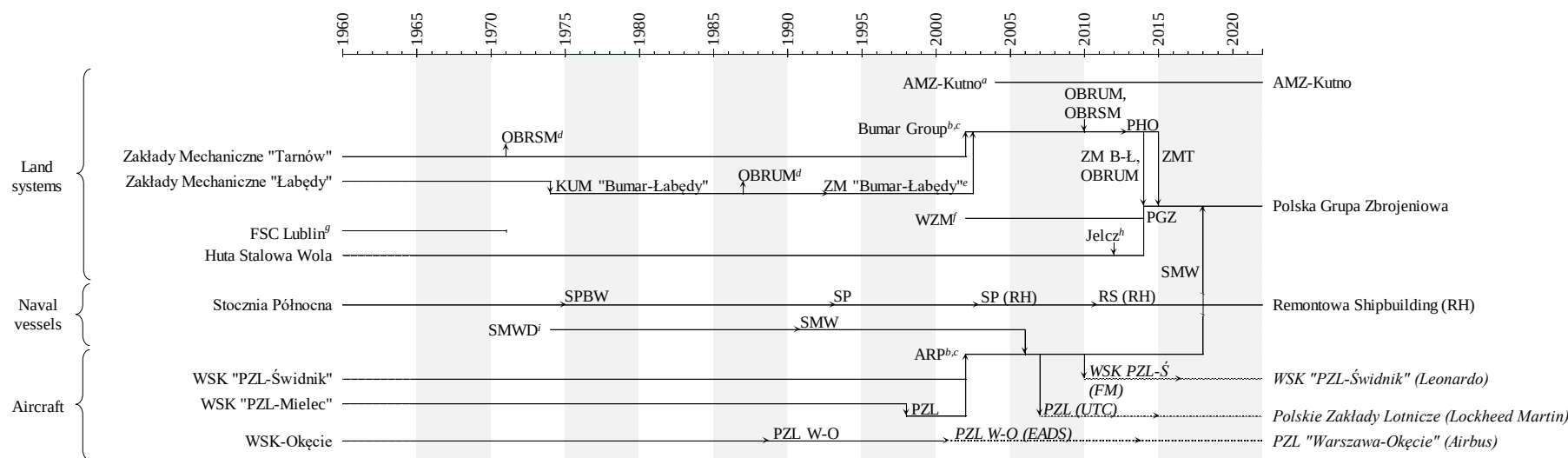
¹⁹⁴ (Czekaj, 2012).

¹⁹⁵ *Remontowa Shipbuilding* recently built the *Kormoran* class mine-countermeasure ships. *Stocznia Marynarki Wojennej* (now *PGZ Stocznia Wojenna*) recently finished a large offshore-patrol ship, the sole remainder from a scaled-down programme initially aimed at building seven frigates under German license (Czekaj, 2012). In addition, *PGZ* is also building special-purpose naval vessels at the *Nauta* yard (Stevenson, 2018d).

¹⁹⁶ See (Lipka, 2018, p. 9), (Lipka, 2017a, pp. 7, 9) and (Lipka, 2017b, p. 8) on the *Orka* programme.

¹⁹⁷ The aircraft manufacturers *PZL "Warszawa-Okęcie"*, *WSK "PZL-Mielec"* and *WSK "PZL-Świdnik"* were privatised in 2001, 2007 and 2010 (*PZL "Warszawa-Okęcie"* was transferred to *EADS* prior to the creation of the *ARP* holding) (Kiss, 2014, p. 70). See also (Klimek, 2018, p. 154), (Terlikowski, 2017, p. 5). Further information on the development of the Polish aircraft sector since the end of the Cold War is presented by (Bochniarz, et al., 2016, pp. 332-339) and (Kiss, 2014, pp. 107-116).

Figure 14: Restructuring of the aircraft, naval and land systems sectors of Poland, 1960-2022



Source: Authors' illustration.

Notes:

- See notes i and ii below Figure 1 for further information on the underlying methodology.
- Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as the shipbuilding and repair yards *Morska Stocznia Remontowa "Gryfia"* and *Stocznia Remontowa "Nauta"* or the armoured vehicle repair and upgrading specialist *Wojskowe Zakłady Motoryzacyjne*) are not regarded as major suppliers by the authors and have therefore not been included.
- ARP=Agencja Rozwoju Przemysłu; EADS=European Aeronautic Defence and Space; FM=Finmeccanica; FSC Lublin=Fabryka Samochodów Ciężarowych w Lublinie; KUM "Bumar-Łabędy"=Kombinat Urządzeń Mechanicznych "Bumar-Łabędy"; OBRSM=Ośrodek Badawczo-Rozwojowy Sprzętu Mechanicznego; OBRUM=Ośrodek Badawczo-Rozwojowy Urządzeń Mechanicznych "OBRUM"; PGZ=Polska Grupa Zbrojeniowa; PHO=Polski Holding Obronny; PZL=Polskie Zakłady Lotnicze (refers to the present firm; the historical abbreviation stands for Państwowe Zakłady Lotnicze); PZL W-O=PZL "Warszawa-Okęcie"; RH=Remontowa Holding; RSB=Remontowa Shipbuilding; SMW=Stocznia Marynarki Wojennej; SMWD=Stocznia Marynarki Wojennej im. Dąbrowszczaków; SP=Stocznia Północna; SPBW=Stocznia Północna im. Bohaterów Westerplatte; UTC=United Technologies Corporation; WSK-Okęcie=Wytwórnia Sprzętu Komunikacyjnego Okęcie; WSK "PZL-Mielec"=Wytwórnia Sprzętu Komunikacyjnego "PZL-Mielec"; WSK PZL-Ś/WSK "PZL-Świdnik"=Wytwórnia Sprzętu Komunikacyjnego "PZL-Świdnik"; WZM=Wojskowe Zakłady Mechaniczne; ZM B-Ł/ZM "Bumar-Łabędy"=Zakłady Mechaniczne "Bumar-Łabędy"; ZMT=Zakłady Mechaniczne "Tarnów".
- AMZ-Kutno did not produce armoured fighting vehicles prior to the year 2004 and is therefore only displayed from this year onwards.
- While *Przedsiębiorstwa Handlu Zagranicznego "Bumar"* had operated as a trading company since 1971, the company only emerged as a major defence manufacturer when it became the centre of the *Bumar Group* in 2002. Accordingly, the company is not included prior to the year 2002. For the same reason, ARP is likewise only included from 2002 onwards.
- PHO is displayed until 2015 (the year in which *Zakłady Mechaniczne Tarnów* was transferred to PGZ), whereas ARP is included until 2018 (the year which saw the sale of *Stocznia Marynarki Wojennej* to PGZ). While both holdings continue to operate in the Polish defence industry, they are no longer regarded as important defence manufacturers by the authors after the divestment of their major arms-producing subsidiaries.
- OBRUM and OBRSM have not only acted as major R&D institutes, but also produced land systems in smaller numbers (OBRUM, for example, has delivered some engineer & recovery vehicles). However, to the authors' knowledge, these companies did not engage in the large-scale serial production of land systems and are therefore not displayed as separate defence manufacturers.

- ^e While some scholars, including (Kiss, 2014, p. 52), state that *Zakłady Mechaniczne “Bumar-Łabędy”* was among the first companies to join the *Bumar Group* in 2002, others report that the main battle tank manufacturer initially underwent a restructuring process and only joined the *Bumar Group* at a later date – see, for example, (Behr & Siwiecki, 2004, p. 36).
- ^f *Wojskowe Zakłady Mechaniczne*, which had served as a repair plant for armoured vehicles since the 1950s, also provided upgrading services since the mid-1990s. However, it did not engage in the serial production of new vehicles prior to 2002 (the year in which the licensed production of the *Patria AMV/KTO Rosomak* was initiated) and is thus only included from this year onwards.
- ^g To the authors’ knowledge, *Fabryka Samochodów Ciężarowych w Lublinie* ceased the production of armoured vehicles after the deliveries of the *OT-64 SKOT* were completed in 1971.
- ^h Although *Jelcz* produces armoured and non-armoured military trucks which also serve as base for self-propelled artillery systems and specialised vehicles offered by *Huta Stawola Wola*, the company itself is not regarded as a major defence manufacturer by the authors and is thus not displayed separately.
- ⁱ *Stocznia Marynarki Wojennej* did not engage in the supply of major naval vessels prior to the mid-1970s (to the authors’ knowledge). The company is thus not included during earlier years.

A.2.5 Romania

From 1968 onwards, the Romanian Government strove to establish a capable domestic defence industry to lessen its dependence on foreign countries.¹⁹⁸ While Romania was neither a wealthy nor a technologically advanced country by European standards, significant capabilities were created in the land systems, aircraft and naval sectors (see Figure 15).¹⁹⁹ Besides the licensed production of foreign equipment, these ambitions also brought several domestic systems to the market, including indigenously developed main battle tanks, combat and jet trainer aircraft, destroyers and corvettes. By the late 1980s, about 70-85% of “*Romania’s military needs were met by domestic production*”.²⁰⁰ Following the revolution of 1989, a large share of Romania’s defence industry, including the leading plants from the land systems sector,²⁰¹ was grouped into three public holding companies: (1) *Grupul Industrial al Armatei – Regia Autonomă (GIARA)*, (2) *Regia Autonomă pentru Producția de Tehnică Militară (RATMIL)* and (3) *Regia Autonomă Rompiro*.²⁰² In 1996, *GIARA* was merged with *Rompiro* and some companies held by *RATMIL* into *Regia Autonomă Arsenalul Armatei*.²⁰³ Finally, between 2000 and 2001, the major arms-producing subsidiaries of *Arsenalul Armatei* and *RATMIL* were combined into the new state-owned holding *Compania Națională Romarm*,²⁰⁴ which has since operated as the ‘national champion’ of the Romanian land systems sector. Romania’s aircraft manufacturers and naval shipyards, on the other hand, did not form part of this consolidation process.

Many of Romania’s main domestic suppliers in the aircraft, naval and land systems sectors produced little to no armaments in the 1990s and 2000s due to an absence of orders and instead focused on the maintenance and upgrade of existing equipment.²⁰⁵ In recent years, however, several partnerships were entered with foreign manufacturers to participate in tenders for the modernisation of Romania’s armed forces. Herein lies the potential for a limited re-emergence

¹⁹⁸ (Alexiev, 1981, pp. 9-10, 17). See also (Kiss, 2014, p. 317), (Năstase, 2011, pp. 173-174), (Faltas, 2008, p. 92).

¹⁹⁹ See also (Alexiev, 1981, p. 10): “*Given the low starting point and their lack of technological capacities, the Romanians have [...] achieved considerable success.*”

²⁰⁰ (Kiss, 2014, p. 326).

²⁰¹ Together with the artillery manufacturer *Uzina Mecanică Reșița* (today *Arsenal Reșița*), the armoured vehicle plants *Uzina Mecanică București* (Romania’s sole producer of main battle tanks, formerly known as *Fabrica de Mașini Grele Speciale*) and *Uzina Mecanică Mizil* (today *MFA Mizil*) were integrated into *GIARA*. The wheeled armoured vehicle manufacturer *Întreprinderea Automecanică Moreni* (now *Uzina Automecanică Moreni*), on the other hand, was integrated into *RATMIL* (Government of Romania, 1995). Except for *MFA Mizil*, which was privatised in 2003, these companies remain part of *Romarm* to this date (the authors could not determine with certainty whether *MFA Mizil* was still active as of 2022).

²⁰² (Năstase, 2011, pp. 174-175, 184-186). For an overview of the companies which were grouped in each of the three holdings, see (Government of Romania, 1995).

²⁰³ For an overview of those companies grouped into *Arsenalul Armatei*, see (Government of Romania, 1997).

²⁰⁴ Additional information on the creation and subsequent development of *Romarm* is provided by (Kiss, 2014, pp. 312-313, 319, 335-337).

²⁰⁵ The artillery plant *Arsenal Reșița*, for example, has even been ‘mothballed’ by the Romanian Government.

of Romania's defence industry. In the land systems sector, two of *Romarm*'s subsidiaries, *Uzina Automecanică Moreni* and *Uzina Mecanică Bucureşti*, partake in the renewal of Romania's armoured personnel carrier fleet in partnership with *GDELS* and (possibly) *Rheinmetall*.²⁰⁶ Due to the associated technology transfers and local production, *Romarm* is provided with a chance to restore its capabilities to produce modern armoured vehicles.

Despite various attempts to privatise them,²⁰⁷ three of Romania's major aircraft companies – *Avioane Craiova*, *Industria Aeronautică Română Braşov* and *Romaero* – remain majority-owned by the Romanian Government. *Industria Aeronautică Română Braşov*, the sole domestic producer of rotary-wing aircraft, maintains the supply of transport/multirole types (since 2002 in partnership with *Airbus Helicopters*).²⁰⁸ *Avioane Craiova*, which has built the *IAR-93* and *IAR-99* in the past, now engages in the development of the modernised *IAR-99TD (Technology Demonstrator)*²⁰⁹ and might re-establish the small-scale production of jet trainer aircraft in Romania with the planned *IAR-99NG*. *Romaero* (which has historically been specialised in the production of light transport types) and the privatised *Aerostar* (once an important manufacturer of piston-engine trainer aircraft) now largely focus on aerostructures and other aircraft-related products and services rather than on the supply of entire aircraft systems.²¹⁰

In the naval sector, Romania's largest historical naval yards – *Şantierul Naval 2 Mai* and *Şantierul Naval Galaţi* – are now controlled by the *Damen Shipyards Group* of the Netherlands. Two other shipyards are operated by *VARD* (part of the Italian shipbuilder *Fincantieri*). Both the *Damen Shipyards Group* and *VARD* have made their Romanian facilities an integral part of their own naval shipbuilding activities, and the Romanian yards participate in the construction of surface naval vessels (including large amphibious ships, offshore-patrol ships and support ships) on behalf of their parent firms. However, these yards' participation of is largely restricted to labour-intensive tasks (such as the construction of the hull), as Romania has not built major naval vessels on a purely domestic basis for more than two decades.²¹¹ In 2022, Romania's Government contracted the French *Naval Group* with supplying four *Gowind* class corvettes, to be built in partnership with the local yard *Şantierul Naval Constanţa*.

²⁰⁶ (Cranny-Evans, 2019), (MacDonald, 2018). Whereas the deliveries of the *Piranha V* by *GDELS* commenced in 2018, the procurement of the *Rheinmetall Agilis* was put on hold and remains subject to further evaluation. (as of mid-2022, Romania reportedly contemplates purchasing the *Rheinmetall Puma* instead).

²⁰⁷ (Kiss, 2014, pp. 314, 340-344).

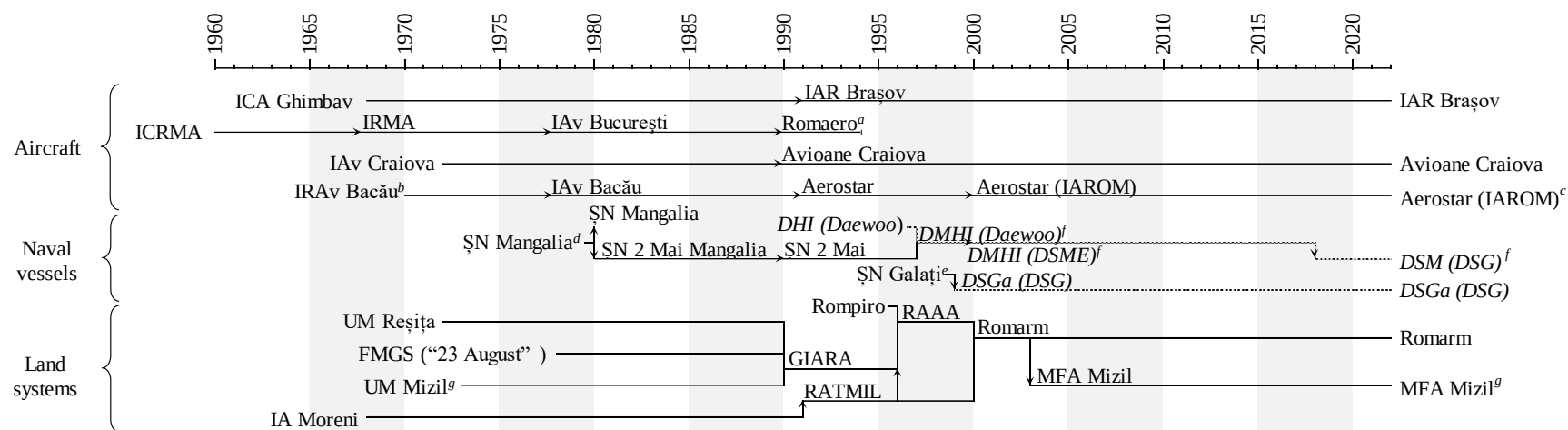
²⁰⁸ (Banila, 2018), (Kiss, 2014, pp. 341-342). Since 2002, both firms cooperate via the joint company *Airbus Helicopters Romania*, of which *Industria Aeronautică Română Braşov* owns 49%. In 2016, the *Airbus Group* additionally established a new, wholly-owned rotary-wing plant (*Airbus Helicopters Industries*) in Braşov.

²⁰⁹ (Scott, 2017).

²¹⁰ While *Aerostar* continues to offer light trainer aircraft, production appears to take place at a very limited scale at most. Besides its aircraft-related activities, *Aerostar* also maintains various operations in the land systems sector (including the development and production of self-propelled multiple-rocket launchers).

²¹¹ (Vişan, 2017, pp. 9-10, 22).

Figure 15: Restructuring of the aircraft, naval and land systems sectors of Romania, 1960-2022



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology.
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current producers (such as *Uzina Tractorul Braşov* in the land systems sector as well as various smaller Romanian shipyards) are not regarded as major suppliers by the authors and have therefore not been included.
- iii DHI=Daewoo Heavy Industries; DMHI=Daewoo Mangalia Heavy Industries; DSG=Damen Shipyards Group; DSGa=Damen Shipyards Galaţi; DSM=Damen Shipyards Mangalia; DSME=Daewoo Shipbuilding & Marine Engineering; FMGS=Fabrica de Maşini Grele Speciale; GIARA=Grupul Industrial al Armatei – Regia Autonomă; IA Moreni=Întreprinderea Automecanică Moreni; IAR Braşov=Industria Aeronautică Română Braşov; IAROM=Industria Aeronautică Română; IAv Bacău/Bucureşti/Craiova=Întreprinderea de Avioane Bacău/Bucureşti/Craiova; ICA Ghimbav=Întreprinderii de Construcţii Aeronautice Ghimbav; ICRMA=Întreprinderea de Construcţii şi Reparatii Material Aeronautic; IRAv Bacău=Întreprinderea de Reparatii Avioane Bacău; IRMA=Întreprinderea de Reparatii Material Aeronautic; MFA Mizil=Mechanical Factory for Armament Mizil; RAAA=Regia Autonomă Arsenalul Armatei; RATMIL=Regia Autonomă pentru Producţia de Tehnică Militară; ŞN=Şantierul Naval; UM Mizil/Reşiţa=Uzina Mecanică Mizil/Reşiţa.
- ^a Since its strategic reframing in 1994, *Romaero* has largely ceased the production of entire aircraft systems. Therefore, *Romaero* is not listed as a major aircraft manufacturer beyond this year.
- ^b While *Întreprinderea de Reparatii Avioane Bacău* had been created in 1953, it did not engage in aircraft development or production prior to 1970 and is thus only included from this year onwards.
- ^c Whereas *Aerostar* has only built very few light trainer aircraft in the last two decades, it is still listed as an important domestic defence firm due to its activities in the land systems sector.
- ^d *Şantierul Naval Mangalia* was established in 1956 and remains active as of 2022. However, only *Şantierul Naval 2 Mai* – which was set up between 1974 and 1980 and subsequently detached from *Şantierul Naval Mangalia* – engaged in the construction of major naval vessels. Accordingly, only *Şantierul Naval 2 Mai* is listed as a naval shipyard in Figure 15.
- ^e Although *Şantierul Naval Galaţi* acted as Romania's main naval shipyard during the first half of the 20th century, it did not build major naval vessels between the 1950s and its takeover by the *Damen Shipyards Group*. For this reason, *Şantierul Naval Galaţi* (now *Damen Shipyards Galaţi*) is only included from the year 1999 onwards.
- ^f From 1997, the activities of *Şantierul Naval 2 Mai* were maintained by the joint company *Daewoo Mangalia Heavy Industries* (in which the South Korean partners held a 51% stake). In 2018, a new agreement was struck with the *Damen Shipyards Group*. While the latter only holds a 49% stake in *Damen Shipyards Mangalia* (with the Romanian Government retaining 51%), the Dutch company has assumed operational control over the yard's activities. Therefore, *Damen Shipyards Mangalia* is displayed in Figure 15 as if it were majority-owned by the *Damen Shipyards Group*.
- ^g *Uzina Mecanică Mizil*, established as a repair facility in 1951, was only transformed into an armoured vehicle production plant in 1973 and is therefore only included from this year onwards. The authors were unable to determine with certainty to which extent this company was still active in 2022.

A.3 Former Yugoslavia

A.3.1 Croatia

Croatian companies have played a significant role in the defence industry of the former Socialist Federal Republic of Yugoslavia – particularly in the naval and land systems sectors, where they supplied (among other types of armaments) conventionally powered submarines, frigates and main battle tanks. As of 2022, only two of Croatia's leading historical producers – the armoured vehicle manufacturer *Đuro Đaković Group* and the shipbuilder *Brodograđevna industrija Split* (commonly known as *Brodosplit*) – maintain some of their defence-related activities.

In the naval sector, *Brodosplit* remains the leading company following the demise of *Brodogradilište Kraljevica* (which had gone bankrupt after its privatisation failed in 2012²¹²). While the yard claims to possess the capabilities to build large surface naval vessels (up to the size of frigates) and submarines, the modest-sized Croatian Navy presently has no need for such units and the naval activities of *Brodosplit* thus focus on the supply of small patrol vessels. This market is also served by some smaller Croatian shipbuilders. In the land systems sector, the *Đuro Đaković Group* – which participates in this segment since the 1980s – preserves Croatia's capabilities to build armoured fighting vehicles (a second domestic supplier, the *Torpedo* plant, has disappeared at the turn of the century). In addition to the company's experience in the production and upgrade of main battle tanks, the *Đuro Đaković Group* now also engages in the supply of wheeled armoured personnel carriers in partnership with the Finnish *Patria Group*. While its armoured vehicle production activities have been restricted by the relatively low demand of Croatia's armed forces, this might partially be compensated by the cooperation with the *Patria Group*, which enables the *Đuro Đaković Group* to build the *Patria AMV* range for selected customers in third markets.²¹³

A.3.2 Slovenia

Despite the small size of its defence industry, Slovenia has been home to system integrators in the land systems sector. Until Slovenia's independence from the Socialist Federal Republic of Yugoslavia, wheeled armoured vehicles were supplied by the commercial and military vehicle producer *Tovarna Avtomobilov in Motorjev (TAM) Maribor*. After these activities ceased in the 1990s, another Slovenian company – *Stroji in Tehnološka Oprema (STO) Ravne* – obtained a license to build the Austrian armoured personnel carrier *Pandur* under the local designation *Valuk*. Following the conclusion of the contract, *Sistemska Tehnika* (the former defence division

²¹² (Bajo, et al., 2016, pp. 8-9).

²¹³ (Yurukova, 2016).

of *STO Ravne*) sought to cement its position in the land systems sector by offering the *Krpan* (a licensed variant of the *Pandur II*) to the Slovenian Army. However, the tender was lost to the Finnish *Patria Group* in 2006,²¹⁴ and *Sistemska Tehnika* received no further orders for its armoured vehicles. After 2014, its activities as a tier supplier and maintenance provider were continued by its successor company *Armas* (however, it appears that this firm became defunct prior to the year 2020). A few other Slovenian firms still engage to a varying extent in the land systems sector (such as in the development of turrets and weapon stations), and it is possible that they might see some participation in future armoured vehicle procurement programmes.

A.4 A note on defence production in other European countries

Seven additional European countries – Cyprus, Iceland, Luxembourg, Malta as well as the three Baltic nations – were not presented in Appendices A.1-A.3 as their defence industries were not home to major system integrators in the aircraft, naval or land systems sectors since the 1960s. However, it must be noted that the absence of significant system integrators is not synonymous with non-participation in these defence-industrial segments. On the contrary, countries with small economies and low levels of military expenditure (and without a historical record in the supply of major armaments) may nevertheless yield companies which (1) engage in the production of relatively inexpensive types of armaments, (2) serve as important tier suppliers in subcontract to foreign defence producers, or (3) conduct specialised R&D activities and thus foster military-technological advances. Examples of firms from the first group are found in several shipbuilders which construct small patrol vessels for military and security purposes. Concerning the second group, one may refer to shipyards such as *Rīgas kuģu būvētava* of Latvia, *Loksa Shipyard* of Estonia and *Western Baltija Shipbuilding* of Lithuania, which have performed some of the more labour-intensive tasks in the construction of major foreign naval vessels (notably the production of hulls and steel blocks). In the third group, an example from the land systems sector is provided by *Milrem Robotics*, an Estonian company that develops modular unmanned ground vehicles for various military applications.

²¹⁴ (Vogel, 2007).

Appendix B Combined Overview of the Restructuring of the European Aircraft, Naval and Land Systems Sectors

The information collected from the country-level assessments presented in Appendix A further permits to outline the restructuring of the aircraft, naval and land systems sectors at an aggregate regional level. In other words, whereas Appendix A has illustrated the evolution of the aircraft, naval and land systems sectors from 1960 to 2022 at the individual country-level, the following figures present the development of these sectors in the same period across the entire ‘European’ region (defined in this dissertation as covering the EU28, Iceland, Norway and Switzerland). Thereby, Appendix B offers more than a mere summary of the findings of Appendix A – rather, the figures presented in Appendix B provide a better overview of cross-border developments and allow (1) to identify pan-European trends in defence industry restructuring and (2) to assess the long-term impact of consolidation in the European aircraft, naval and land systems sectors. The combined information obtained from Appendices A and B deliver the sectoral findings presented in our main document titled ‘*Six Decades of Consolidation in the European Defence Industry (1960-2022)*’.

Figure 16: Restructuring of the European aircraft sector, 1960-2022

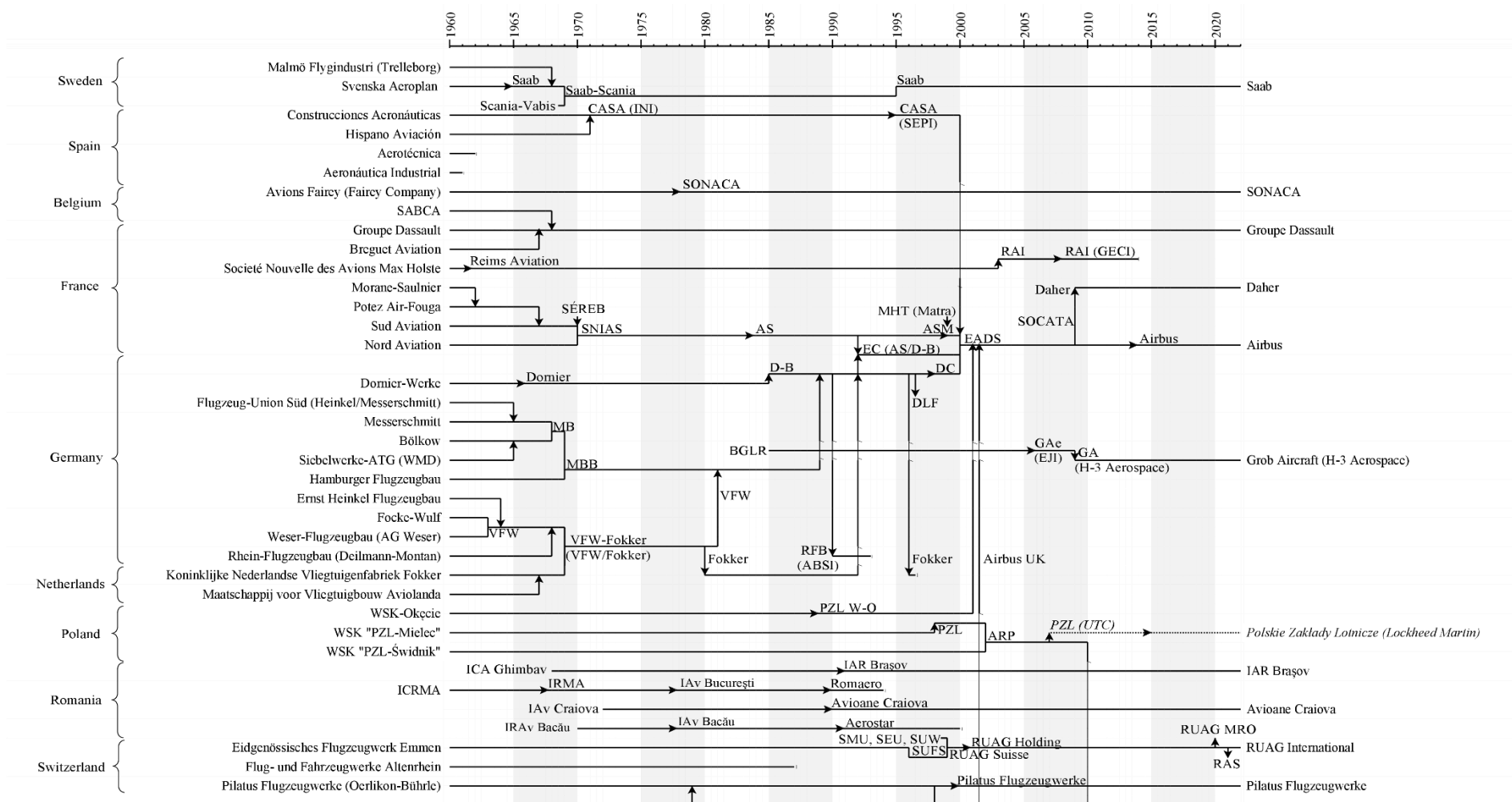
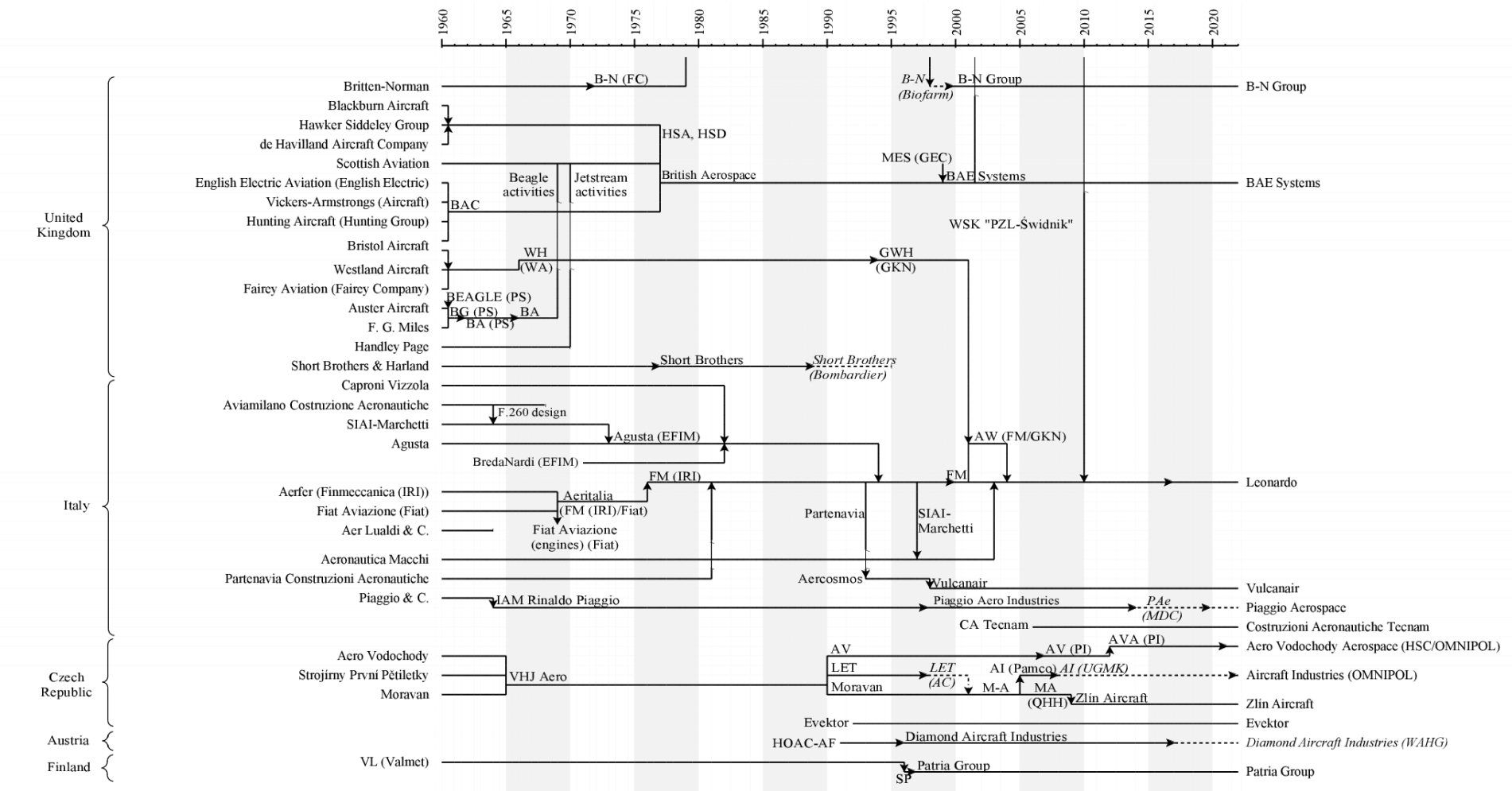


Figure 16: Restructuring of the European aircraft sector, 1960-2022 (continued)



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology. Throughout Appendix B, dashed horizontal lines and italicised designations signify that a company is under non-*European* ownership (in contrast to the figures included in Appendix A, where they signified non-*national* ownership).
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current aircraft manufacturers which are not regarded as major companies by the authors are excluded from Figure 16. Several companies are not included for the whole duration of their existence, but only for the period during which they engaged in significant aircraft manufacturing activities. Further information on the decisions made on the in- or exclusion of specific firms is provided by the notes below Figures 15-22, 24, 26-29.
- iii ABSI=ABS International; AC=Ayres Corporation; AI=Aircraft Industries; ARP=Agencja Rozwoju Przemysłu; AS=Aérospatiale; ASM=Aérospatiale-Matra; AV=Aero Vodochody; AVA=Aero Vodochody Aerospace AW=AgustaWestland; BA=Beagle Aircraft; BAC=British Aircraft Corporation; BEAGLE=British Executive and General Aviation Limited; BG=Beagle Group; BGLR=Burkhart Grob Luft- und Raumfahrt; B-N=Britten-Norman; CASA=Construcciones Aeronáuticas S.A.; CA Tecnam=Costruzioni Aeronautiche Tecnam; D-B=Daimler-Benz; DC=DaimlerChrysler; DLF=Dornier Luftfahrt; EADS=European Aeronautic Defence and Space; EC=Eurocopter; EFIM=Ente Partecipazioni e Finanziamento Industrie Manifatturiere; EJI=Executive Jet Investments; FC=Fairey Company; FM=Finmeccanica; GA=Grob Aircraft; GAe=Grob Aerospace; GEC=General Electric Company; GECI=Groupe d'Études et Conseils en Ingénierie; GKN=Guest, Keen and Nettlefolds (prior to 1986); GWH=GKN Westland Helicopters; HOAC-AF=HOAC-Austria Flugzeugwerk; HSA=Hawker Siddeley Aviation; HSD=Hawker Siddeley Dynamics; IAM Rinaldo Piaggio=Industria Aeronautiche e Meccaniche Rinaldo Piaggio; IAR Braşov=Industria Aeronautică Română Braşov; IAv Bacău/Bucureşti/Craiova=Întreprinderea de Avioane Bacău/Bucureşti/Craiova; ICA Ghimbav=Întreprinderii de Construcţii Aeronautice Ghimbav; ICRMA=Întreprinderea de Construcţii şi Reparatii Material Aeronautic; INI=Instituto Nacional de Industria; IRAv Bacău=Întreprinderea de Reparatii Avioane Bacău; IRI=Istituto per la Ricostruzione Industriale; IRMA=Întreprinderea de Reparatii Material Aeronautic; M-A=Moravan-Aeroplanes; MA=Moravan Aviation; MB=Messerschmitt-Bölkow; MBB=Messerschmitt-Bölkow-Blohm; MDC=Mubadala Development Company; MES=Marconi Electronic Systems; MHT=Matra Hautes Technologies; PAe=Piaggio Aerospace; PI=Penta Investments; PS=Pressed Steel Company; PZL=Polskie Zakłady Lotnicze (refers to the present firm; the historical abbreviation stands for Państwowe Zakłady Lotnicze); PZL W-O=PZL "Warszawa-Okęcie"; QHH=QucomHaps Holdings; RAI=Reims Aviation Industries; RAS=RUAG Aerospace Services (inkl. Dornier); RFB=Rhein-Flugzeugbau; SABCA=Société Anonyme Belge de Constructions Aéronautiques; SEPI=Sociedad Estatal de Participaciones Industriales; SÉREB=Société d'Études et de Réalisation d'Engins Ballistiques; SEU=SE Schweizerische Elektronikunternehmung; SMU=SM Schweizerische Munitionsunternehmung; SNIAS=Société Nationale Industrielle Aérospatiale; SOCATA=Société de Construction d'Avions de Tourisme et d'Affaires; SONACA=Société Nationale de Construction Aérospatiale; SP=Suomen Puolustusväline; SUFS=SF Schweizerische Unternehmung für Flugzeuge und Systeme; SUW=SW Schweizerische Unternehmung für Waffensysteme; UGMK=Uralskaja Gorno-Metallurgitscheskaja Kompanija; UTC=United Technologies Corporation; VFW=Vereinigte Flugtechnische Werke; VHJ Aero=Výrobně hospodářskou jednotku Aero; VL=Valmet Lentokonetehtas (from 1974: Valmet Lentokonetehtaat; from 1989: Valmet Lentokonetehtas); WA=Westland Aircraft; WAHG=Wanfeng Auto Holding Group; WH=Westland Helicopters; WMD=Waggon- und Maschinenbau Donauwörth; WSK-Okęcie/"PZL-Mielec"/"PZL-Świdnik"=Wytwórnia Sprzętu Komunikacyjnego Okęcie/"PZL-Mielec"/"PZL-Świdnik".

Figure 17: Restructuring of the European naval sector, 1960-2022

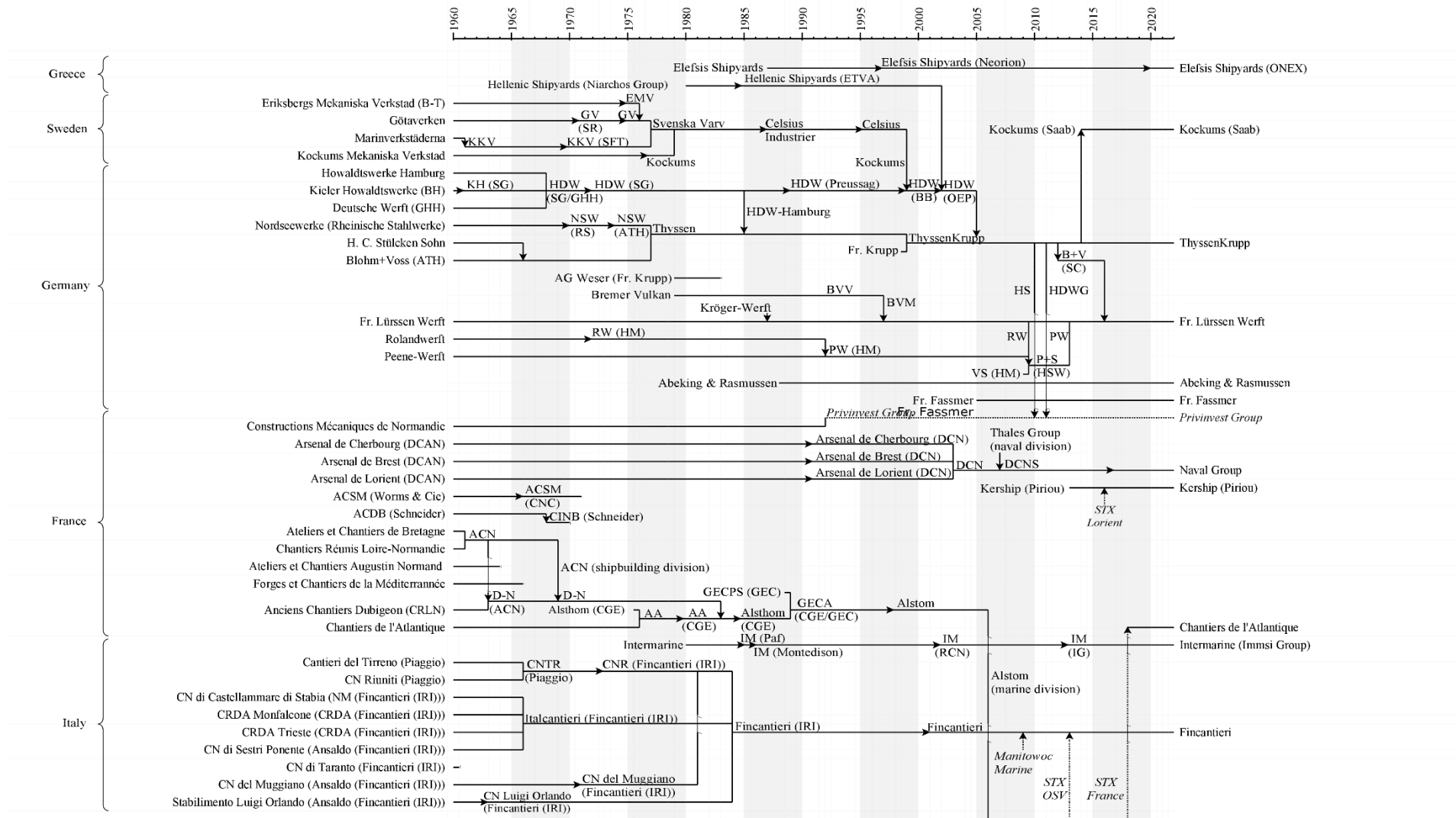


Figure 17: Restructuring of the European naval sector, 1960-2022 (continued)

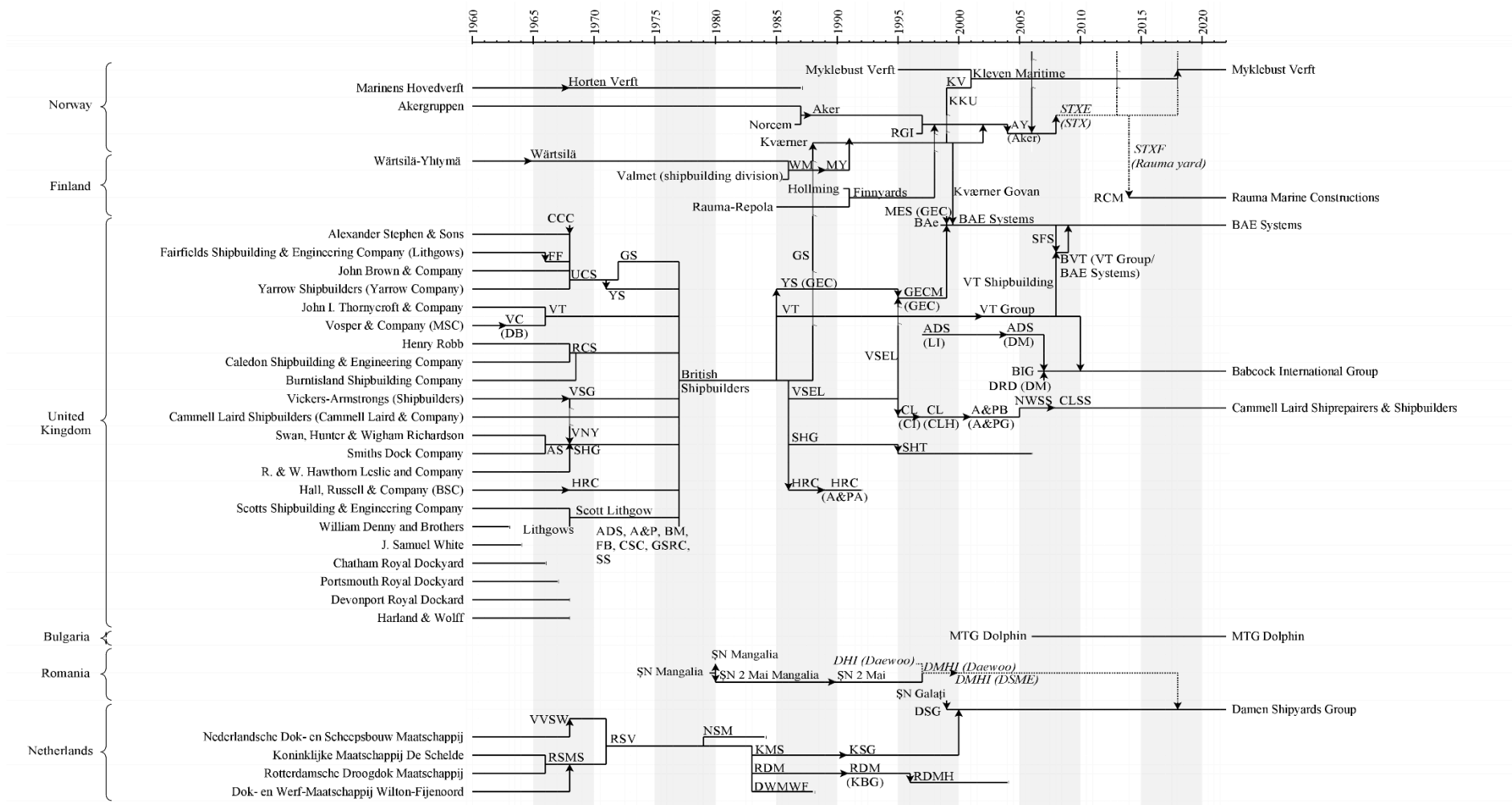
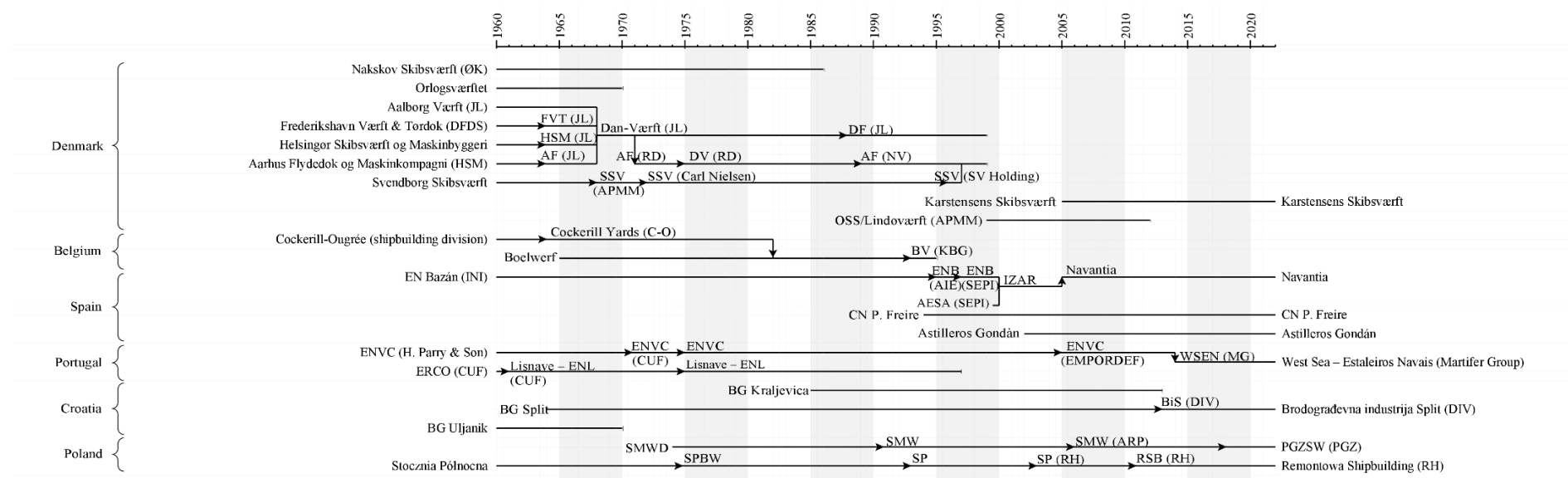


Figure 17: Restructuring of the European naval sector, 1960-2022 (continued)



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology. Throughout Appendix B, dashed horizontal lines and italicised designations signify that a company is under non-European ownership (in contrast to the figures included in Appendix A, where they signified non-national ownership).
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current naval shipbuilders which are not regarded as major companies by the authors are excluded from Figure 17. Several companies are not included for the whole duration of their existence, but only for the period during which they engaged in significant naval shipbuilding activities. Further information on the decisions made on the in- or exclusion of specific firms is provided by the notes below Figures 15-18, 20-26, 28-29.
- iii AA=Alstom-Atlantique; ACDB=Ateliers et Chantiers de Dunkerque et Bordeaux; ACN=Ateliers et Chantiers de Nantes; ACSM=Ateliers et Chantiers de la Seine-Maritime; ADS=Appledore Shipbuilders; AESA=Astilleros Españoles S.A.; AF=Aarhus Flydedok; AIE=Agencia Industrial del Estado; A&P=Austin & Pickersgill; A&PA=A&P Appledore; A&PB=A&P Birkenhead; A&PG=A&P Group; APMM=A.P. Møller-Mærsk; ARP=Agencja Rozwoju Przemysłu; AS=Associated Shipbuilders; ATH=August Thyssen-Hütte; AY=Aker Yards; BAe=British Aerospace; BB=Babcock Borsig; BG=Brodgradilište; BH=AG für Bergbau und Hüttenbetrieb; BIG=Babcock International Group; BiS=Brodogradevna industrija Split; BM=Brooke Marine; BSC=Burntisland Shipbuilding Company; B-T=Broström-Tirfing; B+V=Blohm+Voss; BV=Boelwerf Vlaanderen; BVM=Bremer Vulkan Marineschiffbau; BVT=BVT Surface Fleet; BVV=Bremer Vulkan Verbund; CCC=Charles Connell & Company; CGE=Compagnie Générale d'Électricité; CI=Coastline Industries; CINB=Constructions Industrielles et Navales de Bordeaux; CL=Cammell Laird; CLH=Cammell Laird Holdings; CLSS=Cammell Laird Shiprepairers & Shipbuilders; CN=Cantiere Navale/Cantieri Navali; CNC=Chantier Naval de La Ciotat; CN P. Freire=Construcciones Navales P. Freire; CNR=Cantieri Navali Riuniti; CNTR=Cantieri Navali del Tirreno e Riuniti; C-O=Cockerill-Ougrée; CRDA=Cantieri Riuniti dell'Adriatico; CRLN=Chantiers Réunis Loire-Normandie; CSC=Clelands Shipbuilding Company; CUF=Companhia União Fabril; DB=David Brown Corporation; DCAN=Direction des Constructions et Armes Navales; DCN=Direction des Constructions Navales; DF=Danyard Frederikshavn; DFDS=Det Forenede Dampskibs-Selskab; DHI=Daewoo Heavy Industries; DIV=DIV Tvornica vijaka; DM=Devonport Limited; DMHI=Daewoo Mangalia Heavy Industries; D-N=Dubigeon-Normandie; DRD=Devonport Royal Dockyard; DSG=Damen Shipyards Group; DSME=Daewoo Shipbuilding & Marine Engineering; DV=Dannebrog Værft; DWMWF=Dok- en Werf-Maatschappij Wilton-Fijenoord; EMPORDEF=Empresa Portuguesa de Defesa; EMV=Eriksbergs Mekaniska Verkstad; ENB/EN Bazán=Empresa Nacional Bazán; ENVC=Estaleiros Navais de Viana do Castelo; ERCO=Estaleiro da Rocha Conde de Óbidos; ETVA=Elliniki Trapeza

Viomichanikis Anaptyxis; FB=Ferguson Brothers; FF=Fairfields; FVT=Frederikshavn Værft & Tørdok; GEC=General Electric Company; GECPS=GEC Power Systems; GECA=GEC Alstom; GECM=GEC-Marconi Marine; GHH=Gutehoffnungshütte; GS=Govan Shipbuilders; GSRC=Goole Shipbuilding & Repairing Company; GV=Götaverken; HDW=Howaldtswerke-Deutsche Werft; HDWG=HDW Gaarden; HM=Hegemann Group; HRC=Hall, Russell & Company; HS=Hellenic Shipyards; HSM=Helsingør Skibsværft og Maskinbyggeri; HSW=HSW Treuhand- und Beteiligungsgesellschaft; IG=Immsi Group; IM=Intermarine; INI=Instituto Nacional de Industria; IRI=Istituto per la Ricostruzione Industriale; JL=J. Lauritzen; KBG=Koninklijke Begemann Groep; KH=Kieler Howaldtswerke; KKV=Kværner Kleven Ulsteinvik; KKV=Karlskronavarvet; KMS=Koninklijke Maatschappij De Schelde; KSG=Koninklijke Schelde Groep; KV=Kleven Værft; LI=Langham Industries; Lisnave – ENL=Lisnave – Estaleiros Navais de Lisboa; MES=Marconi Electronic Systems; MG=Martifer Group; MSC=Mineral Separation Company; MY=Masa-Yards; NV=Nordsøværftets Holding; NM=Navalmecanica; NSM=Nederlandse Scheepsbouw Maatschappij; NSW=Nordseewerke; NWSS=Northwestern Shiprepairers & Shipbuilders; OEP=One Equity Partners; ØK=Østasiatisk Kompagnis; OSS=Odense Staalskibsværft; Paf=Partecipazioni Finanziarie; PGZ=Polska Grupa Zbrojeniowa; PGZSW=PGZ Stocznia Wojenna P+S=P+S Werften; PW=Peene-Werft; RCM=Rauma Marine Constructions; RCN=Rodriguez Cantieri Navali; RCS=Robb Caledon Shipbuilders; RD=Rederiaktieselskabet Dannebrog; RDM=Rotterdamsche Droogdok Maatschappij; RDMH=RDM Holding; RGI=Resource Group International; RH=Remontowa Holding; RS=Rheinstahl; RSB=Remontowa Shipbuilding; RSMS=Rijn-Schelde Machinefabrieken en Scheepswerven; RSV=Rijn-Schelde-Verolme Machinefabrieken en Scheepswerven; RW=Rolandwerft; SC=Star Capital; SEPI=Sociedad Estatal de Participaciones Industriales; SFS=Surface Fleet Solutions; SFT=Statsföretag; SG=Salzgitter AG; SHG=Swan Hunter Group; SHT=Swan Hunter (Tyneside); SMW=Stocznia Marynarki Wojennej; SMWD=Stocznia Marynarki Wojennej im. Dąbrowszczaków; ŞN=Şantierul Naval; SP=Stocznia Północna; SPBW=Stocznia Północna im. Bohaterów Westerplatte; SR=Salénrederierna; SS=Sunderland Shipbuilders; SSV=Svendborg Skibsværft; STXE=STX Europe; STXF=STX Finland; STX OSV=STX Offshore & Specialized Vessels; UCS=Upper Clyde Shipbuilders; VC=Vosper & Company; VNY=Vickers Naval Yard; VS=Volkswerft Stralsund; VSEL=Vickers Shipbuilding and Engineering Limited; VSG=Vickers Shipbuilding Group; VT=Vosper Thornycroft; VVSW=Verolme Verenigde Scheepswerfen; WM=Wärtsilä Meriteollisuus; WSEN=West Sea – Estaleiros Navais; YS=Yarrow Shipbuilders.

Figure 18: Restructuring of the European land systems sector, 1960-2022

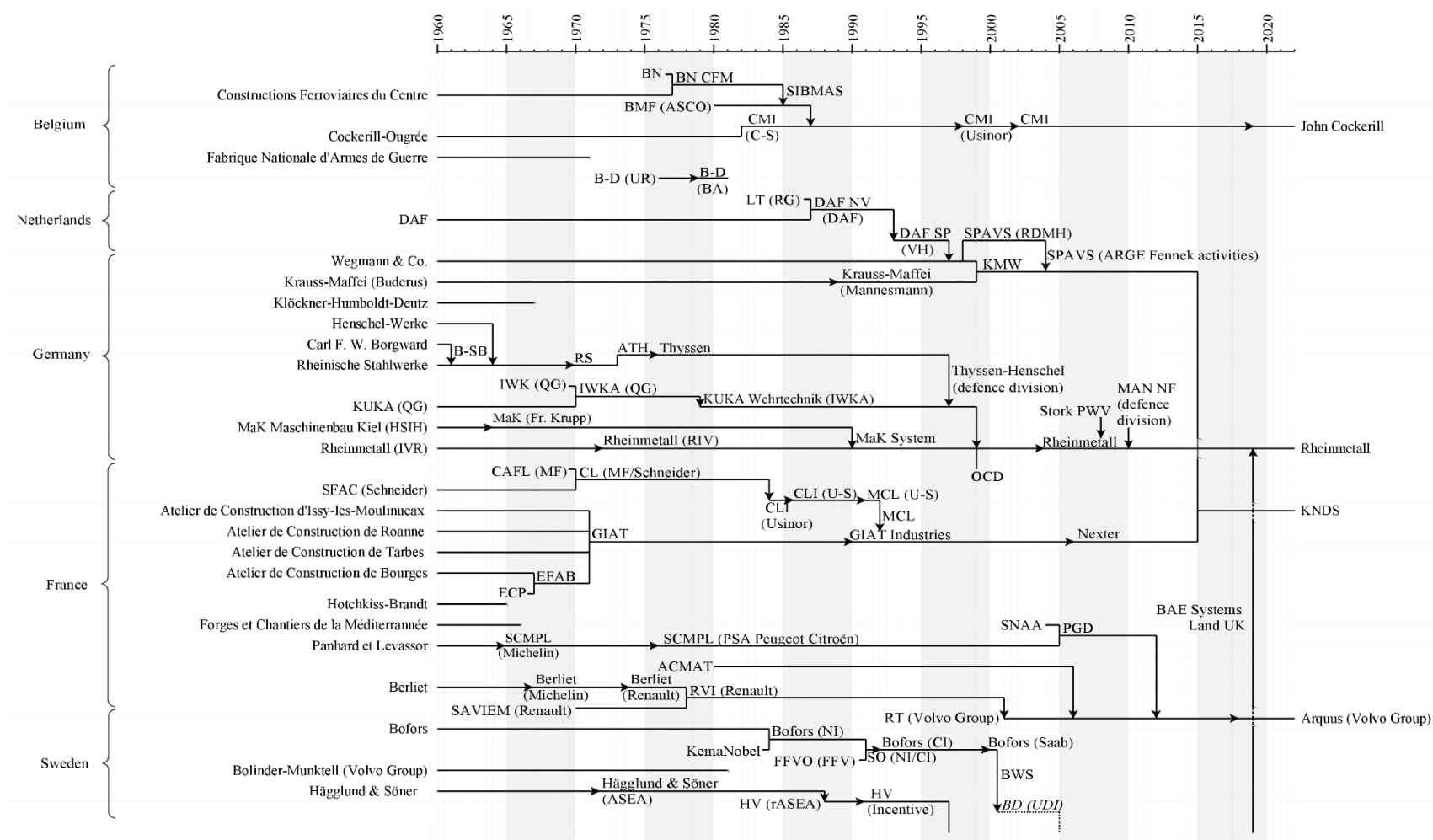


Figure 18: Restructuring of the European land systems sector, 1960-2022 (continued)

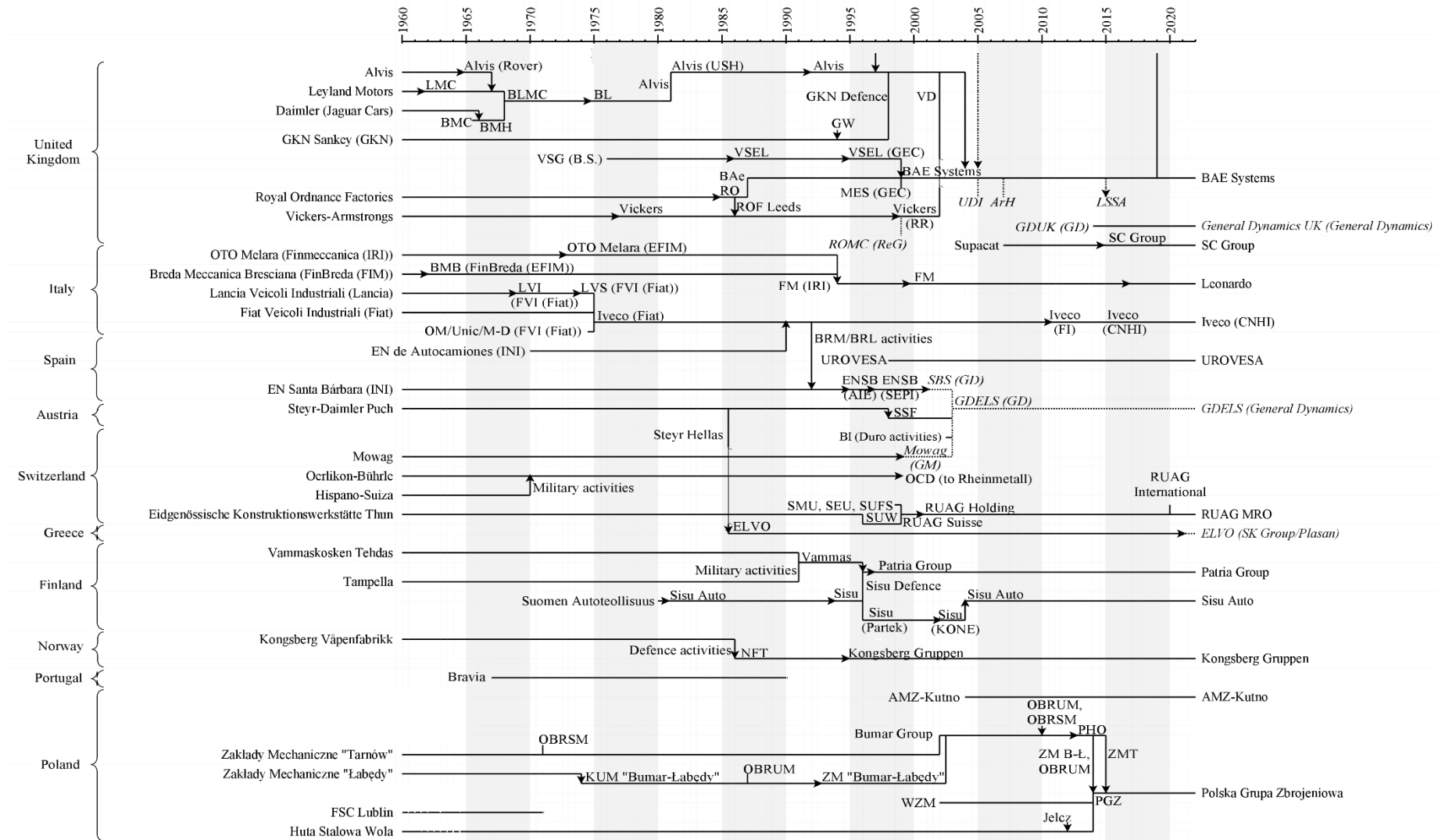
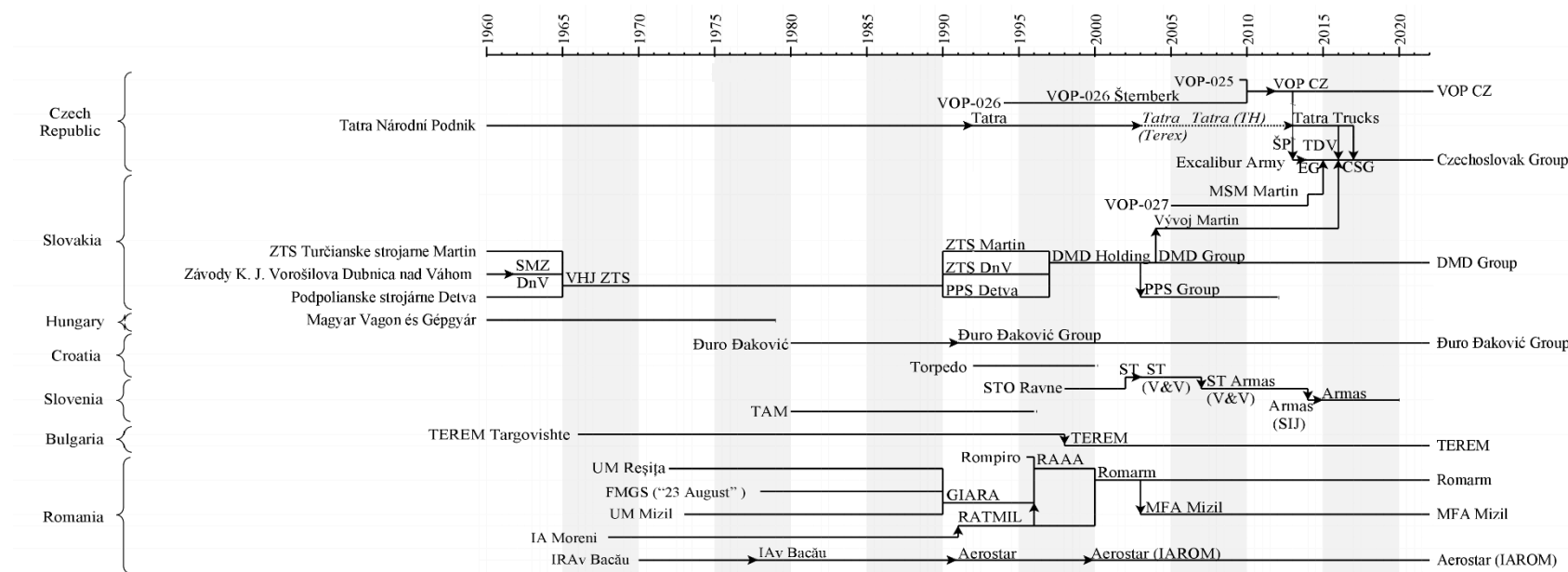


Figure 18: Restructuring of the European land systems sector, 1960-2022 (continued)



Source: Authors' illustration.

Notes:

- i See notes i and ii below Figure 1 for further information on the underlying methodology. Throughout Appendix B, dashed horizontal lines and italicised designations signify that a company is under non-European ownership (in contrast to the figures included in Appendix A, where they signified non-national ownership).
- ii Only primary system integrators and other major manufacturers to the understanding of the authors are displayed. Additional historical and current land systems manufacturers which are not regarded as major companies by the authors are excluded from Figure 18. Several companies are not included for the whole duration of their existence, but only for the period during which they engaged in significant land systems activities. Further information on the decisions made on the in- or exclusion of specific firms is provided by the notes below Figures 15-22, 24-29.
- iii ACMAT=Ateliers de Construction Mécanique de l'Atlantique; AIE=Agencia Industrial del Estado; ArH=Armor Holdings; ASEA=Allmänna Svenska Elektriska Aktiebolaget; ATH=August Thyssen-Hütte; BA=Beherman Auto; BAe=British Aerospace; BD=Bofors Defence; B-D=Beherman-Demoen; BI=Bucher Industries; BL=British Leyland; BLMC=British Leyland Motor Corporation; BMB=Breda Meccanica Bresciana; BMC=British Motor Corporation; BMF=Belgian Mechanical Fabrication; BMH=British Motor Holdings; BN=La Brugeoise et Nivelles; BN CFM=BN Constructions Ferroviaires et Métalliques; BRM/BRL=armoured vehicle programmes of Empresa Nacional de Autocamiones; B.S.=British Shipbuilders; B-SB=Bremen-Sebaldsbrück Plant; BWS=Bofors Weapon Systems; CAFL=Compagnie des Ateliers et Forges de la Loire; CI=Celsius Industrier; CL=Creusot-Loire; CLI=Creusot-Loire Industrie; CMI=Cockerill Mechanical Industries (from 2004: Cockerill Maintenance & Ingénierie); CNHI=CNH Industrial; C-S=Cockerill-Sambre; CSG=Czechoslovak Group; DAF SP=DAF Special Products; DnV=Dubnica nad Váhom; ECP=École Centrale de Pyrotechnie; EFAB=Établissement d'Études et de Fabrication d'Armement de Bourges; EFIM=Ente Partecipazioni e Finanziamento Industrie Manifatturiere; EG=Excalibur Group; ELVO=Elliniki Viomihania Ohimaton; EN=Empresa Nacional; ENSB=Empresa Nacional Santa Bárbara; FFV=Försvarets Fabriksverk; FFVO=FFV Ordnance; FI=Fiat Industrial; FIM=Fondo per il Finanziamento dell'Industria Meccanica; FM=Finmeccanica; FMGS=Fabrica de Mașini Grele Speciale; Fr. Krupp=Friedrich Krupp; FSC Lublin=Fabryka Samochodów Ciężarowych w Lublinie; FVI=Fiat Veicoli Industriali; GD=General Dynamics; GDELS=General Dynamics European Land Systems; GDUK=General Dynamics UK; GEC=General Electric Company; GIAT=Groupement Industriel des Armements Terrestres; GIARA=Grupul Industrial al Armatei – Regia Autonomă; GKN=Guest, Keen and Nettlefolds (prior

to 1986); GM=General Motors; GW=Glover Webb; HSIH=Hugo Stinnes Industrie und Handel; HV=Hägglunds Vehicle; IA Moreni=Întreprinderea Automecanică Moreni; IAROM=Industria Aeronautică Română; IAv Bacău=Întreprinderea de Avioane Bacău; INI=Instituto Nacional de Industria; IRAv Bacău=Întreprinderea de Reparatii Avioane Bacău; IRI=Istituto per la Ricostruzione Industriale; IVR=Industrie Verwaltung Röchling; IWK=Industrie-Werke Karlsruhe; IWKA=Industrie-Werke Karlsruhe-Augsburg; KMW=Krauss-Maffei Wegmann; KNDS=KMW+Nexter Defense Systems; KUM “Bumar-Łabędy”=Kombinat Urządzeń Mechanicznych “Bumar-Łabędy”; LMC=Leyland Motor Corporation; LSSA=Land Systems South Africa; LT=Leyland Trucks; LVI=Lancia Veicoli Industriali; LVS=Lancia Veicoli Speciali; MaK=Maschinenbau Kiel; MAN NF=MAN Nutzfahrzeuge; MCL=Mécanique Creusot-Loire; M-D=Magirus-Deutz; MES=Marconi Electronic Systems; MF=Marine-Firminy; MFA Mizil=Mechanical Factory for Armament Mizil; NFT=Norsk Forsvarsteknologi; NI=Nobel Industrier; OBRSM=Ośrodek Badawczo-Rozwojowy Sprzętu Mechanicznego; OBRUM=Ośrodek Badawczo-Rozwojowy Urządzeń Mechanicznych “OBRUM”; OCD=Oerlikon-Contraves Defence; OM=Officine Meccaniche; PGD=Panhard General Defense; PGZ=Polska Grupa Zbrojeniowa; PHO=Polski Holding Obronny; PPS=Podpolianske strojárne; QG=Quandt Group; rASEA=rest-ASEA; RAAA=Regia Autonomă Arsenalul Armatei; RATMIL=Regia Autonomă pentru Producția de Tehnică Militară; RDMH=RDM Holding; ReG=Reumech Group; RG=Rover Group; RIV=Röchling Industrie Verwaltung; RO=Royal Ordnance; ROF Leeds=Royal Ordnance Factory Leeds; ROMC=Reumech OMC; RR=Rolls-Royce; RS=Rheinstahl; RT=Renault Trucks; RVI=Renault Véhicules Industriels; SAVIEM=Société Anonyme de Véhicules Industriels et d'Équipements Mécaniques; SBS=Santa Bárbara Sistemas; SCMPL=Société de Constructions Mécaniques Panhard et Levassor; SEPI=Sociedad Estatal de Participaciones Industriales; SEU=SE Schweizerische Elektronikunternehmung; SFAC=Société des Forges et Ateliers du Creusot; SIBMAS=Société Industrielle Belge de Matériel Automobile Spécial; SIJ=Slovenska industrija jekla; SMU=SM Schweizerische Munitionsunternehmung; SMZ=Strojárske a metalurgické závody; SNAA=Socété Nouvelle des Automobiles Auverland; SO=Swedish Ordnance; ŠP=Šternberk plant; SPAVS=SP Aerospace & Vehicle Systems; SSF=Steyr-Daimler-Puch Spezialfahrzeug; ST=Sistemska tehnika; ST Armas=Sistemska tehnika Armas; STO Ravne=Stroji in tehnološka oprema Ravne; Stork PWV=Stork Pantser Wiel Voertuig; SUFS=SF Schweizerische Unternehmung für Flugzeuge und Systeme; SUW=SW Schweizerische Unternehmung für Waffensysteme; TAM=Tovarna avtomobilov in motorjev Maribor; TDV=Tatra Defence Vehicle; TH=Tatra Holdings; UDI=United Defense Industries; UM Mizil/Reșița=Uzina Mecanică Mizil/Reșița UR=Usines Raghen; UROVES=URO Vehículos Especiales S.A.; U-S=Usinor-Sacilor; USH=United Scientific Holdings; VD=Vickers Defence; VH=Van Halteren; VHJ=Výrobně hospodářskou jednotku; VOP-025/026/027=Vojenský Opravárenský Podnik 025/026/027; VSEL=Vickers Shipbuilding and Engineering Limited; VSG=Vickers Shipbuilding Group; V&V=Viator & Vektor; WZM=Wojckowe Zakłady Mechaniczne; ZM B-Ł/ZM “Bumar-Łabędy”=Zakłady Mechaniczne “Bumar-Łabędy”; ZMT=Zakłady Mechaniczne “Tarnów”; ZTS=Závody těžkého strojárstva; ZTS DnV/Martin=ZTS Dubnica nad Váhom/Martin.

Appendix C Additional European Defence Firms not Assessed in the Main Document

Appendix C offers additional information to our main document ‘*Six Decades of Consolidation in the European Defence Industry (1960-2022)*’, specifically to the section ‘*Comparing Today’s Major Suppliers*’. While the section ‘*Comparing Today’s Major Suppliers*’ compares Europe’s leading firms in the aircraft, naval and land systems sectors, Tables 1-3 subsequently list other companies which, while usually not considered as leading firms in the respective sectors, may nevertheless play important roles in the European defence industry. For each firm, Tables 1-3 broadly classify the defence-industrial capabilities in the respective sectors. Furthermore, some information is offered on foreign ownership.

Table 1: Additional European Aircraft Manufacturers with Moderate Capabilities (2022)

Company	Country	Capabilities	Comment on foreign ownership
Aero Vodochody	Czech Republic	3	Partly controlled by a Hungarian investor
Aircraft Industries	Czech Republic	7	Controlled by UGMK (Russia) until 2022
Avioane Craiova	Romania	3	
Britten-Norman	United Kingdom	7	Controlled by the Zawawi Group (Oman)
C. A. Tecnam	Italy	7/8	
Daher	France	7	
Diamond Aircraft	Austria	8	Controlled by the Wanfeng Group (China)
Evektor	Czech Republic	7/8	
Grob Aircraft	Germany	8	
IAR Braşov	Romania	4	Cooperation with Airbus (Trans-European)
Piaggio Aerospace	Italy	7	
PZL Mielec	Poland	7	Controlled by Lockheed Martin (US)
PZL Świdnik	Poland	4	Controlled by Leonardo (Italy)
PZL Warszawa-Okęcie	Poland	8	Controlled by Airbus (Trans-European)
Sonaca Aircraft	Belgium	8	

Notes: List is non-conclusive. Capabilities: (2) advanced combat aircraft; (3) jet trainer or light combat aircraft; (4) rotary-wing aircraft; (5) heavy transport or tanker aircraft; (6) medium transport or tanker aircraft; (7) light transport aircraft; (8) piston or turboprop trainer aircraft. Includes licensed production and major participations in national or transnational consortia.

Table 2: Additional European Naval Shipbuilders with Moderate Capabilities (2022)

Company	Country	Capabilities	Comment on foreign ownership
Abeking & Rasmussen	Germany	7	
Astilleros Gondán	Spain	6	
C. N. P. Freire	Spain	6	
Elefsis Shipyards	Greece	6	
Fr. Fassmer	Germany	6	
Intermarine	Italy	7	
Karstensens Skibsværft	Denmark	6	
MTG Dolphin	Bulgaria	6	
Myklebust Verft	Norway	6	
Piriou	France	6	
Polska Grupa Zbrojeniowa	Poland	5/6	
Rauma Marine Constructions	Finland	5/6	
Remontowa Holding	Poland	6/7	
VARD	Norway	6	Controlled by Fincantieri (Italy)
West Sea	Portugal	6	

Notes: List is non-conclusive. Capabilities: (1) nuclear-powered submarines; (2) conventionally powered submarines; (3) aircraft carriers or large amphibious ships; (4) destroyers; (5) frigates; (6) corvettes or offshore-patrol ships; (7) mine-counter-measure vessels (offshore or coastal). Includes licensed production and major participations in national or transnational consortia.

Table 3: Additional European Land Systems Manufacturers with Moderate Capabilities (2022)

Company	Country	Capabilities	Comment on foreign ownership
AMZ-Kutno	Poland	2b	
BAE Systems Hägglunds/Bofors	Sweden	2a/3/4	Controlled by BAE Systems (UK)
DMD Group	Slovakia	3/4	
Đuro Đaković	Croatia	2b	
FFG Flensburger Fahrzeugbau	Germany	2a	
Romarm	Romania	2b/4	
SC Group	United Kingdom	2b	
Sisu Auto	Finland	2b	
URO Vehículos Especiales	Spain	2b	

Notes: List is non-conclusive. Capabilities: (1) main battle tanks or assault guns; (2) other types of armoured fighting vehicles (a: tracked; b: wheeled); (3) self-propelled or towed guns/howitzers; (4) armoured vehicle turrets or weapon stations. Includes licensed production and major participations in national or transnational consortia.

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