

**THE POLITICS OF INTERNATIONAL INDUSTRIAL COLLABORATION:
THE CASE OF THE AIRBUS INDUSTRIE CONSORTIUM**

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ABSTRACT

THE POLITICS OF INTERNATIONAL INDUSTRIAL COLLABORATION: THE CASE OF THE AIRBUS INDUSTRIE CONSORTIUM.

Purpose and Theses:

This study examines the creation, development and significance of the Airbus Industrie (AI) consortium. Now the world's second largest manufacturer of commercial airliners, AI brings together the design and construction skills of Europe's premier aerospace firms. Formed under French law in 1970 as a Groupement d'Interet Economique (GIE), AI is jointly owned by Aerospatiale of France (37.9%), Deutsche Aerospace of Germany (37.9%), British Aerospace of the United Kingdom (20%) and CASA of Spain (4.2%). Having developed a family of seven technically sophisticated designs, AI has delivered aircraft to 109 customers world-wide and now claims approximately 30% of new orders in a highly competitive global market.

Since the earliest days of powered flight, aeronautics has been seen by industrialized nations as a definitively strategic industry. This status, especially of the commercial side of the business, has only been enhanced in the post-Cold War "geo-economic" environment. AI's successful penetration of the market for large commercial airframes has caused industrialists and politicians in the United States to view the consortium as a direct threat to continued American dominance in an industry whose exports make the largest single positive contribution to the otherwise dismal US balance of trade. Large and ongoing losses in the airline industry associated with the Gulf War and the global economic downturn have intensified competition among the aircraft manufacturers; Boeing has recently announced production cuts and layoffs while McDonnell-Douglas struggles for its very survival. Thus the question is asked with increasing frequency and insistence in the corridors of American corporate and political power; who or what is Airbus Industrie and why has it been able to claim such a large share of a crucial industry that was until so recently dominated by US companies?

This study seeks answers to these questions in the dynamics of the Cold War and the central role played by aeronautical capabilities in that sustained confrontation. It argues that, in harnessing the material means to deter feared Soviet aggression, the United States government directed the creation of formidable technological and organizational capabilities which gave US firms a dominant position in the era's leading economic sector; aerospace. Government and business leaders in post-WWII Western Europe were thus placed in a paradoxical situation; in assuring its own ability to guarantee the security of the Atlantic Alliance, the United States threatened to relegate its own allies to a position of perpetual economic and political subordination. Thus faced with the dilemma of simultaneous geopolitical alliance and economic competition with the world's premier superpower, European leaders responded by rationalizing and strengthening national capacities across a broad range of industrial sectors. Aerospace assumed a central role in these adaptive strategies, but as European leaders restructured their respective industrial capabilities, they soon realized that national efforts alone would remain inadequate to the challenge posed by the volume of US resources and the continental scale of the American market. In hopes of re-establishing their competitive position in this high-technology industry, these same elites therefore undertook the daunting political and organizational challenges of international collaboration.

Organization and Method:

From the perspective outlined above, European industrial collaboration through Airbus Industrie is seen as a response to an actual and perceived threat to the economic well-being and autonomy of the European nations involved. But understanding why the European partners chose to collaborate in meeting the US challenge explains neither the choice of Airbus Industrie as the mechanism for cooperation, nor why the consortium has proved so successful in its efforts to break the American monopoly. The study addresses both sets of questions, and is therefore divided into two major sections, the first dealing with the background to and initial stages of the collaborative

effort and the second with the subsequent development and success of the consortium itself.

The first section provides the conceptual and factual context for the more focussed analysis of the second. It begins by examining the dynamics of Cold War confrontation that led to American political and economic dominance of the European allies in the Atlantic alliance. It also provides evidence that the situation in the aerospace industry epitomized this unbalanced political and economic relationship, and thus sets the stage for a more detailed examination of the strategies pursued by European leaders in meeting this challenge. Given this background, separate chapters are then devoted to each of the three principal national partners in the consortium (Great Britain, France, and Germany), emphasizing throughout how the international political and economic environment influenced the restructuring of national industrial capabilities, especially the aeronautics sector. Each of these analyses includes discussion of important historical and institutional factors affecting the relationship between the political authorities and economic actors, especially the respective aerospace firms. The main points of these country profiles are then brought together in a summary of both the motives and strategies of the principal actors in ultimately engaging in this example of international industrial collaboration.

The point of the first section is to describe and analyze both the motives and means of the principal partners in their efforts to create and develop this unique and complex entity, Airbus Industrie. The second part examines in detail the internal structure and operation of the consortium, emphasizing how political priorities have interacted with technological and commercial imperatives in the design, development, production and sale of these sophisticated and expensive machines. It is based both on secondary sources and on interviews with executives of the consortium, both at the subsidiary here in the United States (Airbus Industrie of North America in Herndon VA), and at major design and production sites in Europe.

The major theme of this section is that the creation of Airbus industrie as a GIE represented a compromise between commercial imperatives imposed by American dominance of

the world aeronautics market and the dictates of national security which required that vital industrial assets remain under separate national control. In reaching this compromise, the partners chose to effectively divorce from one another the commercial and industrial competencies of the consortium, making the GIE the single interface with subcontractors and customers while retaining national ownership of the research and production facilities. But in reaching this compromise, the partners created and set into motion a mechanism of collaboration which would generate unforeseen consequences and develop an identity and momentum of its own.

Therefore, the second section of the paper has as one major focus the emergence of the GIE as an entity capable of exercising an influence in commercial aviation relatively autonomous of either the national governments or industrial partners who created it. But special attention is also paid to how obstacles to collaboration (such as logistics, language, culture and national interest) have been addressed in the structure and operation of the consortium. The research reveals that another important and related result of the compromise between commercial imperatives and national security outlined above is the unique Airbus system of business control, in which no party has the authority to impose its will on the others in the consortium. Perhaps as unintentional as was the eventual emergence of the GIE, a system of internal operation became gradually institutionalized which effectively placed the partners in roles which were simultaneously cooperative and adversarial. While seeking profits as individual subcontractors, each partner was given strong incentives to compel the others to perform their assigned functions as contractually specified, in a timely fashion and at the lowest possible cost. While somewhat cumbersome because of the sheer number and logistical difficulty of the meetings required to resolve the contentious issues arising at every phase of bringing the product to market, the system has the redeeming quality of generating creative tensions among the members, and as a result continues to produce innovative and effective solutions to technical and commercial challenges.

Finally, the study of the aerospace industry in general and the creation and development of

AI consortium in particular also provides a unique prism through which to view the dynamics of the post-WWII international political economy. Therefore, a concluding section examines lessons to be drawn in relation to inter-governmental cooperation, as well as implications for prevailing conceptions of state/market relations and the role of national governments in directing technological change. Indeed, this study is based on the theoretical proposition that the cumulative effect of states confronting the security dilemma in an increasingly industrialized context has been to condition powerfully the range of technological and organizational possibilities available to other societal actors. In acting out the dynamic of challenge and response, national governments continue to revolutionize economic activity and social relations: telecommunications, information processing and powered flight are but a few of the more important and recent examples of this process. It is hoped that this paper will add to understanding how this ancient dynamic is played out in the modern context and continues to create powerful forces and potent actors that shape today's international relations.

Chapter 5

This chapter will serve two purposes: to summarize the analysis so far, and to frame what is to follow; specifically, a study of the structure and operation of the Airbus Industrie (AI) consortium. First, a synopsis of earlier sections sketches the background to the distinctive, yet ultimately convergent, national rationales for European industrial collaboration in civil aerospace. Secondly, it then seeks to explain why European governments and firms ultimately chose AI as the mechanism for international collaboration. There were alternatives; cooperation with American firms was (and remains) an option, and a supra-national solution within the framework of the EEC was (and still is) seen by some as a preferable approach.

Finally, having situated European collaboration in civil aerospace in a broader context and having recognized that the creation of AI was a conscious political choice made among several options does not necessarily address or explain the reasons for the consortium's technical and commercial achievements, or its subsequent development into the focal point of European civil aerospace. The challenge of designing, producing, marketing and supporting such expensive and technically advanced machines is daunting enough without adding to it the logistical, linguistic and cultural complexities inherent in such an extensive transnational effort.

Thus the task here is to examine not only **why** AI became the focal point of European collaboration civil aviation, but also to learn **how** it eventually became a successful challenger to American market dominance. It should become clear that these two questions are actually quite closely linked; AI was not simply formed and then set into motion with an inherent ability to generate results that would satisfy the demands of either the industrial partners, the respective national governments, or the airlines. Rather, it is the evolution of Airbus Industrie (in response to the often contradictory demands of states, industrial partners and the market) as a corporate entity that is the most interesting aspect of this particular example of international industrial collaboration.

Understanding why and how AI has been a successful European response to the American challenge in civil aerospace should begin by examining the process that produced the consortium's first aircraft. The main substantive focus of this chapter is thus a recounting of the genesis and evolution of the A300, which became the basis for AI's eventual commercial success. This analysis will reveal the political tensions and industrial rivalries inherent in this phase of the collaborative effort, while identifying the key aspects of organizational structure and operational procedure within AI that will be the subject of more intensive analysis. But, we should begin this study by describing the environment in which the creation of an entity such as Airbus Industrie could even be conceived as a rational undertaking.

American Challenge and European Response

The dominance of American firms in the post-WWII market for civil aircraft has its roots in the geopolitics of the era. The United States fought the Cold War on a number of fronts, yet from the time of the Berlin Airlift until the fall of the Berlin Wall, an unparalleled aeronautical capacity was at the core of the US response to the Soviet threat. But the nature of the technology involved insured that the massive resources devoted to aerospace through the US government's de facto industrial policy would necessarily have an important commercial impact as well. While companies such as Douglas and especially Boeing did indeed take significant commercial risks in creating the jet airliners that have revolutionized modern society, it is clear that ultimately their technological leadership and dominant market position was owed to government funding.

European politicians and business leaders perceived the dominance of American firms in a number of key industries as a threat to political and economic independence, and sought to rationalize and strengthen their national capacities. The inadequate scale of both resources and markets was recognized as the root of European competitive disadvantage, and both national consolidation and international collaboration were employed to remedy this defect. Due to the tight

links between the military and commercial aspects of the industry, aerospace was a quintessential strategic sector, and thus received special governmental attention. But despite common imperatives, both aerospace policies (like economic and industrial policies more generally) and attempts at cross-border collaboration manifested national idiosyncracies that directly affected both the form and efficacy of the European response.

Great Britain

Post-WWII economic, industrial and aerospace policies in Great Britain reflected the influence of both historical development and recent experience. Long the bastion of classical political and economic liberalism, British elites saw inherent virtue in separating the competencies of government and private enterprise, and were thus unwilling to countenance overt and sustained state involvement in the economy. Moreover, victory in WWII, however nominal, convinced the political and industrial leadership of the essential solidity of British institutions and practices, and blinded them to the erosion of Great Britain's position in the global economic and political systems. Finally, Britain was fundamentally ambivalent in its foreign policy orientation, and indeed remains divided today on whether to rely on its 'special relationship' with the United States or to pursue a 'European vocation'.

These factors combined to produce British policies inappropriate to the new imperatives of the Cold war era. The Treasury's fixation on the external balance of payments and maintaining the value of sterling served only to exacerbate the deterioration in relative productivity that was at the root of the persistent British economic and industrial malaise. The ill effects of continued reliance on the 'invisible hand' of market forces were compounded by governmental action too erratic and unsystematic to be effective in reshaping the industrial base. This was seen quite clearly in aerospace, as government contracts were spread over too many projects and too many firms for either to be viable in a now global competition. The timid and convulsive pattern of consolidation

within the industry yielded corporate agglomeration rather than true merger; "rationalization" was thus slow to produce meaningful benefits of scale. Despite the recommendations of the 1965 Plowden Report, collaboration with other European nations foundered on the designs of pet firms such as British Airways and Rolls-Royce, especially the latter who disdained European projects in the search for the grail of American contracts.

All of these shortcomings were evident in the British attitude and behavior toward the Airbus project. A lack of clear government policy toward both industrial consolidation and European collaboration allowed Rolls-Royce to hold the entire A300 program hostage, precipitating British withdrawal and leaving firms like Hawker-Siddeley to negotiate their own terms with their European counterparts. Only the humiliating financial collapse in 1971 of Europe's premier aero-engine builder would reveal the fundamental bankruptcy of government policy, and begin in earnest the (as yet incomplete) focussing of financial and industrial assets on the real promise of a European solution to the problems of British industry.

France

Post-WWII British policies stand in contrast to those in France, where military defeat and political collapse had provided post-WWII leaders with an unambiguous mandate to restructure governmental, economic and industrial practices and institutions. But despite the novel means used in creating the "economie concertee", Jean Monnet's technocrats drew on a deep dirigiste tradition in recasting the French economy on a modernized industrial base. Though despising the inherent weakness of the Fourth Republic's political institutions, de Gaulle gladly used the fruits of economic and technological resurgence to assert the independence and grandeur of the Fifth Republic, and oversaw the creation of industrial 'national champions' that would represent France in competition against American pretensions to economic and political hegemony.

As exemplified in the 'force-de frappe', a tightly knit military-industrial complex reliant on

exports to lower procurement costs was a crucial element of French resurgence. Aerospace received particular attention, as both Dassault's planes and personage were a major source of prestige and political influence, both within France and abroad. But civil aviation was not neglected, as Dassault's monopoly position in fighter aircraft (after its merger with Breguet in 1967) was eventually mirrored in commercial ventures, as the numerous French aerospace firms surviving WWII were gradually consolidated through the selective use of government research and procurement funds. With the culmination of the process of rationalization in the creation of Aerospatiale in 1970, it became the only French builder of military transports, helicopters and (following Dassault's brief but disruptive attempt to return to the civil market in the early-1970s) the sole French firm in civil airframe design and production. Already SNECMA had been designated the national instrument in military engine research and construction, and was encouraged in the late 1960s to extend its expertise into civil engine technology.

In addition to state-led rationalization, French aerospace firms, both private and nationalized, had long been involved in collaborative efforts as a means of strengthening national assets and lowering costs. Although reluctant to share combat aircraft development, government-directed participation in troop transport and civil projects was part and parcel of the effort to rationalize national aerospace assets. While Nord had played the leading role in the NorAtlas and Transall collaborative programs, Sud Aviation gradually emerged as the favored French representative in major collaborative efforts like the Concorde.

Following the 1970 merger of Nord and Sud, Aerospatiale inherited all collaborative obligations, including participation in A300 project, and consistent with the French role in earlier collaborative efforts, played a leading role in establishing the consortium. Having successfully negotiated that final assembly (except for the new A321 model) and flight testing of all Airbus aircraft be located in Toulouse, the French have used their participation in AI to make the Haute-Garonne region into a major 'technopole', drawing firms from all over France, Europe and the

world to service the burgeoning industry. Clearly, political and industrial leaders have seen collaboration in European civil aerospace, including France's major role in Airbus Industrie, as an important component of a larger strategy of national resurgence.

Germany

German economic, industrial and aerospace policies share aspects of those of their eventual partners in collaboration, yet also have characteristics peculiar to the unique situation of Germany in post-WWII Europe. Having, like its counterparts, been a leader in the theory and practice of powered flight, Germany found itself after the defeat of the Third Reich prohibited from having an indigenous aviation capability. Although the ban was lifted after about 10 years as the increasing scope and intensity of the Cold War necessitated West German rearmament, the aeronautics industry remained fragmented and starved of resources well into the 1950s.

Lacking a base of domestic programs, Germany depended heavily on both licensed production and international collaboration to rebuild its national aeronautical capacities, often having to accept a subordinate role because of both political and industrial disabilities. While the Americans (by virtue of their uniquely influential position relative to German political and especially military behavior) supplied most of the early work for German firms, cooperation with the French was also a means to demonstrate European credentials and gain expertise. The Noratlas and Transall troop transport projects were the most important of the early Franco-German efforts, but Germany has also played a major political and industrial role in the Tornado fighter aircraft project with the Italians and British, even if the fate of its successor (EFA, or now Eurofighter 2000) is at best uncertain.

Perhaps as importantly, participation in collaborative efforts drew German firms into closer working relations with one another, thus providing impetus to the gradual, yet ultimately quite thorough, process of industrial consolidation in aerospace. Indeed it is somewhat ironic, given the

neo-liberal rhetoric of the architects of the social market economy, that Germany today has the most tightly integrated aerospace sector among the major European powers. While quite unlike the dirigiste rationalization across the Rhine, neither has the German consolidation in aerospace been hampered by British-style reservations concerning the active encouragement of mergers really effective in creating benefits of scale. Rather than direct government intervention, the state has used the uniquely German attitude and practice regarding the regulation of competition and economic concentration to direct the grouping of all major aerospace assets into Deutsche Aerospace, and place them under a single corporate banner, that of Daimler-Benz.

Yet in the early 1960s, the German aerospace industry was still fragmented into jealously competitive firms and riven by regional divisions. Significantly, it was the firms who worked together in collaboration with the French that would coalesce into larger units that formed VFW, based in Bremen and later linked to the Dutch firm Fokker. Their major competitor, MBB (based in Munich and formed in 1972), was also an amalgamation of firms that had formerly collaborated. And it was the firms who had cooperated on the Transall project with Nord of France which formed first the study group and then the working coalition that would become Deutsche Airbus and manage German participation in its largest civil project to date. For the Germans, the Airbus program promised to serve as a ticket of entry into the big leagues of world aviation, although it provided no guarantee of success.

The Primacy of Politics

This brief summary of the policy orientations of the three major partners in AI has portrayed both national consolidation and international collaboration in European civil aerospace as complementary responses to political, economic and industrial imperatives inherent in US domination of the era's leading sector. While the steep learning curves and powerful ripple effects intrinsic to aeronautical technologies were certainly important contributing factors, it was primarily

the logic of national self-interest, rather than technological or economic necessity, that was behind the decision to collaborate. This view thus rejects neo-functionalist interpretations of industrial collaboration which assert that political decisions to cooperate across national borders result from technological or economic conditions whose scope or scale necessitate a trans-national solution. Rather, while a decision to engage in trans-national collaboration may be a logical and rational strategy, "it is more accurate to assert the primacy of political choice over deterministic explanations."¹

It follows from this perspective that both the choice to collaborate and the exact form this cooperation assumes are powerfully shaped by national characteristics of the type outlined in the previous section. Each national partner brings to the negotiations, agreements and eventual ventures a unique set of concerns, strengths and weaknesses that affect the entire collaborative process. Therefore; "Collaborative projects are from inception to production opportunities for political choice, they do not automatically suggest that a participant is committed to, or always accepts the validity of a particular strategy of aerospace policy."²

The inherently political and open-ended nature of collaborative arrangements implies that both the creation of AI in December 1970 and its subsequent development was a calculated yet inherently indeterminate compromise solution capable of generating unanticipated consequences for all involved. As will be seen in the next section, while the creation and early history of the consortium reflects clearly the influence of national political priorities, the gradual assertion of technical and commercial considerations in response to market imperatives impelled the emergence of the newly formed organization as a relatively autonomous actor in global aviation.

¹Keith Hayward,"Politics and European Aerospace Collaboration: The A300 Airbus." Journal of Common Market Studies 14, No.4,(June 1976), pp.354-367:356. Hayward follows Henry Nau in criticizing integration theorists who see political cooperation as a necessary consequence of technological and economic interdependence, or as simply one step on the road to greater integration.

²Ibid.

From the A300 to the A300B

There had been in Europe since the early 1960s ongoing discussion of the need for and possible configuration of a so-called "Airbus"; a craft that would provide air transportation for large numbers of people (200-300) over short to medium hauls (800-1200 nautical miles). Design studies were conducted with the relatively (compared to the US) short distances between the urban populations of Europe in mind, and the whole idea evoked the moving of masses of people at low cost with few frills. The French and British governments set up a joint committee in early 1965 to evaluate prospects, but established no design specifications or formalized working procedures. French and British aviation firms also took an active interest in these discussions of configuration, range and cost, and produced a number of interesting if not completely practical designs, both separately and in conjunction with one another.³ Along with the industrialists, in October 1965 the major European airlines had also put their heads together on these requirements, and proposed designs converged around "jumbo-twin" configuration having two engines and two aisles, something as yet untried.⁴ These early discussions also drew the interest of the Germans, first at the Paris Airshow in July of 1965, where seven firms formed Studiengruppe Airbus to discuss design specifications with their French counterparts.⁵ On 23 Dec 1965 it was converted into Arbeitsgemeinschaft (Arge) Airbus, which became the German partner in the A300 project.⁶

³Bill Gunston [Airbus, Osprey, 1988] and Arthur Reed [Airbus:Europe's High Flyer, Norden, 1991] both provide informative and amply illustrated descriptions of the forerunners of the A300.

⁴Interestingly, Frank Kolk, the technical Director for American Airlines had in April 1966 specified projected requirements for an aircraft that looked remarkably similar to the eventual Airbus design. Called "the Kolk machine", on the drawing boards of the American airframe designers it metamorphosized into the tri-jets later produced by Lockheed (L-1011) and Douglas (DC-10).

⁵Gunston(op.cit.:14) lists the seven firms as ATG Siebelwerke, Bolkow, Dornier, Flugzeug-Sud, HFB, Messerschmitt, and VFW.

⁶Pierre Muller. Airbus: L'Ambition Europeenne. L'Harmattan, 1989.:48 "In December 1965, the Germans transformed the study group into a more formal structure regarding the Airbus project (Arbeitsgemeinschaft [sic] Airbus) which brought together the principal industrial firms (Dornier,

Eventually, the discussions among airlines and the aeronautics industry became serious enough for the respective governments to become directly involved by selecting national firms to participate in more formal negotiations. The most important aspect of this development was that the selection of firms for collaboration on the proposed Airbus "obeyed, in each country, strictly national considerations."⁷ In fact, the French and British choices of representatives almost seemed calculated to disrupt existing cross-border working relationships. As a result, in January 1966 Hawker-Siddeley (HSA) found itself paired with Sud, although the British firm had worked well with both Breguet and Nord in designing the HBN-100, which closely resembled the eventual Airbus A300.⁸ For its part, Sud was the already the French partner in the Concorde project along with British Aircraft Corporation (BAC), and so had to establish working relations with its new partner during 1966. September 1966 saw the first meeting at the board level for the companies selected, and on 15 October 1966 produced a formal request for funds from the three national governments, along with first brochure describing the A300. 9 May 1967 saw the first meeting at the ministerial level, bringing together: for Great Britain, John Stonehouse (Minister of State for Technology); for France, Andre Bettencourt (Minister of State for Foreign Affairs); and Dr. Johann Schollhorn (State Secretary at the Economic Ministry) for the Germans. Research and development costs were estimated and work-shares discussed. A follow-up meeting on 25 July 1967 (with French Transport Minister Jean Chamant taking Bettencourt's place) became the basis for the formal Memorandum of Understanding (MoU) signed 26 September 1967. Although the MoU "did not authorize a final go-ahead for an A300 development program", a final design of the A300 was to be specified by July

Hamburger Flugzeugbau, Messerschmitt-Bolkow, Siebel and later, VFW).

⁷Muller(op.cit:50).

⁸I will not pretend to resolve the dispute over the exact parentage of the A300. Gunston (op.cit.:19) has "no hesitation in stating that the HBN.100 and its successor, the A300, had their genesis principally at Hatfield." But Muller(op.cit.) specifically takes Gunston to task on this saying there is no single antecedent aircraft.

1968, after which a prototype phase could begin.⁹

The MoU specified that work on the airframe was to be shared among the member countries according to the formula: Great Britain 37.5%, France 37.5%, and Germany 25%. This division of labor and responsibility reflected a predictable and well-worn approach to such collaborative projects. Since Hawker-Siddeley would work entirely on the wing of the aircraft, the British were effectively granting France the leading role on the fuselage and cockpit, with the latter aspect providing especially important work in overall systems integration. In return, the British would have almost complete control of the engine project, with Rolls-Royce having 75% of the work and sub-contracting about 12.5% each to the French and German partners, SNECMA and MAN. Again, this arrangement was typical of past Franco-British collaboration; the French had almost always sought control of the airframe, and "when a cooperative project was envisaged, the primary concern of the British representatives seemed to be assuring leadership for Rolls-Royce on the engine."¹⁰ And as in the past, in both facets of the program the Germans were left with only a supporting role, yet could reasonably expect no more at this juncture. Still, the members of Arge Airbus used the impetus of the negotiations to further formalize their working relationship, and formed Deutsche Airbus GmbH in 1967.¹¹

Reflecting the divergence in national priorities, division between the British and their partners concerning the choice of engines for the aircraft was already evident by the time the initial MoU was signed. Since the early stages of project definition, both the French and Germans had argued that the A300 should be powered by Pratt and Whitney (P&W) JT9D engines, developed

⁹Mark Lorell, Multinational Development of Large Aircraft, Rand, 1980:55.

¹⁰Muller(op.cit.:47).

¹¹Muller(op.cit.:49) says "At the beginning of 1967, the structure was again transformed with the creation of the company Deutsche Airbus which brought together (20%) each, the five principal firms involved in the Airbus project." Lorell(op.cit.:61) lists the five firms comprising Deutsche Airbus as VFW, Messerschmidt, Siebel, Hamburger, and Dornier, which matches Muller's list (see footnote #6).

for and recently ordered by Boeing for its new 747. For the French, having SNECMA (already tooled to P&W specifications) build the JT9D on license would provide valuable engineering expertise, while the Germans wanted the A300 to have engine commonality with Lufthansa's substantial fleet of Boeings. Even the British were not in total agreement amongst themselves; the other British engine builder, Bristol-Siddeley Engines (BSE), hoped to act as an important subcontractor to P&W and SNECMA on the JT9D. These proposals were successfully resisted by Rolls Royce, who, in a bold move, bought out BSE in September 1966, thus removing any domestic industrial resistance to its plan to be the prime engine contractor on the Airbus.¹² So despite the concerns of the other partners, "the RB-207 was chosen for the Airbus not because it was the best choice economically, commercially, or technologically, but because its choice had become prerequisite to British participation."¹³

Allowing Rolls-Royce to offer an as yet untested engine for the A300 added substantial risk to the project. The technical considerations raised were compounded by the desire (especially keen since having its RB-178 rejected as the powerplant for the 747) of Rolls-Royce to penetrate the American market with a new engine designed to fit the proposed tri-jets, even while retaining dominance of the European scene as well. Realizing that the RB-207 proposed for A300 would be too large for the American application, Rolls-Royce approached HMG for launch aid on a smaller and even more experimental model, the RB-211. A figure of 40 million pounds was agreed, contingent on an American order, and the company spared no effort in the competition with the

¹²Keith Hayward in Government and British Civil Aerospace notes that after the BSE merger Rolls was able to dominate British aerospace policy because there existed no effective industrial counterweight in Britain, especially since merger negotiations between HSA and BAC had collapsed earlier that year. In particular see Chapter 3 (pp.69-98) on the influence of Rolls-Royce on British aerospace policy.

¹³Hayward, Government and British Civil Aerospace.(op.cit.):82 Similarly, Muller(op.cit:59) asserts that "British participation, from the beginning was built around the use of Rolls-Royce engines."

established US builders and shocked the aviation world by eventually signing on Lockheed in March 1968.¹⁴

The transatlantic ambitions of Rolls-Royce were to prove an insurmountable obstacle to maintaining British participation in the A300. Rolls-Royce now had two new engines to develop, and it soon became clear where its priorities lay; "almost overnight David Huddie and his team at Derby pushed the European Airbus into their No 2 spot."¹⁵ But "the British government so valued Rolls-Royce as a national technological and economic asset that it quickly adopted the company's technological and financial goals as its own."¹⁶ Further alienating British governmental support for the project was the fact that the A300 was fast approaching the "go, no-go" decision date of July 1968 without a single firm order. Over the months since its first definition, the aircraft had "grown" substantially in projected size and capacity, while Rolls-Royce continued to promise whatever thrust would be necessary. "Because industrial and political considerations had played a more important role in shaping the A300 than airline requirements, most European carriers were dissatisfied with the proposed aircraft's specifications."¹⁷

So by mid-1968, there was deep suspicion on the part of the airframe designers and engine builder alike concerning the other's ability to deliver a viable product. But the resulting impasse proved a crucial turning point in the history of the consortium, because it marked the beginning of the gradual ascendance of technical and commercial criteria in the development of what had been heretofore primarily a political aircraft. Realizing that the entire project was in real danger of

¹⁴Hayward in Government and British Civil Aerospace (op.cit.:89) notes that knighthoods were given to two Rolls-Royce executives for their efforts.

¹⁵Gunston(op.cit.:22).

¹⁶Lorell(op.cit.:53).

¹⁷Lorell(op.cit.:56).

collapsing, Henri Ziegler, appointed head of Sud in July 1968¹⁸, convinced the French government to give the A300 program a 3-month window of time within which to render itself commercially credible. Around Roger Beteille (then Director of the Airbus Program at Sud) and Felix Kracht, Ziegler gathered a small team of engineers to secretly redesign the aircraft.¹⁹

What emerged in December of 1968 was a 250 seat plane with a smaller fuselage, weighing much less than its predecessor, and now called the A300B. But the most important feature of the new plane was that the RB-207 would no longer be the sole engine offered; the A300B was really designed around existing American engines; P&W's JT9D and General Electric's CF6. These initiatives placed the British government in an awkward position, since the design changes actually addressed two of its primary complaints about the aircraft; rising costs (due in large part to the development of a new engine), and a lack of marketability. But since both the RB-207 and the RB-211 were experiencing serious performance problems and big cost over-runs, it was clear that the initial British position was in the European project fatally compromised. "The alternative was thus between pursuit of the program while renouncing the exclusivity of Rolls-Royce, or retreat pure and simple."²⁰

A British decision to withdraw from the project had been made even more likely by recent events in both the diplomatic and industrial arena. The French had already unilaterally and summarily pulled out of from the Anglo-French AFVG project in June 1967, while the infamous Concorde continued to produce nothing but red ink and ridicule. Adding insult to injury, de Gaulle had rejected Britain's application for membership in the EEC at the end of that same year, a move that provoked ire in both political and industrial quarters throughout Britain. So while not a

¹⁸Ziegler had been Chief of Staff of the Free French forces in London during WWII, the first director-general of Air France, and head of Breguet Aviation before coming to Sud.

¹⁹This episode is recounted in virtually all sources on Airbus Industrie, and occupies a prominent place in the lore of the consortium.

²⁰Muller(op.cit.:60).

foregone conclusion, few were surprised when the Wilson government chose to interpret the proposed design changes as an abrogation of the original 1967 MoU. Despite representations at the highest political level to resolve the issue (Chancellor Kiesinger and Prime Minister Wilson met in Bonn February 1969), Great Britain officially pulled out of the A300 program 10 April 1969.

It was widely assumed at this juncture that the Airbus program would simply collapse; there were no orders, and one of the two leading governmental partners had withdrawn its political and financial support. But although seeking constantly to retain full British participation, the French and Germans had already determined to press on together, and signed on 29 May 1969 a new MoU, "for the first time taking them into the great and exciting area of big money and real risk."²¹ Beyond being a more modest project "the new document represented a fundamental change in approach in that it stressed cost, commercial, and market factors above other considerations."²² It was agreed that the governments would allow the industrial partners identify and find solutions to technical problems without undue interference, while the engineers were to use designs and components providing maximum congruity with airline preferences while minimizing costs and development delays. This meant the use of standard technology and proven off-the-shelf systems where possible, and so numerous American components were used for speed and simplicity.²³

In view of the difficulties created by the recent British withdrawal, the MoU bound both governments to fund the project to completion, even in the event of default by the industrial partners. The agreement also formalized working relations, both between the governments and among the firms, but stopped far short of creating a single entity to manage the project. Rather, an intergovernmental committee was to approve proposals and arbitrate disputes at the industrial level,

²¹Gunston(op.cit.:25).

²²Lorell(op.cit.:59).

²³The most important of these components was of course the engine, but the A300B shared numerous other systems with its competitors. See Lorell(op.cit.:60) for a listing of some of these.

and an executive committee would implement its findings through existing governmental channels. With a view to the eventual establishment of a genuinely mutual decision-making structure, the French partner was assigned the leading industrial role: "The Executive Agency would place contracts with Sud, which in turn would contract with Deutsche Airbus."²⁴

The Germans could accept the new situation because it was recognized that the A300B still provided "a unique chance to reestablish a foothold in civil aviation."²⁵ But neither the industrial partners nor the German government were prepared to concede the removal of what both considered a vital British role in the project. For the German industrial partners, British withdrawal was a mixed blessing since it offered both a chance to increase their share of the A300B project, but also removed an important counterweight to traditional French leadership, indeed domination, of such cooperative ventures. For its part, aware of Hawker-Siddeley's bitter reluctance to accept British withdrawal from the project, "the German government decided--and this is a measure of its will to push the project through-- to share in the expenses of the development of the wing, thus substituting itself for the British government."²⁶ This was a means of maintaining valuable British engineering and industrial contact with the Airbus, while hoping for an eventual reconsideration by the government.

And as a measure of its own commitment to the A300, Hawker-Siddeley signed (at the Paris airshow in July 1969) an agreement which included providing about \$30 million of its own funds to act as a private subcontractor to provide wing-boxes for the prototype aircraft, and to continue work

²⁴Lorell(op.cit.:61). Also see his chart (p.61) on the evolution of the governmental and industrial arrangements coordinating the A300B project.

²⁵Muller(op.cit.:70).

²⁶Muller(op.cit.:71). More specifically, Ian MacIntyre says that "Karl Schiller, the SPD finance minister in the grand coalition, and Franz Joseph Strauss, who was defence minister at the time, gave their backing to the idea that West Germany should not only match the French contribution but also find the 60 percent of the development cost of the wing that Hawker-Siddeley was not able to meet." Ian MacIntyre, Dogfight: The Transatlantic Battle over Airbus. Praeger, 1992:24.

on wing development. The new division of work involved having some of the wing's movable parts assembled in Bremen before going on to Toulouse for final fitting. These arrangements were further complicated by the entry of the Dutch into the program, sparked by the merger in May of 1969 of VFW and Fokker of Amsterdam; the Dutch government agreed on 28 December 1970 to contribute 6.6% of A300B development costs in exchange for work on slats and flaps being transferred to Holland.²⁷

From Minority to Majority: The Emergence of the GIE

The introduction of new partners and the complexity of the work-sharing arrangements in the A300B project compounded the difficulties of its primary members, France and Germany, in establishing a mutually satisfactory entity to manage the collaborative effort. Yet existing arrangements provided simply for coordination, and the only entity representing the project to the rest of the world was "Airbus International", a small organ set up in the 1969 MoU. Authorized only "to quote firm prices and delivery schedules to clients..., it was "for the moment only a sales office."²⁸ For their part, the French, already dominating the existing arrangements, wanted a skeletal oversight body. But since they were now equal partners (actually a bit more in terms of actual financial contribution), "it was clear that the Germans did not have the intention of playing a secondary role indefinitely...and saw a strong organ as the only means to protect their influence in the program."²⁹ Long and sometimes acrimonious negotiations resulted in the creation 18 December 1970 under French law of a corporate entity known as a Groupement d'Interet Economique (GIE) to be called Airbus Industrie. Its only shareholders were Aerospatiale and

²⁷There were attempts throughout this period to bring the British back into the project on a formal basis, culminating in a final British refusal in December 1970.

²⁸Muller(op.cit.:72).

²⁹Ibid.

Deutsche Airbus (now comprised of VFW and the MBB grouping, Dornier having dropped out), with Hawker-Siddeley and Fokker acting as risk-sharing subcontractors.

As a form of corporate organization, members of a GIE retain ownership and management of productive assets, yet agree to be jointly and severally responsible for any obligations incurred as the result of their mutual participation in designated projects. For its part, the GIE proper coordinates the activities of the partners relative to the project, and may assume specified management functions as required. In the case of Airbus Industrie, the partners committed themselves as contractors to deliver components to the others in specified state of completion. A Board of Directors comprised of 5 members from each partner was created, and its first President was Franz Joseph Strauss. There was also a Management Committee supervised by a Managing Director, the first of whom was Henri Ziegler, then President of Aerospatiale, a position he held until 1975.

The new entity was to serve three primary functions: 1) provide a single interface with clients, arranging commercial terms, payment and service, 2) assure technical and industrial coordination, including product definition and work-sharing, and 3) conduct flight-testing. This first of these would prove especially significant, because in delegating commercial responsibilities to the GIE, the partners had placed between themselves and the market an entity which could effectively perform its assigned responsibilities only by exercising a degree of autonomy not yet imagined by the partners, or indeed, by the GIE itself. So although not yet apparent, the actual execution by the GIE of its functions as defined by the partners would reveal that actually "the accord marked the end of a certain type of industrial collaboration, in which one of the partners would necessarily exercise leadership of the program."³⁰

This transformation had actually already begun during the 1968 dispute over the RB-207 that resulted in a redesigned aircraft and British withdrawal from the project. The way in which the A300

³⁰Muller(op.cit.:74).

was redefined - both its configuration and choice of engine - reflected the ascendancy of commercial or market considerations over political ones, or the beginning of what Muller calls the displacement of the "logic of the arsenal by the logic of the market."³¹ In this view, the early stages of the A300 program had represented "the consecration of the logic of the arsenal, since the aircraft and engine builders were both chosen according to a rationale that was fundamentally political."³² But the industrial partner's acceptance 10 December 1968 of Ziegler's redesigned aircraft began the inversion of this logic and the assertion of commercial over political concerns within the nascent organization. The use of standard components, especially the GE CF6-50 engines showed that technical and market criteria had become the litmus test for product definition. This represented the triumph of the engineers; "the least one could say was that Henri Ziegler had forced the hand of the responsible politicians...likewise Roger Beteille and Felix Kracht had presented their industrial partners with a *fait accompli*."³³

The British pullout which followed the redefinition of the A300 only served to accelerate the pace at which commercial considerations began to take clear precedence over political ones. In Gunston's view, there was "one unquestionably beneficial result of British withdrawal at the government level: it eliminated British Ministry influence on the design."³⁴ So after the French and Germans agreed to press on in December 1970, Airbus Industrie could concern itself with developing and marketing the A300B, and actually adhered quite closely to the schedule laid out

³¹Muller(*op.cit.*). This is the main theme of his book on Airbus.

³²Muller(*op.cit.*:53).

³³Muller(*op.cit.*:58).

³⁴Gunston(*op.cit.*:31). Gunston sees British policy toward the aircraft industry in general and toward the Airbus program in particular as short-sighted and ultimately damaging to the country's industrial and economic health. He notes that the government's withdrawal from the A300 project meant that skilled British engineers were recruited to both France and Germany, and that many smaller British firms that might have benefitted from sub-contracting work were denied the opportunity.

in the original 1967 MoU. Two basic designs, the B2 and the B4, were settled upon, and prototype development and flight testing went forward with the GE engines. The first fuselage was assembled in September 1971, and in that November the first pair of wings was shipped from Britain to Toulouse in a "Super Guppy". Landing gear was attached in January 1972, and systems testing progressed throughout the year. First roll-out of the A300B was on 28 September 1972 (face-to-face with a Concorde at Toulouse)³⁵, and the first flight was one month later, on 28 October 1972. "The technical bet was thus won. Airbus Industrie had proven the industrial and technical feasibility of the program."³⁶

The remarkable smoothness of this process was evidence not only of the technical ability of the engineers and flight crews, but was also an important phase in the gradual emergence of Airbus Industrie as an autonomous and significant entity in civil aeronautics. For not only had technical and commercial imperatives shaped the overall design of the aircraft³⁷, their influence was also being felt in the organizational structure of the collaborative effort. Indeed, high-profile political turmoil had masked ongoing developments of real significance at the organizational level, where Roger Beteille and Felix Kracht had painstakingly been using market-like incentives to elicit "on time and on cost" performance on the part of the partners. For Beteille and Kracht, "the principal idea from the beginning and which remains the basis of the industrial organization is that each participant is completely responsible for the element they must construct..."³⁸

³⁵Muller(op.cit.:81) notes that the Airbus was now a physical reality, and "particularly significant from this point of view was the fact that henceforth Airbus would be written with a capital letter. What had been up until then a common name had become a proper name."

³⁶Ibid.

³⁷Gunston and Muller both observe that the extent to which commercial considerations ultimately determined the aircraft's design is exemplified in the late (but later proven wise) decision to expand slightly the fuselage diameter so as to accommodate the new LD3 cargo storage containers developed for the wide-bodies.

³⁸Muller(op.cit.:55).

This concept was carried directly over into the structure of Airbus Industrie itself. While final assembly would be handled by Aerospatiale in Toulouse, the finished aircraft were transferred to Airbus Industrie, who was wholly responsible for customer relations, including eventual delivery and after-sales support. What this meant in practice was the diminution of the importance of the partners, both individually and collectively, and a concomitant increase in influence for those in charge of coordination and overall system management. That the traditional French leadership role in European aerospace collaboration really was at stake here is borne out by the fact that the growing autonomy of AI was perceived as a capitulation by the people at Aerospatiale in Toulouse. As an example, flight testing became an early bone of contention, with the French insisting that their pilots, engineers, certification rules and terminology be used in this prestigious phase of aircraft development. The Germans had quietly argued that this crucial function be performed by a multi-national group under the auspices of the GIE. Even more galling to the French than their loss of sole control over flight testing was that Airbus teams insisted upon using an Anglo-American vernacular or "Boeing slang" as the working language of the consortium, again in deference to the reality of the technical and commercial situation in world aviation. So even though Aerospatiale remained very influential within the consortium, it was at this early stage that "the umbilical cord between Aerospatiale and the GIE began to be severed."³⁹

But the necessity of actually selling airplanes was the most important factor behind the gradual assertion of AI as an entity exercising an influence independent of the partners. Beyond having to explain the concept of a GIE and convince potential buyers of AI's ability to provide product support, the sales force had to reassure customers "whose greatest fear was having to deal with several interlocutors who would toss the ball amongst themselves."⁴⁰ Careful attention was thus given to cultivating a perception of the GIE as the sole entity competent in all aspects of the

³⁹Muller(op.cit.:86).

⁴⁰Muller(op.cit.:87).

A300.

These developments were not received with equanimity by the industrial partners, since in its ceaseless efforts to attract customers, the GIE was negotiating generous terms that the firms would be obliged to meet. Yet, the leaders of the GIE were gradually able to translate their newly acquired sales experience into a kind of "strategic expertise", and to use it as leverage within the larger collaborative system. Significantly, the real owners of the consortium's productive assets were now referred to in sales negotiations as "divisions" or "principle sub-contractors" rather than partners or any other term implying a division of interest or authority.⁴¹

The GIE relied on its role as the single interface with both suppliers and customers to assert its autonomy, making success in the sales arena crucial to its continued independence. But the A300 came on the market during the economic upheaval precipitated by the 1973 oil shock, which, through the combined effects of recession and large increases in fuel prices, had seriously cut into air travel demand and airline profitability. In this inhospitable environment, sales of the first product from a newly created manufacturer were predictably slow; the national airlines of the two major partners were the first customers for the A300 (Air France in November 1971 and Lufthansa in May 1973).

Despite these difficulties, the A300 was introduced at time when its competitors had either just launched a major new venture (Boeing 747) or were fighting between themselves for the same market niche (Douglas DC-10 vs. Lockheed L-1011). The attention of the US builders also remained concentrated on the still massive American market just when commercial aviation was becoming rapidly internationalized. Therefore, many of the A300's early sales battles were fought in countries where the Europeans had historical influence and where market requirements were more closely met by the specific capabilities of the European plane. Finally, rising fuel prices had made the advantages of the A300 in direct operating costs (DOC) much more significant.

⁴¹Muller(op.cit.:88) cites a very interesting internal memo to this effect.

Recognizing opportunity, it was Bernard Lathiere (who succeeded Henri Ziegler in 1975) who "concentrated his efforts on the consolidation of the external image of Airbus through direct contacts with the leaders of the major airline companies."⁴² The overseas sales tours to America, the Far East and Africa were especially important in this regard; they "cemented the team..., and Airbus Industrie self-consciously "began to exist as a professional community."⁴³ The persistence of AI sales efforts combined with these factors to produce some significant successes on the international market, including Indian Airlines, Korean Airlines and South African Airways. However, from December 1975 to April 1977, only two aircraft were sold, the latter a conversion of an already existing option.⁴⁴ Times were tough for the partners and the GIE alike, and the latter found the basis of its newfound influence being undermined. Especially frustrating was that, despite intense efforts and some disappointing near misses, penetration of the lucrative American market continued to elude Lathiere and his team. The first break came 4 May 1977 when Frank Borman of Eastern Airlines agreed to lease four A300-B4s, and then put them through severe tests of performance and reliability. Duly impressed, Borman followed through 6 April 1978 with a firm order for 23 of the aircraft (with options on 9 more), along with 25 of the planned A310s, a smaller version of the A300.⁴⁵ This was the break the consortium needed, since the reputation of Eastern as a savvy buyer and efficient operator of aircraft conferred credibility no promotional efforts could ever match.

⁴²Muller(op.cit.:87).

⁴³Ibid.

⁴⁴Arthur Reed entitles Chapter 6 in Airbus: Europe's High Flyer(Norden,1991) on this difficult period "Through the Marketing Desert", as it was a very trying time for all involved in AI.

⁴⁵See Gunston(op.cit.:78-80) for a thorough account of the Eastern deal.

Arrangement or Entity?

The sale to Eastern Airlines marked a turning point in the development of the consortium, both internally and in its relations with its competitors. Within the consortium, penetration of the American market confirmed and perpetuated "the emergence of the GIE as the key actor in a system of multinational cooperation..." which had now succeeded in making itself "the obligatory point of passage" in the Airbus system.⁴⁶ This was a feat not yet attained by any of the organizations set up to manage other successful collaborative projects in Europe, including even other GIE such as ATR or joint-ventures such as CFM.⁴⁷ But AI may have been the victim of its own success, in that increased sales, especially on terms like those given to Eastern, led to even more acrimonious disputes between the GIE and the industrial partners. The latter complained that AI sold aircraft for prices that were too low and offered too much in inducements, such as customizing the interior of the aircraft, for the partners to make a profit. In this so-called 'revolt of the partners', they questioned "the legitimacy for an organization that was ostensibly to be concerned with sales to exercise control of the entire system of decision making."⁴⁸ But its principals responded that the GIE does what it must in meeting stiff competition and customer demands, and that the partners should find a way to make money given existing market conditions.

So while the assertion (beginning in 1968) of technical and commercial criteria in product design, followed by the gradual emergence of an autonomous organization to handle marketing responsibility, may have finally overcome "the logic of the arsenal which had paralyzed the

⁴⁶Muller(op.cit.:158).

⁴⁷ATR is Avions de Transport Regionale, a GIE set up by Aerospatiale and Alenia of Italy to coordinate their shared production of regional (less than 100 seats) aircraft. CFM is Commercial Fan Moteur, a 50\50 joint venture set up by GE of the US and SNECMA of France to manage the co-production and marketing of the CFM series of aero engines.

⁴⁸Muller(op.cit.:161).

European aerospace industry", there have been associated costs.⁴⁹ At the bottom of the dispute between the partners and the GIE is "the division between industrial expertise and commercial expertise", which has created a "schizophrenic" kind of organization.⁵⁰ "The paradox is that it is precisely this division which has permitted Airbus to surpass even the most optimistic predictions."⁵¹

Can this fundamental ambiguity be overcome without undermining the basis for continued commercial success? In the Fall of 1987, a group of "wise men" was appointed to study the entire question, and their results were presented in May 1988. While they felt that, in the long run, the best solution would be to create a fully integrated European civil aerospace company, the obstacles were too great to make such a solution practicable in the foreseeable future. So they proposed (in a seemingly contradictory way) that the GIE be strengthened even while giving the partners more control over it. Specifically, they advised organizational changes designed to both streamline the decision-making process within the consortium and to give the partners greater oversight over its actions. This would be done through the creation of a "supervisory council", composed of the Presidents of the four member companies, meeting four times a year, and abandoning the rule of unanimity in making its decisions. A second proposal would create a "directory" meeting once a month composed of 7 members; 4 representing the members and 3 other directors; marketing, financial and general. Taken together, these new bodies would give the partners greater influence in the day-to-day operation of the GIE. But the committee also recommended that, in the interest of transparency and accounting rigor, the new financial director be given access to the relevant accounts of the partners. If Muller is correct in saying that such a development should be seen "as

⁴⁹Muller(op.cit.:165).

⁵⁰Ibid.

⁵¹Ibid.

a step in the direction of the integration of the Airbus system into an unified entity..."⁵², then indeed we would be witnessing changes in the very nature of the collaborative relationship.

Solutions to the issues raised by these proposals, the most important of which is perhaps the financial status of the GIE in relation to both the industrial partners and the national governments, will require much more than the mere adjustment of existing relationships and practices.⁵³ Muller cites an editorial published in the British aerospace journal Flight which asserts that Airbus is "not an entity but nothing more than an arrangement."⁵⁴ But the question of where precisely it stands between these two poles can be answered only through a much more detailed analysis of the consortium's structure and operation. The following chapters, beginning with the creation of the GIE in 1970 and coming forward to the present day, propose to do just that.

⁵²Muller(op.cit:168).

⁵³Muller discusses the close connection between the debate within the consortium over the ambiguous status of the GIE, and the raging dispute with the United States over the issue of product development and export subsidies, exchange rate guarantees and other forms of European governmental support of AI. To the extent that the parties to AI ask for greater financial transparency and more rigorous accounting practices within the consortium, government subventions and other guarantees to AI will become harder to defend in disputes with competitors and before international bodies like the GATT. He is also correct when he says regarding the subsidy issue: "In reality, we see a very profound conflict between two conceptions of the proper place of the state in the economy, which have roots in the industrial cultures of each continent."(Muller,op.cit.:157).

⁵⁴Muller(op.cit.:168).

BIBLIOGRAPHY

- Adams, William J. Restructuring the French Economy. Washington DC: The Brookings Institution, 1989.
- Anastassopoulos, Jean-Pierre, Georges Blanc and Pierre Dussauge. Les Multinationales Publiques. Geneve: L'Institut de Recherche et D'Information sur les Multinationales, 1985.
- Arnold and Porter. "U.S. Government Support of the U.S. Commercial Aircraft Industry." Report prepared for the Commission of the European Communities, November 1991.
- Aviation Week and Space Technology. Various Issues.
- Baldwin, Richard and Paul Krugman. "Industrial Policy and International Competition in Wide-Bodied Aircraft." pp.45-71 in Trade Policy Issues and Empirical Analysis, Robert E. Baldwin (ed.) Chicago: University of Chicago Press, 1988.
- Berg, Hartmut and Gerhard Mammen. "Alternative Strategien staatliche Technologieforderung: Eine Analyse der Projekte "Concorde" und "Airbus." Zeitschrift fur Wirtschaftswissenschaft. Band 32 (1981) Heft 3:346-379.
- Berghahn, Volker R. The Americanisation of West German Industry 1945-1973. Leamington Spa, UK: Berg Publishers, 1986.
- Blank, Stephen. "Britain: The Politics of Foreign Economic Policy" pp. 89-137 in Between Power and Plenty: Foreign Economic Policies of Advanced Industrial States, Peter J. Katzenstein, (ed.) Madison: University of Wisconsin Press, 1978.
- Bluestone, Barry, Peter Jordan and Mark Sullivan. Aircraft Industry Dynamics. Boston: Auburn House, 1981.
- Bogdan, Lew. L'Epopée du Ciel Clair. Paris: Hachette, 1988.
- Bright, Charles D. The Jet Makers. Lawrence: Regents of Kansas Press, 1978.
- Business Week. Various Issues.
- Cairncross, Alec. The British Economy Since 1945. Oxford: Blackwell, 1992.
- Calleo, David and Benjamin Rowland. America and the World Political Economy. Bloomington and London: Indiana University Press, 1973.
- Chadeau, Emmanuel. De Bleriot a Dassault. Fayard, 1987.

- Chapman, Herrick. State Capitalism and Working Class Radicalism in the French Aircraft Industry. Berkeley: University of California Press, 1990.
- Cohen, Benjamin J. "The Revolution in Atlantic Economic Relations: A Bargain Comes Unstuck." pp. 106-133 In The United States and Western Europe, Wolfram Hanrieder (ed.) Cambridge Mass: Winthrop Publishers, 1974.
- Cohen, Stephen S. Modern Capitalist Planning: The French Model. London: Weidenfeld and Nicolson, 1969.
- Collet, Andre. Les Industries d'Armement. Paris: Presses Universitaires de France, 1988.
- Constant, Edward W. II. The Origins of the Turbojet Revolution. Baltimore: Johns Hopkins University Press, 1980.
- Demsetz, Harold. Ownership, Control, and the Firm. Oxford: Basil Blackwell, 1988.
- Denman, Ann McKinstry. "Airbus and its ilk: Thumbing their noses at the GATT?" Harvard International Law Journal, Vol. 29, No. 1 (Winter 1988):111-125.
- DePorte, Anton W. Europe Between the Superpowers. New Haven and London: Yale University Press, 1979.
- Dosser, Douglas, David Gowland and Keith Hartley. The Collaboration of Nations. New York: St. Martin's Press, 1982.
- Dussage, Pierre. "Activities dans l'armement et strategie d'enterprise." Defense Nationale mars 1986:103-115.
- Economist. Survey of the Aircraft Industry. The Economist, 1 June 1985.
- Esser, Josef and Wolfgang Foch with Kenneth Dyson. "'Social Market' and Modernization Policy: West Germany." pp. 102-127 in Industrial Crisis, Kenneth Dyson and Stephen Wilks (eds.), New York: St. Martin's Press, 1983.
- Feldman, Elliot J. Concorde and Dissent. Cambridge University Press, 1985.
- Financial Times (London). Various Issues.
- Flight International. Various Issues.
- Gianni, P. "L'Airbus Europeen." Revue general de l'air et de l'espace, Vol. 34, No. 4 (1971):401-443.

Golich, Vicki. **"From Competition to Collaboration: The Challenge of Commercial-class Aircraft Manufacturing."** International Organization 46, Vol.4 (Autumn 1992):899-934.

----- . **"Resisting Integration: Aerospace National Champions."** pp.124-140,184-188 in Shaping Postwar Europe. Peter M.R. Stirk and David Willis (eds.), New York: St. Martin's Press, 1991.

Gunston, Bill. Airbus. Osprey, 1988.

Hagrup, Knut. The Aerospace Industry of Western Europe. Stockholm: Tekniska Hogskolan I Stockholm, Institutionen for Trafikplanering, 1980.

Hall Peter A. Governing the Economy. New York: Oxford University Press, 1986.

Hart, Jeffrey. **"West German Industrial Policy."** pp. 161-186 in The Politics of Industrial Policy, Claude E. Barfield and William A. Schambra (eds.), Washington DC: American Enterprise institute, 1986.

Hayward, Jack. The State and the Market Economy. New York: New York University Press, 1986.

Hayward, Keith. The British Aircraft Industry. Manchester University Press, 1989.

----- . Government and British Civil Aerospace. Manchester University Press, 1983.

----- . International Collaboration in Civil Aerospace. New York: St. Martin's Press, 1986.

----- . **"Airbus: twenty years of European collaboration."** International Affairs Vol. 64, No. 1 (Winter 1987-88):11-26.

----- . **"Politics and European Aerospace Collaboration: The A300 Airbus."** Journal of Common Market Studies XIV, No.4 (June 1976):354-367.

Hochmuth, M.S. **"Aerospace"** in Big Business and the State, Raymond Vernon (ed.) Cambridge, Mass: Harvard University Press, 1974:145-169.

----- (ed.). Revitalizing American Industry. Cambridge, Mass: Ballinger, 1985.

----- . **"The European Aerospace Industry."** pp. 205-225 in European Approaches to International Management. Klaus Macharzina and Wolfgang H. Staehle (eds.) Berlin and New York: de Gruyter, 1986.

- Homze, Edward L. Arming the Luftwaffe. Lincoln and London: University of Nebraska Press, 1976.
- Hooks, Gregory. Forging the Military-Industrial Complex. Urbana and Chicago: University of Illinois Press, 1991.
- Jobert, Bruno et Pierre Muller. L'Etat en Action. Paris: Presses Universitaires de France, 1987.
- Johnson, Chalmers, Laura Tyson and John Zysman. Politics and Productivity. New York: HarperBusiness, 1989.
- Jones, Aubrey. Britain's Economy: The Roots of Stagnation. Cambridge: Cambridge University Press, 1985.
- Karweger, Von Andreas. "Kooperation in der europaischen Luftfahrtindustrie." Europa-Archiv, Vol. 1 (1985):19-27.
- Katzenstein, Peter J. Industry and Politics in West Germany. Ithaca: Cornell University Press, 1989.
- Kennedy, Paul. The Rise and Fall of the Great Powers. New York: Random House, 1987.
- Klepper, Gernot. "Entry into the Market for Large Transport Aircraft." European Economic Review, Vol. 34, No 4 (1990): 775-803.
- Kolodziej, Edward A. Making and Marketing Arms. Princeton: Princeton University Press, 1987.
- Krugman, Paul R. Strategic Trade Policy and the New International Economics. Cambridge: MIT Press, 1986.
- Krugman, Paul R. and Maurice Obstfeld. International Economics. (second edition). New York: HarperCollins, 1991.
- Kuisel, Richard F. Capitalism and the State in Modern France. Cambridge: Cambridge University Press, 1981.
- Lamont, Douglas F. Winning Worldwide: Strategies for Dominating Global Markets. Homewood, Ill.: Business One Irwin, 1991.
- Lipsey, Richard G. and Wendy Dobson. Shaping Comparative Advantage. Ontario: C.D. Howe Institute, 1987.
- Lorell, Mark. Multinational Development of Large Aircraft. Santa Monica: RAND, 1980.
- MacLennan, Malcolm et. al. Economic Planning and Policies in Britain, France and Germany. New York: Praeger Publishers, 1968.

- Magaziner, Ira C. and Mark Patinkin. The Silent War. New York: Random House, 1989.
- Majumdar, Badiul A. "Upstart or Flying Start? The Rise of Airbus Industrie." The World Economy Vol.10, No.4 (Dec. 1987):497-518.
- Markovitz, Andrei S.(ed.) The Political Economy of West Germany. New York: Praeger, 1982.
- Markusen, Ann et al. The Rise of the Gun Belt. London: Oxford University Press, 1991.
- Martre, Henri. "'Aerospatiale' et l'aeronautique mondiale." Defense Nationale fevrier 1990:45-54.
- McIntyre, Ian. Dogfight: The Transatlantic Battle over Airbus. Westport, Conn. and London: Praeger, 1992
- Miller, Ronald and David Sawers. The Technical Development of Modern Aviation. New York: Praeger, 1970.
- Morgan, Roger and Caroline Bray, (eds.) Partners and Rivals in Western Europe: Britain, France and Germany. Brookfield, VT: Gower, 1986.
- Morris, D.J. and D.K. Stout. "Industrial Policy" pp. 851-894 in The Economic System in the UK, (3rd edition), Derek Morris (ed.), Oxford University Press, 1985:.
- Mowery, David C. Alliance Politics and Economics. Cambridge, Mass: Ballinger Pub. Co., 1987.
- Mowery, David C. and Nathan Rosenberg. "The Commercial Aircraft Industry." pp. 101-161 in Government and Technical Progress, Richard R. Nelson (ed.) New York: Pergamon Press, 1982.
- Mueller, Peter. Airbus. [Translated from German into English by Richard Van Osten]. Vienna: Europa Verlag, 1984.
- Muller, Pierre. Airbus: L'ambition Europeenne. Paris: L'Harmattan, 1989.
- Mytelka, Lynn K (ed.) Strategic Partnerships and the World Economy. London: Pinter Publishers, 1991.
- Picq, Jean. Les Ailes de l'Europe. Paris: Fayard, 1990.
- Quinet, Emile. La Planification Francaise. Paris: PUF, 1990.
- Rallo, Joseph. "The European Communities Industrial Policy Revisited: The Case of Aerospace." Journal of Common Market Studies Vol.XXII, No. 3 (March 1984):245-267.

- Reed, Arthur. Airbus: Europe's High Flyer. St. Gallen, Switzerland: Norden Publishing House, 1991.
- _____. Britain's Aircraft Industry. London: J.M. Dent & Sons, 1973.
- Reich, Simon. The Fruits of Fascism. Ithaca: Cornell University Press, 1990.
- Sampson, Anthony. The Arms Bazaar. New York: Viking Press, 1977.
- Schumacher, Hanns H. "Europe's Airbus Programme and the Impact of British Participation." The World Today, Vol.35, No. 8 (August 1979): 332-339.
- Servan-Schrieber, Jacques. Le Defi Americain. Paris: Denoel, 1967.
- Sen, Gautam. The Military Origins of Industrialisation and International Trade Rivalry. New York: St. Martins Press, 1984.
- Shanks, Michael. Planning and Politics: The British Experience 1960-1976. London: Allen and Unwin, 1977.
- Silbertson, Aubrey. "Industrial Policies in Britain 1960-1980." pp. 39-51 in Industrial Policy and Innovation, Charles Carter (ed.), London: Heinemann, 1981.
- Simonson, G.R. (ed.) The History of the American Aircraft Industry. Cambridge, Mass. and London: MIT Press, 1968.
- Smith, Eric Owen. The West German Economy. New York: St Martin's Press, 1983.
- Smith, Trevor. "The United Kingdom" pp. 87-104 in Big Business and the State, Raymond Vernon (ed.) Cambridge, Mass: Harvard University Press, 1974.
- Stegemann, Klaus. "Policy rivalry among industrial states: what can we learn from models of strategic trade policy?" International Organization 43 No. 1 (Winter 1989):73-100.
- Smyser, W. R. The Economy of United Germany. New York: St Martin's Press, 1992.
- Stoffaes, Christian. French Industrial Policy. Washington DC: Brookings Institution, 1986.
- ". "French Industrial Strategy in the Sunrise Sectors." pp. 274-292 in European Industry, Alex Jacquemin (ed.) Oxford: Clarendon Press, 1984.

Stout D.K. "**De-Industrialization and Industrial Policy.**" pp. 171-201 in De-Industrialization, Frank Blackaby (ed.) London: Heinemann, 1979.

Strauss, Franz Joseph. Challenge and Response. (translated by Henry Fox). New York: Athenuem, 1970.

Todd, Daniel and Janice Simpson. Aerospace and Development: A Survey. Winnipeg, University of Manitoba, 1985.

Tyson, Laura D. Who's Bashing Whom? Trade Conflict in High-Technology Industries. Washington, DC: Institute for International Economics, 1992.

Vernon, Raymond. "**Enterprise and Government in Western Europe.**" pp. 3-24 in Big Business and the State, Raymond Vernon (ed.), Cambridge, Mass: Harvard University Press, 1974.

Williams, Roger. European Technology: The Politics of Collaboration. London: Croom Helm, 1973.

Wood, Derek. Project Cancelled. London:MacDonald and Janes, 1975.

Yoshino, M.Y. "**Global Competition in a Salient Industry: The Case of Civil Aircraft.**" pp.517-538 in Competition in Global Industries. Michael E. Porter (ed.), Boston: Harvard Business School Press, 1986.

Zysman, John. Governments, Markets and Growth. Ithaca and London: Cornell University Press, 1983.

----- . Political Strategies for Industrial Order.
Berkeley: University of California Press, 1977.

----- . "**The French State in the International Economy.**" pp. 255-293 in Between Power and Plenty, Peter J. Katzenstein, (ed.), University of Wisconsin Press, 1978.