Freie Universität Berlin

Stability requires change: Path bending in the case of Airbus' work-share allocation (A300-A350 XWB)

Inaugural-Dissertation zur Erlangung des akademischen Grades
einer Doktorin der Wirtschaftswissenschaft (Dr. rer. pol.)
des Fachbereichs Wirtschaftswissenschaft der Freien Universität Berlin

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M.A., Dipl. Pol.

Berlin, im November 2013

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Tag der Disputation: 01. November 2013

Wege entstehen dadurch,
daß man sie geht.
— Franz Kafka

Danksagung

Das vor mir ausgewählte Eingangszitat dieser Arbeit trifft im übertragenen Sinne nicht nur auf die Entstehung und Entwicklung des Unternehmens Airbus, sondern auch auf diese Doktorarbeit zu. Ich bin sehr dankbar dafür, dass ich diesen Weg – mit all seinen Abzweigungen und Umwegen – gehen durfte. Ich möchte hier die Gelegenheit wahrnehmen, um den Menschen, die mich begleitet und unterstützt haben, aufrichtig zu danken.

Zuallererst gebührt mein besonderer Dank meinem Erstbetreuer, Prof. Dr. Arndt Sorge. Ich hatte das große Glück, dass er sich als gelernter Luftbildmesstechniker und passionierter Segelflieger – nach eigener Aussage – noch mehr für Airbus und seine Geschichte interessiert als ich. Diese persönliche Begeisterung äußerte sich nicht nur in seiner stets offenen Bürotür, in langen und zahlreichen Betreuungsgesprächen, sondern auch in seiner vollen Unterstützung bei der Erschließung dieses nur schwer zugänglichen Feldes. Als große Bereicherung habe ich ferner seine Denkweise empfunden: Eine undogmatische Offenheit gegenüber den verschiedensten Theorien, ein aktives Kombinieren von Klassikern mit gegenwärtigen Ansätzen und eine unerschütterliche Auffassung, dass die soziale Welt zwingend komplex ist. Diese Geisteshaltung hat mich tief beeindruckt und hat bleibende Anstöße für das eigene Denken geliefert. Bedanken möchte ich mich auch bei meiner Zweitbetreuerin, Frau Prof. Dr. Jana Costas für ihre hilfreichen Kommentare, vor allem zum empirischen Teil dieser Arbeit, sowie die Erstellung des Zweitgutachtens.

Mein besonderer Dank gilt ferner den Kollegen aus der Abteilung „Internationalisierung und Organisation“ am Wissenschaftszentrum Berlin, insbesondere Dr. Dieter Plehwe, Dr. Sebastian Botzem, Thomas Blanchet und Prof. Dr. Christina Teipen. Auch hier standen die Türen immer weit offen für kritisch-konstruktiven Austausch. Die sachkundigen und immer wohlwollenden Kommentare haben diese Dissertation stark bereichert.

Danken möchte ich auch dem Graduiertenkolleg „Pfade organisatorischer Prozesse“ am Fachbereich Wirtschaftswissenschaften der Freien Universität Berlin. Das Stipendium der Deutschen Forschungsgemeinschaft erlaubte mir die Promotion in einem finanziell gut ausgestatteten Forschungsumfeld und ermöglichte mir die Durchführung von Interviews in Deutschland, Frankreich und Belgien. Prof. Dr. Georg Schreyögg und Prof. Dr. Jörg Sydow gebührt mein Dank für die Leitung des Graduiertenkollegs, Frithjof Stöppler für seinen unermüdlichen Einsatz für das Kolleg und die KollegiatInnen.

Mein spezieller Dank gilt den zahlreichen Interviewpartnern aus Wirtschaft, Politik und Verbänden, die mir wertvolle Einsichten zur Entwicklung von Airbus gewährten, wichtige Hintergrundinformationen zur Verfügung stellten und weitere relevante Gesprächspartner vermittelten. Ohne sie wäre der tiefe Einblick in die innerkonzernliche Arbeitsverteilung nicht möglich gewesen. Da allen Interviewpartnern strikte Vertraulichkeit zugesichert wurde, kann ich nur wenigen persönlich danken. Hervorheben möchte ich insbesondere Dr. Hartmut Mehdorn, ehemaliger Vorsitzender der Geschäftsführung der Deutschen Airbus, und Dr. Jean Roeder, ehemaliger Chefingenieur von Airbus Industrie GIE in Toulouse. Beide haben maßgeblich zur empirischen Fundierung dieser Arbeit beigetragen. Obwohl diese Dissertation stark von qualitativen Interviews getragen wird, bin ich für den Inhalt der Arbeit allein selbst verantwortlich. Mit Ausnahme von Zitaten geben alle Aussagen meine persönliche Auffassung und Interpretation des Sachverhalts wieder und stellen keinesfalls die Ansichten dritter Personen oder der im Text erwähnten Unternehmen dar.

Nicht zuletzt bin ich meiner Familie zu tiefem Dank verpflichtet. Insbesondere meinem Vater danke ich für seine bedingungslose Unterstützung. Seiner tiefen Verbundenheit verdanke ich viel. Aus tiefstem Herzen danke ich Tobias für seine Liebe, Unterstützung und Ermutigung auf meinem langen und teilweise steinigen Weg zur Promotion. Über all die Jahre waren sein Zuspruch, Verständnis und Rückhalt sowie seine ruhige, ausgeglichene Art für mich essentiell. Ich vermag es nicht trefflicher auszudrücken: „*Es muss dunkel werden, damit wir Sterne sehen*“ (Rainer Malkowski) – auf allen unseren Wegen.

Lisa Maria Arnold
Berlin, im November 2013

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AI	Airbus Industrie GIE
AIC	Airbus Integrated Company, incorporated under French law as Airbus S.A.S.
ATR	Avions de Transport Régional
BDLI	Bundesverband der Deutschen Luft- und Raumfahrtindustrie: German Aerospace Industries Association
BMWi	Bundesministerium für Wirtschaft und Technologie: Federal Ministry of Economy and Technology
BWA	Behörde für Wirtschaft und Arbeit: Hamburg Ministry of Economic and Labour Affairs
CASA	Construcciones Aeronáuticas S.A.
CNRS	Centre national de la recherche scientifique: French National Center for Scientific Research
CoE	Centre of Excellence
DASA	From May 19, 1989 to December 31, 1994: Deutsche Aerospace AG; from January 1, 1995 to November 17, 1998: Daimler-Benz Aerospace AG; from November 17, 1998 to July 10, 2000: DaimlerChrysler Aerospace AG
DFG	Deutsche Forschungsgemeinschaft: German Research Association
DFI	Deutsch-Französisches Institut Ludwigsburg
DGAC	Direction générale de l'Aviation civile: Directorate General for Civil Aviation
DGAP	Deutsche Gesellschaft für Auswärtige Politik: German Council on Foreign Relations
DLR	Deutsches Zentrum für Luft- und Raumfahrt: German Aerospace Center
EADS	European Aeronautic Defence and Space Company
EASA	European Aviation Safety Agency
EGOS	European Group for Organizational Studies
GATT	General Agreement on Tariffs and Trade
GIE	Groupement d'Intérêt Économique
GmbH	Gesellschaft mit beschränkter Haftung

MBB	Messerschmitt-Bölkow-Blohm
MDD	McDonnell Douglas
MTU	Motoren- und Turbinen-Union
ONERA	Office Nationale d'Études et de Recherches Aérospatiales: The French Aerospace Lab
R&D	Research and Development
S.A.S.	Société par Actions Simplifiée
SEREB	Société pour l'Étude et la Réalisation d'Engins Balistique
SNECMA	Société Nationale d'Étude et de Construction des Moteurs d'Aviation
SNIAS	Société Nationale Industrielle Aérospatiale
SOGEADE	Société de Gestion de l'Aéronautique, de la Défense et de l'Espace
SOGEPA	Société de Gestion de Participations Aéronautiques
UK	United Kingdom of Great Britain and Northern Ireland
VFW	Vereinigte Flugtechnische Werke
VLCT	Very Large Commercial Transport
WTO	World Trade Organization
WZB	Wissenschaftszentrum Berlin für Sozialforschung: Social Science Research Center Berlin

1 Introduction

"The incorporation of stability and continuous change in the same theory poses a paradox, because each is defined as the opposite of the other. Hernes (1976) argued that adequate theories must explain stability and change in the same terms. Generally, however, organizational theories have emphasized either stability or change, slighting the other term."
— Poole and Van de Ven 1989, pp. 564-565

1.1 Background and problem statement

This dissertation addresses a fundamental problem of organizational path dependence — the underspecified relationship between stability and change of organizational trajectories. Up to today, organizational path dependence can only explain stability or change, while both concepts continue to be conceived as separate and independent phenomena. This is in line with the prevalent conceptions of stability and change in organizational theory. Most scholars consider stability and change as two independent and yet opposing developments (see, for example, Benner and Tushman 2003; Gupta et al. 2006), because stability and change are typically "defined as the opposite of the other" (Poole and Van de Ven 1989, p. 564). While stability is associated with continuity and persistence, change is understood as alternation or modification. However, other prominent scholars suggest that stability and change can also be dialectically related (Berger and Luckmann 1972; Seo and Creed 2002) or "viewed as a duality", that is "interdependent and potentially compatible – mutually enabling and a constituent of one another" (Farjoun 2010, p. 205). By integrating these conceptions, the aim of this dissertation is to extend the emerging theory of organizational path dependence. This dissertation thereby intends to contribute to a better understanding of the complex and interconnected developments of stability and change, "which the [current] literature on path-dependency does not" take into account (Sorge 2005, p. 13).

In the social sciences, the argument for stability is often made on the basis of path dependence theory. The concept of path dependence allows researchers to explain persistent

processes on various levels of analysis over long periods of time (see, for example, Arthur 1994; Thelen 1999; Sydow et al. 2005). Due to this explanatory value, the concept is widely applied in the social sciences (see, for example, David 1985; Mahoney 2000; Pierson 2000). Despite its broad application, the scientific community, however, still disagrees on the central terms of the concept. For instance, the definition of path dependence remains critically discussed just as the properties and the conditions for such a process (Ackermann 2001, pp. 9-10). In opposition to a rather metaphorical 'history matters' comprehension, prominent scholars of path dependence employ a precise conception of the processes' properties (Arthur 1989, p. 121) and conditions (Vergne and Durand 2010, p. 737). The sine qua non condition for path-dependent processes are social mechanisms (Hedström and Swedberg 1998; Mayntz 2004) that exert some kind of positive feedback for the actors involved. Motivated by the positive feedback, the actors are incited to replicate previous actions or decisions. When they repeatedly refer to past actions or decisions, actors, however, gradually commit themselves to a specific action pattern and thereby progressively exclude other, potentially more efficient, alternatives. The mechanisms are thus understood as being self-reinforcing in nature, stabilizing specific repertoires, norms and institutions of many kinds, often against economic or functional considerations (North 1990; Mahoney 2000; Pierson 2000).

The concept of path dependence was recently transferred to the study of organizations. In line with the mechanism-based conceptions of path dependence, Sydow et al. (2005, 2009) are concerned with organizational persistence that is grounded on self-reinforcing social mechanisms. These scholars have conceptualized the development of this specific kind of stability as a three-step process: preformation, path formation and lock-in (Sydow et al. 2009, p. 692). After the preformation phase where trajectories are still contingent, four specific self-reinforcing mechanisms gradually restrict the scope of action available to organizational actors. Due to the unfolding positive feedback of complementarity effects, coordination effects, learning effects and adaptive expectation effects, actors are limited in their choices of action to such an extent that they become locked-in to a specific, potentially inefficient action pattern (Sydow et al. 2009, pp. 699-701). This conception has contributed much to substantiate our understanding of path-dependent developments in organizations. By advancing the broad 'history matters' point of view, scholars of organizational path dependence have accorded fixed properties and conditions to such a process.

By concentrating on the explanation of organizational stability, path dependence theory typically lacks attentiveness for countervailing pressures for change. The very few scholars of organizational path dependence that address developments of change conceive them as radically opposing phenomena, occurring only in sharp contrast to the persistent nature of organizational trajectories. Due to their understanding that actors gradually become locked-in to a specific action pattern, scholars of organizational path dependence only distinguish two possibilities for change: "coincidental path-dissolution" processes emerging from within the organization, or path-breaking change coming from outside (Sydow et al. 2009, pp. 701ff.). An internal path-dissolution process is unintentionally triggered by actors locked-in to a specific pattern of action and is therefore seen as an "accidental process, […] which — nobody knows — may or may not occur" (Sydow et al. 2009, p. 701). In their preferred approach to change, the authors conceive change as being triggered by external "shocks, catastrophes, or crises" (Sydow et al. 2009, p. 701). Such a path-breaking change can only be radical in nature and will introduce a "restoration of a choice situation" for the actors involved (Sydow et al. 2009, p. 702). Organizational path dependence can thus only explain stability or radical change, both concepts being conceived as separate and independent phenomena. However, empirical observations from the initial example of path dependence theory suggest to consider the nuances in-between the two extremes.

At a closer look, path dependence theory's most prominent example for stability and lock-in, namely the character arrangement of the QWERTY keyboard, is not genuinely stable. In his seminal paper "Clio and the Economics of QWERTY" Paul David (1985) argues that self-reinforcing mechanisms, such as learning effects and complementarity effects, helped the QWERTY keyboard to prevail on the market and to become the dominant keyboard standard. Because QWERTY's keyboard layout is widely considered as inferior to the, at that time already existing, Dvorak keyboard, David uses QWERTY to illustrate the dominance of a still prevalent, yet inferior technological standard. Despite strong criticism from other economists (Liebowitz and Margolis 1990, 1995), the QWERTY case remains the emblematic example for path dependence theory (see, for example, Sydow et al. 2009, p. 690). However, a closer examination of keyboard layouts in different countries reveals minor, local adaptations to the QWERTY standard. For instance, instead of the genuine QWERTY layout, we find an AZERTY character arrangement in France and a QWERTZ arrangement in Germany. In both countries, additional characters, such as the French accents and the German umlauts, are added to the keyboard. The

QWERTY standard is thus not identically reproduced, but rather situationally adapted to conform to specific circumstances.

These 'path adaptations' have been overlooked in the literature on path dependence up to today. Its focus remains for the largest part on the development of persistent, potentially inefficient paths, which are upheld by self-reinforcing mechanisms and gradually lock actors in. However, the QWERTY case highlights that stability appears to be much more complex than path dependence theory suggests. In the light of QWERTY's modifications, so-called paths do no longer seem as persistent as path dependence theory emphasizes. Organizational path dependence theory thus needs to reconsider its understanding of stability. Since the modifications of the QWERTY path reveal that actors are involved in its situational adaptations, path dependence theory should first and foremost reassess its understanding of stability with regard to the role that actors play in path-dependent processes.

New, more actor-centered approaches to organizational path dependence have recently begun to integrate actors in the upholding of stability in a more complex manner. Building on Sydow et al. (2009), this line of research has revealed that the role of actors remains underspecified in the three phases of organizational path dependence (Botzem 2010; Sydow et al. 2010; Berthod 2011). Botzem (2010) reexamines the role of actors in the path-formation phase and shows that this second phase cannot be understood without considering the influence of actors on self-reinforcing mechanisms. Moreover, the author sheds light on the interaction between opposing groups of actors and demonstrates that, depending on their capability to deploy resources, different groups of actors are able to shape positive feedback mechanisms through strategic action. In order to integrate actors in all of the three phases of a path-dependent process, other scholars of organizational path dependence applied Giddens' structurationist approach which allows researchers to simultaneously incorporate action and structures into the analysis (Dobusch 2008a, 2008b; Schüßler 2008; Sydow et al. 2010; Berthod 2011). These "agency-oriented and yet structure-sensitive" approaches reveal a more complex picture of organizational path dependence (Sydow et al. 2010, p. 175). In line with Botzem (2010), they shed light on the different groups of actors that have varying and opposing interests and that are capable of acting strategically for their implementation.

However, also the more actor-centered conceptions of organizational path dependence continue to focus on stability and to neglect change. In line with the conception of Sydow et al. (2009), these approaches concentrate on the development and the maintenance of stability and

its underlying mechanisms. Up to today, actor-centered extensions remain preoccupied with explaining how such mechanisms oblige actors to reproduce specific, potentially inefficient action patterns. However, the case of QWERTY reveals that paths are more difficult to maintain than path dependence theory indicates. QWERTY's modifications show that the conception of actors being trapped on to specific action patterns must be regarded as both too deterministic and too simplistic. Although actor-centered extensions of organizational path dependence have recently introduced a more complex conceptualization of agency, they are, however, not precise enough to uncover modifications to a once established pattern. Threats to stability or pressures for change emanating from strategic actors are not taken into account. As a result, organizational path dependence is not detailed enough to capture the complexities of persistent developments and their modifications over time. It must in this be complemented by organizational theories with a more detailed conceptualization of actors that allow researchers to unravel the paradoxical nature of stability and change.

In the light of these theoretical and empirical motivations, this study addresses the relationship of stability and change in the context of organizational structures that actors negotiate collectively. In this perspective, the maintenance of organizational stability turns out to be more complex than path dependence theory suggests. The QWERTY case has exemplified that actors retain room for maneuver and continue to exert pressures for change, even in the lock-in phase. However, due to a deterministic conception of path dependence, we at present know very little about how organizational stability is upheld by strategic actors despite countervailing pressures for change. We lack knowledge on how strategic actors deal with these threats to stability and how they eventually adjust or change persistent patterns. In line with this, the study raises the following research question:

> *How is organizational stability maintained by actors over time despite countervailing pressures for change?*

Structurationist approaches to organizations emphasize that the interactions of actors are guided by rules (Crozier and Friedberg 1980; Giddens 1984), which "help to constitute and regulate activities" (Giddens 1984, p. 87). In Sydow et al.'s structurationist reinterpretation of organizational path dependence, the authors accentuate the benefits of rule-guided behavior that gives rise to a self-reinforcing coordination mechanism (Sydow et al. 2010, p. 177). For the

exploration of actor-driven path-dependent processes, the notion of rules is thus crucial and therefore requires special attention in the context of the empirical case at hand.

1.2 Methodology and case selection

A qualitative longitudinal case-study design is applied for unraveling organizational stability and countervailing pressures for change over time. This research focus requires a detailed, in-depth understanding of the interactions of actors in their organizational context over the course of time, which can only be provided by a qualitative longitudinal research design. Qualitative methods allow researchers to perform holistic analyses of a limited number of cases within real-life contexts. Because they are appropriate for investigating complex social processes (Flick et al. 2007, p. 17), qualitative methods are frequently applied by scholars of path dependence (Sydow et al. 2005).

Among the numerous qualitative methods, scholars of organizational path dependence prefer the case-study method for investigating persistent processes over time (Vergne and Durand 2010, p. 737). This is because case studies are well suited for contextualizing the development of organizational phenomena (Yin 2003, p. 89). In addition, the case-study method facilitates the application of the longitudinal perspective required for unraveling path-dependent developments (Sydow et al. 2005, p. 33) that are typically concerned with revealing "how" processes evolve (Yin 2003, p. 10). In order to investigate the development of stability despite countervailing pressures for change, a longitudinal case-study design is employed by examining a single case in detail over an extended period of time (Yin 2007, p. 49). Because this study aims at uncovering phenomena path dependence theory has so far overlooked, the case under investigation was selected "for theoretical, not statistical, reasons" (Eisenhardt 1989, p. 537). In line with this procedure of "theoretical sampling" (Eisenhardt 1989, p. 537), the case examined is selected in order to extend the emerging theory of organizational path dependence and to provide it with a more profound understanding of how actors maintain stability despite countervailing pressures for change.

The work-share allocation of the European aircraft manufacturer Airbus is selected as case for examination. This case shows evidence of a largely persistent, presumably path-dependent form of organization that emerged as the result of the interactions of different groups of actors. However, at the same time, the organizational setup was constantly challenged by the

actors, which exerted countervailing pressures for change. The case of Airbus is thus ideally suited to explore the research question at hand.

From a one project company, Airbus Industrie (AI)[1] evolved to produce passenger planes across the whole spectrum of civil aviation jets from about 100 seats upwards. At the outset, the Airbus organization[2] was established as a joint-venture consortium between French Aérospatiale and Deutsche Airbus. Initially, set up as a Franco-German project for only building the A300, AI was quickly joined by Spanish CASA and British Aerospace. In 2001, Airbus was turned into a joint-stock corporation in the French form of a Société par Actions Simplifiée (S.A.S.) and became a wholly owned subsidiary of the European Aeronautic Defence and Space Company (EADS). The national manufacturers merged to become Airbus Integrated Company (AIC)[3], a multinational enterprise with factories and engineering under one management.

Over the course of its 40 years history, Airbus shows evidence of a largely persistent organizational pattern, namely its work-share allocation among the involved national manufacturers (Hayward 1986, p. 73; Hornschild 1992, p. 70; Kracht 1994, pp. 58ff.; Schmidt 1997, p. 40; Salot 2006, p. 61; Mazaud 2007, p. 249; Figgen 2008, p. 19). From the first aircraft program (A300) launched in 1969 to the latest launched in 2006 (A350 XWB), sections and systems were constantly distributed in the same way: (1) wings to Britain; (2) cockpits, front fuselage sections, center wing box and the pylons to France; (3) central and back fuselage sections to Germany; (4) the horizontal tail to Spain. In spite of technological progress or variations in aircraft size, the initial allocation of the A300 aircraft has established a division of work and distribution of expertise that still exists today. In line with the literature on aircraft production (Wright 1936; Asher 1956; Hartley 1965), one could argue that this persistent allocation was solely sustained by self-reinforcing learning effects. Following this line of thought, learning effects over time generated specialization processes at the national and the site level. As

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1 In the following text, the joint venture Airbus Industrie, in the form of a Groupement d'Intérêt Économique (GIE), is referred to as AI. It is described in section 4.3.1.1. For reasons of simplicity, I also employ the term 'Airbus' when referring to the company group as a whole.

2 In line with the two meanings of organization (Sorge 2002, p. 4), the collectivity of Airbus will be referred to as the 'Airbus organization'. The organizational properties of the collectivity will be defined as processes, more precisely decision-making processes.

3 The Airbus Integrated Company, Airbus S.A.S, is designated as AIC in the following text. AIC is elaborated in detail in section 4.4.1.1.

path dependence theory indicates, learning effects could thus be considered as underlying Airbus' persistent work-share allocation. At first sight, this case thus seems to be an archetype of 'conventional' path dependence, built on self-reinforcing learning effects. However, while tempting, such a simplifying explanation of organizational stability would fall short in capturing the complexities of the empirical case.

At a closer look, it becomes evident that the largely stable work-share allocation pattern was the result of fierce negotiations among several different groups of actors: Airbus Industrie (AI) and its industrial partners French Aérospatiale, Deutsche Airbus, Spanish Construcciones Aeronáuticas S.A (CASA) and British Aerospace. Due to the specific characteristics and the strategic importance of the aircraft industry, these national manufacturers were in their goals strongly supported by their respective national governments. These were highly involved in the Airbus project from the outset. This is because national governments consider the aircraft industry as a strategically important sector for essentially three reasons. First, the industry touches issues of national security as the interdependencies between civil and military production are high (Ecorys 2009, p. 22). Second, the industry's sales are of great importance for the national trade balance. Finally, aerospace is a key industry for technological progress. Due to the industry's high level of R&D investment, governments hope for technological spill-over effects to other domestic industries and for positive effects on employment (Salot 2006, p. 35; Ecorys 2009, p. 191; Bundesministerium für Wirtschaft und Technologie 2013, p. 6). As a result, national governments subsidized the Airbus project from the very beginning (see, for example, Salot 2006, p. 31; Watzke 2010).

Airbus' stable work-share allocation pattern originated from repeated negotiations in spite of constant countervailing pressures for change. In the context of the work-share negotiations, the national manufacturers strove to maximize their individual work shares. This maximization goal entailed different strategies for different actors. Manufacturers that produced technologically sophisticated work packages, for instance, strove to maintain the status quo. Other manufacturers who aimed at gaining more technological expertise intended to alter the work-share allocation. As a result, they exerted pressures for change during the work-share negotiations. The same holds true for the national governments that were guided by their national interests in terms of employment, trade balances and technology spill-over effects. Given Airbus' numerous "powerful and highly dispersed" stakeholders and their diverging

interests (Arnold and Sorge 2010, p. 3), it is all the more astonishing that Airbus' stable work-share pattern still exists today.

Stability and change in the case of Airbus are examined by comparing the qualitative and the quantitative work-share allocations. Work shares are defined as parts of an aircraft program[4] and have a qualitative and a quantitative dimension. The qualitative dimension of work share refers to aircraft parts and components, such as cockpits and wings, produced by the national manufacturers. The quantitative dimension of work share denotes the percentage of the overall production costs that is attributed to a national manufacturer.[5] If, for example, Aérospatiale held 36.5 percent work share on the A300 program, this implied that the company received 36.5 percent of the aircraft production costs. In order to clearly differentiate between the two dimensions, I refer to the quantitative dimension of work shares as 'percentage of the overall program costs' and to the qualitative dimension of work shares as 'work packages'. When making a reference to both dimensions, I employ the overarching term work share.

The work-share allocations and related negotiations of five central civil aircraft programs A300 (1969), A320 (1984), A330/340 (1987), A380 (2000) and A350 XWB (2006) are selected as sub-cases because of their great importance for the company. These programs either constitute the starting point of modified versions, e.g. the A310 derivative[6], or of a whole new family of aircraft[7], such as the A320 family with the middle range aircraft A318, A319, A320 and A321.

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4 Here and in the following text I define an aircraft program as the development and production of a single type of aircraft. The A300 was, for example, the first aircraft program of the European Airbus consortium. Over time, AI designed several aircraft programs and started to offer families of aircraft. For a definition of the term family of aircraft, please refer to footnote 7.

5 Airbus precisely defines the quantitative work share as the "relative transfer price of all aircraft parts and services" (GATT 1992, p. 5). A distinction must be made between the preliminary and the definitive transfer price: "The preliminary transfer price is agreed at the same time as workshare, and is used in the calculation of the expected profitability of a given aircraft programme. The definitive transfer prices are agreed upon after internal negotiation among the partners and between the partners and Airbus Industrie" (GATT 1992, p. 6). For a description of these negotiations in the times of AI, please refer to section 4.3.2.3.

6 Derivatives are defined as variants of existing aircraft that vary in the design parameters speed, passenger capacity and range. The development of derivatives is prevalent in the aircraft industry because it allows manufacturers to economize development costs to a large extent by reverting to existing know-how in, for example, wings and cockpit (Salot 2006, p. 30).

7 A family of aircraft is defined as a group of aircraft programs "made up of derivate jet-liners built around a basic model" (Cohen 2008, p. C41), mainly by shortening or stretching the

The selected work-share negotiations are analyzed in five "clinical case-studies fitted into a comparative research design" (Crozier and Friedberg 1995, p. 86). These five sub-cases serve as "embedded units of analysis" (Yin 2009, p. 46) and are examined in detail with the help of Crozier and Friedberg's strategic analysis ("within-case analysis", see Eisenhardt 1989, p. 533). After the in-depth analysis of each of the five sub-cases, the results are compared in order to investigate the development of stability under pressures for change ("cross-case analysis", see Eisenhardt 1989, p. 533).

Data on Airbus' work-share allocations and the related negotiations was collected by a combination of document analysis and semi-structured interviewing. I collected 322 documents, consisting of scientific and non-scientific literature, talks by former Airbus chief engineers and CEOs, magazine and press articles, company reports as well as publications from government bodies. In addition, I conducted 39 interviews in Germany, France and Belgium with several former CEOs of Airbus' national manufacturers, chief engineers of Airbus and other Airbus/EADS employees. Talks were also held with European Commission staff, German and French civil servants as well as industry experts, for example, representatives from business associations and trade unions. Combining the comprehensive document analysis with direct access to key participants of the work-share negotiations served to gather multiple sources of evidence and achieve data triangulation.

1.3 Contributions

The aim of this study is to advance our understanding of the development of stability despite pressures for change as a result of actors' interactions. Thereby this research makes three main contributions to organizational path dependence. First, I further conceptualize the role of actors in path-dependent processes by extending path dependence theory with Crozier and Friedberg's structurationist approach to organizations. Second, I show how interlinked rules give rise to self-

fuselage, and by modifying engine power. Each family is composed of programs which differ in the design parameters speed, passenger capacity and range. The A320 family is, for example, composed of the A318, A319, A320 and A321 jetliners which cover short and medium ranges with passenger capacities ranging from a minimum 107 (A318) to a maximum of 220 (A321). Airbus currently produces four families of aircraft: the single-aisle A320-family and the wide-body families: A330/340, A380 and A350 XWB. The production of the A300/A310 family was recently ceased after more than 35 years of production.

reinforcing coordination mechanisms on which organizational paths are built. Third, I introduce the concept of 'path bending' in order to contribute to a better understanding of the complex and seemingly paradoxical developments of stability and change of organizational trajectories.

With regard to the more detailed conceptualization of actors in path-dependent processes, I build on new, more actor-centered approaches to organizational path dependence (Botzem 2010; Sydow et al. 2010; Berthod 2011). In order to reveal "the genesis of contradictory organizational processes" (Schreyögg and Sydow 2010, pp. 1259-1260) these actor-centered approaches have so far neglected, I extend organizational path dependence with the structurationist approach of Michel Crozier and Erhard Friedberg (1977, 1980, 1995). Because this theoretical perspective allows a more detailed view on the role that actors play in the upholding of stability ('path maintenance'), this study reveals that such processes cannot solely be explained by the unfolding effects of self-reinforcing mechanisms. Instead, path maintenance needs to consider the interactions of organizational actors in the context of rules they determine collectively.

By drawing on Crozier and Friedberg's perspective, this study also draws attention to the fact that self-reinforcing mechanisms are more complex that organizational path dependence suggests. With the help of strategic analysis, I describe in detail how two closely coupled, and at times conflicting, rules for actors' interactions give rise to a self-reinforcing coordination effect. Exploring their genesis and reproduction, I highlight how the two rules in their specific combination contribute to maintaining the organizational trajectory and at the same time provide actors with the necessary flexibility for resolving their conflicts.

On that basis, the notion of 'path bending' is introduced to describe minor modifications to a previously established stable pattern. In line with the local adaptations of the QWERTY keyboard, path bending brings to light that actors situationally adjust stability over time in order to uphold a path. In exchange for overall stability, they approve compensations that bring about minor changes. The presented empirical case exemplifies that organizational paths are neither reproduced automatically nor identically with regard to content. Instead, paths are situationally adjusted by actors in organizational bargaining processes. By offering a less radical conceptualization of change, this study allows researchers of organizational path dependence to overcome the dichotomy of path dependence and path breaking.

1.4 Research outline

This dissertation is structured in seven chapters. This first introductory chapter has described the background, the methodology and the contributions of this research. It is followed by the theoretical part in chapter two, which reviews the literature germane to the research question.

In this second chapter, the theory of organizational path dependence and its more actor-centered extensions are critically discussed, in particular with regard to their conception of stability and change as a result of the interaction of actors. Because of their inaccuracy to illustrate such developments, organizational path dependence is complemented by Michel Crozier and Erhard Friedberg's structurationist approach to organizations. This approach provides the analytical framework for studying the research question at hand.

The third chapter addresses the study's research design. It elaborates on the reasons for choosing a qualitative longitudinal research design and for selecting the case of Airbus' work-share allocation for the study of stability and change over time. Furthermore, the chapter explicates the reasons for examining five sub-cases as 'critical junctures'. Due to their importance for the theory of organizational path dependence, five 'critical junctures' are studied in a "within-case analysis" (Eisenhardt 1989, p. 533) which are then compared to each other in a "cross-case analysis" (Eisenhardt 1989, p. 533). Data collection and data analysis methods are described in detail before closing the chapter with a discussion on the quality of research.

Chapters four and five present the empirical substantiation. In line with Crozier and Friedberg's approach, the forth chapter introduces the case of Airbus. After briefly explaining the turbulent history of the organization, the chapter elaborates on the key groups of actors and decision-making processes in the old Airbus Industrie GIE organization (1970-2001) and in the new Airbus Integrated Company organization (2001-2010). This background paves the way for the strategic analysis of five consecutive sub-cases in chapter five.

The fifth chapter examines the work-share negotiations of the A300, A320, A330/340, A380 and A350 XWB as 'critical junctures'. The analysis reveals that actors have collectively established a largely stable work-share allocation pattern from the A300 to the A350 XWB program. In order to react to the constant pressures for change, actors have, however, also modified the work-share distribution which as a result differs slightly from program to program.

Chapter six revisits these findings in the light of path dependence theory. After separately discussing the overall stability of Airbus' work-share allocations and its minor changes

over time, the missing link between stability and change is established. Through Crozier and Friedberg's close-up perspective, it becomes visible that actors have renegotiated rules for generating stability and change at every critical juncture. Through these rules, actors have situationally adjusted Airbus' work-share allocation. As a result, the concept of path bending is introduced.

The seventh and final chapter summarizes the study's major findings and discusses their theoretical and practical implications. The chapter closes by discussing the limitations of this study and by pointing out avenues for future research.

2 Theories of organizational path dependence and structuration

2.1 Introduction

This chapter reviews the literature germane to the research focus and develops its analytical framework. First, after a brief introduction to the theory of path dependence in general, it presents the concept of organizational path dependence and its recent actor-centered extensions in particular. The subsequent critical discussion reveals that several key assumptions of organizational path dependence regarding its conception of stability need to be reconsidered. Because of its inaccuracy to illustrate the role of actors for the development of organizational persistence, it is argued that organizational path dependence must be complemented by structuration theories in general and by a structurationist approach tailored to the analysis of organizations in particular. For this purpose, I propose Crozier and Friedberg's structurationist approach to organizations, which is elaborated on in detail. Crozier and Friedberg's approach provides the analytical framework for this study, which is applied in such a way as to theoretically account for the developments of stability and change over time. The chapter concludes by a short summary.

2.2 Organizational stability: Path dependence and its actor-centered extensions

2.2.1 A general introduction to path dependence theory: Mechanism-based theorizing versus a broad 'history matters' point of view

The concept of path dependence has become increasingly popular in the social sciences since the late 1990s.[8] The concept enables researchers to explain stable processes by illustrating the

[8] In order to illustrate the concepts' popularity, Vergne and Durand have searched seven top organization and management journals (for direct references "to path dependence, path dependency, or path-dependent processes") from 1998 to 2007 (Vergne and Durand 2010, pp. 736-737). Through a data-base search, the authors were not only able to show that the literature on path dependence has grown substantially over the reviewed period, but also that ten percent of all of the journals' articles have directly referred to the concept from 2003 to 2007.

persistence of certain potentially inefficient solutions over time, highlighting both time and sequence (Pierson 2000, p. 264). Because of this explanatory value, the concept of path dependence emanated from historical economics (David 1985) and has been applied across disciplines, for example in sociology (Mahoney 2000), political science (Pierson 2000) or geography (Martin and Sunley 2006). Today, research on path dependence is concerned with institutional (Thelen 1999), technological (Arthur 1994; Meyer 2012) and organizational paths (Sydow et al. 2005, 2009) situated at the three different levels of analysis: the macro, the meso and the micro level (Vergne and Durand 2010, p. 737). At the macro level, institutional paths initiate potentially detrimental effects for economic development (North 1990), for political processes (Pierson 2000) or for transformation processes in transnational contexts (Djelic and Quack 2007). At the meso level, technological paths are concerned with inferior technologies that prevail and persist for long periods of time (David 1985; Arthur 1989). Finally, at the micro level, organizational paths are used to explain rigid, potentially inefficient trajectories in organizations (Teece et al. 1997; Sydow et al. 2005; Schreyögg and Kliesch-Eberl 2007; Teece 2007; Sydow et al. 2009).

Despite its broad application, the concept of path dependence is still contested within the scientific community and the definition of the term 'path dependence' remains heavily debated (Beyer 2005; Djelic and Quack 2007). Most researchers agree on a general, metaphorical understanding that 'history matters', although this reveals little more than that "the past influences the future" (Mahoney 2000, p. 507). In addition, no consensus exists on the definition of a 'path-dependent process' (Vergne and Durand 2010). James Mahoney, for example, characterizes processes as path dependent in which "reactive sequences", or "chains of temporally ordered and causally connected events", unavoidably lead to a specific result (Mahoney 2000, p. 509). However, for the majority of scholars, historical processes can only be classified as being path dependent if they are driven by social mechanisms (Hedström and Swedberg 1998; Mayntz 2004) that exert some kind of the positive feedback for the actors involved (David 1986, pp. 41-45; Arthur 1994, pp. 112-113; North 1990, p. 95; Pierson 2000, p. 252; Sydow et al. 2009, p. 698).

Prominent scholars have therefore limited their understanding of path dependence to specific trajectories caused by the unfolding effects of social mechanisms. Recently, the interest in mechanism-based explanations has grown significantly in the social sciences (Campbell 2005; Davis and Marquis 2005; Falleti and Lynch 2009; Gerring 2010; Hedström and Ylikoski 2010). However, the conception of mechanisms differs widely in the literature (Mahoney 2001). An

understanding which is generally agreed upon was introduced by Mayntz (2004). The author defines mechanisms as "sequences of causally linked events that occur repeatedly in reality if certain conditions are given" (Mayntz 2004, p. 241). Mechanisms thus describe recurring social processes, which over time causally connect initial conditions with a certain outcome.

However, the number and the nature of social mechanisms leading to a path-dependent outcome remain controversially discussed within the scientific community. After reviewing relevant literature, Beyer (2005, p. 18) identifies seven mechanisms in the social sciences: increasing returns, sequences, functionality, complementarities, power, legitimacy and conformity. Ackermann (2001) distinguishes between mechanisms that occur in technological and institutional settings. For technological settings, he summarizes the findings of David (1985), Arthur (1994) and Katz and Shapiro (1985) and discusses economies of scale, network effects, complementarity effects and learning effects (Ackermann 2001, pp. 59ff.). For institutional settings, the author draws upon North (1990) and David (1994) and identifies coordination effects, complementarity effects and learning effects as underlying path-dependent processes (Ackermann 2001, pp. 97ff.). Irrespective of their technological or institutional setting, all of these mechanisms are understood as being self-reinforcing in nature.[9] This self-reinforcement, defined as "the increase of a particular variable [that] leads to a further increase of this very variable", gradually results in actors committing themselves to a specific action pattern while simultaneously excluding other alternatives (Sydow et al. 2009, p. 694). Thus, "factors that recursively intensify one another" (Dobusch 2008a, p. 17) are seen as sine qua non conditions for path dependence.

2.2.2 Organizational path dependence: Self-reinforcing mechanisms gradually locking actors in to a specific action pattern

In line with these mechanism-based approaches, scholars of organizational path dependence are concerned with persistence that is grounded on self-reinforcing mechanisms and that gradually restricts the scope of action available to organizational actors. Building on David (1985) and Arthur (1989, 1994), Sydow et al. (2005, 2009) have transferred the concept of path dependence to organizations and summarized its quintessence in Schreyögg and Sydow (2011). By situating

[9] I will use the terms positive-feedback mechanisms and self-reinforcing mechanisms interchangeably during the course of the study.

self-reinforcing mechanisms at the heart of their concept, researchers of organizational path dependence explicitly differentiate their concept from other explanations of organizational persistence, for example imprinting (Stinchcombe 1965) or commitments arising from sunk costs (Ghemawat 1991). Sydow et al. (2009, pp. 699-701) distinguish four self-reinforcing mechanisms:

- *Coordination effects*, defined as the "benefits of rule-guided behavior", are understood as key mechanisms for the functioning of organizations (Sydow et al. 2009, p. 699). Coordination effects generate positive feedback for actors because "behavior that is guided by rules can be anticipated, and the likely reactions can be taken into account. That is, the more actors adopt and apply a specific institution (such as an organizational rule or an interorganizational road map), the more efficient the interaction among these actors, thereby reducing the coordination costs" (Sydow et al. 2010, p. 177). Thus, rule-guided behavior reduces actors' uncertainty and thereby increases the efficiency of their interactions over time.
- *Complementarity effects* refer to "synergy resulting from the interaction of two or more separate but interrelated resources, rules or practices" (Sydow et al. 2009, p. 699). Complementarities are thus understood as two or more organizational practices that mutually enrich or reinforce each other to the benefit of the organization as a whole (Milgrom and Roberts 1995, p. 181). For scholars of organizational path dependence, the emphasis lies on the self-reinforcement that is engendered by this interaction. It is precisely because "the advantages of repeatedly combining interrelated activities do not simply add up [that] they produce an additional surplus" (Sydow et al. 2009, p. 699). Such complementarities are seen to appear mostly within organizations, for example between "marketing skills and R&D capabilities" (Sydow et al. 2009, p. 699) or between a successful production model that is sustained by a "bonus scheme, the ownership structure, [and/or] the inventory policy" of a company (Milgrom and Roberts 1995, p. 204).[10]

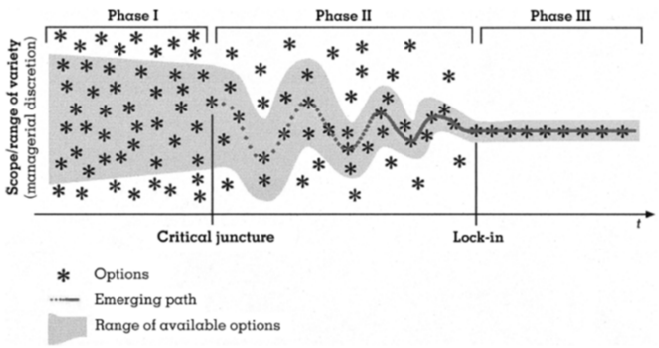
[10] For a conceptualization of the different forms of complementarity in organizational path dependence in comparison to the comparative capitalism literature, please refer to Becker-Ritterspach (2011).

- *Learning effects* hold that "the more often an operation is performed, the more efficiency will be gained when operating subsequent iterations" (Sydow et al. 2009, p. 700). Over time, increasing experience allows for a more efficient operation of tasks. As an operation is performed more smoothly, learning permits to increase the production volume. Similar to economies of scale, learning effects thus engender decreasing average unit costs over time and thereby generate important productivity gains for an organization (Argote 1999, p. 28). Because of these productivity gains, an organization is incited to stick to a once established pattern and direct all future investments to its existing competencies (March 1991). This is especially the case in sectors where production costs are high. Prominent examples for learning effects therefore come from manufacturing in general and aircraft production in particular (Wright 1936; Asher 1956; Alchian 1963; Hartley 1965; Bletschacher and Klodt 1992, pp. 74-75; Hornschild 1992, p. 54; Neven and Seabright 1995, p. 322; Argote 1999, p. 2; Hill 2008, p. C23). For organizational path dependence such learning effects "are often reinforced and extended by earnings from coordination costs and complementarities" (Sydow et al. 2009, p. 700).
- *Adaptive expectations effects* refer to the preference formation of an individual in interaction with the preferences it expects from others. Accordingly, they describe the self-reinforcing effect that "the more people are expected to prefer a particular product or service (…), the more attractive it becomes" (Sydow et al. 2009, p. 700). This mechanism is often explained in reference to the distribution of technologies or the diffusion of technological standards (David 1985, p. 335, Arthur 1989, p. 123). In these cases, the benefit of an individual in adopting a certain technology is closely related to the decisions of others because the utility of the individual increases the more the technology it chose is prevalent. Thus, when individuals expect a certain technology to be preferred by others, they align their individual purchasing decisions. This in turn will result in a higher distribution of a certain technology and will again raise expectations about its future distribution. Because expectations enhance the probability of a certain distribution and thereby contribute to its very realization, scholars of organizational path dependence believe that this positive feedback effect can also act as a "self-fulfilling prophecy" (Sydow et al. 2009, p. 700).

Due to the unfolding positive feedback effects of these four mechanisms, actors gradually limit their scope of action, which is conceived as the number of options available to actors. In line with this argument, researchers of organizational path dependence define an organizational path "as a rigidified, potentially inefficient action pattern built up by the unintended consequences of former decisions and positive feedback processes" (Sydow et al. 2009, p. 696).

Demanding conceptional rigor, Sydow et al. (2009) have conceptualized organizational path dependence as a three phase process. With their concept, scholars of organizational path dependence claim to capture all path-dependent processes in organizations, regardless of their context, their nature and their underlying self-reinforcing mechanisms. Up to today, the concept has, for example, been applied to study path-dependent processes at the managerial level (Erfurt 2012), the organizational level (Holtmann 2008; Koch 2008) or the inter-organizational level (Burger and Sydow 2010; Burger 2012). The concept as depicted in Figure 1 illustrates the three phases of preformation (phase I), path-formation (phase II) and lock-in (phase III).

Figure 1 **The constitution of an organizational path**
(Source: Sydow et al. 2009, p. 692)



1) In the preformation phase, the evolution of a trajectory is contingent, i.e., "unpredictable, non-purposive, and seemingly random" (Vergne and Durand 2010, p. 755). Since events can occur in one way or another, the scope of action available to actors is high. Marginally determined by past developments and institutional settings, various different outcomes are possible up to the moment when a randomly occurring 'small event' affects the preferences of actors and gradually triggers the development of positive feedback mechanisms. Their unfolding influence incites actors to hold on to previous actions or decisions.

2) In the path-formation phase, a 'critical juncture' understood as "the moment of entering into the dynamics of a self-reinforcing process" (Schreyögg and Sydow 2011, p. 323), activates positive feedback for actors. Due to the positive feedback of complementarity, coordination, learning and adaptive expectations effects, actors have an ever increasing incentive to replicate previous actions or decisions. Repeatedly referring to past actions or decisions, however, progressively restricts the choices of actors and alternative developments become increasingly unlikely.
3) In the lock-in phase, the organization has reached an "irreversible state of total inflexibility" (Sydow et al. 2009, p. 691) and has thus become 'path dependent'. Due to positive feedback, actors have extremely restricted their choices of action to choices in line with the previous decisions and have thus become locked-in to a certain action pattern. From now on, they are perceived as being determined by the path and its underlying mechanisms. Although the authors admit that a lock-in can never be considered as absolute in a social context, the actors' restricted scope of action is insufficient to overcome the mechanisms' positive effects that retain them to a certain path (Koch 2007). As a result, organizational actors cannot adequately respond to future challenges and the organization ultimately resists change when it is needed. In line with this, a path is thus conceived as a potentially inefficient outcome from which it is extremely difficult to escape.

However, even in the eyes of path dependence scholars, no path exists forever. Path dependence theory argues that change is possible either through internal "coincidental path-dissolution" processes or through external path-breaking shocks (Sydow et al. 2009, pp. 701ff.). Such a dissolution process can, for example, occur, when a path's underlying self-reinforcing mechanism is unintentionally interrupted through, or replaced by, another self-reinforcing mechanism. This mechanism might then pave the way for an unthought-of, more efficient alternative. The Intel Corporation's successful internal shift from the memory to the microprocessor business serves as an example for such a path-dissolution process (Burgelman 1994, pp. 24ff.). However, in the eyes of path dependence scholars such a disrupting event is extremely rare and accidentally triggered, which makes its occurrence more than unlikely. Sydow et al. (2009, p. 701) thus consider its "passive" awaiting as "fatalistic" and bring forward their preferred approach to change, namely the breaking of paths. Within the reasoning of the authors, this process can, however, only be

introduced through external forces as they conceive actors as being locked-in to a certain action pattern. It is precisely because of this deterministic lock-in conception that change can only be radical in nature. Thus, only external "shocks, catastrophes, or crises" can initiate path-breaking change (Sydow et al. 2009, p. 701), which the authors define as an "effective restoration of a choice situation — the insertion of at least one alternative course of action", whereas "the new alternative has to be a superior one" (Sydow et al. 2009, p. 702). Because initiatives for such a restoration of choice can never come from inside of the organization, path dependence scholars suggest external monitoring in order to prevent path-dependent developments (Schreyögg et al. 2003, pp. 279-280). The goal of this "path monitoring" (Eberl 2010, p. 156) can, however, only be the detection of paths and the development of suitable tools for its dissolution. In the eyes of organizational path dependence, such a dissolution remains extremely difficult to achieve and an actual path-breaking process would in their view again require the intervention of "exogenous forces" (Sydow et al. 2009, p. 701).

2.2.3 Opening the black box of path dependence[11]: Approaches to a more actor-centered research on organizational paths

Organizational path dependence neglects the complexity of path-dependent developments in social environments. New research in this field goes beyond these restrictions and extends its scope to intentional influences of actors on shaping trajectories (Garud and Karnoe 2001; Crouch and Farrell 2004; Garud et al. 2007; Meyer 2009; Garud et al. 2010). Crouch and Farrell (2004) have, for example, proposed to integrate socially embedded actors that interact with, and that can adapt to, their environment in Arthur's mathematical polya-urn model for path-dependent developments. In their model, the authors emphasize that, despite the effects of positive feedback, alternative action patterns to the unfolding dominant solution remain accessible. Actors possess the capacity to deploy such "dormant resources" (Crouch and Farrell 2004, p. 17) in situations where they perceive the need to adapt to changing environments. In line with this understanding, socially embedded actors are conceived as being able to influence path-dependent processes at all stages of development. As a result, actors may at all times induce path-breaking change within the limits of their perceptions of their environment and resources. Garud and Karnoe (2001) have introduced another notion of the influences of actors on

[11] This expression is taken from Sydow et al. (2010, p. 190).

trajectories. In their conception of path creation, the authors highlight the role of actors, or 'entrepreneurs', in the intentional creation of path-dependent processes. In their understanding, actors can decide to depart from previous trajectories through a process of "mindful deviation" (Garud and Karnoe 2001, p. 2). This implies that actors can modify the structures in which they are currently embedded in. Since such creative actors perceive new paths as being more efficient, the authors do not consider paths as the results of unintended or inefficient processes. Instead, paths are understood as positive developments and outcomes that are worth "planning for" (Sydow et al. 2010, p. 175). In favor of a positive conception of paths, these new approaches thus disregard the criterion of potential inefficiency so important to the economic literature on path dependence (David 1985; Liebowitz and Margolis 1990, 1995)[12] and the conventional literature on organizational path dependence (Sydow et al. 2009). Recent studies that reflect on the complexity of path-dependent developments in social environments therefore leave aside the inefficiency criterion (Meyer 2009; Sydow et al. 2010).

A new stream of literature has recently advocated a more moderate understanding of path dependence by integrating actors in different phases of path-dependent processes. This remains challenging for orthodox researchers of organizational path dependence. Because in their view unfolding self-reinforcing mechanisms progressively limit the scope of action available to organizational actors, they conceptualize agency differently in the course of preformation, path-formation and lock-in. In the first preformation phase the scope of action available to actors is still high. The more the process evolves, however, the less important becomes the role that actors play. In the second path-formation phase, the actors' scope of action is progressively restricted, and in the lock-in phase actors can no longer adequately react to changing environmental demands. Because actors can only make choices that are in line with the predetermined path, their actions are now virtually determined by rigidified structures. Actors and the differences among them become less and less important as the process evolves and are ultimately neglected in the lock-in phase.

New research in this field has begun to critically discuss the role of agency in the different phases of the constitution of a path (Sydow et al. 2005; Botzem 2010; Berthod 2011).

[12] By empirically questioning QWERTY's inferiority, neoclassical economists contested David's interpretation, both from a theoretical and empirical point of view. For their critique, see Liebowitz and Margolis (1990, 1995).

Based on the idea that actors affect developments in societal contexts (North 1990; Pierson 2000; Crouch and Farrell 2004), Botzem (2010) has recently introduced the idea of actor-centered research on organizational paths. Framing the standardization of international accounting as a path-dependent process, he argues that the second phase of the Berlin model of organizational path dependence, the path-formation phase, cannot be understood without considering the influence actors have on self-reinforcing mechanisms. The author sheds light on the interaction between different groups of actors in the path-formation phase and demonstrates that competition, conflict and bargaining among these groups is essential for a path-dependent outcome. Depending on their capability to deploy resources, actors are able to shape positive feedback mechanisms by using four strategies: professionalization, legitimization, diversification and domination. Their influence is at its peak in situations where actors are confronted with both a limited number of possibilities for action and a high centralization of power. Accordingly, the power to act ("Handlungsmacht") can be distributed unequally among the actors and some have more influence on developments than others (Botzem 2010, p. 200).

Other scholars of organizational path dependence have proposed a structurationist perspective in order to integrate actors in all phases of a path-dependent process (Dobusch 2008a, 2008b; Sydow et al. 2010; Berthod 2011). Structuration theories allow researchers to simultaneously incorporate action and structures. In their conceptions, structuration theories overcome the traditional opposition of action and structure because they allow studying the mutual constitution of the action of actors in structures they are embedded in. Anthony Giddens introduced this perspective to the social sciences. In his understanding of the "duality of structure" (Giddens 1984, p. 25), structures are produced and reproduced through the interactions of actors. Their interaction is, however, only possible within the context of these same structures. As a result, structures are conceived as both the "medium and [the] outcome" of actors' actions (Giddens 1984, p. 374). In this process, actors unconsciously refer to 'modalities' that link interaction and structures. With reference to "interpretative schemes, facilities and norms", actors tend to reproduce the structures of their interactions (Giddens 1984, p. 29), yet they also have the possibility to alter them. Such a structurationist understanding was also almost simultaneously developed for organizations by Crozier and Friedberg (1977, 1980), for

organization studies by Maurice et al. (1980) and for socioeconomics by Maurice et al. (1982) (see Sorge 2006, p. 183).[13]

For organizational path dependence, these "dialectical approaches" (Schreyögg and Sydow 2011, p. 322) allow integrating actors in its reasoning because, in the view of structuration theories, paths are conceived as both the "medium and [the] outcome" of the actions of embedded actors (Giddens 1984, p. 374). Due to these insights, scholars of organizational path dependence have gladly applied structuration theory, however, up to now primarily in Giddens' interpretation.[14] For instance, Dobusch (2008a, 2008b) combines organizational path dependence with Giddens' structuration theory in order to expose how organizations, in his case large urban administrations in Germany and Austria, have dealt with the 'Microsoft Windows path' in the field of desktop software. Through the development of discourse coalitions, some of these administrations were eventually able to migrate and to break away from the "Windows path" (Dobusch 2008b, p. 8), while others remained locked-in. Also on an organizational level, Berthod (2011) shows how and why various groups of actors in the city of Dresden held on to the decision to build the Waldschlösschen bridge over the Elbe River, although this led to the withdrawal of the UNESCO World Heritage designation for the site. In order to pursue their interests of building this bridge, the author shows how organizational actors made use of their institutional environments in order to influence and shape paths. On a network level, Sydow et al. use the case of the Berlin-Brandenburg Optics Cluster to reveal that "actors actively and purposively draw upon rules and resources that were shaped" during its structuration (Sydow et al. 2010, p. 173). With the help of Giddens' approach, the authors demonstrate the central role of agency in the cluster's development and are able to show "how agency turns coordination into a self-reinforcing mechanism" (Sydow et al. 2010, p. 173).

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13 Giddens' structuration perspective was also applied by scholars of strategic choice (Child 1997) and neo-institutionalism (Scott 2001). For an overview of its application to organization theory, see Ortmann et al. (1997, pp. 341-343).

14 For an application of Giddens' structuration theory to the creation of technological paths, please refer to Windeler (2003).

2.2.4 Critical discussion and research gap

In line with the more actor-centered approaches to organizational paths, I propose to further conceptualize the relationship of stability and change in the context of organizational structures that actors negotiate collectively. The discussed "agency-oriented and yet structure-sensitive" approaches already give us an idea of a more complex picture of organizational path dependence that goes well beyond the conventional perspective (Sydow et al. 2010, p. 175). They differentiate between different groups of actors that strive for the implementation of their varying and opposing interest. However, these more actor-centered approaches to organizational path dependence continue to center their attention solely on the unraveling of stability and its underlying self-reinforcing mechanisms. Building their analysis on Sydow et al.'s (2009) rigid understanding of path-dependent developments, the new approaches remain concentrated on examining actors that gradually become locked-in. Due to the unfolding positive feedback effects of self-reinforcing mechanisms, actors progressively reduce their scope of action, defined as the number of options available to them. The number of alternative options thus steadily decreases until the ever further diminishing scope of action is reduced to a certain way of behavior. From now on, actors are conceived as locked-in to a path that restrains them from adapting to necessary changes. As a result, the path constrains and paralyzes actors in such a way that change can only come from "exogenous forces" (Sydow et al. 2009, p. 701). Thus, the discussed actor-centered extensions exclude actors' potentials to strategically adjust their behavior. They continue to overlook actors that exert pressures for change and thus ignore modifications to a once established pattern.

Despite their more complex conceptualization of agency, these new approaches continue to lack the accuracy to illustrate the complexities of persistent developments and their modifications over time. In order to reveal "contradictory organizational processes", I follow Schreyögg and Sydow's recommendation to apply a structurationist perspective for shedding light on these scarcely explored phenomena (Schreyögg and Sydow 2010, pp. 1259-1260). This structurationist perspective must, however, enable researchers to apply a complex conceptualization of actors and in this way allow them to unravel the seemingly paradoxical relationship of stability and change (Poole and Van de Ven 1989, pp. 573-575).

Crozier and Friedberg's (1977, 1980) structurationist approach to organizations offers a more differentiated perspective on actors in the context of organizational structures they have

collectively negotiated and also proposes a research procedure for their investigation. Crozier and Friedberg conceive actors as intelligent and strategically behaving individuals or groups of agents[15] that possess diverging interests and rationalities. These actors compete for asserting their interest by mobilizing resources available to them. In order to achieve their goals, these actors react to the strategies of others and can adjust their tactics accordingly. Actors thus always retain room for maneuver. Structures, defined as the "rules of the game" (Crozier and Friedberg 1995, p. 78) actors have previously agreed upon, constrain actors, but at the same time provide them with a scope of action. These rules of the game restrict the scope of strategies actors can choose from, but leave actors free to select and to implement their individual strategy within these constraints. By playing games inside these structures, actors reproduce the structures and, at the same time, strive to influence them in their favor. Through their interactions, actors thus replicate structures which they may also collectively modify. In the eyes of Crozier and Friedberg, actors are thus not simply trapped on to a specific action pattern and follow it deterministically. Instead, they act within the boundaries they have produced and are at the same time determined by them. As a result, actors can exert influence on the structures within which they operate. Moreover, due to what Giddens calls the "dialectic of control" even "less powerful [actors can] manage resources in such a way as to exert control over the more powerful" (Giddens 1984, p. 374).

In addition to their theoretical contribution, Crozier and Friedberg (1980, pp. 259-272) have also developed a research method for examining the "reciprocal constitution" (Sorge 2006, p. 183) of strategic actors and structures within organizations. Originating from the individual strategies of actors, the strategic analysis allows researchers to reconstruct the games actors play and thereby understand the underlying rules of the game that determine their interactions. The strategic analysis thus includes both actors and structures and enables researchers to reveal the development of certain processes under the given arrangements. By drawing on Crozier and Friedberg's theory and method, researchers can thus uncover the details of path-dependent processes and show that maintaining stability is more complex than organizational path dependence argues. As a result, this approach allows for a more nuanced view on persistent developments in organizations. Because Crozier and Friedberg's structurationist approach is

[15] In line with Crozier and Friedberg, I use the terms 'actor' and 'agent' interchangeably.

tailored to analyzing the "reciprocal constitution" (Sorge 2006, p. 183) of strategic actors and structures within organizations, it has much to offer for the extension of organizational path dependence, both from a theoretical and a methodological point of view.

Crozier and Friedberg's structurationist perspective leads us to rethink several key notions of organizational path dependence, namely its conception of stability, of mechanisms and of critical junctures.

Through the theoretical lens of Crozier and Friedberg, stability is always renegotiated by strategic actors in structures that they have collectively shaped and can alter. In the authors' conception, strategic actors play games in the context of organizational structures, or as the authors designate them, the rules of the game. Even if the rules are extremely constraining, they leave actors room for maneuver that actors use to coordinate their actions. Actors make use of this room in order to react to the strategies of others and to potentially adjust their own behavior. Especially in games that are highly conflictual, this room for maneuver may provide actors with the flexibility needed in order to take their diverging interests into account and in this way find solutions acceptable for all of the actors involved. In Crozier and Friedberg's perspective, actors can thus collectively determine change to stability within the limits of their organizational structures. Against this background, a complete and identical reproduction of organizational paths seems implausible. Crozier and Friedberg's perspective thus offers a more nuanced view of stability that is situationally reproduced and, at least partly, changed by actors.

In the view of Crozier and Friedberg, the same is true for social mechanisms. Following the understanding of Mayntz (2004), mechanisms describe recurring social processes, which over time causally connect initial conditions with a certain outcome. Since, for Crozier and Friedberg, all social processes in organizations are reciprocally constituted by actors' behavior and structures, self-reinforcing mechanisms have to be conceived as being more complex than organizational path dependence argues. Just like in any other organizational process, strategic actors are involved in their reproduction. Through their interactions, actors reproduce and potentially modify self-reinforcing mechanisms. Crozier and Friedberg's theoretical approach not only allows us to gain a more detailed understanding of such mechanisms, but also allows us to reveal how mechanisms sustain stability and foster change in detail.

In addition to a more complex understanding of organizational stability and its underlying mechanisms, Crozier and Friedberg's perspective also makes us rethink our understanding of critical junctures. Critical junctures are a key notion of path dependence

research (see, for example, Mahoney 2000; Pierson 2000, 2004). However, their conceptualization varies widely in the literature.[16] For historical institutionalists, "critical junctures are characterized by the adoption of a particular institutional arrangement from among two or more alternatives. These junctures are 'critical' because once a particular option has been selected it becomes progressively more difficult to return to the initial point when multiple alternatives were still available" (Mahoney 2000, p. 513). Building on Collier and Collier (1991, p. 27), scholars of organizational path dependence refer to a critical juncture as a single moment in time when self-reinforcing mechanisms activate positive feedback for actors for the first time (Schreyögg and Sydow 2011, p. 323). However, the conceptualization of only one single critical juncture seems inappropriate to capture the complexity of organizational processes as a result of actors' interactions. In the eyes of Crozier and Friedberg, these mechanisms are always subject to the interaction of organizational actors. They are thus continuously renegotiated, reactivated of readjusted. In order to account for this ongoing understanding, I designate critical junctures "as relatively short periods of time during which there is a substantially heightened probability that agents' choices will affect the outcome of interest" (Capoccia and Kelemen 2007, p. 348).

2.3 Rethinking organizational path dependence from a structurationist perspective: Strategic actors (re-)negotiating paths

2.3.1 A general introduction to Crozier and Friedberg's structurationist approach to organizations

As pioneers in organizational theory, Michel Crozier and Erhard Friedberg have developed their structurationist perspective on organizations in the late 1970s. In the early 1960s, Michel Crozier has introduced his seminal analysis of "The Bureaucratic Phenomenon" in French administrations (Crozier 1961, 1964). Based on these widely received works, Michel Crozier and Erhard Friedberg have devised their structurationist approach of organizations at the Centre de Sociologie des Organisations, a joint research institute of the Institut d'études politiques de Paris (Sciences Po) and the French National Center for Scientific Research (CNRS). "L'Acteur et le Système" was published in 1977 (Crozier and Friedberg 1977), the English translation appeared

[16] For a comprehensive summary, please refer to Capoccia and Kelemen (2007, pp. 347ff.).

three years later (Crozier and Friedberg 1980). In line with Giddens' "duality of structure" (Giddens 1984, p. 25), Crozier and Friedberg conceive organizational actors as acting within organizational structures they have collectively produced. Through their interaction, actors reproduce structures, which simultaneously enable and constrain the action of actors:

> "Problems, solutions, constraints, opportunities, material objects and immaterial repertoires or procedures, formal structures and institutional arrangements, none of it all exists outside and independently of human agency. Human action is of course constrained by them but at the same time sustains and enacts them. Indeed, they come to life only through human action which at the same time contributes to their maintenance and to their transformation" (Crozier and Friedberg 1995, p. 76).

This interpretation of the socially constructed nature of organizational processes was widely received in France (see, for example, Thoenig 1994). However, it remained only scarcely recognized in the German or the Anglo-American literature (Ortmann 1995, p. 32). While the German-language literature has mostly associated Crozier and Friedberg with micro-political approaches (Ortmann et al. 1990; Neuberger 1995; Ortmann 1995; Dörrenbächer 2006)[17], American scholars have criticized the approach for being too ambiguous (Stinchcombe 1979, p. 1268). As a response to this critique, the authors have summarized their approach in "Organizations and Collective Action: Our Contribution to Organizational Analysis" (Crozier and Friedberg 1995). The article, which appeared in the edited volume "Studies of Organizations in the European Tradition", recounts the development of the approach and provides a pointed overview. In addition to "Actors and Systems" (Crozier and Friedberg 1980), it is referred to throughout the text.

In line with their previous works, the authors ground their approach on the notions of bounded rationality and the relational concept of power. In line with Dahl (1957) and Emerson (1962), Crozier and Friedberg perceive "power as a relation of exchange, hence a reciprocal relation, but one in which the terms of exchange favor one of the parties involved. It is a relation of force from which one party can obtain more than the other, yet in which neither party is totally defenseless" (Crozier and Friedberg 1980, p. 32). Moreover, the concept of bounded rationality introduced by Simon (1955) is central to the approach. Actors are thus conceived as

[17] For a recent application of micro-political approaches to multinational enterprises in numerous detailed case studies, please see Dörrenbächer and Geppert (2011).

bounded "by all the limitations (cognitive, affective, cultural, ideological), which have been […] emphasized by the critique of rational choice" (Crozier and Friedberg 1995, p. 77). This perception allows Crozier and Friedberg to develop a "balanced view of organizational structures as the product of human interaction under conditions of bounded rationality" (Crozier and Friedberg 1995, p. 73). Due to the combination of bounded rationality and the relational concept of power, the approach also permits to "explore the sociological boundaries of management rationality, that is, the boundaries imposed by social interaction and bargaining processes" (Crozier and Friedberg 1995, p. 74). Because actors, games and rules of the game are key concepts of Crozier and Friedberg's approach, they will be elaborated in detail in the following section.

2.3.2 Actors, games and rules of the game

2.3.2.1 Actors: Strategic agents with room for maneuver

Crozier and Friedberg conceive actors as strategic and intelligent agents, which interact by mobilizing resources in an organizational context that they can alter. For the authors, "understanding organizations is all about understanding […] collective action" (Crozier and Friedberg 1995, p. 75). Their approach thus originates from actors that engender such action within organizations. "Everybody is an actor as soon as he acts in a field of action, that is, contributes by his behavior to the structuration of this field of action" (Crozier and Friedberg 1995, p. 75). Actors as defined by Crozier and Friedberg can thus be individuals, groups or any other organizational entity. Whatever their nature, these actors are conceived as being boundedly rational, intelligent agents. Equipped with "the capacity of analysis, anticipation and calculation", strategic actors pursue what they consider their interests in an interaction with other agents (Crozier and Friedberg 1995, p. 76). These individual interests can conflict or be consistent with the interests of other actors, and relate to current or future issues.

Due to their structurationist perspective, the authors, however, abstain from defining the interests of actors: "No a priori definition can be given, since the actors' rationalities do not exist independently from their interactions and the stakes that structure them" (Crozier and Friedberg 1995, p. 77). Regardless of the nature of their interests, strategic actors make use of the resources available to them in order to implement whatever they consider their interests. Actors are the more influential the more resources they can deploy in support of their interests. However, "not

all the resources available to an actor are equally relevant or mobilizable within a given organization" (Crozier and Friedberg 1980, p. 38). According to the authors, a resource "exists and becomes significant for organizational processes only when it is understood and invested in by actors pursuing their own strategies" (Crozier and Friedberg 1980, p. 40). As a result, Crozier and Friedberg enumerate four general types of resources agents can mobilize (1980, pp. 39-44): expert knowledge, sources of power connected to the organization's relevant environments, control of communication and information flows as well as the utilization of organizational rules (Table 1).[18]

Table 1 **Actors' resources according to Crozier and Friedberg**
(Source: Crozier and Friedberg 1980, pp. 39-44)

Four types of resources	*Definitions*
Expert knowledge	"Possession of a special skill or functional specialization for which no ready substitute is available" (p. 40) "The expert is the only person with the competence, knowledge, and experience of the situation needed for solving certain problems crucial to the organization" (pp. 40-41)
Sources of power related to the organization's relevant environments	Control over the "sectors of society with which [the organization] enters into relation" (p. 41) "Individuals and groups capable, by means of their manifold connections with one or more sectors of the environment, of at least partially controlling this zone of uncertainty, and of turning it to the organization's use and profit, will enjoy a considerable power. This sort of power has been called boundary spanning" (p. 41)

[18] For other conceptions of organizational sources of power see, for example, Mintzberg (1983, p. 24) as well as Ortmann and Becker (1995, pp. 54-56).

Four types of resources	*Definitions*
Control of communication and information flow	"To perform adequately the tasks of functions assigned to him, an actor needs information that is in the possession of other individuals. If, for a variety of reasons, he cannot short-circuit of forgo their cooperation, such individuals will have power over him, inasmuch as the manner of their transmission of information (with longer or shorter delays, withholding or "doctoring" of pertinent data, more or less, etc.) will have profound impact on the recipient's capacities for action" (p. 42)
Utilization of organizational rules	Organizational rules "are supposed to suppress sources of uncertainty … but they also create new uncertainties which can be capitalized on by the very person whom the rules sought to constrain and whose behavior they were supposed to regularize" (p. 43)

Because these resources cover relevant *zones of uncertainty* for the organization as a whole, they provide the agents that possess them with the ability to assert their interests in an organizational exchange relation:

> "The power and capacity of action of an individual or group within an organization depend, in the final analysis, on the control which can be exercised over a source of uncertainty affecting the organization's capacity to attain its objectives, as well as on the importance and relevance of this source of uncertainty to the other members. Thus, the more crucial the zone of uncertainty controlled by an individual or group, the more power he or it will command" (Crozier and Friedberg 1980, p. 37).

In their interest-driven exchange relations, actors are shaped and not just passively determined by the structures they are embedded in. Actors always retain a margin of liberty and negotiation that provides them with alternative options of action as well as the possibility to influence other actors for the transformation of current structures.

2.3.2.2 Games: Linking action and structure

In their game concept, Crozier and Friedberg bring strategic actions of interest-driven agents together with organizational structures and thereby reveal how the coordination of actors takes

place. In order to link actors' behavior and organizational structures, Crozier and Friedberg 'borrowed' the game concept "from decision-making – and the then developing game-theory" (Crozier and Friedberg 1995, p. 74). However, their use of the term has nothing in common with the formal modeling of the behavior of agents in the social sciences in general and in economics in particular. By using the term "game" the authors refer to "the essential instrument of organized action" that actors use "to regularize their cooperation" (Crozier and Friedberg 1980, p. 56). In their games, actors mobilize resources available to them and compete by pursuing their individual strategies, may they be cooperative or conflicting with those of others. During their interactions, actors react to the strategies of others and may adjust their own strategies. Thus, the games actors play do not only reveal how their coordination takes place.

By combining the strategic actions of interest-driven agents within organizational structures, the game concept also exposes the interaction of agency and structures, or the "duality of structure" (Giddens 1984, p. 25). According to Crozier and Friedberg, an organizational game is "always one of cooperation" (Crozier and Friedberg 1980, p. 56). Organizational games have been classified by various authors. Mintzberg has, for example, identified five ideal types: games about authority, resistance to authority, power, rivalry and organizational change (1983, p. 187). Ortmann et al. (1990, pp. 58-59) have distinguished "innovation and routine" games.[19] However, for Crozier and Friedberg, the particular game the actors play has to be uncovered by an inductive, qualitative analysis of a specific field of study (Crozier and Friedberg 1980, pp. 269-272).

2.3.2.3 Rules of the game: Negotiated structures that enable and constrain actors

In their games, actors are guided and constrained by organizational structures, or the rules of the game. Crozier and Friedberg conceive the rules of the game as organizational structures that provide strategic actors with a scope of action for choosing their individual strategies. According to the authors, the rules of the game constitute the results of the previous interactions of actors. They "structure the relations among actors", and since they simultaneously enable and constrain action, they "consequently condition [the] strategies" of actors (Crozier and Friedberg 1980,

[19] For a detailed overview on organizational games see Neuberger (1995, pp. 192-204).

p. 259). The rules of the game do not determine the actors' behavior, but, while constraining their actions, they also provide them with a scope of action actors may use.

> „…if there is constraint in organizations, there cannot be determinism. Structure in a situation does not preclude freedom for the actors" (Crozier and Friedberg 1980, p. 61).

Thus, while structures limit the scope of strategies actors can choose from, actors remain free in their choices.

The rules of the game also provide actors with room for maneuver they can use to achieve their interests. Due to this margin of liberty, actors are able to select strategies that are "more or less risky, more or less aggressive, or, conversely, more or less defensive" (Crozier and Friedberg 1980, p. 59). Moreover, they can also decide on adopting a strategy that is opposed to the current structure. Through the interaction of actors in games, such strategies may induce changes to current structures. Thus, actors do not only possess a scope of action, but they also actively use it in order to assert their interests. By mobilizing resources, actors strive to influence the other actors in the game and, if it is in their interest, also the rules of their games.

2.3.3 Strategic analysis: Crozier and Friedberg's analytical framework

Structurationist approaches have often been criticized for their vague operationalization of key concepts. As a result, these approaches remain difficult to apply and researchers have to put much effort in adopting them to their specific field of study (Neuberger 1995, p. 333; Osterloh and Grand 1997, p. 357). Walgenbach, for example, acknowledges that "Giddens is difficult to interpret and that every user of his theory will need to develop an interpretation of his or her own" (2006, p. 423, translated by the author).[20] In order to facilitate the application of their approach, Crozier and Friedberg have proposed the "strategic analysis" method in order to unveil actors, games and the rules of the games within organizations (1980, pp. 259-272). In their words, strategic analysis is concerned with the "constraints that are placed on the capacity of an organization and each of its members to act, develop, and change by the conditions, modalities, and constructs of the games through which they have managed to achieve cooperation" (Crozier and Friedberg 1980, p. 259).

[20] Empirical specifications of Giddens' key concepts were, for example, provided by Ortmann et al. (1990), Neuberger (1995) as well as Küpper and Felsch (2000).

Crozier and Friedberg's strategic analysis consists of five analytical steps. Table 2 illustrates the five steps of strategic analysis, the researcher's analytical tasks as well as the corresponding data collection and analysis methods.

Table 2 **The steps of Crozier and Friedberg's strategic analysis**
(Source: Crozier and Friedberg 1980, pp. 259-272)

The five steps of strategic analysis	*The researcher's analytical tasks*	*Data collection and analysis methods*
1. Familiarize with the terrain	Gain a detailed understanding of the organization and the research problem studied	Document analysis and interviewing
2. Identify the actors relevant to the research problem	Inductively denominate the actors germane to the research problem	Document analysis and interviewing
3. Study every actor in detail	Inductively reconstruct the interests and the resources of actors and derive their individual strategies from studying their attitudes and behavior	Interviewing and document analysis
4. Reconstruct the game	Derive the game actors play from the analysis of the interaction of actors' strategies	Game analysis based on the analysis of the interaction of the strategies of actors
5. Reconstruct the rules of the game	Apply an "iterative procedure": Formulate increasingly precise hypotheses about the rules of the game by testing them against attitudes and behavior of actors (p. 271)	Rule analysis based on Crozier and Friedberg's iterative procedure

As a first step of strategic analysis, the researcher has to gain "experience" in his or her specific field of study (Crozier and Friedberg 1980, p. 260). Similarly to other inductive approaches, the researcher needs to "familiarize with the terrain" (Crozier and Friedberg 1980, p. 269), i.e., gain a detailed understanding of the organization in general and of the phenomena relevant for the research problem in particular.

In a second step, the researcher can start with detecting the actors germane to the research problem by analyzing data and conducting interviews. In line with Crozier and Friedberg's structurationist approach to organizations, the strategic analysis originates from the actors and their subjective experience (Crozier and Friedberg 1980, p. 263). The actors studied may be individuals, groups or any other organizational entity, depending on the focus of the study. Whatever their nature, these actors are conceived as being boundedly rational, intelligent agents, which pursue strategies in their organizational context.

In order to reconstruct these strategies, the researcher has to study every actor in detail through in-depth interviewing and extended data analysis. For this third step, the researcher must first "gain some perspective to preserve his autonomy and his unjaundiced view. But he then has to move on to the heart of the matter, as it were, to 'put himself in the place' of the various actors in order to reconstruct the logic of the diverse situations they face" (Crozier and Friedberg 1980, p. 262). With this view "from within" (Crozier and Friedberg 1980, p. 262), the researcher strives to reconstruct the interests and the resources of actors. On the grounds of this knowledge, the researcher aims at reconstructing the strategies the actors actively pursued during the course of a specific game. These strategies are derived from studying the attitudes and the behavior of actors.[21] Human behavior is understood as "the exercise and expression of choice within a range of possibilities. The conduct of the actors is considered as the expression of a rational strategy associated with a game to be discovered" (Crozier and Friedberg 1980, p. 60). Like behavior, attitudes are seen as "tools permitting rapid access to […] the various choices effectively made by the members of a system of action from a range of options" (Crozier and Friedberg 1980, p. 269). Always taking into account the influences that organizational structures exert on actors, the researcher can thus reconstruct the individual strategies of actors by studying their attitudes and behavior.[22]

On the grounds of this knowledge, the researcher can, in a fourth step, reconstruct the game the actors play. After having adopted the individual actors' point of view, the researcher

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21 I use the terms behavior and action interchangeably throughout the text.

22 It is important to note that Crozier and Friedberg do not only consider attitudes and behavior as an expression of actors' "past (their socialization, their past experience), but as a function of the future, of the present and future opportunities that they see in the games they are playing and in relation to which they orientate their strategies" (1980, p. 264).

must now "recover his exteriority and compare the many contingent rationalities or strategies he may have observed" (Crozier and Friedberg 1980, p. 262). The researcher thus analyzes the interaction of the individual strategies of actors by asking more and more precise questions about "what type of game such strategies might correspond to" (Crozier and Friedberg 1980, p. 272).

After having understood the game, the researcher can, in a fifth step, reconstruct the organizational structures which guide and constrain the actors while playing. These rules of the game are revealed by applying "an iterative procedure – going from feelings to strategies, strategies to games, and then back to feelings, etc." (Crozier and Friedberg 1980, p. 271). In this rule analysis, the researcher first formulates increasingly precise hypotheses about the rules underlying the game and then tests these hypotheses against the attitudes and behavior of actors (Crozier and Friedberg 1980, p. 271).

2.3.4 Applying consecutive strategic analyses for organizational path dependence research

The analytical framework for analyzing how actors maintain stability under pressures for change is derived from Crozier and Friedberg's strategic analysis (1980, pp. 259-272). In comparison to other structurationist approaches that abstain from proposing a methodology for investigation, the strategic analysis offer researchers a guideline for applying Crozier and Friedberg's structurationist approach to organizations. The five steps of the strategic analysis thereby serve as instructions for applying the theory's key concepts to the empirical research object: actors, games and the rules of the game. Despite this detailed guideline, some scholars criticize that Crozier and Friedberg have not sufficiently specified the notions of strategy and of games (Neuberger 1995, p. 216).[23] However, Neuberger acknowledges that this partially vague conceptualization provides researchers with the required flexibility to adapt the strategic analysis to their distinct, complex cases.[24] As a result, the strategic analysis' conceptual openness is in

[23] For a specification of the Crozier and Friedberg's game concept see, for example, Wender (1983).

[24] For examples that apply Crozier and Friedberg's strategic analysis, please refer to Ortmann et al. (1990), Ortmann (1995) or Bogumil and Schmid (2001).

some sense necessary to account for the inductive nature of structurationist approaches. It is precisely in this way that the strategic analysis can be tailored to every specific field of study.[25]

The application of Crozier and Friedberg's strategic analysis has much to offer for research on organizational paths. Because the method highlights various types of actors, structures and their interactions, it allows researchers to unravel the reproduction of stability in detail. Thereby, strategic analysis not only enables researchers to open the "black box of path dependence" with a structurationist methodology (Sydow et al. 2010, p. 190), but it especially allows researchers "to understand the origins of change in the interaction itself" (Crozier and Friedberg 1980, p. 60). Crozier and Friedberg's method is tailored to revealing the interactions of organizational actors in structures they negotiate collectively. Understanding actors' games and the underlying rules of the game is central for exploring the development of organizational stability and pressures for change with a structurationist lens. These developments, which are in the focus of this study, can only be examined by adopting a longitudinal perspective. In order to apply Crozier and Friedberg's strategic analysis in the context of organizational path dependence research, the procedure has to be applied over an extensive period of time. This can be done, for instance, by examining consecutive rounds of negotiations at 'critical junctures' where there is a "substantially heightened probability that agents' choices will affect the outcome of interest" (Capoccia and Kelemen 2007, p. 348), i.e., where the further direction of the organizational trajectory is decided. It is this intertemporal comparison of these critical junctures that allows us to unveil how actors renegotiate stability and change in organizational settings.

2.4 Summary

The objective of this chapter was to discuss the theoretical concepts relevant to this study's research focus and to develop the analytical framework for its investigation. The fundamental criticism this study advances to previous works on organizational path dependence is their disregard of actors that exert pressures for change in the upholding of paths. As a result, path dependence and its recent actor-centered extensions continue to focus their attention solely on the unraveling of stability and its underlying self-reinforcing mechanisms and to overlook modifications to a once established pattern. In order to close this fundamental research gap, the

[25] For the application of the strategic analysis to my specific cases, please see section 3.5.

chapter introduces a structurationist extension to organizational path dependence in the specific interpretation of Crozier and Friedberg. By proposing a differentiated conceptualization of actors, Crozier and Friedberg's approach allows to shed light on the reproduction of stability in detail. The approach thereby reveals the complexities of stability as a result of the interactions of organizational actors in structures they negotiate collectively. Furthermore, this chapter proposes the analytical framework of the study which will be applied in such a way as to depict a longitudinal process and to unveil how actors consecutively renegotiate stability and change in organizational settings. This research procedure allows for a deeper understanding of how organizational stability is maintained by actors over time despite countervailing pressures for change.

3 Research design

3.1 Introduction

This chapter elaborates on the methodology chosen for examining the research question at hand. First, it explains the reasons for choosing a qualitative longitudinal case-study design. The chapter then explains the motives for selecting Airbus' work-share allocation as a case and justifies why it is studied by comparing five work-share negotiations as sub-cases over time. Subsequently, the data collection, which is based on document analysis and semi-structured interviewing, is described in detail. In the following, this chapter explicates the details of the data analysis, which is performed according to Crozier and Friedberg's strategic analysis framework described in chapter 2.3. The chapter concludes by discussing the quality of the research according to standards typically used in the social sciences.

3.2 A qualitative longitudinal case study to explore an organizational path

This study applies a qualitative longitudinal case-study design for answering the research question under investigation. It aims at exploring the complexities of organizational stability by shedding light on how organizational actors handle the countervailing pressures for stability and change in organizational structures they collectively negotiate. This research goal requires an in-depth analysis of actors' interactions in their organizational context as well as their development over time — a detailed understanding only a qualitative longitudinal research design can provide. Based on Van Maanen (1979, p. 520), Merriam (2009, p. 13) defines qualitative research as:

> "an 'umbrella term covering an array of interpretive techniques which seek to describe, decode, translate, and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world (p.520)'. Basically, qualitative researchers are interested in understanding the meaning people have constructed, that is, how people make sense of their world and the experiences they have in the world."

Qualitative research thus allows researchers to perform holistic analyses of a limited number of cases within real-life contexts. Because of its open approach towards empirical context and data, qualitative research is also especially suited for answering little-researched questions (Baur 2005, p. 235). Furthermore, qualitative research is particularly appropriate for investigating the

development of complex social processes over time (Flick et al. 2007, p. 17). As a result, qualitative research designs are recommended both by scholars of path dependence (Sydow et al. 2009, p. 704) and of structurationist approaches (Crozier and Friedberg 1995, p. 86).

Among the numerous qualitative methods, case study analysis is chosen for examining the research question at hand. Qualitative research consists of various research methods.[26] Creswell (1998, 2007) distinguishes, for example, between five approaches: biographical method, phenomenology, grounded theory, ethnography and case study analysis. For studying organizational path dependence, most scholars use case study analysis (Vergne and Durand 2010, p. 737)[27] and lately suggest discourse analysis as procedure for investigation (Dobusch 2008b; Haussmann 2013). Discourse analysis is concerned with the "content of speech, its relevant topics and its social, more than its linguistic composition" (Flick 2006, p. 293, translated by the author). Thus, by analyzing discourses of various kinds, researchers aim at revealing how participants construct their social reality by shedding light on their interpretations of events as well as their "interpretative repertoires" (Flick 2006, p. 293, translated by the author).[28] However, this is not the focus of this study, which aims at investigating organizational trajectories. Because case studies focus "on understanding the dynamics present within single settings" (Eisenhardt 1989, p. 534), they allow researchers to contextualize the development of organizational phenomena (Yin 2003, p. 89). The case-study method thus provides researchers with the required longitudinal perspective for researching organizational paths and enables them to effectively answer research questions that ask "how" processes evolve (Yin 2003, p. 10).

Eisenhardt (1989, p. 534) notes that, depending on the research question, the researcher has to choose to investigate either single or multiple cases. Single case studies are concerned with

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26 For a detailed overview see, for instance, Flick et al. (2007).

27 Although case studies remain the dominant approach for studying organizational path dependence (see, for instance, David 1985; Dobusch 2008b; Holtmann 2008; Schüßler 2008; Botzem 2010; Berthod 2011; Erfurt 2012; Blanchet 2013), a growing number of scholars suggest "moving away from historical case studies of supposedly path-dependent processes" (Vergne and Durand 2010, p. 737). Instead, they propose to conduct more controlled, quantitative research designs. In recent times, scholars of organizational path dependence are increasingly following their request by, for example, conducting experiments (Bach 2008; Koch et al. 2009; Langer 2011) or simulation studies (Roedenbeck and Nothnagel 2008; Petermann 2010; Meyer 2012).

28 For an introduction to discourse analysis see, for example, Parker (2007).

one particular case that is thoroughly described as a whole. Moving away from this holistic approach, multiple case studies single out a number of cases with similar properties and compare them in the light of the research question under investigation. In order to investigate the development of stability despite countervailing pressures for change, a longitudinal case-study design is employed by examining a single case in detail over an extended period of time (Yin 2007, p. 49). Because this study aims at revealing phenomena path dependence theory has so far overlooked, the case under investigation was selected "for theoretical, not statistical, reasons" (Eisenhardt 1989, p. 537). Accordingly, "cases may be chosen to replicate previous cases or extend emergent theory, or they may be chosen to fill theoretical categories and provide examples of polar types" (Eisenhardt 1989, p. 537). In line with "theoretical sampling" (Eisenhardt 1989, p. 537), the goal of this study is to extend the emerging theory of organizational path dependence by examining a case that exhibits the development of stability maintained by actors under countervailing pressures for change.

3.3 Case selection: Illustrating stability and change in the case of Airbus' work-share allocation (A300-A350 XWB)

The work-share allocation of the European aircraft manufacturer Airbus is selected as a case for examination because it ideally shows evidence of a largely persistent, presumably path-dependent pattern that emerged as a result of the interactions of different groups of actors despite countervailing pressures for change. A case that can reveal such developments needs to satisfy three selection criteria. First, it has to exhibit the development of organizational stability over a long period of time. In order to assume a presumably path-dependent development, the case must show an organizational persistence that typically results from self-reinforcing mechanisms such as complementarity effects, learning effects, or coordination effects. Second, many different groups of actors should be involved in the development as well as the reproduction of stability. Third, these groups of actors must possess the possibilities to exert countervailing pressures for change. As a result of these pressures, change has to remain possible, although it may become increasingly difficult to achieve over the course of time. The case of Airbus' work-share allocation ideally satisfies these three criteria, which are now elaborated in detail.

First, Airbus' work-share allocation reveals the development of a largely persistent, presumably path-dependent work-sharing pattern over the company's forty year's history.

During this period, Airbus has organized industrial work sharing in more or less the same way (Hayward 1986, p. 73; Hornschild 1992, p. 70; Kracht 1994, pp. 58ff.; Schmidt 1997, p. 40; Salot 2006, p. 61; Mazaud 2007, p. 249; Figgen 2008, p. 19). From the first aircraft program (A300) launched in 1969 to the latest launched in 2006 (A350 XWB)[29], sections and systems were constantly distributed in the following way: (1) wings to Britain; (2) cockpits, front fuselage sections, center wing box and the pylons to France; (3) central and back fuselage sections to Germany; (4) the horizontal tail to Spain. Despite technological progress or variations in aircraft size, the initial allocation of the A300 aircraft has thus established a division of work and distribution of expertise that still exists today. One could argue that Airbus' persistent work-share allocation is sustained by self-reinforcing learning effects. Literature on aircraft production widely agrees upon the fact that learning effects generate decreasing average unit costs due to a more efficient operation of tasks (Wright 1936; Asher 1956; Alchian 1963; Hartley 1965; Bletschacher and Klodt 1992, pp. 74-75; Hornschild 1992, p. 54; Neven and Seabright 1995, p. 322; Argote 1999, p. 2; Hill 2008, p. C23). Because learning effects generate important productivity gains for an organization (Argote 1999, p. 28), it is incited to stick to a once established pattern, especially in sectors where production and sunk costs are high as is the case of aircraft production. Following this line of reasoning, learning effects with a potentially self-reinforcing nature engendered specialization processes in the Airbus organization and its partner companies. Over time, benefits from specialization made it increasingly difficult to change the work-share allocation once determined. As path dependence theory indicates, learning effects could thus be considered as underlying Airbus' persistent work-share allocation. At first sight, this case thus seems to be an archetype of 'conventional' path dependence, build on self-reinforcing learning effects. However, while tempting, such a simplifying explanation of organizational stability would fall short in capturing the complexities of the empirical case.

This is because this largely stable pattern was the result of negotiations among several different groups of actors: Airbus Industrie (AI) and its industrial partners French Aérospatiale, Deutsche Airbus, Spanish CASA and British Aerospace. AI was established as a joint-venture consortium between French Aérospatiale and Deutsche Airbus in 1970 and was quickly joined by Spanish CASA and British Aerospace. Initially set up as a Franco-German project, the Airbus

[29] For an overview of the program launches of Airbus, please refer to Appendix A.

consortium was not necessarily meant to be durable.[30] Long-term collaboration that covers several projects remains the exception in the aerospace industry. In line with this industry habit, Airbus was set up as a one product company for only building one plane and was initially not conceived for long-term collaboration among the partners involved. Path continuity was therefore not a foregone conclusion. The manufacturers involved in the consortium were fully or partly state-owned at the time of their AI accession with the exception of Deutsche Airbus. Due to the strategic importance of the aircraft industry, the German government was, however, also highly involved in the Airbus project from the very beginning. Muller (1989, p. 187) therefore describes the organization of Airbus Industrie GIE[31] as a relational network of three important groups of actors with diverging interests: Airbus Industrie (AI), the industrial partners French Aérospatiale, Deutsche Airbus, Spanish CASA and British Aerospace, and national governments of France, Germany, United Kingdom and Spain.[32] These national governments were very much engaged in the Airbus project and subsidized it from the very beginning (see, for example, Salot 2006, p. 31; Watzke 2010).[33] Although they did not directly intervene in the negotiations for the allocation of work shares, the national governments indirectly backed their respective national manufacturers in their work-share negotiations through funding and political support (Muller

30 Industry collaboration is common both in the military and the civil aerospace due to the huge program costs and the restricted number of purchasers. The Franco-British Concorde program for building the first supersonic passenger aircraft (see section 4.2.1) or the recently announced collaboration among EADS, and the American defense company Northrop Grumman for the US "tanker deal" (Hegmann 2009a) exemplify such partnerships. In the majority of cases these are, however, only arranged for the implementation of one single project. A durable collaboration of the project partners is usually not envisaged.

31 The AI organization, its key actors and decision-making processes are described in detail in section 4.3.

32 In this sense, Airbus is an exemplary specimen of a federated, multinational enterprise vastly more complex and governed by more stakeholders than the multinational company examined in the seminal work "Local players in global games" of Kristensen and Zeitlin (2005).

33 Due to the specific characteristics and the strategic importance of the aerospace industry, aircraft manufacturers are treated specifically in all of their respective countries. For instance, the involvement of the US-Government in the Boeing Company and its civil aircraft branch, Boeing Commercial Airplanes, was high in the past and still is so today. Contrary to direct or indirect company ownership in Europe, ways and means of political influences are different in the US. Boeing Commercial Aircraft was, for example, never state-owned, but a private company firmly protected by regulation. As such, legal restrictions ensure that an acquisition by non-American firms is virtually impossible (Schubert and Knop 2011, p. 11).

1989, p. 202).[34] As path dependence theory indicates, these 'political' interventions may increase self-reinforcing learning effects (Sydow et al. 2009, p. 700).

Lastly, Airbus' work-share pattern persisted over time despite the countervailing pressures for change emanating constantly from different groups of actors inside the Airbus consortium. National governments, for example, demanded returns in terms of the overall production costs (quantitative dimension of work share) and the actual work packages (qualitative dimension of work share) assumed by their respective national manufacturers in exchange for their governmental loans and subsidies. If the approximate balance between the governmental contributions and the industrial returns was not maintained, national governments exerted pressures on their respective national manufacturers to promote changes during the work-share negotiations. The national manufacturers also expected approximate industrial returns in line with their respective governments' contributions and at the same time strove to maximize their individual work shares both in the qualitative and the quantitative dimension. This maximization goal entailed different strategies for different actors. Some manufacturers, for example, strove to maintain the status quo because they produced technologically sophisticated work packages. Other manufacturers who aimed at gaining more technological expertise intended to alter the work-share allocation. As a result, they exerted pressures for change during the work-share negotiations. Given Airbus' numerous different stakeholders and their diverging interests, it is all the more astonishing that Airbus' work-share pattern still exists today.

In order to examine the case of Airbus' work-share allocation over time, this study analyses five work-share negotiations in the period from 1969 until 2006, which took place around the launches of each aircraft program. Within the Airbus consortium, the national manufacturers renegotiated the work-share allocation of every aircraft program. From program to program they were thus able to reconsider former decisions and change or modify previous work-share allocations. During these so-called work-sharing negotiations the chief engineers of the national manufacturers Aérospatiale, British Aerospace, CASA and Deutsche Airbus bargained for the allocation of production and R&D. As every manufacturer wanted to conserve and expand its activities, these negotiations were long and hard-fought (Mehdorn 2010b).

[34] For the details of this governmental support, please refer to section 4.3.1.3.

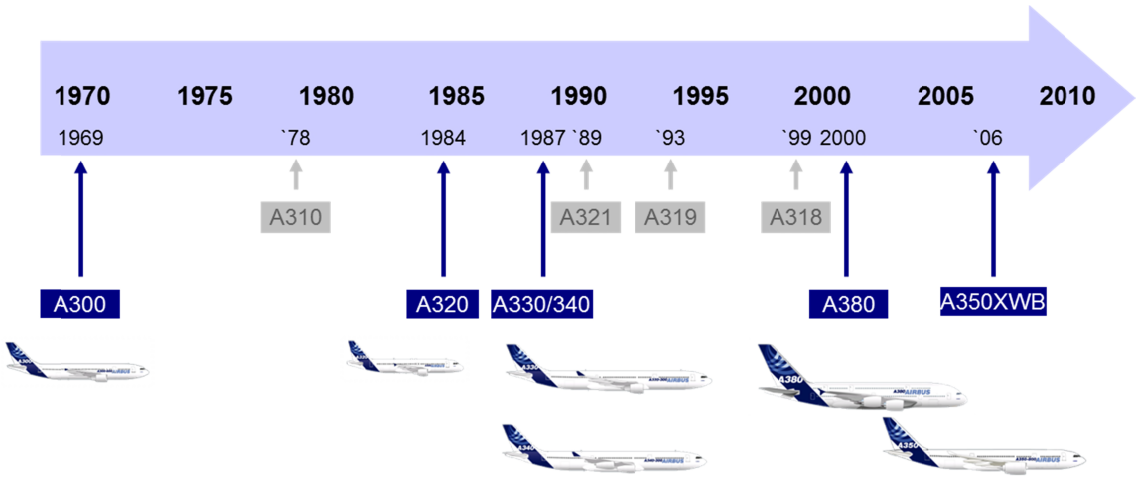
Negotiations were made more complex by the fact that the success of the manufacturers depended on their ability to obtain financial support by their national governments (Hayward 1987, pp. 15-16). Hence, both governmental and industrial actors could influence the work-sharing allocation during these situations: the political actors by providing funding via industrial or educational policies, and the national manufacturers by emphasizing their competencies and bargaining power.

In the period under review, I have selected the work-share negotiations of the civil aircraft programs A300 (1969), A320 (1984), A330/340 (1987), A380 (2000) and A350 XWB (2006) as 'critical junctures', or sub-cases to be compared, for detailed analysis due to their great importance for the company. These programs either constitute the starting point of modified versions, e.g. the A310 derivative, or of a whole new family of aircraft, such as the A320 family with the middle range aircraft A318, A319, A320 and A321 (Figure 2). With these programs AI grew to produce passenger planes across the whole spectrum of civil aviation jets from about 100 seats upwards.[35] As a result, it evolved to become the major rival of Boeing Commercial Airplanes[36], the only other company worldwide to offer the full range of civil aviation jet planes. The selected work-share negotiations of these five central programs serve as "embedded units of analysis" (Yin 2009, p. 46) or sub-cases in order to examine the development of stability maintained by actors under countervailing pressures for change.

[35] Originally set up as a consortium for building aircraft with 250-300 seats (A300), the Airbus Integrated Company today produces the whole spectrum of passenger planes aircraft with more than a 100 seats. Regional aircraft were, however, exempt from the collaboration. The Airbus partners were thus able to work together with other partners on regional aircraft projects. Since 1982 Aérospatiale, for example, collaborates with the Italian company Alenia on the regional turboprop aircraft Avions de Transport Régional (ATR).

[36] In the following text I designate Boeing Commercial Airplanes as Boeing. Boeing Commercial Airplanes is the civil aircraft branch of the Boeing Company and produces the complete product range of passenger planes of more than a 100 seats. The counterpart of the whole Boeing Company with its wide product spectrum of military and civil activities is EADS. For a detailed description of the Boeing Company's history, see Lawrence and Thornton (2006).

Figure 2 **Critical junctures: Five work-share negotiations at Airbus**



Analysis starts with the work-share negotiation of the A300 in 1969. At that time, national companies negotiated for the allocation of R&D and production work packages. Negotiations on the core work shares were always terminated before the public announcement of the program launch. Minor components could, however, still be renegotiated after the launch of a program.[37] Since these changes concerned only minor changes, they are not considered in the study. On the 1st of December, 2006, Airbus launched the completely revised A350 XWB (Xtra-Wide-Body) program (Airbus 2006). Work-sharing negotiations had been going on for some time before. The work-share allocation of the A350 XWB was officially announced on the 28th of February 2007 (Airbus 2007). The period of intense investigation of the work-share allocation thus ends in 2007. However, information regarding the final work-share allocation of the A350 XWB is also considered beyond 2007.

Military programs, such as the A400M, are deliberately excluded from the scope of the study for two reasons. First, despite their importance for the technological advancement of the aerospace industry in general and civil aerospace in particular, the work-share allocations of military programs are far more political than those of civil programs (Sénat français 2009, p. 26).

[37] Due to the long life cycle of aircraft, the technological progress achieved in developing a new program is constantly integrated into older models (Roeder 2011). As a result, work-share negotiations for older models may be resumed after years. Since data is not accessible for these specific changes, they can, however, not be considered in the study.

Due to the involvement of the national ministries of defense, information on the work-share allocation processes is top secret and thus virtually inaccessible. Second, from a technological point of view, the work-share allocation of the A400M can at best be compared to Transall's[38] work-share allocation and not to the civil programs.

With respect to the research questions, I focus on the work-share allocation among the four national manufacturers Aérospatiale, British Aerospace, CASA and Deutsche Airbus and their successor companies, which were also shareholders of the Airbus consortium. Because French and German manufacturers traditionally held the majority of Airbus' shares and work share was equally balanced between them (Sénat français 2007, p. 13), special attention is devoted to the division of work between Germany and France over time. Outside suppliers, i.e., manufacturers without direct shareholding in the company, are also excluded from the scope of the study for two reasons. First, the national manufacturers were solely responsible for selecting their outside suppliers in the times of AI and data on their selection remains inaccessible until today. Second, the additional complexity of integrating all of the national manufacturers' outside suppliers would go far beyond the scope of this study and would only contribute limited insights for answering the study's research question.

3.4 Data collection

As recommended by Crozier and Friedberg's strategic analysis, data on Airbus' work-share negotiations and allocations was collected by a combination of document analysis and semi-structured interviewing. Case studies "typically combine data collection methods" (Eisenhardt 1989, p. 534) in order to achieve triangulation.[39] The aim of triangulation is to "strengthen a study by combining methods" (Patton 2002, p. 247). Based on Denzin (1978), Miles and

[38] The Transall C-160 is a military transport plane, which was developed by a Franco-German consortium in the 1960s. The "Transporter Allianz" consortium that built this "political" aircraft comprised Nord Aviation as well as Weser-Flugzeugbau, Hamburger Flugzeugbau and the "Ingenieurbüro Blume" with "equipment suppliers" coming from France, Germany, Britain, America and Belgium (Wilson 1968, p. 614). Today, the Transall is still operated by the French, the German and the Turkish air force and will be replaced by the A400M as soon as this program is ready for use (Friederichs 2010). For more background information on the Transall, please refer to Wilson (1968).

[39] For a general introduction to triangulation see, for instance, Flick (2007).

Huberman (1994, p. 267) distinguish between four types of triangulation: "Triangulation by *data source* (which can include persons, times, places, etc.), by *method* (observation, interview document), by *researcher* (investigator A, B, etc.) and by *theory*" (theory A, B, etc.). In addition to the triangulation by collection method, I analyzed multiple sources of evidence to achieve triangulation by data source. I collected and analyzed 322 documents, consisting of scientific and non-scientific literature, talks by former chief engineers and CEOs of Airbus, magazine and press articles, company reports as well as publications from government bodies. In addition, I conducted and analyzed 39 interviews in Germany, France and Belgium with several former CEOs of AI's national manufacturers, AI and AIC's chief engineers and other Airbus/EADS employees. Talks were also held with European Commission staff, German and French civil servants as well as industry experts (e.g. representatives from business associations and trade unions). Some of the study's key interviews were jointly conducted with a senior researcher, Professor Arndt Sorge, in order to compensate for individual impressions and achieve researcher triangulation.

3.4.1 Data collection methods

3.4.1.1 Document analysis

I first conducted a document analysis in order to familiarize with the terrain. When conducting such an analysis, researchers must be very critical with regard to the origins, the quality and the interpretation of the documents they gather (Mayring 2008, p. 47). Yin emphasizes that every document "was written for some specific purpose and some specific audience *other than* those of the case study being done" (Yin 2009, p. 105). This is of particular importance when studying the case of Airbus. In 1994, the AI pioneer Felix Kracht has already noted that a lot has been written about Airbus, but that most publications have an "attention-grabbing emphasis" (Kracht 1994, p. 7, translated by the author). Ever since, the number of publications about the company has only continued to grow. However, most of these numerous documents are indeed attention-grabbing, biased and interest-driven, written for a specific purpose for a specific audience. Moreover, because Airbus remains a 'hot topic' from political and economical points of view, publications are often sponsored by opponents or supporters. Thus, two considerations were key for document selection. First, I had to select those documents that seemed both reliable and suitable for answering the research question at hand. Concentrating on the most pertinent

documents also allowed me to avoid "death by data asphyxiation" (Pettigrew 1990, p. 281), a threat case-study researchers are often confronted with. Documents collected were thus critically examined with regard to their reliability and significance for studying the Airbus' work-share allocation.

3.4.1.2 Semi-structured interviewing

In order to reveal the actors' view "from within" (Crozier and Friedberg 1980, p. 262) on the work-share negotiations, semi-structured interviewing was used to complement the document analysis (Patton 2002, p. 248). Because strategic analysis departs from the subjective "experience" of actors (Crozier and Friedberg 1980, p. 263), the researcher has to get access to their particular experience in order to reveal and reconstruct the strategies actors pursue in their organizational context. Thus, the researcher "seeks to know what resources the actor possesses, what his margin of liberty is, and in what way, under what conditions, and within what limits he can make use of them" (Crozier and Friedberg 1980, p. 263). Because only interviews can provide the researcher with this kind of information, they are considered as a key source of evidence of strategic analysis. Interviews allow the researcher to gather information on:

> "perceptions and feelings of individuals and groups regarding their respective situations. In particular, his data will include: detailed information regarding perception and behavior, constraints and ensuing difficulties; information on relationships among actors, the importance placed on them, associated expectations, nature of frequent conflicts and of solutions generally attempted; information concerning the actors' evaluations of their activities, situations, relations, areas of satisfaction and/or dissatisfaction, hopes and disappointments; finally, the actors' estimates of their own and others' action potential in view of the forgoing" (Crozier and Friedberg 1980, p. 270).

An interview guide specified the standard structure of the interviews conducted and the themes addressed (see Appendix B). For each interview, this general interview guide was adopted to the interviewees' position and period of involvement. Because the interviews aimed at revealing the subjective experience of actors, the guide only served as a rough framework for discussion. This allowed me to address new questions brought up during the talk on an ad hoc basis.

3.4.2 Data collected

3.4.2.1 Documents collected

I gathered and analyzed scientific and non-scientific literature, company reports, publications of governmental bodies as well as magazine and newspaper articles. In addition, for each of these types of documents, I also strove to collect information from multiple, independent sources in order to be able to triangulate findings. Table 3 gives an overview of the 322 documents collected which will be elaborated on in detail in the following text.

Table 3 Overview of the documents collected

Documents collected	*Description*
48 pieces of scientific and non-scientific literature	Among these 48 publications, seven sources served as central references for this study: Hayward 1986; Muller 1989; Kracht 1994; Béteille 1995; Thornton 1995; Schmidt 1997; Aris 2002
5 talks by current and former Airbus chief engineers and CEOs	Thomas 1999; Stüssel 2003; Thomas 2003; Weber 2009; Butschek 2011
223 press articles	French press 1970-2012 (Le Figaro; Le Monde; Les Echos)
	German press 1970-2012 (Frankfurter Allgemeine Zeitung; Süddeutsche Zeitung; Financial Times Deutschland/Handelsblatt)
7 publications from governmental bodies	Bundesministerium für Wirtschaft und Technologie 2002; Bundesministerium für Wirtschaft und Technologie 2009; Bundesministerium für Wirtschaft und Technologie 2013; Deutscher Bundestag 2009; House of Commons 2007; Sénat français 2007; Sénat français 2009
39 company reports	Deutsche Airbus 1967-1983; DASA 1989-1999; EADS 2000-2011

3.4.2.1.1 Literature

I reviewed the scientific and non-scientific literature in order to gain a detailed understanding of the Airbus organization[40], its key groups of actors and its decision-making processes. For this purpose, I first reviewed the scientific literature on the Airbus' organization in general and its work-share allocation in particular. Since some of the major contributions were written by former AI managers, I also carefully examined non-scientific works on the company.

I started by conducting a broad, interdisciplinary literature review, because the Airbus' organization and its work-share allocation are addressed in various disciplines. While engineering is of course first and foremost concerned with technological solutions (Altfeld 2010), law has for a long time concentrated on the transatlantic trade dispute on trade in civil aircraft (Carbaugh and Olienyk 2004; Olienyk and Carbaugh 2011). Historical works offer valuable understandings of the development of AI in general and of the national aerospace industries in particular.[41] However, up to day, little social-science research has been conducted on Airbus and even less on organizational processes within the company. The economic literature mostly calls upon Airbus for debating the sense or nonsense of national and European industrial policies (Berg and Tielke-Hosemann 1988; Bletschacher and Klodt 1992; Neven and Seabright 1995) or for discussing its sites' ties to the regional economy (Kidess 2003; Frigant et al. 2006; Jalabert and Zuliani 2009). Business scholars address the company typically from the strategic or marketing point of view (Sandholtz and Love 2001; Wilken 2001). More recently they are concerned with the company's changing production model and its altering supplier relations (Alcouffe and Corrégé 2004; O'Sullivan 2006; Mazaud 2007; Mazaud and Lagasse 2007; Kechidi 2008).

However, for studying stability and change in the case of Airbus, several contributions from the realm of political science have proved to be of particular relevance. Trying to grasp Airbus as a whole, political scientists often describe Airbus as an exemplary case for European

[40] For the sake of clarity I remind the reader that the collectivity of Airbus is referred to as the 'Airbus organization' in the text. The organizational properties of the collectivity are defined as processes, more precisely decision-making processes. For the two meanings of organization, please refer to Sorge (2002, p. 4).

[41] For the development of "the British aircraft industry" see, for example, Hayward (1989) and for the "history of the West German commercial aircraft construction" Kirchner (1998, title translated by the author).

collaboration (Hayward 1986; Muller 1989; Thornton 1995). In doing so, they offer key insights into the political, technological and commercial aspects of collaboration. Keith Hayward was the first to present a detailed description of the AI organization and its organizational processes in his book the "*International Collaboration in Civil Aerospace*" (Hayward 1986). Taking these insights further, Pierre Muller opened the organizational black box by defining AI's key groups of actors, its decision-making processes and their underlying functional logics. His book "*Airbus: L'ambition européenne*" (Muller 1989) therefore constitutes one of the central reference for analyzing the company in general as well as its actors and processes in particular. Two doctoral theses complement Muller's analysis both in time and in insights: "*Flugzeughersteller zwischen globalem Wettbewerb und internationaler Kooperation: Der Einfluss von Organisationsstrukturen auf die Wettbewerbsfähigkeit von Hochtechnologie-Unternehmen*" (Schmidt 1997)[42] as well as "*Airbus Industrie: The Politics of an Industrial Collaboration*" (Thornton 1995).

In addition to the scientific literature, there are serious non-scientific books or studies written by acknowledged journalists (Braunberger 2006) or researchers (Hornschild 1992; Alcouffe 2005b), which provided valuable background information for this study.[43] On the grounds of numerous interviews with current and former Airbus managers and industry experts, the business journalist Stephen Aris has written a comprehensive overview of the Airbus organization and its development from the early years until 2000: "*Close to the Sun: How Airbus challenged America's domination of the Skies*" (Aris 2002). In addition to Aris' contribution, the key non-scientific references for this study come from the Airbus pioneers Roger Béteille and Felix Kracht. In his book "*Der europäische Airbus*", Felix Kracht described the evolution of the Airbus organization in general and of its production system in particular (Kracht 1994). Since he was in charge of the industrial organization of AI from 1967 until 1981 (Thomas 2003, p. 3), this study heavily relies on his insider knowledge. Such an inside perspective was also obtained from

[42] In line with Schmidt (1997), the few other organizational scholars that have addressed Airbus emphasize the influence of organizational structures for the company's success (Bugos 1993; Kechidi 1995).

[43] Despite these serious publications, most of the non-scientific books on the topic are, however, indeed attention-grabbing descriptions of the, for example, fierce competition between Airbus and Boeing (see, for example, McIntyre 1992; Lynn 1997; Newhouse 2007).

analyzing Roger Béteille's[44] publication: "*Airbus, or the reconstruction of European civil aeronautics*" (Béteille 1995).

To conclude, based on a comprehensive literature review I selected several credible scientific and non-scientific publications as central references for this study. By taking into account the perspective of German, French, British and American authors, I strove to avoid a structural bias towards any of the nationalities involved in the Airbus company. Furthermore, comparing evidence from different scientific and non-scientific contributions allowed me to triangulate the findings of the document analysis.

3.4.2.1.2 Talks

More recent insights into the company were derived from talks by current and former Airbus chief engineers and CEOs. The analyzed speeches were held by Jürgen Thomas, former chief engineer of the A380 program: "*Die Airbus Industrie-Saga: Dreißig Jahre Geschichte*" in June 1999 (Thomas 1999) and "*Traité de l'Elysée*" at the University of Hamburg on 28 February 2003 (Thomas 2003).[45] Moreover, Rolf Stüssel, father of the VFW-Fokker 614 aircraft and former head of the regional aircraft division of Deutsche Airbus offered valuable historical insights in this talk on "*The Airbus Family. Progress and Set-Backs in the Development of European Commercial Aircraft*" (Stüssel 2003). Current and future developments were discusses by Gerald Weber, Chairman of the Airbus Management Board, in his talk *"Airbus in Deutschland – Mit Innovationen Zukunft sichern*" in front of the aerospace parliamentary group of the German Bundestag in Berlin on 23 April 2009 (Weber 2009). As a frequent visitor of the aerospace discussion group 'Berliner Forum Zukunft' of the German Council on Foreign Relations (DGAP), I listened to Günther Butschek, current Airbus Chief Operating Officer, speaking on the future of the European aerospace industry in this talk: "*Wohin steuert Europas*

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[44] Roger Béteille was one of the founding fathers of AI. He was the first technical director of the A300 program and was appointed AI's Chief Operating Office in 1974 (Streit 1979, p. 323). In order to honor his merits for the company, the final assembly line of the A350 XWB in Toulouse was recently named after him (Tauber and Wüpper 2012).

[45] In addition to talks, personnel documents of Airbus' chief engineers were analyzed in this study. I would like to thank Jean Roeder for making personnel documents, such as testimonials written by Roger Béteille, available for this study.

Luftfahrtindustrie? Strategische Ausrichtung in veränderten Marktsituationen" in Berlin on 27 June 2011 (Butschek 2011).

3.4.2.1.3 Press

In addition, I conducted a press analysis in order to identify the groups of actors that played an important role and that exerted considerable influence on the work-share negotiations around the time of the five critical junctures. Even more than in the literature, Airbus remains a 'hot topic' in the international press. Accordingly, news coverage on the company is enormous. However, press releases are often written in a lurid style, are biased or interest-driven. In order to gain trustworthy information, I selected newspapers and magazines that seemed to provide reliable information. Because Airbus started as a Franco-German project in which French and German manufacturers equally balanced work shares between them during all times (Sénat français 2007, p. 13), I chose to concentrate on the quality press from both countries.

In order to exclude political bias, I selected newspapers with different political attitudes: center-left (Le Monde, Süddeutsche Zeitung), center-right (Le Figaro, Frankfurter Allgemeine Zeitung) and business press (Les Echos, Financial Times Deutschland/Handelsblatt). I began searching the Lexis Nexis database for articles from these newspapers published on the Airbus company around the time of the five critical junctures. Lexis Nexis, however, only covers articles from 1980 until today. In order to cover the period from 1965 until 1980, I searched for other possibilities to collect the missing information and came across the Franco-German press archive at the Deutsch-Französisches Institut (DFI) in Ludwigsburg. A research stay allowed me to conduct a thorough press analysis (1965-1980) and cover the first work-share negotiation of the Airbus consortium both in the German and the French press.[46] By including different newspapers from different countries into the analysis during all times, I again strove to collect evidence from multiple, independent sources of information and avoid bias towards any one of the nationalities involved.

[46] The research stay was co-financed by a scholarship of the Deutsch-Französisches Institut (DFI).

3.4.2.1.4 Government publications

In order to complement previous documents and to identify the interest of the relevant actors involved, I examined official publications from British, French and German governmental bodies. A search in the library of the German Bundestag helped me to obtain key governmental reports. For the German government, the "Coordinator of German Aerospace Policy" expresses the official view in his recurring reports: "*Berichte des Koordinators für die Deutsche Luft- und Raumfahrt*".[47] The two most recent reports (Bundesministerium für Wirtschaft und Technologie 2002; Bundesministerium für Wirtschaft und Technologie 2009) as well as the new *"Luftfahrstrategie der Bundesregierung"* (Bundesministerium für Wirtschaft und Technologie 2013) served as key sources of evidence for identifying the official German position. In addition, the Bundestag library search revealed the "*Protokoll des 7. Parlamentarierkolloquiums Paris-Berlin*" on "*European industrial policy in the aerospace sector*", a protocol of the joint session of the German-French parliamentary groups of the German Bundestag and the French Assemblée nationale (Deutscher Bundestag 2009, translated by the author). The protocol offered valuable insights into the company's current situation and its assessment by German and French parliamentarians. The same is true for the reports of the French Senate: "*Rapport d'information […] sur la situation d'EADS et ses perspectives d'évolution*" (Sénat français 2007) and *"Rapport d'information […] sur les conditions financières et industrielles de mise en oeuvre du programme A400M*" (Sénat français 2009). The House of Common's report "*Recent developments with Airbus*" introduced the British perspective on the company's previous developments and current situation (House of Commons 2007). By considering British, French and German official publications, I again strove to avoid bias towards any one of the nationalities involved and to triangulate findings.

3.4.2.1.5 Company reports

In addition, I collected and examined company reports, in order to gather reliable data on the work-share allocation of the aircraft programs under study. For their collection, I strove to get

[47] In Germany, the competencies for the civil aerospace industry fall within the jurisdiction of the Federal Ministry of Economics. The minister is supported in this work by a Parliamentary Secretary of State referred to as the "Coordinator of German Aerospace Policy" (Bundesministerium für Wirtschaft und Technologie 2011).

access to the EADS company archive in a first step. Because the archive is destined for internal company use only, access was denied. In a second step, I then attempted to gather the company reports of the members of the Airbus consortium Aérospatiale, Deutsche Airbus, CASA and British Aerospace respectively. Because Aérospatiale, British Aerospace and CASA were for long state-owned companies, their reports were not publicly available. In order to collect the reports of the German national manufacturer, I visited the Daimler Benz company archive in Stuttgart.[48] Because the Deutsche Airbus consortium was gradually acquired by the Daimler Benz AG, the company archive could provide me with company reports from 1989-1999.[49] In addition, Hartmut Mehdorn, former chairman of the Deutsche Airbus, lent me his personal Deutsche Airbus company reports (1967-1983) for the course of this study. This loan was gratefully acknowledged since these company reports would otherwise not have been accessible. The company reports of EADS were available on the company's website (2000-2011). In the remaining cases where data on the work-share allocation of the aircraft programs under study could not be extracted from company reports, I collected this information from other reliable sources of evidence, e.g. other company publications, literature, press and interviews.

3.4.2.2 Interviews conducted

Although access initially appeared extremely difficult to the field of study, I conducted 39 interviews in Germany, France and Belgium with current and former top-management and chief engineers of AI and AIC, German and French civil servants, European Commission Staff and industry experts. From the document analysis, I identified key persons that were either directly involved in or that closely followed the work-share negotiations at each critical juncture and tried to get in contact with them. As expected this task turned out to be quite difficult because the contact details were often not publicly available and official requests to the Toulousian

48 The research stay was financed by the Deutsche Forschungsgemeinschaft (DFG).

49 In 1989, the Daimler Benz AG incorporated virtually all German aerospace activities in its affiliate DASA. The aerospace subsidiary of Daimler Benz operated under the acronym DASA from 1989 to 2000. From May 19, 1989 to December 31, 1994 the acronym DASA stood for Deutsche Aerospace Aktiengesellschaft, from January 1, 1995 to November 17, 1998 for Daimler-Benz Aerospace Aktiengesellschaft and after the merger of Daimler-Benz and Chrysler for DaimlerChrysler Aerospace Aktiengesellschaft from November 17, 1998 to July 10, 2000 (Deutsche Aerospace 1989, p. 7; Daimler-Benz Aerospace 1994, p. 1; DaimlerChrysler Aerospace 1998, p. 1).

headquarters or national subsidiaries remained unsuccessful. Personal contacts allowed me to conduct first interviews with current Airbus and EADS employees, industry experts and civil servants in France and Germany. At the end of each interview, I asked respondents for further contact persons involved in the work-share negotiations. Through their personal recommendations, I gradually got access to the field.

Key informants, i.e., persons that provide researchers with "with insights into a matter and can initiate access to corroboratory or contrary sources of evidence" (Yin 2009, p. 107), played a crucial role to the success of the study. With their help, I had the chance to conduct 39 semi-structured interviews with several former CEOs of Airbus' national manufacturers, chief engineers of AI and AIC as well as other Airbus/EADS management staff. Furthermore, interviews were held with policy officers of the Enterprise and Industry Directorate-General and the Research and Innovation Directorate-General of the European Commission. In addition, I was able to speak with civil servants of the Federal Ministry of Economics and Technology (BMWi), the Hamburg Ministry of Economics and Labour Affairs (BWA) and the French Directorate General for Civil Aviation (DGAC). The views of all of these actors were complemented by interviews with representatives of business associations, such as the German Aerospace Industries Association (BDLI), representatives of trade unions, journalists and field experts. An overview of the interviews conducted is provided in Table 4.

Table 4 **Overview of interviews conducted**

Interviews conducted	*Description*
6 interviews	(Former) CEOs of Airbus' national manufacturers
6 interviews	(Former) chief engineers of AI and AIC
9 interviews	Airbus/EADS management staff
6 interviews	German and French civil servants
2 interviews	European Commission Staff
10 interviews	Industry experts (e.g. business associations, trade unions, journalists)
39 interviews	

The 39 interviews were conducted from 2009 to 2011, because access to the field had to evolve gradually.[50] During this period of time, I also repeatedly talked to specific key respondents. The interviews typically lasted from one to three hours, in one case I had the chance to spend a whole day talking to Jean Roeder,[51] former head of the directorate technology and product development of AI, in Toulouse. Thanks to these long interviews, I was able to discuss all critical junctures in detail and to test hypotheses about the strategies and the games actors played. Respondents were aged from thirty to eighty-one so that all of the study's critical junctures were covered by the interviews. With the exception of one telephone interview, all interviews were conducted face-to-face.

After approval of the respondents, the interviews were recorded and transcribed. If recording was not permitted, I took notes during the meetings and wrote protocols afterwards. In order to reduce personal bias, transcripts and notes were sent to the respondents for cross-checking. In several cases, interviewees amended and specified at least some their answers.[52] In addition, some of the study's key interviews were jointly conducted and discussed with the supervisor of the study and senior researcher, Professor Arndt Sorge. This allowed me to compensate for individual impressions and achieve researcher triangulation.

In order to give the interviewees the opportunity to speak openly about the work-share negotiations, I had to guarantee confidentiality. With the exception of Hartmut Mehdorn, Erich Riedl[53] and Jean Roeder, who explicitly agreed to be cited in the text, respondents are neither named nor specified in their functions. Moreover, their statements are completely anonymized.

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50 One of the 39 interviews was jointly conducted with two respondents.

51 Jean Roeder started his career as a project engineer at Weser-Flugzeugbau in Bremen, where he became program manager of the Transall in 1965 (Streit 1979, p. 323). In 1969, he was appointed head of development for the German work share of the A300 at the Deutsche Airbus in Munich. In 1976, he became the Senior Vice President Technical of AI in Toulouse (Béteille 1985, p. 1). In this position, he was charged with developing a concept for an entire product range of Airbus aircraft (Roeder 2011). In 1986, he was then appointed head of the newly created directorate for technology and product development, which he managed until 1994. Until his retirement in 1995, he acted as a consultant to the Administrateur Gérant, or managing director, of AI Jean Pierson (Roeder 2011).

52 For instance, Jean Roeder corrected and complemented the interview transcript with 19 hand written pages.

53 Erich Riedl was the Coordinator of German Aerospace Policy from 1987 to 1993.

For this, each interview was given a code that consists of the interview date (year-month-day), the interview category described in Table 4 (e.g., former CEO of Airbus' national manufacturers, former chief engineers of AI and AIC, etc.)[54] and the interview number (chronologically in each category). The second interview with a former chief engineer of AI or AIC that was held on May 7, 2010 is, for example, mentioned as 20100507/CE/2 in the text.[55] These codes are used to refer back to the interviews in a completely anonymized way especially in the case description (chapter 4) and the case analysis (chapter 5) of this study.

In addition to the interviews, various other sources of evidence are cited. If possible, these sources are given priority over interviews while quoting in order to ensure confidentiality. In the case of Airbus, informed persons are certainly able to ascribe statements to specific individuals. Secondary sources such as literature, press and company reports are thus preferred for citations in order to avoid any direct or indirect inference. Because data published on Airbus in general and its work-share negotiations in particular is often biased, the interviews allowed me to determine the relevance and the validity of available documents. The interviews thus guided the selection of secondary sources of evidence. I used them as a filter for assessing information about the interests of actors, their strategies and the games they played. This evidence was then compared to the information obtained from other sources of evidence. In this way, I was also able to achieve data triangulation and minimize personal bias of the interviews.

3.5 Data analysis methods

To investigate the development of Airbus' persistent work share allocation under pressures for change between 1969 and 2006, the data analysis consisted of five "clinical case-studies fitted into a comparative research design" (Crozier and Friedberg 1995, p. 86). The five "clinical case studies" explore each of the five selected critical junctures in detail with the help of Crozier and Friedberg's strategic analysis ("within-case analysis", see Eisenhardt 1989, p. 533). Subsequently, the five critical junctures, which serve as sub-cases for analysis, are compared to investigate the

[54] For the sake of clarity, the names of the six interview categories are shorted in the codes. Former CEO of Airbus' national manufacturers are referred to as CEO, former Chief engineers of AI and AIC as CE, Airbus/EADS management staff as MS, German and French civil servants as CS, European Commission Staff as EC and Industry experts as IE.

[55] For the complete list of the coded interviews, please see Appendix C.

development of stability under pressures for change ("cross-case analysis", see Eisenhardt 1989, p. 533). The clinical case-studies of the five critical junctures (chapter 5) thereby set the scene for the comparative cross-case analysis (chapter 6).

3.5.1 Within-case analysis: Work-share negotiations at five critical junctures

In a first step, the five critical junctures were examined with the five steps of Crozier and Friedberg's strategic analysis. As a prerequisite to the strategic analysis described in chapter 2.3.3, I started by gathering detailed information about the Airbus organization in order to understand the functioning of the organization in general and the decision-making process of Airbus' work-share negotiations in particular. Furthermore, I applied document analysis and interviewing to examine the groups of actors that took on important roles during the work-share negotiations and that were thus able to influence stability and change of the work-share allocation over time (chapter 4).[56] This close-up view on the company set the scene for analyzing each of the identified critical junctures with the five steps of strategic analysis (chapter 5). Table 5 illustrates these steps and their application to Airbus' work-share negotiations.

[56] Because the Airbus organization was transformed during the forty-year period covered by the study, chapter 4 describes the decision-making processes and its work-share negotiations in the old Airbus Industrie GIE organization (1970-2001) as well as the decision-making processes and its work-share allocation process in the new Airbus Integrated Company organization (2001-2010).

Table 5 **Application of Crozier and Friedberg's strategic analysis to Airbus' work-share negotiations**

The five steps of strategic analysis	*The analytical tasks for examining Airbus' work-share negotiations*
1. Familiarize with the terrain	Gain a first understanding of the work-share negotiation, its key groups of actors and its specific context
2. Identify the actors relevant to the research problem	Identify the groups of actors that play an important role in the work-share negotiation and that exert considerable influence on stability and/or pressures for change
3. Study every actor in detail	Inductively reconstruct the interests and resources of actors from interviews and derive their individual strategies from studying their attitudes and behavior during the work-share negotiations
4. Reconstruct the game	Derive the game the actors played in the course of the work-sharing negotiations, based on the analysis of their strategic interactions
5. Reconstruct the rules of the game	Derive the rules of the game by formulating increasingly precise hypotheses about the underlying logic of Airbus' work-share negotiations, and by testing these hypotheses against the attitudes and actual behavior of the actors

Accordingly, each juncture was studied in detail by analyzing its specific work-share negotiations, its relevant actors as well as the interests, resources and strategies of actors (steps 1 to 3).[57] As recommended by Eisenhardt (1989, p. 540) this analysis was performed by "case study write-ups". Structured along the first three steps of Crozier and Friedberg's strategic analysis, these detailed, narrative accounts were written on the grounds of the 322 documents collected and the 39 interviews conducted. In the light of this large amount of data, the first challenge was to organize and reduce the data collected (Miles and Huberman 1994, p. 10). Therefore, I needed to separate the useful and reliable information "from the mass of available […] data" (Crozier

[57] The relevant groups of actors were newly identified and studied in the specific context of each critical juncture since their constellation and their strategies changed over time (chapter 5).

and Friedberg 1980, p. 262). Data was thus decomposed, manually coded and chronologically grouped according to each of the critical junctures, starting with the work-share negotiations of the A300 until the one of the A350 XWB. During this process, the 39 interviews served as a filter for validating the documents collected and for assessing the significance of particular issues occurring during the course of the work-share negotiations. Equipped with the 'filtered' information, I examined the literature, press, government publications and company reports. Evidence from different sources of evidence was thus compared in order to validate findings. In combination with the complementary information gathered from document analysis, the interviews allowed me to gain the view "from within" (Crozier and Friedberg 1980, p. 262) required for reconstructing the interests and resources of actors in the course of the work-share negotiations. By examining the attitudes and behaviors of actors, I reconstructed their individual strategies during the work-share negotiations.

The analysis of actors paved the way for reconstructing the games and the rules of these games (steps 4 to 5). On the grounds of the detailed write-ups which were further condensed during the research process, I analyzed the interaction of the actors' individual strategies and formulated more and more precise questions about "what type of game such strategies might correspond to" (Crozier and Friedberg 1980, p. 272). On the basis of this knowledge, I reconstructed the rules of the game, which guided and constrained the actors while playing by "an iterative procedure – going from feelings to strategies, strategies to games, and then back to feelings, etc." (Crozier and Friedberg 1980, p. 271). I therefore employed what Crozier and Friedberg call the "method of anomalies" (1980, p. 262):

> "In a more or less formalized manner (depending on the phase of the research), the investigator will use the available descriptive data relative to his field in order to formulate a series of hypotheses as to what ought to be observed if everything went 'normally', i.e. in a way consistent with the logic and 'rationality' used in elaborating the hypotheses. By then comparing these predictions with what actually occurs in practice, he will discover a whole series of 'anomalies' or processes and conducts which do not seem to obey the rational 'norms' embodies in his hypotheses".

Thus, I formulated increasingly precise hypotheses about the rules that could underlie the game and tested them against the attitudes and behavior actors expressed and recounted during the interviews. Because I conducted interviews over a long period of time (2009-2011), I was able to discuss and to test my hypotheses on the individual junctures games and rules of the games with

different interviewees, for example, former CEOs of Airbus' national manufacturers or AI's chief engineers.

3.5.2 Cross-case analysis: Comparing the work-share allocation of Airbus between 1969 and 2006

In a second step, the five critical junctures were compared in order to examine whether the observed stability in Airbus' work-share allocation could be explained by the proposed theoretical frameworks. The dimensions for comparing the cases were derived from the research question. Focusing on similarities and differences, I compared the work-share allocation of each aircraft program studied. This intertemporal comparison allowed me to illustrate stability and change in terms of the qualitative and the quantitative allocation of work share over time. In order to allow such a detailed comparison, I followed Miles and Huberman's recommendations on data display (1994, p. 11). Accordingly, the results of the work-share allocation were condensed and displayed after the analysis of each critical juncture in chapter 5. These within-case overviews illustrate both the actors and the work packages assigned to them. Comparative cross-case overviews in chapter 6 show the work-share allocation across all aircraft programs studied. This condensed data display allowed me to detect stability and change in the work-share allocation across the five critical junctures and to discuss the empirical findings in the light of the theoretical frameworks suggested. In this final step of data analysis, I was thus able to draw and verify conclusions (Miles and Huberman 1994, p. 11) on how actors maintain stability despite countervailing pressures for change.

3.6 Quality of research

This chapter discusses the quality of the research according to standards generally applied in the social sciences. Four criteria are typically used to assess the quality of research designs: construct validity, internal validity, external validity and reliability (Yin 2009, p. 40).

The first criterion of construct validity examines whether the operational measures chosen by the researcher can appropriately capture the concepts studied. In order to comply with this criterion, the theoretical concepts suggested were thoroughly 'translated' into the study's research design, case study write-ups and interview guide. This 'translation' was discussed with peers at research unit meetings of the Wissenschaftszentrum Berlin (WZB) and several conferences of the Pfadkolleg Research Center. First empirical findings were also presented to

the scientific community at the European Group for Organizational Studies (EGOS) 2010 Colloquium (Arnold and Sorge 2010). In addition to peer review, construct validity was also enhanced by the application of three analytical "tactics": The "use of multiple sources of evidence", the establishment of "a chain of evidence" during data collection as well as the review of the case study write-ups by key informants during the composition phase (Yin 2009, p. 41). Crozier and Friedberg's research procedure complies with the first two tactics by:

> "the systemic collection of a multiplicity of 'facts' and points of view, the systematic and unweighted confrontation and exploitation of these 'facts' along the lines of the mode of reasoning outlined above [i.e., in the strategic analysis], as well as the obligation flowing from there not to choose arbitrarily among these 'facts', but to fit all of them into the picture" (Crozier and Friedberg 1995, p. 87).

In order to meet Yin's third recommendation, the critical junctures' write-ups and hypotheses on actors' strategies and games were extensively discussed with several key interviewees.

The second criterion that is typically used in the social sciences to assess the quality of research is internal validity. This criterion tests whether the researcher can "establish a causal relationship" during data analysis, "whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships" (Yin 2009, p. 40). In contrast to controlled, quantitative research designs, internal validity is often considered as the "crunch question" of qualitative research (Miles and Huberman 1994, p. 278). Among the several measures to enhance internal validity, scholars recommend the consideration of alternative explanations (Miles and Huberman 1994, p. 279; Yin 2009, p. 41). Such explanations were continuously brought forward by key respondents during the interviews as well as by scientific peers at several meetings and conferences. Due to these continuous challenges, alternative explanations for Airbus' persistent work-share allocation were constantly addressed during data analysis. Moreover, crucial rival explanations are considered in the study's empirical discussion (chapter 6.3.2).

The third criterion of external validity assesses whether a study's findings can be generalized to other domains. Based on Firestone (1993), Miles and Huberman (1994, p. 279) propose to differentiate between three "level of generalization: from sample to population (less helpful for qualitative studies), analytic (theory-connected), and case-to-case transfer". With regard to such a case-to-case transfer, Crozier and Friedberg point out the intrinsically restricted external validity of strategic analysis. Because its results are always closely linked to a specific

empirical setting, "the validity of the analyses produced with such a methodology are limited to the contexts they are based on and therefore do not provide the basis for sweeping generalizations and general laws" (Crozier and Friedberg 1995, p. 86). Thus, although a comparative case-study approach enhances the persuasiveness of strategic analysis, Crozier and Friedberg exclude the transferability of its findings to different empirical settings (1995, p. 88). In their view, the knowledge produced by strategic analysis is always "specific and local" (Crozier and Friedberg 1995, p. 87) and it "cannot be transferred from its original context of production to a new one" (Crozier and Friedberg 1995, p. 88). In addition to the restricted case-to-case transfer, the findings obtained from case studies cannot be statistically generalized to populations (Miles and Huberman 1994, p. 279; Yin 2009, p. 43). However, "case studies, like experiments, are generalizable to theoretical propositions" (Flyvbjerg 2006, p. 224). In such an "analytical generalization, the investigator is striving to generalize a particular set of results to some broader theory" (Yin 2009, p. 43). Accordingly, I will discuss the theoretical implications of the study's findings with the aim of contributing to the refinement of the theory of organizational path dependence in chapter 7.

The forth criterion of reliability measures the extent to which a study's findings can be replicated by other researchers. The aim of this criterion is to ensure that "the process of the study is consistent, reasonably stable over time and across researchers" (Miles and Huberman 1994, p. 278). In order to allow the reproducibility of this study, I documented data carefully during data collection. During this process, I organized the data collected according to the five critical junctures. For every critical juncture, notes from interviews and document analysis, annotated documents, transcribed interviews as well as tabular material on work-share allocation were compiled in folders. In this way, I set up a "formal, presentable database, so that in principle, other researchers can review the evidence directly" (Yin 2009, p. 119). This database will be stored and made available to other researchers on request.

3.7 Summary

The purpose of this chapter was to explicate the methodology chosen for answering the research question at hand. Because the methodology has to be in line with the study's objectives, a qualitative longitudinal case-study design was selected. Moreover, the case of Airbus was chosen for the purpose of revealing how actors maintain stability under countervailing pressures for change. Because Airbus' work-share allocation can ideally illustrate such developments, five of

the company's work-share negotiations were studied as 'critical junctures', or sub-cases to be compared. Data was collected by a combination of document analysis and semi-structured interviewing. I gathered 322 documents, consisting of scientific and non-scientific literature, talks, magazine and press articles, company reports as well as publications from government bodies. I addition, I conducted 39 interviews in Germany, France and Belgium with several former CEOs of Airbus' national manufacturers, chief engineers of AI and AIC as well as other Airbus/EADS management staff. In addition, talks were held with European Commission personnel, German and French civil servants as well as industry experts (e.g. representatives from business associations and trade unions). Based on this evidence collected, this chapter elaborated on the data analysis methods. Each of the five critical junctures will be studied in detail according to Crozier and Friedberg's strategic analysis (chapter 5). Subsequently, the five critical junctures will be compared in order to examine whether the observed stability in Airbus' work-share allocation can be explained by the proposed theoretical framework (chapter 6). To close this methodological chapter, I discussed the criteria of construct validity, internal validity, external validity and reliability for assessing the quality of this research.

4 The case of Airbus

4.1 Introduction

This chapter examines the case of Airbus and thereby sets the scene for the succeeding strategic analysis of the Airbus work-share allocations between 1969 and 2007. In order to reconstruct the games actors played and their rules, Crozier and Friedberg's strategic analysis requires an in-depth understanding of the organization studied. In a chronological order, this chapter first briefly describes the turbulent history of the Airbus organization that set the prerequisites for European collaboration. Highlighting key groups of actors and decision-making processes, the chapter then elaborates on the organizational context of the in the old Airbus Industrie GIE organization (AI). Subsequently, the organizational context of the new Airbus Integrated Company (AIC) with its key groups of actors and decision-making processes is explained.

4.2 The genesis of the Airbus organization 1965-1970: Organizing collaboration from scratch

4.2.1 The turbulent history of the A300 program and the establishment of Airbus Industrie

After the Second World War, the world market for civil aircraft was dominated by American manufacturers (Hayward 1986, p. 22; Kracht 1994, p. 8; Béteille 1995, p. 2).[58] Profiting significantly from the post-war excess supply of military transport planes and the financial support of US Air Force research and development programs, Boeing, Douglas and Lockheed provided 90 percent of the world's commercial jet planes (Stüssel 2003, p. 3). The three companies offered competing aircraft programs for nearly every market segment and thus controlled the market with the Boeing 727, 737, 747, the Douglas DC-9, DC-10 and the Lockheed 1011 TriStar (Schmidt 1997, p. 155). Among the big three US manufacturers, Boeing was already the market leader at that time (Hayward 1987, p. 13). This company was the only

[58] Please note that this description does not include the former Comecon area. The market for civil aircraft was divided along the lines of the two blocs after the Second World War (20091207/IE/3). As a result, the Soviet aircraft industry and its aircraft market are not taken into account because its integration would go far beyond the scope of this study.

one to offer a range of aircraft models covering all important market segments: the small 737 for short-distance flights with low passenger volume, the slightly larger 727 for medium-haul and the 707 for long-haul distances. Boeing's product range was completed by the newly developed 747 for long-haul flights with high passenger volume.[59]

At the same time the European manufacturers were virtually absent from the world's civil-aircraft market. With less than 10 percent market share, the various national manufacturers lacked critical mass and mostly produced aircraft according to the specifications of national airlines (Stüssel 2003, p. 3). Accordingly, the short-haul Hawker-Siddeley Trident was closely tailored to the needs of the launching British European Airways and did not match other airlines demands (Béteille 1995, p. 5). The British Comet and the French Caravelle were more successful, though both aircraft did not sell in large quantities on the world market (20100507/CE/2). After the lifting of the post-war production ban in 1955, the German Vereinigte Flugtechnische Werke (VFW) and the Dutch Fokker built the small-capacity VFW-Fokker 614 regional aircraft in a joint venture in the early 1970s (Schmidt 1997, p. 118). Although technologically sophisticated, this program was commercially unsuccessful, as its design was based neither on market analysis nor on substantial airline demand (Mehdorn 2010a). With the exception of the VFW 614, all European aircraft programs in the 1950s and early 1960s were implemented and produced in purely national contexts. Small domestic markets, unilateral development and production as well as "national compartmentalization" (Béteille 1995, p. 3) contributed to Europe's commercial failures. Thus, while US manufacturers were developing the first wide-body aircraft such as the 747, the DC-10 and the L-1011, European manufacturers were about to almost completely disappear from the world market.

The Franco-British Concorde constituted the first important European collaboration in civil aerospace (Schmidt 1997, p. 142; 20100322/CEO/4). In the early 1960s, European companies and governments realized the need for cooperation if they wanted to stay involved in the production of civil aircraft (Hayward 1983, p. 58 cited in Muller 1990, p. 45).[60] Launched in

[59] For several decades, the Boeing 747, or the 'Jumbo Jet', was the only plane to serve this market segment. As a result, it assured Boeing monopoly profits for more than thirty years (Thomas 2003, p. 5).

[60] This new perception evolved in the leading European aerospace nations for two reasons. First, necessary resources could not be mobilized on the national level after numerous commercial failures. Second, the will to support this high-technological sector was strong among political

late 1962, Concorde entered service in 1976. Mandated by a government treaty, Sud Aviation and British Aircraft Corporation cooperated on the first supersonic passenger aircraft.[61] Though technically advanced, the Concorde program was considered a substantial economic failure (20100322/CEO/4), with only 16 airliners in service (Welter 2003). Concorde's lack of market success was attributed to escalating costs and organizational deficits (Schmidt 1997, pp. 147-150). Due to political reasons, two parallel production lines were set up and several positions were redundantly staffed in France and Britain. Furthermore, engineers and governments ignored airline demands (Schmidt 1997, p. 148). Accordingly, sales were poor and only the national flag carriers Air France and British Airways could be obliged to purchase by their respective governments. After 27 years, Air France and British Airways ceased regular service in 2003 (Welter 2003). Despite the economic loss, the supersonic aircraft was extremely important for technical progress in Europe (20100322/CEO/4; Roeder 2011). From the experience gained in the Concorde program, organizational and technological deficiencies were largely avoided in the following Airbus collaboration (Schmidt 1997, p. 152).

Originating from an industry initiative, the cooperation among European manufacturers and governments for the A300 evolved in gradual steps.[62] Preliminary conversations between German and French industry representatives took place in 1965 at the Paris Air show (Kirchner 1998, p. 87). In the following October, British European Airways organized a symposium gathering the twelve main European airlines and European manufacturers of aircraft and engines (Muller 1989, p. 47). A few months later Air France, British European Airways and Lufthansa announced their need for a medium-haul 200 to 250 seat aircraft (Béteille 1995, p. 5). Due to scarce national resources and limited market size, it quickly became apparent to the manufacturers involved that only a close collaboration among as many countries as possible

and industrial actors (Roeder 2011). Due to its specific characteristics, political support is of considerable important in the aerospace industry. Since newcomers face high risks and long payback periods, market entry is virtually impossible without state financial assistance (Hornschild 1992, p. 112). For further details concerning the sectors distinctiveness, see section 4.3.1.3.

61 The treaties for the development of the Concorde program were twofold. They encompassed agreements between the French and the British government as well as the contracts between the manufacturers Sud Aviation and British Aircraft Corporation (Schmidt 1997, pp. 143-144).

62 The configuration of the A300 program is described in detail in section 5.2.

could develop a competitive European aircraft (20100322/CEO/4). The British and the French governments were willing to support transnational cooperation and encouraged their key manufacturers to form joint working groups. The first group united Sud Aviation, Dassault and British Aircraft Corporation around the Galion project; the second united Nord Aviation, Hawker Siddeley Aviation[63] and Bréguet in the HBN-100 venture (Frigant et al. 2006, p. 39). In order to cooperate with the Franco-British undertakings, the West German aerospace industry pooled its resources in the 'Deutsche Arbeitsgemeinschaft Airbus' (20110128/CE/6).[64]

When governments had agreed on their mutual involvement, the basis for collaboration on the A300 program was quickly determined. Compared to their national manufacturers, European governments reached agreements for collaboration rather late (Kirchner 1998, p. 142). After a preliminary meeting in January 1966 that ended without an official result, the French and the British government appointed Sud Aviation and Hawker Siddeley Aviation as national contractors charged with implementing the European aircraft project (Kracht 1994, p. 50). The West German government designated the Deutsche Arbeitsgemeinschaft Airbus as their contractor, which shortly afterwards became the 'Deutsche Airbus GmbH' consortium (Berg and Tielke-Hosemann 1988, p. 124).[65] Based on governmental specifications, the selected companies presented a design for a medium-range airliner in June, 1967 (Kracht 1994, p. 51). Shortly afterwards, the directors of the responsible agencies approved the design in July, 1967. Furthermore, they appointed Roger Béteille as technical director and allocated the work shares on the basis of existing know-how to the selected national manufacturers (Kracht 1994, p. 51). Wings and engine design were to go to Britain, the cockpit, front and central fuselage as well as

63 Hawker Siddeley Aviation was the civil aviation division of the Hawker Siddeley Group. The military division of the Group was called Hawker Siddeley Dynamics. Together with the British Aircraft Corporation and Scottish Aviation, both divisions merged into the British Aerospace in 1977 (Frigant et al. 2006, p. 39).

64 The Deutsche Arbeitsgemeinschaft Airbus was a joint working group of the German manufacturers for collaborating in the planed Airbus project. It was created on December 3, 1965 (Kirchner 1998, p. 141).

65 The major German manufacturers founded the Deutsche Airbus in the legal form of a German Gesellschaft mit beschränkter Haftung (GmbH) on September 4, 1967 (Deutsche Airbus GmbH 1967, p. 2). After its establishment, the consortium was responsible for implementing and coordinating the work of the Airbus program definition phase among the several German manufacturers. Its evolution and responsibilities are elaborated on in chapter 4.2.1.2.

design of the airframe to France and the remaining fuselage sections and tailplane to Germany (Kracht 1994, p. 51).[66] Measured in production costs, the work-share allocation amounted to 37.5 percent for France and Britain, and 25 percent to Germany (Kirchner 1998, p. 154). Shortly after this meeting, the three governments approved joint financing of the definition phase, encompassing funding for all research and development work for one year (Kirchner 1998, p. 143).[67] In this one year, Airbus was supposed to secure 50 firm orders from major airlines and organize industrial production (Kracht 1994, p. 51). The signing of the 'Memorandum of Understanding' in September 1967 then officially launched the first phase of the A300 program (Hayward 1987, p. 12).

After the withdrawal of the British government, the French and the German partners agreed to continue the A300 program bilaterally. Officially announcing its withdrawal in early 1969, the British government decided to cease its financial contributions to the A300 program at the end of the program-definition phase (Deutsche Airbus GmbH 1969, p. 2). This withdrawal was ascribed to two domestic reasons (Hayward 1989, pp. 53-54). First, the British engine manufacturer Rolls-Royce was simultaneously working on the RB207 motor for the A300 and the RB211 motor for the Lockheed L-1011 TriStar. After 94 TriStar sales in the United States, Rolls-Royce concentrated its efforts on the RB211 engine (Kirchner 1998, p. 218). Second, British Aircraft Corporation was autonomously working on the design of the BAC Three-Eleven[68], an aircraft which was sought to have 220 to 240 seats and would thus directly compete with the A300 program (Béteille 1995, p. 7). Apart from the financial shortfall, the British government's withdrawal also raised the problem of who would supply the wings. With financial support of the German government, the British Hawker Siddeley Aviation agreed to fill the gap and assume wing fabrication as a private subcontractor (Deutsche Airbus GmbH 1969, p. 2).

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66 The fuselage of an aircraft is divided into several fuselage sections. The sections of the A300B are, for instance, enumerated from 12 to 19 (Deutsche Airbus GmbH 1972, pp. 7-8). For an illustration, see section 5.2.4.

67 The exact period of the program-definition phase varied according to national manufacturers and governments. For the Deutsche Airbus, it lasted from June 25, 1967 to July 31, 1968 (Deutsche Airbus GmbH 1967, p. 4).

68 However, because the British government chose to support and to nationalize Rolls Royce after its almost bankruptcy in the late 1960s, financial support for the BAC Three-Eleven was missing. The program was thus abandoned in the early 1970s. For more information on the BAC Three-Eleven program, please refer to Flight International (1968).

Therefore, the French and the German governments were able to continue the program. By signing an intergovernmental treaty on May 29, 1969, the governments formally agreed to absorb costs for the development and production of the A300B[69] (Thomas 1999, p. 2). For the manufacturers, the accord was initialed by the chairman of Deutsche Airbus GmbH, Bernhard Weinhardt, the chairmen of Hawker Siddeley Aviation, Sir Arnold Hall, and the President of Sud Aviation, Henri Ziegler (Thornton 1995, p. 80).

After the re-launch of the A300 program, the French and German manufacturers had to agree on a cooperative organizational framework. The intergovernmental treaty of 1969 specified that the Airbus company "had to build an aircraft according to strict commercial criteria" (Hayward 1986, p. 75) and stipulated an independent joint venture responsible for coordinating the A300 program. Nevertheless, Sud Aviation and Deutsche Airbus negotiated eighteen months for an agreement:

> "The debate centered on the extent to which the French would lead the program. Financially, the partners should be equally responsible, and the Germans wanted to ensure that their input to the program would be recognized in the organization" (Hayward 1986, p. 64).

Drawing on the lessons from the organization of the Concorde program, the manufacturers intended to restrict state influence and costly duplication of work (Frigant et al. 2006, p. 41). Moreover, the organization was required to comply with the interests of airlines (Kracht 1994, p. 56). In search of an "effective and commercially credible industrial organization" (Hayward 1986, p. 64), the French and the German manufacturers settled on an unusual formula for transnational cooperation (Mehdorn 2010c). The legal form of a French Groupement d'Intérêt Économique (GIE) was chosen after a lengthy review of various structures. On December 18, 1970, the joint venture Airbus Industrie GIE was founded by the successor to Sud Aviation, the state-owned Société Nationale Industrielle Aérospatiale (SNIAS)[70] and Deutsche Airbus GmbH (Deutsche Airbus GmbH 1970, p. 4).

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[69] The A300 program was redesigned to become the smaller A300B. For further details, see section 5.2.

[70] Since its creation in 1970, the Société Nationale Industrielle Aérospatiale (SNIAS) has mostly been referred to as Aérospatiale in the literature. I use this short form throughout the text, although SNIAS was only officially renamed to Aerospatiale (without accent) in 1984 (Carlier

4.2.2 Work-share allocation: The prerequisite for European collaboration

Felix Kracht determined the principles of work-share allocation in the A300 definition phase and thereby set the conditions for Airbus' cross-country production system.[71] After governmental approval of the one year program-definition phase, Roger Béteille and Felix Kracht set up a "mini-management" team at the Parisian headquarters of Sud Aviation (Kracht 1994, p. 57). Starting at the end of June, 1967, they began by coordinating operations among the companies involved. In early 1968, they divided management responsibilities among themselves (Kracht 1994, p. 58). Since then, Roger Béteille concentrated mainly on technical design as well as sales and Felix Kracht on industrial organization, investments as well as change and quality management (Kracht 1994, p. 58).

In contrast to the duplication of work in the supersonic Concorde, Kracht decided to divide work shares among manufacturers. However, the fabrication of large subassemblies in different countries and different sites entailed the problem of transportation. Big wings and fuselage sections were difficult to move by train or by ship in the early 1970s. As a result, Felix Kracht set up a special air-transport system ('Skylink') by four Supper-Guppies aircraft (Kracht 1994, p. 58; Thomas 2003, p. 3).[72] Although it was often criticized for its cost intensiveness (see, for example, Hornschild 1992, pp. 133-140; Schmidt 1997, pp. 162-166)[73], Airbus' Skylink effectively minimized times of immobilization (Muller 1989, p. 197). In fact, transportation was

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and Sciacco 2001, p. 25; Eurocopter 2011a). Accordingly, the company is referred to as Aérospatiale from 1970 until 1984, and to Aerospatiale (without accent) from 1985 onwards. The company is described in detail in section 4.3.1.2.

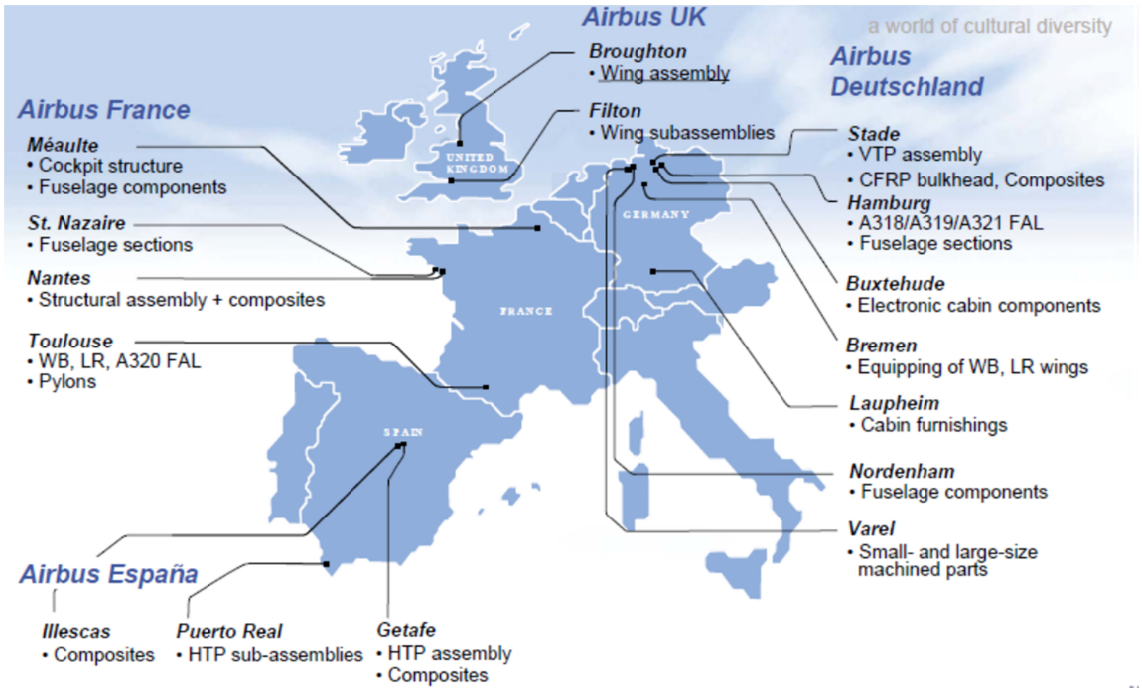
71 Felix Kracht was responsible for the organization of production and the allocation of work sharing from 1970 to 1981 (Thomas 2003, p. 3). In his book "Der europäische Airbus" he describes the evolution of Airbus' production system (Kracht 1994, pp. 58-61), which this subchapter heavily relies on. Before joining the Airbus team in December 1967, Felix Kracht worked on the Transall program at Nord Aviation (Thornton 1995, p. 77).

72 The large cargo-freight aircraft were bought from Aerospacelinies in Santa Barbara (Kracht 1994, p. 58) and replaced by the Airbus produced Beluga in the early 1990s (Thomas 2003, p. 3).

73 In addition to costly logistics, the Airbus consortium was also criticized for its duplication of research (Hornschild 1992, p. 134), its dispersed procurement (Schmidt 1997, p. 164) and its high costs of collaboration (Hayward 1987, p. 11; Hickie 1991, p. 200). These included, for example, high transaction costs for decision-making and communication in the making of an aircraft program as well as the costs for exchange-rate fluctuations among the partner companies (Hayward 1987, p. 24).

not expensive, "it just appeared this way. The transportation costs are negligible [in aircraft production]. What is not negligible, is the production time and the capital employed" (Mehdorn 2010a, translated by the author). Through the Skylink system, whole sections of planes could be transported over long distances in Europe. Over time, this resulted in Airbus' cross-country production system (Figure 3).[74] In contrast to Boeing's centralized organization, Airbus' locations are thus dispersed across several European countries (Birke 2010). Today, large wings from Broughton are, for example, flown to Bremen for mounting of controls, flaps and slats. From there they are transported to Toulouse for assembly (Kiani and Bläske 2009, p. 62).

Figure 3 **Airbus' cross country production**
(Sources: Airbus Deutschland GmbH 2007, p. 11; cf. Mühlnickel 2004, p. 9; cf. Figgen 2008, p. 19)



The work-share partition relied on the pre-fabrication of integrated subassemblies and the limitation of interfaces among them. Manufacturers were made responsible for the development and production of fully integrated subassemblies. Accordingly, they did not only produce metal

[74] This production system, being scattered all over Europe, evolved to rely heavily on communication, logistics and other infrastructure systems (Bugos 1993).

fuselage sections, but also equipped them with the required hydraulic or electronic systems. Sud Aviation, for instance, fitted the cockpit with the primary flight control systems, and German manufacturers furnished the center fuselage with all cabin systems (Roeder 2011). Therefore, this form of task assignment required manufacturers to possess and promote technical skills in several specialist fields. In addition to the principle of pre-fabricating fully equipped subassemblies, work share was allocated in such a way as to minimize the interfaces between the manufacturers. Therefore, each intersection involved two partners at most and both were made responsible for ensuring that junctions fit correctly. This precise definition and allocation of interfaces helped to reduce organizational complexity, particularly with regard to modifications (Roeder 2011).

The pre-fabrication of integrated subassemblies and the limitation of interfaces fostered specialization among the national manufacturers. Due to the direct equipment of subassemblies, manufacturers produced the systems that corresponded to their components. Together with the limitation of interfaces, this enabled manufacturers to work independently from each other (Cohen 2008, p. C41). Moreover, the two principles reduced the importance of final-assembly to only four percent of the total volume of work (Hayward 1986, p. 71; 20100503/CE/1). As a result of this, the manufacturers could specialize in specific subassemblies and systems as the Airbus organization launched further aircraft programs.

> "It was the great achievement of Felix Kracht to promote specialization among the national partners in components and systems in which they had already acquired competencies. At the behest of the AI management, the national governments did not intervene in the management of the Airbus program for the first time in the history of European aircraft construction" (Roeder 2011, translated by the author).

By fostering technological advancements, specialization generated important gains for the program as a whole (Schmidt 1997, p. 40).

4.3 The old Airbus organization 1970-2001: Collaboration of national manufacturers coordinated by Airbus Industrie

The Airbus organization from 1970-2001 can be described as a relational network of three important groups of actors: the joint venture AI, the national manufacturers and the national governments (Muller 1989, p. 187). These groups interacted in three decision-making processes central to the functioning of the Airbus organization. After describing the key groups of actors, I

elaborate on their interactions in the commercial and political decision-making processes in general and in the work-sharing negotiations in particular.

4.3.1 The key groups of actors

4.3.1.1 Airbus Industrie: The industrial mediator[75]

The national manufacturers chose to create Airbus Industrie in the form of a Groupement d'Intérêt Économique (GIE) because this legal form assured a loose and equal collaboration among independent firms. The GIE structure was created by the French government in 1967 to foster collaboration among companies (Berg and Tielke-Hosemann 1988, p. 125). By collectivizing the risks and funding of a project, the joint venture assured stability for the airlines (Hayward 1987, p. 15) and formal equality among its partners (Frigant et al. 2006, p. 42). Furthermore, it allowed the partners to loosely collaborate on specific projects by granting vast economic and technological autonomy to the parties involved (Thomas 2003, p. 4; Mehdorn 2010c). The collaborative venture did not demand fixed capital contributions or equity capital (Kirchner 1998, p. 234). The proportion of shares in the joint venture determined both the financial contribution and the voting rights of the members (Hayward 1986, p. 67). Given its flexibility, a GIE could be easily expanded to implement further aircraft programs and to include additional members.[76] As the GIE did not publish accounts (Hornschild 1992, p. 35), it profits and losses were assigned to the member companies according to their share in capital and published in their respective financial statements (Schmidt 1997, p. 162).[77]

AI was primarily charged with coordinating technical and industrial tasks among its partner firms and with providing external relations (Muller 1990, p. 32).[78] As the sole interface

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75 This expression is adopted from Muller (1989, p. 15).

76 The GIE formula permitted full or associated members. The associated members were partners with restricted liability and decision-making rights (Hayward 1986, p. 65).

77 Since the profits and losses were registered in the annual report of the AI members only, reliable data on the overall profits and losses of the joint venture is not publicly available (Hornschild 1992, p. 35; Schmidt 1997, p. 162).

78 In addition to coordination and external communication, AI was also in charge of flight testing (Kracht 1994, p. 61; Thornton 1995, p. 82). Since all the knowledge of development is accrued in this essential task, Deutsche Airbus wanted flight testing assured by AI (Muller 1990, p. 29).

with third parties, the joint venture was responsible for all relations with customers and regulatory authorities (Thomas 1999, p. 3). Regarding the airlines, AI was entrusted with marketing, sales and services, including pricing, product-support and aircraft delivery (Thomas 2003, p. 4). By conducting market studies and ensuring constant communication with airlines, AI assured that aircraft were "defined according to market requirements and applicable technology" (Béteille 1985, p. 1). In addition to external communication, AI coordinated technical and industrial activities among its members, including the allocation of work shares among its partner companies (Hayward 1986, p. 65). After settling work-share negotiations, it ordered integrated subassemblies from its industrial partners as well as engines and components from outside suppliers (Hayward 1986, p. 66). Because of this influential position, AI was the only actor to have a complete overview of the aircraft project. Therefore, it was also charged with the overall program coordination. With AI as the single contact interface with the national manufacturers, each aircraft program was coordinated by a program manager with a small team at the AI headquarters (Hayward 1986, p. 65).

AI gradually gained the credibility of airlines and other manufacturers who eventually acceded to the joint venture. Initially, it was a Franco-German project with both Aérospatiale and Deutsche Airbus holding 50 percent of its shares and assuming all financial contributions and voting rights. Due to the flexibility of the GIE formula, other manufacturers were able to join the joint venture. In 1971, the Dutch Fokker became an associated partner with restricted liability and decision-making rights for supplying wing components (Deutsche Airbus GmbH 1971, p. 6). Acquiring a small share in 1972, the Spanish CASA acceded to the joint venture as a full member (Deutsche Airbus GmbH 1972, p. 4). Accordingly, AI's shares were reallocated, with Deutsche Airbus and SNIAS holding 47.9 percent each and CASA 4.2 percent.

At that time the international airline jet fleets almost exclusively comprised Boeing, Douglas and Lockheed aircraft.[79] While the American manufacturers were already providing reliable after-sales service (Béteille 1995, p. 2), AI was still learning how to organize product support and maintenance in the early 1970s (Mehdorn 2010c). Moreover, airlines were hesitant in buying the A300, since AI was initially conceived as a one-product company and it was not

[79] Please note that at that time the BAC One-Eleven, produced by the British Aircraft Corporation, and the Caravelle, manufactured by Sud Aviation, were widespread among European airlines in addition to the American manufacturers' aircraft.

certain that it would persist. However, AI's standing changed at the end of the 1970s. In 1977, Eastern Airlines purchased several A300 aircraft to replace its Lockheed TriStars (Béteille 1995, p. 9). The order was considered Airbus' breakthrough in the essential US market (Riedl 2010). With the launching of the A310 program in 1978, AI communicated its intention to expand and to develop a family of aircraft (Stüssel 2003, p. 5; Roeder 2011). Subsequently, the Belgian Belairbus consortium became an associated AI partner in 1979 (Thomas 1999, p. 3). That same year British Aerospace entered the collaborative venture with 20 percent participation (House of Commons 2007, p. 5).[80] With this accession, the joint venture now incorporated all major European aerospace countries (Thomas 1999, p. 5). Reducing the shares of Aérospatiale and Deutsche Airbus by 10 percent respectively, Airbus Industrie GIE's ownership structure had to be adapted accordingly. The allocation of AI shares from 1970 until 1979 can be seen in Table 6.

Table 6 **The allocation of Airbus Industrie GIE's shares**
(Sources: Deutsche Airbus GmbH 1970, p. 5; Deutsche Airbus GmbH 1972, p. 4; Schmidt 1997, pp. 153-154)

National manufacturers	*1970*	*1972*	*1979*
Société Nationale Industrielle Aérospatiale / Aerospatiale (France)	50 %	47.9 %	37.9%
Deutsche Airbus GmbH / DASA (Germany)	50 %	47.9 %	37.9 %
Construcciones Aeronáuticas S.A. (Spain)	-	4.2 %	4.2 %
British Aerospace (United Kingdom)	-	-	20 %

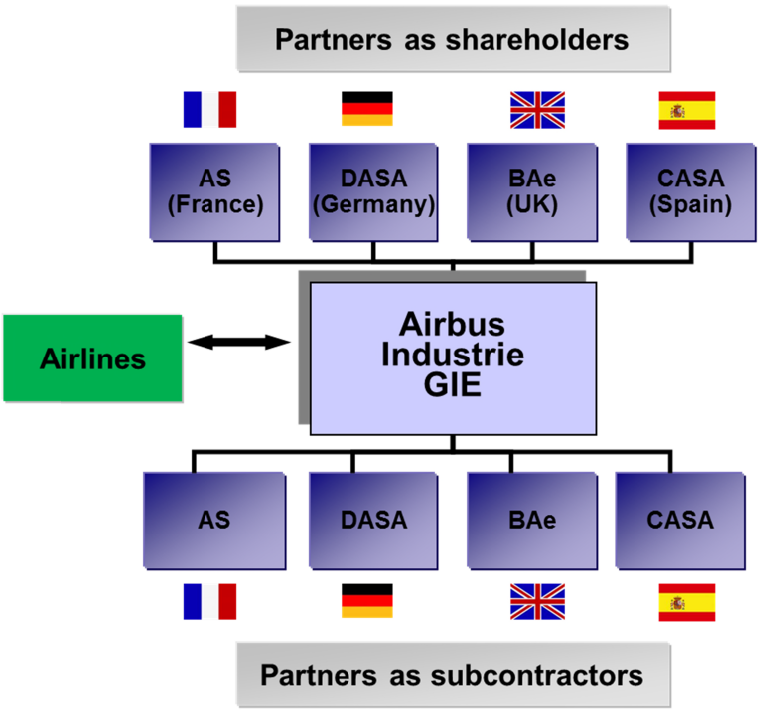
[80] British Aerospace was formed by a merger of the British Aircraft Corporation, the Hawker Siddeley Group and the Scottish Aviation and nationalized in 1977 (BAE Systems 2011). British Aerospace is described in detail in section 4.3.1.2.

4.3.1.2 The national manufacturers: Shareholders and subcontractors

The national manufacturers Aérospatiale, DASA, British Aerospace and CASA were both shareholders and subcontractors of AI. As shareholders, they were members of the supervisory and had the final say in AI's decisions. The board's members exerted voting rights proportional to their shares and met quarterly to unanimously approve company decisions, such as the launch of new programs (Hayward 1986, p. 67). After the AI management reform of 1989, the supervisory board consisted of one representative per manufacturer and the chairman of the board (Schmidt 1997, p. 160).[81] The French and the German representatives, however, still exercised voting-rights according to their respective 37.9 percent share. As subcontractors, the national manufacturers developed and produced fully integrated subassemblies for AI. After work-sharing agreements, AI ordered integrated subassemblies from French Aérospatiale, German DASA, British Aerospace and Spanish CASA in relation to the amount of their shares (Hayward 1986, p. 66; Hornschild 1992, p. 68). The manufacturers were solely responsible for industrial and technological tasks and selecting their suppliers. Figure 4 illustrates the "duality of members-as-owners and members-as-subcontractors" in the Airbus organization (Hayward 1986, p. 65).

[81] Before the AI management reform in April 1989, the supervisory board was composed of seventeen members, six representatives each from Aérospatiale and Deutsche Airbus, four from British Aerospace and one from CASA. Fokker representatives attended the board's meetings with no voting rights. From 1970 until 1988, the board was chaired by the German politician Franz-Josef Strauss (Muller 1989, p. 189).

Figure 4 **The Airbus organization (1970-2001)**
(Illustration based on Hornschild 1992, p. 69)



In their two roles as shareholders and subcontractors, the national manufacturers strategically defended varying interests. Depending on whether they acted in their capacity of shareholder or of subcontractor, the national manufacturers argued in favor of mutually exclusive objectives during the work-sharing negotiations. Their Janus face is well captured by an excerpt from the Frankfurter Allgemeine Zeitung (1993, p. 20):

> "The constellation resembles a balancing act: The four European partners are paradoxically interested in both a cost-efficient and a cost-intensive Airbus Industrie."

In their capacity as shareholders, the national manufacturers wanted AI to purchase subassemblies at favorable terms and to realize profits ("cost-efficient Airbus Industrie"). As shareholders, the national manufacturers were interested in keeping costs down and buying subassemblies from manufacturers that offered the best cost-quality ratio. Their shareholder function thus encouraged the national manufacturers to promote specialization processes both within their own companies and their partner companies. However, in their capacity of subcontractors, the national manufacturers strove to conceal their real production costs

(20090512/CEO/1) and to obtain the highest possible price from AI for their delivered subassemblies ("cost-intensive Airbus Industrie"). Yet, high prices went against the other shareholders' interests. As a result, competition was fierce and pricing was highly contested among the national manufacturers in the times of AI.

Aérospatiale[82] was the major French state-owned manufacturer for civil aerospace. It was created through a government-administered process that integrated the three nationalized aerospace companies Sud Aviation, Nord Aviation and the Société pour l'Etude et la Réalisation d'Engins Balistiques (SEREB) (Thornton 1995, p. 51). In 1970, they merged to become the Société Nationale Industrielle Aérospatiale (SNIAS), or Aérospatiale (Kechidi and Talbot 2006, p. 79), whose activities covered all sectors of aerospace, including civil and military aircraft and helicopters, missiles as well as space systems (Carlier and Sciacco 2001, pp. 30ff.).[83] As a Société Nationale Industrielle, Aérospatiale was preponderantly state-owned and implemented the French governments' development policy in the aerospace sector (Talbot 2000, p. 228).[84] In the course of the state-guided restructuring process of the French aerospace industry, Aerospatiale ceded its satellite activities to Thomson-CSF in 1997, and received the French state's participation of Dassault Aviation in 1998 (Carlier and Sciacco 2001, p. 115). In 1998, the French state sold the majority of its shares to the Lagardère group. After the acquisition of Aerospatiale, Lagardère merged Aerospatiale with the French armament company Matra Hautes Technologies

82 I remind the reader that since its creation in 1970, the Société Nationale Industrielle Aérospatiale (SNIAS) has mostly been referred to as Aérospatiale in the literature. I use this short form throughout the text, although SNIAS was only officially renamed to Aerospatiale (without accent) in 1984 (Carlier and Sciacco 2001, p. 25; Eurocopter 2011a). Accordingly, the company is referred to as Aérospatiale from 1970 until 1984, and to Aerospatiale (without accent) from 1985 onwards.

83 In addition to the Airbus program, the company was involved in several civil aerospace joint ventures. As the legal successor of Sud Aviation, Aérospatiale worked on the Concorde project with the British Aircraft Corporation. Since 1982, Aérospatiale has collaborated with the Italian company Alenia in the Avions de Transport Régional (ATR) joint venture on the production of regional turboprop aircraft (ATR 2011). For a detailed recounting of the ATR collaboration, see Schmidt (1997, p. 127).

84 In 1970, Aérospatiale was 100 percent state-owned, 75 percent through direct government participation and 25 percent via a state-owned aerospace investment group (Hornschild 1992, p. 68). After an act of parliament allowed private sector participation in public companies, Credit Lyonnais acquired 20 percent of Aerospatiale's shares in 1992 (Carlier and Sciacco 2001, p. 116).

to form Aerospatiale-Matra (Kechidi and Talbot 2006, p. 89). This company was integrated in EADS in 2000.

After pooling its resources in Deutsche Airbus, the scattered German industry gradually consolidated under the leadership of Daimler Benz to form the national aerospace manufacturer DASA.[85] Until the mid-1960s, the German aerospace industry has stayed "small in absolute size, broken into numerous competing enterprises and divided regionally" (Thornton 1995, p. 63).[86] Since no single manufacturer possessed enough assets or industrial capacity to participate in the European aircraft project, the industry pooled its resources in the Munich-based Deutsche Airbus in 1967 (20110128/CE/6). The joint-venture consortium was created by Bölkow GmbH/Siebelwerke ATG GmbH, Dornier GmbH, Messerschmitt-Werke Flugzeug-Union-Süd GmbH, Hamburger Flugzeugbau GmbH and Vereinigte Flugtechnische Werke GmbH on September 4, with the founding companies each holding 20 percent (Deutsche Airbus GmbH 1967, p. 2). Deutsche Airbus was made responsible for managing, coordinating and monitoring the development and production work for the Airbus program among the several German manufacturers (Deutsche Airbus GmbH 1970, p. 1).[87] With the exception of Dornier, the Messerschmitt-Bölkow-Blohm (MBB) group gradually acquired all members of the consortium, thus becoming the sole owner of Deutsche Airbus on December 31, 1982 (Deutsche Airbus GmbH 1982, p. 4; Deutsche Airbus GmbH 1983, p. 4).[88] In 1989, the Daimler Benz AG acquired

[85] As the aerospace subsidiary of Daimler Benz, the major German aerospace manufacturer operated under the acronym DASA from 1989 to 2000. From May 19, 1989 to December 31, 1994 the acronym stood for Deutsche Aerospace Aktiengesellschaft, from January 1, 1995 to November 17, 1998 for Daimler-Benz Aerospace Aktiengesellschaft and after the merger of Daimler-Benz and Chrysler for DaimlerChrysler Aerospace Aktiengesellschaft from November 17, 1998 to July 10, 2000 (Deutsche Aerospace 1989, p. 7; Daimler-Benz Aerospace 1994, p. 1; DaimlerChrysler Aerospace 1998, p. 1).

[86] In the north of Germany, the major manufacturers were the Bremen-based Vereinigte Flugtechnische Werke (VFW) and the Hamburger Flugzeugbau, a subsidiary of Blohm&Voss; in the south, the manufacturers Dornier, Siebelwerke, Messerschmitt and the Bölkow group had their production sites. After an act of parliament facilitated large company mergers in 1968, the manufacturers Messerschmitt, Bölkow and Blohm consolidated to become Messerschmitt-Bölkow-Blohm in May, 1969 (Thornton 1995, p. 64).

[87] Furthermore, the Deutsche Airbus acted as the single intermediary to the German economics ministry and the international aerospace industry (Deutsche Airbus GmbH 1970, p. 1).

[88] For a detailed description of the concentration process in the German aerospace industry, see Kidess (2003, pp. 55ff.).

MBB[89] and incorporated virtually all German aerospace activities in its affiliate DASA. All Airbus activities, including the Deutsche Airbus, were incorporated in the Hamburg-based "Deutsche Aerospace Airbus GmbH" in 1992 (Deutsche Aerospace 1992, p. 16). After restructuring[90] and rationalizing DASA, Daimler Benz integrated its affiliate in EADS in 2000.

British Aerospace was created by a government-induced merger to form the central national manufacturer and, by concentrating its activities on the military sector, the largest European defense company by the end of the 1990s. In 1977, the British Aircraft Corporation, the Hawker Siddeley Group and Scottish Aviation merged to form the state-owned British Aerospace (BAE Systems 2011).[91] Following a Cabinet decision, the nationalized company became a full member of AI in 1979, with a 20 percent share. After turning British Aerospace into a public limited company, the British government started privatizing the national manufacturer in February 1981 and sold its last remaining shares in May, 1985 (Hayward 1989, p. 173). Due to the importance of the company for national security, the British government, however, restricted foreign takeovers by keeping the veto right of a 'golden share' (McIntyre 1992, p. 69). Since its privatization, British Aerospace has diversified and acquired several companies in order to limit its dependence on the cyclical aerospace business. Following a change in strategy in the early 1990s, the company started to focus on the defense business and sold several operations considered non-core. In order to allow collaboration of the independent divisions with external risk-sharing partners[92], British Aerospace was reorganized as a holding company (Schmidt 1997, p. 135). After the takeover of Marconi Electronic Systems in 1999,

89 Because they presumed a monopoly position, the Federal Cartel Office rejected Daimler's request to buy MBB in April, 1989. Subsequently, Daimler demanded ministerial authorization, which was granted in September, 1989 (Deutsche Aerospace 1989, p. 9; Riedl 2010).

90 In 1990, DASA incorporated the subsidiaries Dornier (with 57.6 percent), Motoren- und Turbinen-Union (MTU) (with 57.6 percent), Telefunken System Technik (with 100 percent) and MBB (with 64.9 percent) (Deutsche Aerospace 1990, p. 9). After restructuring, DASA was divided into five divisions: aviation, space, defense and civil systems, motors as well as affiliated companies (Deutsche Aerospace 1992, p. 11)

91 For a detailed description of the merger, see Hayward (1989, pp. 148-153).

92 Risk-sharing partners are defined as large supplier companies capable of bearing the risks and costs of developing and manufacturing completely equipped subassemblies (Jalabert and Zuliani 2009, p. 91).

British Aerospace changed its name to BAE Systems and became the largest European defense company (Salot 2006, p. 113).

By accumulating know-how through licensed production and international cooperation, Spanish CASA became the leading state-owned aerospace company in Spain. After its establishment in 1923, CASA started to build military aircraft under license for the German military (Heinkel He 111 and Me 109) and the French company Bréguet (Pletschacher 1999, p. 10). Starting with the production of Dornier aircraft, the private company evolved to become an important licensee for several military-aircraft programs (Schmidt 1997, p. 137). In 1943, the Spanish state began to acquire 33 percent of the manufacturer's shares via a state-owned holding company and gradually increased its participation. CASA profited from the German production ban after 1945, to enhance its own development capacity. As no aircraft could be built in West Germany until 1955, Claude Dornier developed and produced the Do25 aircraft with CASA's participation, which was later sold as the CASA C-127 (Pletschacher 1999, p. 12). In 1971, the Spanish state acquired the majority of CASA's shares and took over Hispano Aviación S.A, the countries' second largest manufacturer (Wilken 2001, p. 49). To foster its competencies in aerospace, state-owned CASA began cooperating with international partners. Through collaboration with the Airbus program and Indonesian Aerospace on the CASA C-212 Aviocar transport airplane, the manufacturer was able to secure its expansion and to broaden its expertise from licensed production to national aircraft projects.

4.3.1.3 The national governments: Funding and supporting partners

National governments have always been highly involved in the civil aircraft industry due to its specific characteristics and its strategic importance. Aircraft production is characterized by long-term investment[93] and a unique accumulation of risks (Zabka and Mehdorn 1997, p. 15). Given the great technological complexity of aircraft programs, development periods are long and expensive. Accordingly, manufacturers have to finance high development costs and bear technological risks for long periods of time. The time until the break-even point is reached and

[93] The life cycle of a commercial aircraft program extends over several decades and is divided in various phases. Altfeld (2010, p. 48) divides the life cycle of commercial aircraft programs in four phases: research, development, production and operations/product support. For a complete description of the different phases, please refer to Altfeld (2010, pp. 47ff.).

the high upfront investments pay back through sales revenues is accomplished only after several years of production. Moreover, the aircraft manufacturers are reliant on a cyclical market which is characterized by fierce competition on the supply side while a limited number of important airlines dominates the demand side (Zabka and Mehdorn 1997, p. 15; Salot 2006, p. 32). As a result of this accumulation of risks, manufacturers cannot mobilize the financial resources for development of new aircraft by themselves and thus require state funding (Schmidt 1997, p. 43).

Because national governments consider the aircraft industry as a strategically important sector, they are willing to publicly support manufacturing for three main reasons. First, the industry touches issues of national security as the interdependencies between civil and military production are considered to be high (Ecorys 2009, p. 22). Secondly, the industry's sales are of great importance for the national trade balance. Finally, aerospace is a key industry for technological progress. Due to the industry's high level of R&D investment, governments hope for technological spill-over effects to other domestic industries and for positive effects on employment (Salot 2006, p. 35; Bundesministerium für Wirtschaft und Technologie 2013, p. 6).

Governmental assistance for the aircraft industry is primarily divided into direct and indirect forms of funding. Even though these categories overlap in some areas, they have been applied since the beginning of the transatlantic trade dispute in the early 1990s and are suited for illustrating the distinct forms of state aid in this sector. In 1992, the Agreement on Trade in Large Civil Aircraft stipulated that both Airbus and Boeing receive government assistance in direct or indirect forms (van Scherpenberg and Hausséguy 2005, p. 3).[94] Direct funding includes all governmental actions or interventions through which manufacturers obtain public monetary payments or transfers. They generate cost saving for the companies which do not have to render any direct service in return (Wilken 2001, p. 84). This form of funding was primarily accorded in Europe, where state aid for the Airbus program was provided through direct intervention, mostly by financing development costs (Olienyk and Carbaugh 2011, p. 1). Indirect assistance is

[94] The bilateral Agreement on Trade in Large Civil Aircraft was signed by the United States and the European Commission in 1992. It stipulated that both Airbus and Boeing receive governmental assistance and limited its overall level. As a result, direct funding to AI was limited to 33 percent of overall development costs. In return, indirect assistance to US manufacturers was restricted to three percent of revenue (van Scherpenberg and Hausséguy 2005, p. 3). For the history and the main arguments of the transatlantic trade dispute on trade in civil aircraft see McIntye (1992); Carbaugh and Olienyk (2004); Olienyk and Carbaugh (2011).

more difficult to detect. It covers all public non-monetary transfers that generate cost savings for manufacturers (Wilken 2001, p. 84). These include, for example, indirect cross-subsidizing of the development of civil aircraft programs through publicly funded military projects. This indirect from of funding was mostly accorded to American manufacturers (Carbaugh and Olienyk 2004, p. 2).[95]

The governments of France, Germany, Britain and Spain granted various, country-specific forms of direct assistance to their respective national manufacturers. They offered low-interest loans and state securities for development ("launch aid")[96], series production and sales[97] of aircraft. Moreover, national governments accorded exchange rate guarantees, remitted liabilities and suspended taxes (Wilken 2001, p. 85).[98] Each government negotiated the amount of aid and the procedure of allocation directly with their respective manufacturers (Muller 1989, p. 192). The exact amount of launch aid was, for example, dependent on the volume of R&D and production tasks assumed by the national manufacturers. The amount and distribution of aid varied according to national practices. As a nationalized company, British Aerospace obtained funding for its A310 share (Hayward 1986, p. 164). After its privatization, it received launch aid as specified in negotiations between the private company and the British government (Muller 1989, p. 192; House of Commons 2007, p. 22). The French state raised capital funds for Aérospatiale and provided its 'national champion' with repayable low-interest loans (Muller 1989, p. 192). Similarly, the Spanish government supported CASA with financial assistance

95 Examples of military cross-subsidizing of civil aircraft projects include the Boeing 707 and the Boeing 747 (Schmidt 1997, pp. 44-45).

96 Launch aid is defined as "up-front project investment, paid back to governments in the form of a levy on the sale of each aircraft sold" (House of Commons 2007, p. 22).

97 Aircraft sales are supported by governmentally funded export credits that protect companies against possible losses from non-payment by foreign business partners. They are offered at more favorable conditions than could be obtained on the market and are accorded by special governmental agencies, e.g. the German Euler Hermes Kreditversicherungs-AG and the French Compagnie française d'assurance pour le commerce extérieur (Hayward 1986, pp. 168ff.).

98 Reliable data on the overall government assistance for all Airbus programs is not publicly available (Kirchner 1998, pp. 234-235). Since assistance was accorded directly to the manufacturers and AI did not publish accounts, all existing numbers are estimations by authors or public authorities. For reliable data, one would need to incorporate the company reports of the four national manufacturers as well as the national budgets of the involved governments involved and exclude exchange-rate, inflation and interest effects (Wilken 2001, p. 85).

(Hickie 1991, p. 192). In Germany, Deutsche Airbus received public funds from both the federal and the regional governments and distributed them among the several manufacturers (Muller 1989, p. 193).

The amount of indirect governmental assistance accorded to the national manufacturers depended on country-specific forms of state-aid in general and on governmental attitudes towards the aircraft industry in particular.[99] Although reluctant towards interventionist public policies in general, the German government supported its aircraft industry in order to promote European reconciliation and to regain technological expertise lost after the Second World War (Muller 1989, p. 230). Research funding was provided by the federal and the regional governments in various ways. The federal government promoted civil aeronautical R&D through funding for the German federal research center for aeronautics and space (DLR), or by funding research projects between manufacturers and technical universities. The regions with Airbus sites, Bavaria, Hamburg, Bremen and Lower Saxony, assumed costs for local infrastructure projects and accorded site-specific research funds and investment aid. Moreover, they furthered research collaboration between the manufacturers and local universities (Salot 2006, p. 216). In France, aerospace is considered a special sector (Muller 1989, p. 225; Thornton 1995, p. 49). After the Second World War, its reconstruction was strongly motivated by the political goals of staying independent and securing French influence in Europe (Krause-Nehring 2008, p. 79). For strategic reasons, the sector was politically organized in a private pole for the production of fighter jets around Dassault and a public one around Aérospatiale (Muller 1989, p. 226). Predisposed to interventionist policies in general, French central governments have played a particular active role in supporting and shaping the sector.[100] As a nationalized company, Aérospatiale received public funds and profited from long-term political support and several national plans for development of the industry (Hickie 1991, p. 205; Alcouffe 2005a, p. 82). It was supported in its research by the French Aerospace Lab (ONERA) (U.S. Congress 1991, p. 358). With the upcoming decentralization, the French regions Aquitaine and Midi-Pyrénées have also begun to play an active role in supporting local production sites and fostering research collaboration through cluster-building initiatives (Frigant et al. 2006, pp. 59ff.).

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99 In addition to research funding, French presidents and German politicians continuously promoted aircraft sales (Hickie 1991, p. 208).

100 For a comprehensive summary of French industrial policy, see Alcouffe (2005a).

The national governments controlled and monitored the implementation of the Airbus programs through several intergovernmental bodies. The national ministers responsible for the European collaboration convened biannually in the Airbus Ministerial Meetings. Here, they coordinated their decisions on high-level questions such as the launching of new aircraft programs and the admission of new countries to the intergovernmental treaties (Hayward 1986, p. 69). Constant communication between the governments was assured by the Intergovernmental Committee, the Airbus Executive Committee and the Airbus Executive Agency (Muller 1989, p. 195). In the Intergovernmental Committee, high-ranking civil servants met twice a year to oversee the implementation of intergovernmental agreements and exchange their views on Airbus' related policies. The Committee was assisted in its work by the Airbus Executive Committee, which met every month and closely monitored the Airbus programs. On the working level, the Airbus Executive Agency assured the day-to-day communication between AI and the national representatives (20100216/CS/2). It was mainly responsible for overseeing governmental launch aid, for charging levies on aircraft sales and for determining each state's contributions to project development (Hayward 1986, p. 70).

4.3.2 The functioning logics of the old Airbus organizations: Coupled decision-making processes

Three decision-making processes were central in the Airbus organization from 1970 until 2000: the commercial, the political and the work-sharing procedure (Muller 1989, pp. 198ff.).[101] AI, manufacturers or governments each dominated and imposed their norms on one of the main decision-making processes within the Airbus organization. Despite various interactions of the three groups of actors, the processes proceeded in parallel and worked rather independently from one another. This ensured that the Airbus organization was not paralyzed when negotiations in one process stalled (Muller 1990, p. 36). However, in order to progress, the three different groups of actors needed to eventually reach a compromise.

[101] Muller (1989, pp. 198ff., 1990, pp. 35-36) denotes the three decision-making processes as "commercial procedure", "political procedure" and "industrial procedure". In order to emphasize the influence of actors, I refer to the first two procedures as the commercial decision-making process and the political decision-making process. Adopting Airbus 'slang', I refer to the industrial procedure as work-share negotiations.

4.3.2.1 Commercial decision-making processes: Designing an aircraft program according to customer demands

In the commercial decision-making process, AI specified the general features of new aircraft programs in close cooperation with airlines and made decisions regarding their launch (Muller 1989, p. 199). At the beginning of a commercial process, as illustrated in Figure 5, AI carried out market studies, conducted conversations with potential clients and collected requirements of launch customers[102] to ensure future demand for the program (20101116/CS/5). Equipped with this information, the AI program manager and his team determined the programs high-level requirements, such as range, speed, weight, performance and passenger capacity as well as safety standards.[103] For further specifications, the AI team called upon the expertise of the national manufacturers. Presided over by the AI program manager, the chief engineers discussed the details of the program configuration and its work share.[104] At the same time, the AI sales department negotiated price and purchase agreements with airlines and regularly informed the national governments about the status of the talks. When AI had received a critical mass of orders and purchasing options, it assured that both the work-share allocation and governmental funding were more or less settled to then officially launch the new program. As the sole interface with clients, AI was located at the heart of the decision-making process. Chairing all the steps of the commercial decision-making process, AI assured that programs were designed according to customer demands.

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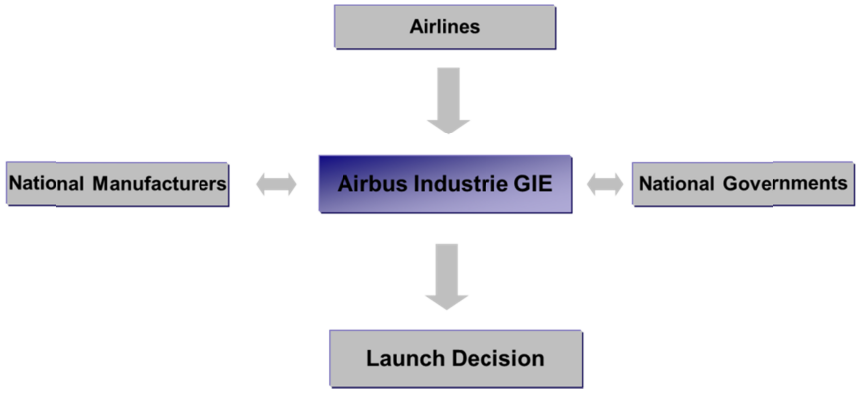
[102] Launch customers are airlines or large leasing companies that work closely with manufacturers in specifying an aircraft program. In order to ensure that a new program complies with their requirements, airline engineers and specialists are closely involved in every step of the program's development. After aircraft certification, the launch customers are the first to take the aircraft into regular airline service.

[103] For specification of the high-level requirements, the AI team did not only rely on market information, but could also draw on aircraft prototypes. In the early 1970s, Roger Béteille had charged Jean Roeder with developing a concept for an entire product range of Airbus aircraft (Roeder 2011). The aircraft were labeled with numbers ranging from B1 to B11, the A300 was for example called B1, its smaller derivative, the A310, B10 (Aris 2002, p. 119). In this function, Jean Roeder literally became the father of all Airbus aircraft.

[104] The decision process leading to a work-sharing agreement is described in detail in section 4.3.2.3.

Figure 5 **The commercial decision-making process**
(Illustration based on Muller 1989, p. 199)



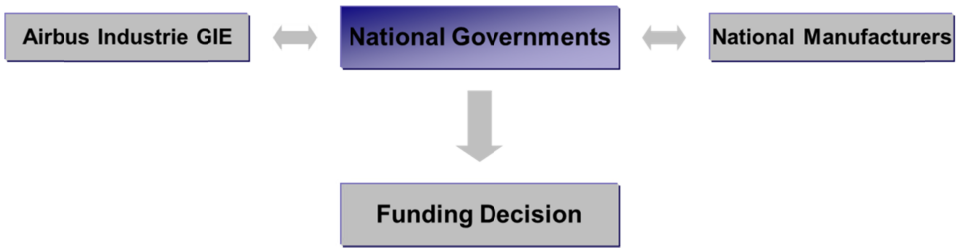
4.3.2.2 Political decision-making processes: Determining governmental support

In the political decision-making process, the governments of France, Germany, Britain and Spain first individually decided on the amount of funding they would accord to their national manufacturers and in a second step collectively agreed on the overall amount of funding each conceded to a specific aircraft program (Muller 1989, p. 200). In the first step of the political process, as depicted in Figure 6, the national governments negotiated the amount of funding and the forms of repayment[105] for a particular program with their respective manufacturer on the national level. For this, national manufacturers submitted their work-sharing concepts to their respective governments, demonstrating the activities that ought to be carried out at national production sites. Before granting assistance, the relevant administrations examined if these concepts were consistent with industrial policies, employments goals and budget constraints (20100216/CS/2). Second, representatives of the national governments of France, Germany, Britain and Spain exchanged their views on program funding on a transnational level. Presided over by AI, the national representatives collectively agreed on the overall funding accorded to a single program and the work-share allocation in the Intergovernmental Committee and/or the Airbus Executive Committee. National governments, who were at the heart of the political

[105] The national governments claimed that manufacturers repaid the accorded funding with interest. The procedure varied according to national practices and according to the respective aircraft programs (Hayward 1987, p. 17).

decision-making process, took funding decisions based on the expertise of their national manufacturers and according to national interests (Muller 1989, p. 201).

Figure 6 **The political decision-making process**
(Illustration based on Muller 1989, p. 200)



4.3.2.3 Work-share negotiations: Configuring the best possible plane and bargaining for technological highlights

In the work-sharing negotiations the manufacturers collectively determined the program configuration in detail and subsequently bargained for the allocation of work share (Muller 1990, p. 36). In the first 'configuration phase'[106], the chief engineers of the national manufacturers jointly specified the overall aircraft design, presided over by the AI program manager. For this purpose, AI required the engineering teams of the national manufacturers to develop individual technological solutions and to submit autonomous proposals for the program's subassemblies. Each proposal was jointly discussed and critically evaluated in a peer-review process by the national chief engineers:

> "We collected good ideas from all members, the best ideas from everywhere. There was fierce competition among German, French and Spanish engineers for the best technical solution" (Hartmut Mehdorn 2010b, translated by the author).

Based on safety criteria, the chief engineers chose the best commercially viable technical solutions among the manufacturers' proposals and integrated them into one detailed design

[106] According to Hartmut Mehdorn, the work-sharing negotiations can be analytically divided into two steps (Mehdorn 2010b), which I refer to as the 'configuration phase' and the 'allocation phase'. Both phases are specified in section 5. The configuration phase of every reviewed program is briefly described in the introductory subsection of each critical juncture. Focusing on the role of actors during the process, the chapter's remaining subsections elaborate on the programs' allocation phases.

blueprint for series production. At this stage the national chief engineers did not know which site or country would be developing or producing a certain component, which enabled "competition of ideas to optimize the aircraft without the national element" (Mehdorn 2010b, translated by the author). However, this changed dramatically in the second phase of the work-sharing negotiations.

The 'allocation phase' consisted of dividing the total amount of work into large manageable subassemblies and assigning them to the national manufacturers at negotiated prices. After collectively determining the single subassemblies of the aircraft, specialized engineers of the national manufacturers bargained for their allocation. Competition among the manufacturers was acrimonious, especially for the allocation of sophisticated systems and expensive high-tech components (Hickie 1991, p. 201). In line with this, negotiations on the price the national manufacturers were able to charge AI for their production were fierce. This so called "pricing", i.e., the fixing of "transfer prices" that AI would pay for individual work packages of a program, was a difficult issue (20101116/CS/5). For this, each manufacturer first calculated his internal price for work package. Based on price, delivery time and quality criteria, the national manufacturers then bargained for their allocation in changing coalitions and alliances (20100216/CEO/2). In order to maximize profits from their work package, national manufacturers concealed their real development and production costs and naturally tended to overestimate the costs of their work package and challenged the cost estimates of others (20100216/CEO/2).[107] However, due to the fierce competition for work packages, the other negotiators were incited to be very well-informed about their potential production-costs and their highest possible price. Based on the costs for raw materials, labor, etc. they estimated the price of work packages and, in their own interest as shareholders of AI, attempted to keep them as low as possible (Thornton 1995, p. 167). Thus, due to fierce peer review, prices could not be exaggerated. At the end of the process, the manufacturers had to unanimously agree on a solution that would reconcile both their interests as shareholders and subcontractors.[108]

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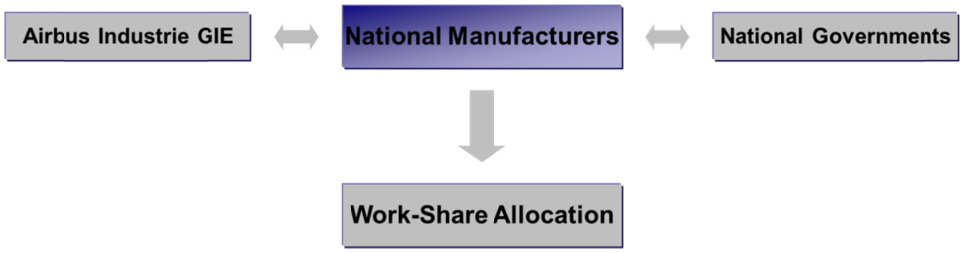
107 These non-transparent practices gave rise to speculation about the real costs of single work packages and concealed the overall costs of an aircraft program (Kechidi 1995, p. 202).

108 Please note that the "transfer prices remained unchanged in principle, but could be renegotiated, after a long period of time had elapsed, if there had been a fundamental modification of the underlying circumstances" (GATT 1992, p. 7).

The work-share allocation was exclusively determined by the national manufacturers in line with AI's commercial guidelines and governments' financial commitments (Muller 1989, p. 202; Frigant et al. 2006, p. 44). Pooling their joint expertise, the national manufacturers first designed the aircraft program based on the high-level requirements of AI. Secondly, the national manufacturers allocated the work shares of individual programs among themselves. These negotiations were chaired by the program director of AI, who arbitrated between the partners and urged them to comply with commercial guidelines. The percentage of the overall program costs a national manufacturer could retrieve during these negotiations did not necessarily correspond to their respective shares of AI. The individual percentage in a particular program was primarily dependent on the manufacturers' "expertise and their specialized facilities" as well as on "the level of funding" they were able to raise from their national governments (Hayward 1987, p. 15). National governments supported their respective manufacturers with direct and indirect funding. In return, the manufacturers had to justify the negotiated compromise, after the final work-sharing agreement was reached. Then, national administrations verified that the overall work-share assignment met their government's objectives but had to accept the final bargaining result (20101130/CS/6).[109] Thus, both AI management and national governments intervened in the decision-making process. However, neither of them decided on the qualitative and the quantitative distribution of work shares. It was the national manufacturers who determined work-share allocation with regard to content and they were therefore located at the heart of the decision-making process, as depicted in Figure 7.

Figure 7 **Work-share negotiations in Airbus Industrie GIE**
(Illustration based on Muller 1989, p. 201)



109 Only if work-share negotiations were entirely blocked did the national manufacturers call upon political actors to resolve open questions on a political level (Mehdorn 2010b). In this case, the manufacturers briefed national politicians of, for example, the Airbus supervisory board or high ranking civil servants and they negotiated a 'political' solution to a certain problem.

4.4 The new Airbus organization 2001-2010: An integrated company

In order to implement the A380 program, increase efficiency and compete with US manufacturers, the old Airbus organization was completely transformed in 2001. That year, the national manufacturers Aerospatiale-Matra, DASA, BAE Systems and CASA merged their Airbus-related assets to become Airbus Integrated Company (AIC), a multinational enterprise with factories and engineering under one management as well as transparent accounts. The restructuring process changed the role of key groups of actors and the functioning of the main decision-making processes within the Airbus organization. After elaborating on the new roles of the old actors, I explicate the decoupled commercial and political decision-making processes in general and the modified process of work-share allocation in particular.[110]

4.4.1 The key groups of actors

4.4.1.1 Airbus Integrated Company: Centralizing control

The implementation of the A380 program required the AI organization to restructure into a joint stock corporation (20101209/CE/3; 20110128/MS/9). Since the early 1980s, the AI organization was subject to strong criticism for its intransparency and inefficiency as well as the opaque involvement of the government. After the launch of the A330/340 program, a commission of four "wise-men" was set up and they presented proposals for reform in April 1988 (Hornschild 1992, pp. 72).[111] Notably, they recommended transforming AI into a public limited company in order to enhance efficiency and transparency. However, all four manufacturers were profiting from the opaque organization and the non-transparent pricing practices for subassemblies (Thornton 1995, p. 167). As shareholders, they had a more or less guaranteed return from sales of their subassemblies to AI. For subassemblies in which they were specialized in, they did not have to offer at the lowest possible price (Frankfurter Allgemeine Zeitung 1993, p. 20). Thus, discussions about the reform of the AI organization were only

[110] I examine the new AIC organization until 2010. The period of investigation ends at this date due to time constraints.

[111] For further information, see Benichou, J., Garcia Gonzales, E., Pfeiffer, P. and Sir Sterling, J., (1988) "A Report on the Airbus system" (cited in Hornschild 1992, p. 73). For all information concerning the report, I rely on the recounting of Hornschild (1992, pp. 72-77).

seriously resumed when the large-scale A380 program called for a less complex structure (20101116/CS/5):

> "We needed to integrate the company and we needed the A3XX. The two went hand-in-glove. You couldn't do one without the other. The A3XX was such a huge risk that you needed to optimize it, otherwise you couldn't do it" (Mike Turner, former British Aerospace's Airbus board member, cited in Aris 2002, p. 196).

In order to gain capital from the financial market, the supervisory board of AI decided in 1997 to convert the consortium into a corporation with "comprehensive corporate responsibility for all development, production, and sales activities of the entire Airbus program, including profit responsibility" (Daimler-Benz Aerospace 1996, p. 7). Details, such as the question of which assets and activities the national manufacturers would transfer to the new entity, were to be resolved by 1999 (Daimler-Benz Aerospace 1996, p. 10).[112] After discussing several possible legal forms, the national manufacturers decided to restructure AI into AIC, a stock corporation in the form of a French Société par Actions Simplifiée (S.A.S.).[113] All industrial assets and employees of the four manufacturers were transferred to the new entity on July 12, 2001. AIC was jointly owned by EADS (80%)[114] and BAE Systems[115] (20%). Since the acquisition of BAE Systems' 20 percent share on 13 October 2006, AIC is a wholly owned subsidiary of EADS (EADS 2007, p. 23).

AIC was created to increase economic efficiency by establishing transparent accounts and realizing synergies from centralization (20110128/MS/9). Due to non-transparent pricing-practices, there had previously been great uncertainty about Airbus' competitiveness. Prior to the

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112 Several interviewees declared that, contrary to the often stated reason, the merger of Boeing and MDD cannot be seen as the primary motive for the integration of Airbus and other mergers in the European aerospace sector. Even though the Boeing Company became the world's largest manufacturer of civil and military aircraft after the consolidation process, interviewees accentuated that increased competition was only one motivation for the European integration, yet not the main reason (e.g., 20101209/CE/3; 20110128/MS/9).

113 The legal entity S.A.S. is a simplified French listed company, possessing a CEO and an executive committee (Salot 2006, p. 66).

114 The genesis of EADS is elaborated on in section 4.4.1.2.

115 BAE Systems is the successor of British Aerospace, which was renamed BAE Systems after British Aerospace's takeover of Marconi Electronic Systems in 1999.

creation of AIC, national manufacturers concealed their real costs for the production of subassemblies and kept their accounts secret:

> "None of the partners were willing to put their cards on the table and disclose exactly how much they had put into Airbus and what they were making out of it" (Aris 2002, p. 201).

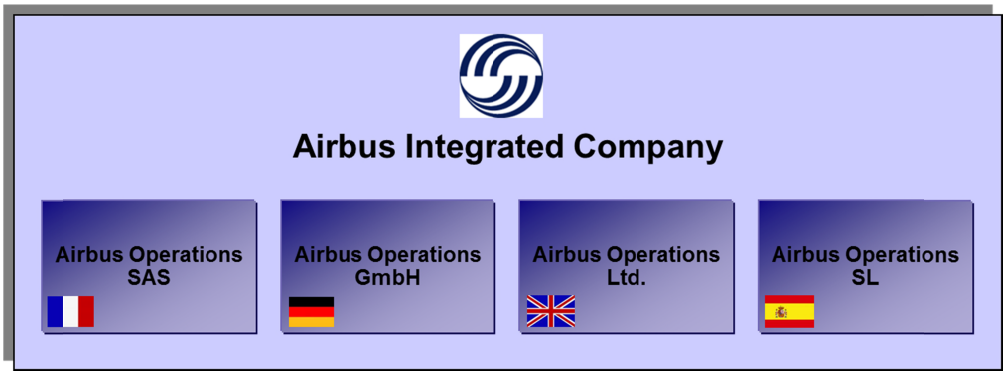
Thus, in the AI organization, no one knew the overall costs of an aircraft program (20090512/CEO/1).[116] Under the homogenous accounting system of AIC, however, the costs for an aircraft program could be calculated and the prices set at a cost-covering level. Moreover, as the gains and losses were attributed to AIC, the previous incentives to overprice the national subassemblies at the expense of others were eliminated (20100324/IE/4; 20100328/IE/6). The integration of the national manufacturers' Airbus-related assets into AIC also created synergies through centralization (20101209/CE/3). The concentration of important functions, such as engineering, procurement, finance and production, reduced duplicate capacities and generated cost savings in various forms. Benefits arising from economies of scope were first and foremost realized in procurement (Frigant et al. 2006, p. 49). Furthermore, AIC was a "leaner, more flexible organization where the lines of communication were shortened" and the decision-making processes accelerated (Cohen 2008, p. C46).

The integration of AI shifted control away from the national manufacturers towards the international headquarters. During the integration process, the former headquarters of the national manufacturers were abolished. Step by step they conferred their assets and decision-making authority, e.g. in controlling or human resources, to AIC in Toulouse. Gradually the AIC organization took over responsibility of "research, design, engineering, procurement, manufacturing, assembly, tests, flight tests, certification, customization, sales, commercialization, finance, leasing, after-sales service, spare parts supply and other services" (Frigant et al. 2006, p. 51, translated by the author). Thus, from design to commercialization, the core competencies of aircraft manufacturing were concentrated at AIC. At the end of the centralization process, the former "mothers" (national manufacturers) had transferred all of their competencies to their former "daughter" (AI, now AIC) (20090512/CEO/1). As depicted in Figure 8, the direct influence of the former national manufacturers was abolished and they were gradually

[116] See section 4.3.2.3 for further details.

transformed into subsidiaries of AIC (Salot 2006, p. 66). The dispersed control in the old AI organization was thus centralized in the hands of the international headquarters.

Figure 8 **The Airbus Integrated Company**
(Illustration based on Jalabert and Zuliani 2009, p. 66)



4.4.1.2 The public and private shareholders: Maintaining a Franco-German balance

Negotiations on the restructuring of the Airbus organization triggered a consolidation process in the European aerospace industry and induced the creation of EADS. In 1996, the four national companies started debating on the restructuring of the AI consortium and agreed to settle the details of the new organization by 1999 (Daimler-Benz Aerospace 1996, p. 10). In the course of these negotiations, ideas for closer collaboration in areas other than civil aviation emerged among the manufacturers. Aerospatiale and DASA had, for example, already merged their helicopter divisions in 1992 (Eurocopter 2011b). In the areas of space and defense, various options for collaboration were discussed among British Aerospace, DASA and Aerospatiale (Aris 2002, pp. 202-206).[117] By July, 1999, DASA and Aerospatiale-Matra had reached an agreement on a mutual collaboration and announced the creation of EADS in October that year (Aris 2002, p. 207). After its privatization, Spanish CASA declared its willingness to merge with Aerospatiale-Matra and DASA within the new European structure in December, 1999 (CASA

[117] While the first attempt for a transnational aerospace merger among Aerospatiale, DASA and British Aerospace failed, British Aerospace and DASA sounded out the possibilities for a bilateral solution. Talks ended when British Aerospace announced its takeover of Marconi Electronic Systems in January, 1999. Subsequently, DASA and the privatized Aerospatiale-Matra intensified bilateral talks and announced the creation of EADS in October, 1999 (Aris 2002, pp. 206-207).

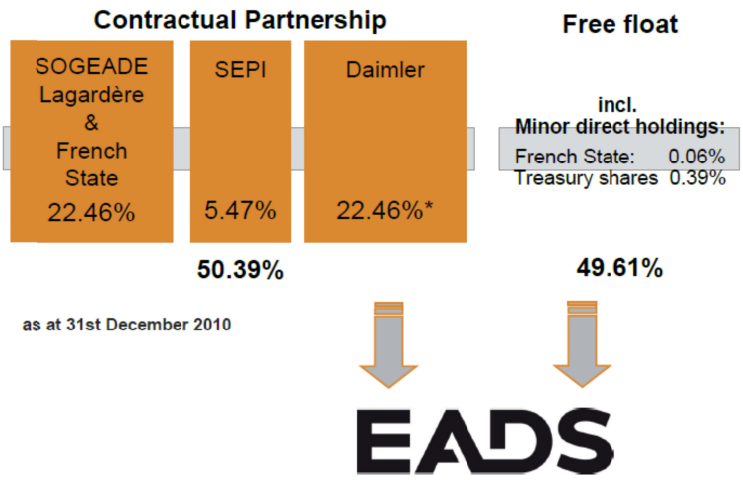
1999, p. 16). On July 10, 2000, the three manufacturers Aerospatiale-Matra, CASA and DASA then officially merged into EADS (EADS 2000, p. 4).[118] The new company was divided into five business units: Airbus, Military Transport Aircraft, Defense and Civil Systems, Space and Aeronautics, with the civil aviation business of Airbus generating 59 percent of the companies' revenues (EADS 2000, p. 6).

Today, the shareholders of Airbus are public authorities and private companies who retain their influence through veto rights on the EADS Board of Directors.[119] Since the integration of the company, the former national manufacturers became Airbus' core shareholders via their majority ownership of EADS. As such, they are no longer directly involved in configuring Airbus' programs and allocating work shares. Figure 9 illustrates that the French state and the Spanish state holding company Sociedad Estal de Participaciones Industriales (SEPI) are also direct shareholders of the company. Holding the majority of shares in a contractual partnership, the German Daimler Benz company, the Spanish SEPI and the French state and the Lagardère Group today exercise their role as "controlling shareholders" through veto rights on the EADS Board of Directors (Louis Gallois, CEO of EADS, cited in Deutscher Bundestag 2009, p. 56). All three have already made use of their veto several times (Louis Gallois, cited in Deutscher Bundestag 2009, p. 57). Figure 9 illustrates the shareholder structure of EADS as of 31 December 2010.

118 For a detailed overview of the activities that the three companies integrated into EADS, see Frigant et al. (2006, pp. 25-27).

119 The Board of Directors "is responsible for the management of the Company" (EADS 2013). Today, it is composed of eleven members and chaired in its meeting by the Chief Executive Officer of EADS, currently Thomas Enders. For more information, please refer to EADS (2013).

Figure 9 **The ownership structure of EADS**
(Source: EADS 2011a, p. 28)[120]



The founding principle of EADS was the equal sharing of power and ownership among the biggest partners, and it governs the company to this day. EADS was first and foremost a Franco-German initiative (20101116/CS/5). Since its creation, the two sides have held the majority of shares, split equally between them (Sénat français 2007, p. 13).[121] Moreover, management responsibilities were balanced between the two nations. From 2000 until 2007, the company was thus "led by a dual-headed management structure, with two Chairmen and two co-Chief Executive Officers" (EADS 2011b), one from each of the respective nationalities. However, after a management reform in July, 2007, this Franco-German diarchy was abolished. The Frenchman Louis Gallois was appointed CEO of EADS and the German Thomas Enders CEO of its most dominant division, Airbus (Frankfurter Allgemeine Zeitung 2007). Today, both the German and the French sides retain 22.49 percent of EADS' shares (Figure 9). French shares are held by the Société de Gestion de l'Aéronautique, de la Défense et de l'Espace (SOGEADE), a joint holding company of the Lagardère Group and the state-owned Société de Gestion de Participations Aéronautiques (SOGEPA). Together, Lagardère and SOGEPA exert the French voting rights.

120 The star next to Daimler's 22.46% shares stands for "on February 9, 2007, Daimler reached an agreement with a consortium of private and public-sector investors through which it will reduce its shareholding in EADS by 7.5%" (EADS 2011a, p. 28).

121 Even though EADS is a company under Dutch law and registered in the Netherlands, Amsterdam has not replaced the national headquarters of its two principles partners, Paris for Aerospatiale-Matra and Munich for DASA.

German shares are distributed among Daimler (14.99%) and a consortium of private and public-sector investors (7.5%)[122] (EADS 2011a, p. 28). However, Daimler solely exercises all of the German voting rights (20090724/MS/4).[123] EADS ownership and decision-making structures therefore maintain the Franco-German balance of the former AI organization (20100507/MS/8).

4.4.1.3 The national governments: Funding and supporting partners

The governments of France, Germany, Britain and Spain supported the restructuring of the AI organization in order to implement the A380 program. In line with their respective manufacturers, the governments agreed that Airbus had to expand its product range and build the A380. However, such a large-scale program would require huge governmental funding. Furthermore, the bilateral Agreement on Trade in Large Civil Aircraft had limited the level of governmental assistance to Airbus to 33 percent of overall development costs in 1992.[124] Since the majority of funding could no longer be assumed by the national governments, the aim was to generate funds from capital markets. Unlike AI, the new organization was to be listed on the stock exchange (Frigant et al. 2006, p. 49). The German government in particular pushed for Airbus' reorganization into a stock corporation. Norbert Lammert, the former aerospace Coordinator of the Federal Government, threatened to withdraw federal funding if Airbus did not change its form:

> "We can no longer justify the assignment of public funds to a company that cannot survive in this structure" (Norbert Lammert, cited in Der Spiegel 1996, p. 102, translated by the author).

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122 This consortium of private and public-sector investors will retain the 7.5 percent share of EADS until 2012, after which time ownership will have to be renegotiated (Frankfurter Allgemeine Zeitung 2011a, p. 16).

123 For some time now, the German press has been reporting that Daimler wants to unload its EADS shares. However, since there is no other German investor large enough and willing to take-over Daimler's shares, Daimler's retreat would destabilize the equality between the German and the French partners. The Federal Government is aware of this fact and is thus highly involved in the process, attempting to identify a solution by 2012 (Hegmann et al. 2011).

124 For more details on the bilateral Agreement on Trade in Large Civil Aircraft signed by the United States and the European Commission, see section 4.3.1.3.

The British government was also strongly in favor of the integration of the company (Flight International 1996). As a stock corporation, Airbus was intended to become more transparent and profitable. After initial hesitation, the French and the Spanish states, who still owned Aerospatiale and CASA, also agreed with the reorganization of the company (Ehrensberger 1996). In the end, the governments left decisions on the new form of Airbus to their national manufacturers (20100810/CS/4).

As direct and indirect shareholders, the national governments of France, Germany and Spain remain highly involved in the civil aircraft industry and continue to financially support Airbus in direct and indirect forms. Since the integration of Airbus, the French government and the Spanish state-owned SEPI are EADS shareholders and the German government is represented on the EADS Board of Directors by the Daimler Company (Louis Gallois, cited in Deutscher Bundestag 2009, p. 56). Despite their different roles, the national governments continue to fund and support AIC in various forms.[125] In terms of direct assistance, they continue to grant launch aid to the AIC. After having finalized a program's work-sharing concept, AIC approaches the national governments and requests launch aid in accordance with the amount of work share assigned to the national production sites (20100216/CS/2). For their part, the national governments reassess AIC's proposal and link financial commitments, such as repayable loans, to concrete work-share assignments (20100629/CS/3). The national governments can thus influence AIC's decisions through the funding they provide (Frigant et al. 2006, p. 46).

In terms of indirect assistance, the national governments provide non-monetary transfers and support R&D in country-specific forms. Regarding the non-monetary transfers, the German and the French governments as well as the regional government of Hamburg have absorbed costs for large infrastructure projects, such as the enlargement of the Hamburg production site and the expansion of transportation routes for the A380 program (Klesse 2004; Morgenstern 2008, pp. 28ff.).[126] With regard to research funding, R&D is nationally promoted by

[125] In addition to AIC itself, the national governments now also directly and indirectly support AIC's national risk-sharing partners and suppliers.

[126] For the transport of the A380's huge subassemblies, a special highway was built between Toulouse and Bordeaux, where components arrive by ship (Morgenstern 2008, p. 33). When the aircraft's parts are being transported, the highway is closed for further traffic. For more information, see Morgenstern (2008) as well as Jalabert and Zuliani (2009, pp. 70-72).

national research programs for aviation, e.g. the "Luftfahrtforschungsprogramm", and recently also regionally by a cluster-driven approach in both France and Germany (20100208/CS/1). In addition to funding existing research labs, such as DLR and its collaborative projects with Airbus, the German Federal Government has, for example, granted 40 million Euros to the Aviation Cluster of the Hamburg Metropolitan Region within the framework of the Leading-Edge Cluster Competition (Bundesministerium für Bildung und Forschung 2011). In France, the government has also encouraged the regions Midi-Pyrénées und Aquitaine to play an active role in supporting local production sites and to closely collaborate within the Pôles de Compétitivité cluster-building initiative (Frigant et al. 2006, pp. 59ff.; Pôles de Compétitivité 2011).

4.4.2 The functional logic of the new Airbus organization: Decoupled coordination and decision-making processes

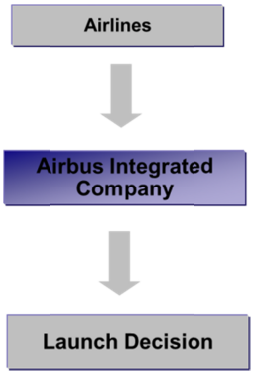
4.4.2.1 Centralized launch decisions: A market-driven decision-making process

The launch decisions within the new Airbus organization are managed by AIC and consist of three steps that involve constant interaction among customers, development engineers, safety agencies and transnational production teams. At the very beginning of the launch decision-making process, talks are held with important airlines and leasing companies. After discussing with potential launch customers, AIC combines their requirements into a general program specification (20110128/CE/5). This specification defines the broad features of a future program, such as range, performance, weight as well as seating and loading capacity. Based on these general specifications and the safety regulations of the European Aviation Safety Agency (EASA)[127], specialized departments then transpose these high-level requirements into detailed specifications (20100322/MS/7). The engineering department, for example, decides on the integration of new technologies, determines which work packages are to be produced in-house and which are to be sourced out. In this way it already configures 80 percent of the future program. Subsequently, the designated program manager and his team divide the project into

[127] Airbus integrates EASA's specialists into the development process from the very beginning, and their involvement is intensified throughout the process. EASA's specialists are regularly informed of milestones and participate in the implementation of the high-level requirements. Before AIC can officially launch the program, EASA has to certify its compliance with European safety regulations (20100322/MS/7).

manageable work packages and invite Airbus sites and outside suppliers to bid (20110128/CE/5). After the tendering procedure, they then assign the work packages to specialized teams of the various Airbus sites or outside suppliers. In close coordination with airlines' and EASA's specialists, the Airbus teams then implement the detailed program requirements. For this, they have to integrate improved or completely new components and at the same time pay attention to interfaces and respect overall weight restrictions. The launch decision is finally taken by the AIC management when a sufficient number of orders and purchasing options have been signed (20100322/MS/7). Figure 10 depicts AIC's launch decision-making process.

Figure 10 **The Airbus Integrated Company's launch decision-making process**



Although the integration of the Airbus organization decoupled the commercial decision-making process from national influences, the current process is no less complex given its many new stakeholders. In the times of AI, national governments and national manufacturers were closely involved in launch decision. Today, AIC unilaterally decides on introducing a new aircraft program (20110128/CE/5). Thus, the integration clearly speeded up the overall decision-making process, but did not reduce its complexity. Today, AIC operates internationally and owns production and development sites all over the world. Final assembly of the A320 is, for example, also performed in Chinese Tianjin (20091207/IE/3). Engineering centers are located in Moscow, Beijing, Bangalore, Wichita and Mobile (Airbus 2011). The integration of the various activities is assured through constant communication. This process is costly and may result in coordination problems among the international headquarters, transnational teams, safety agencies, customers and engine manufacturers (20090727/MS/5). The centralized decision-making process relies on

the collaboration of these different stakeholders, whose constant interaction balances tensions and is key for Airbus' continued existence.

4.4.2.2 Political coordination processes: Reaching inter-governmental agreements

Since the integration of Airbus, the national governments of France, Germany, Britain and Spain coordinate their views in the "Airbus minister meetings" (20100629/CS/3). Today, the national governments are no longer directly involved in the company's decisions. AIC's decisions to launch a new aircraft program are in principle independent of, for example, the governments' willingness to provide funding for the overall program. Nevertheless, the national governments of France, Germany, Britain and Spain exchange their views on questions such as overall program funding on a transnational level. In regular meetings with or without company representatives, the national ministers in charge of the aviation industry come together to discuss questions concerning the industry in general and Airbus in particular (20090727/MS/5). France is represented within these meetings by the transport minister or more specifically the secretaire d'Etat au transport (Ministère de l'Écologie, du Développement durable, des Transports et du Logement 2011).[128] In Germany, the competencies for the civil aerospace industry fall within the jurisdiction of the Federal Ministry of Economics. The minister is supported in this work by a Parliamentary Secretary of State referred to as the "Coordinator of German Aerospace Policy" (Bundesministerium für Wirtschaft und Technologie 2011). The national representatives of the British and the Spanish governments come from the British Department for Business, Innovation and Skills and the Spanish Ministry for Industry, Tourism and Trade, respectively (Ministère de l'Écologie, du Développement durable, des Transports et du Logement 2011). Together, the ministers coordinate their national positions and seek to arrange agreements on Airbus-related matters. Figure 11 summarizes the composition of the Airbus minister meetings.

[128] Due to its strategic importance, the ministerial responsibility for the Airbus program was at first attributed to the French Ministry of Defense. Since 1976, however, the Ministry of Transport has been able to assert its position and has gradually taken over responsibility for the civil aircraft sector (Muller 1989, p. 226).

Figure 11 **The composition of the Airbus minister meetings**

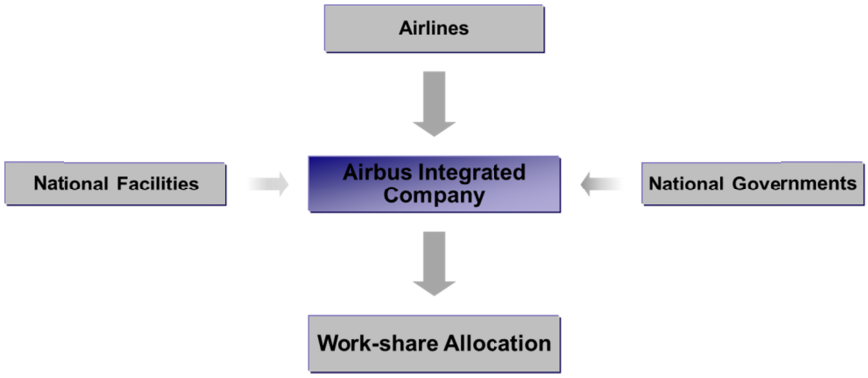
4.4.2.3 Centralized work-share allocation: Relying on existing specializations

Since the integration of the company, both program configuration and program work shares are no longer collectively determined and decided upon, but rather allocated exclusively by AIC, who assigns them to its specialized facilities or outside suppliers. When the national manufacturers were integrated into AIC, the joint program configuration of the national manufacturers' chief engineers was abolished. Moreover, the work-sharing negotiations among the national manufacturers were eliminated together with their nontransparent pricing practices. The integration led to the centralization of key functional areas at the AIC headquarters in Toulouse, among them the engineering department (20090512/CEO/1). This department determines the configuration of a future program, decides on the integration of new technology and presides over outsourcing decisions (20100322/MS/7). As a result, the national manufacturers and sites are no longer directly involved in the configuration of an Airbus program and its work-share allocation. Today, national sites make a bid for the allocation of work packages once AIC's program manager and his team have divided the total amount of work into large manageable subassemblies and put them out to tender (20110128/CE/5). During the tendering procedure, the AIC program team also calls upon bids from outside suppliers. Based on quality, price and time criteria, the program manager then chooses specialized teams from Airbus sites or outside suppliers to provide a certain work package.

The centralization of work-share allocation, as illustrated in Figure 12, has strongly reduced the influence of national stakeholders and at the same time reinforced the impact of AIC's internal decision-making processes on the final result (20110128/CE/6). Today, the qualitative and quantitative distribution of work shares is exclusively determined by company

decisions. Stakeholders, such as the former national manufacturers, today's production sites and the national governments, are no longer directly involved in the decision-making process. Regarding the former national manufacturers, their ultimate decision-making authority for the allocation was abolished with the integration of the company in 2001 (20090512/CEO/1).

Figure 12 **Centralized work-share allocation in the Airbus Integrated Company**



Today, the subsidiaries Airbus Operations S.A.S. (France), Airbus Operations GmbH (Germany), Airbus Operations Ltd. (UK) and Airbus Operations SL (Spain) bid for the allocation of work packages. Since the national manufacturers no longer collectively determine the work-share allocation, they now directly compete with each other or with outside suppliers during the tendering procedure. This intensified competition incentivizes sites to further specialize in existing competencies. They are supported in these efforts by both national and regional governments that try to influence the company's decisions in favor of their interests in various ways. In addition to non-monetary transfers and R&D funding, national governments also provide other forms of support, for example financial commitments. Contrary to the times of AI, the national governments now, however, lack "national negotiators" (20100216/CEO/2), who assure an equitable qualitative and quantitative work-share distribution among the partners. In order to remain informed about current developments, national and regional governments maintain close contact to national facilities and the national representatives at the EADS Board of Directors. Even if the EADS Board ultimately votes on the work-share allocation, it is AIC that unilaterally develops the concept. As a result, today's allocation is strongly dependent on how decisions are reached inside the AIC headquarters (20100319/MS/6).

4.5 Summary

The aim of this chapter was to introduce the complex case of Airbus, its genesis as well as its organizational context. Conceived as a one-product company, the turbulent early years of Airbus already set the prerequisites for a long-term collaboration. In the times of AI (1970-2001), Airbus was characterized as a relational network of Airbus Industrie GIE, the national manufacturers and the national governments. These three groups interacted in commercial and political decision-making processes as well as the work-share negotiations, all central to the functioning of the Airbus organization. In the times of AIC (2001-2010), Airbus was described as a multinational enterprise with facilities and engineering under one centralized management. The integration of the company changed the roles of AI's key groups of actors and the functioning of its main decision-making processes. Centralizing control in the hands of AIC's international headquarters in Toulouse, the company's public and private shareholders as well as the national governments were largely excluded from the company's internal decision-making processes. The commercial and the political decision-making processes were decoupled and the work-share allocation process centralized. Building on these insights of AI's and AIC's organizational contexts, the scene is set for Crozier and Friedberg's strategic analysis of the Airbus' work-share negotiations between 1969 and 2007.

5 The Airbus work-share negotiations 1969-2007

5.1 Introduction

This chapter analyses Airbus' work-share negotiations by applying Crozier and Friedberg's strategic analysis and key concepts of path dependence theory. The consecutive analysis of the five critical junctures A300, A320, A330/340, A380 and A350 XWB allows to illustrate the development of Airbus' largely stable work-share allocation over time in spite of actors that exert countervailing pressures for change.

Every section of this chapter examines one critical juncture, understood as a "relatively short period of time during which there is a substantially heightened probability that agents' choices will affect the outcome of interest" (Capoccia and Kelemen 2007, p. 348), with the five steps of Crozier and Friedberg's strategic analysis. Accordingly, the first section covers the work-share negotiations of the A300B program, the second presents the A320 allocation process, the third the A330/340, the forth the A380 and the last section the one of the A350 XWB program. Every section is internally structured according to Crozier and Friedberg's strategic analysis. After describing the context and the configuration phase of the respective aircraft program, the relevant groups of actors of the work-share negotiations are identified. Subsequently, each group of actors is studied in detail with regard to its interests, resources and strategies. The following analysis of the interaction of the actors' strategies allows to explicitly draw attention to the pressures for change and to reveal the game actors played. By understanding how actors deal with the threats to stability, the rules that underlie their game are ultimately reconstructed. The last section of every section summarizes the findings of the critical juncture by specifying the division of the program's work shares. After the analysis of the five critical junctures, the results of all of the work-share allocations, the games and the rules of the games are summarized in order to set the scene for the critical discussion on how actors maintain stability under pressures for change (chapter 6).

5.2 The first critical juncture: The A300 work-sharing negotiations

5.2.1 Introduction: From a political to a commercial aircraft program

The A300 program was initially conceived as a "political aircraft" in terms of design and work-share allocation (Thornton 1995, p. 77). Following an industry agreement in 1965, the national governments of France, Germany and Britain agreed to fund a one-year definition phase for a European aircraft program. In return for their support, the national governments selected their national manufacturers with the aim of fostering domestic industrial development: French Sud Aviation, Deutsche Airbus and Hawker Siddeley Aviation (Frigant et al. 2006, p. 40). Moreover, in order to reach a political compromise, the national governments pressed for a change in the 200- to 250-seat requirements of Air France, British European Airways and Lufthansa, to a 300-seat aircraft program equipped with two Rolls Royce RB207 engines. As Roger Béteille notes, this "highlighted the fundamental contradiction" of the early A300 program:

> "One the one hand, the cost of the RB207 engines and the technological responsibilities available for the airframe implied increasing the aircraft capacity to above 300 seats to obtain an acceptable operating cost per seat, but on the other hand, the market requirements were for 200 to 300 seats" (Béteille 1995, p. 6).

In line with governmental specifications, the selected companies presented their design for the A300 program in June, 1967 (Kracht 1994, p. 51), a medium-haul, 300-seat aircraft (Thomas 1999, p. 1). For this design, the national governments assigned wings and engine[129] design to Britain; the cockpit, front and central fuselage, and design of the airframe were allocated to France. On the basis of the expertise they had acquired, the remaining fuselage sections and tailplane were to go to Germany (Kracht 1994, p. 51). This work-share division allocated 37.5 percent of the overall program's costs to both the national governments of France and Britain, while Germany was to contribute 25 percent (Kirchner 1998, p. 154).

However, Roger Béteille and Felix Kracht rejected the first A300 configuration and redesigned the 'political aircraft' in line with commercial imperatives. The problems of the first A300 program configuration had become increasingly apparent by the mid-1968: Disagreements

[129] Rolls Royce was assigned 75 percent of the overall work on the engines and was supposed to subcontract 12.5 percent to the French Société Nationale d'Étude et de Construction des Moteurs d'Aviation (SNECMA) and German MTU, respectively (Thornton 1995, p. 76).

between engine and airframe manufacturers grew and airlines were not willing to acquire an aircraft program that did not meet their requirements (Frigant et al. 2006, p. 40). At that time, Airbus was little more than a project-design office. Realizing that the whole project was at stake, its technical director Roger Béteille and Felix Kracht decided to set up a small team and "clandestinely study a new version of the aircraft" (Muller 1990, p. 27). The team reduced the A300's original capacity and presented a smaller version designed for 250 passengers and a range of 1500 km in December 1968 (Kracht 1994, p. 52). The A300B was "better adapted to the needs of the users and able to be equipped with an engine 'off the shelf'" (Muller 1990, p. 27). With the launch of the Douglas DC-10-30 program, General Electric and Pratt & Whitney had developed "engines sufficiently powerful to equip a 250-seat medium-haul twin" (Béteille 1995, p. 6). As a result, American manufacturers could also provide engines for the smaller Airbus program and Rolls Royce's RB207 was no longer the only feasible solution.[130] Potential airline customers responded positively to the changes. For them, the new twin-engine solution implied a significant reduction in operating costs. Moreover, airlines could choose among several engines for the aircraft they ordered.[131] In addition to airlines, the French and the German government also supported the smaller, commercially more viable A300B (Béteille 1995, p. 7).

The redesign of the A300B program changed both the actors involved and the work-sharing allocation of the initial project. Unlike the British government, the French and the German governments favored the program's design changes. If introduced, the modified Airbus program would have directly competed with the British BAC Three-Eleven project and the Rolls Royce engined Lockheed L-1011 program (Béteille 1995, p. 7).[132] In April 1969, the British government officially pulled out of the Airbus program. However, the French and the German

130 In addition to the RB207 engine, Rolls Royce was also developing the RB211 for Lockheed's three-engine L-1011 program. Choosing the American option, Rolls Royce decided to dedicate its resources to the Lockheed project (Béteille 1995, p. 6). After the withdrawal from the A300, the British engine manufacturer became reinvolved in the Airbus project only with the A330/340 program.

131 Before, the aircraft manufacturers selected the engine and the airlines purchased the "aircraft and its engine as a unit" (Hayward 1986, p. 125). At first, the offering of an aircraft program with several different engines generated extra costs for the manufacturer. Since these extra investments attracted new airline customers bound to a certain engine type, they paid off very quickly (Werner Blohm, cited in Kirchner 1998, p. 219).

132 For more details on the British withdrawal, see section 4.2.1.

governments stayed committed to the redesigned A300B. In a Memorandum of Understanding they declared that they would not interfere in the technical characteristics of the program and its allocation of work shares. Moreover, they cleared the way for the use of "standard technology and proven off-the-shelf systems" (Thornton 1995, p. 79) in order to reduce costs and development times. The withdrawal of the British government left Hawker Siddeley Aviation without public funding. Accordingly, financial contributions and work-share allocation had to be renegotiated between the French and the German governments as well as Sud Aviation and Deutsche Airbus.

Because the German government was willing to fill the financial gap, the percentage of the overall program costs assumed by the Deutsche Airbus increased from 25 to 50 percent (Deutsche Airbus GmbH 1970, p. 5). In addition to the development of the largest fuselage sections and the vertical tail, Deutsche Airbus was now responsible for wing development (Kirchner 1998, p. 229).

> "We started by removing everything we could from the wing assembly. Firstly the moveable parts like flaps, rudders and so on. Some went to Germany, some to Holland" (Johann Schäffler, managing director of the German Airbus part at Deutsche Airbus, cited in Aris 2002, p. 44).[133]

As a result, Hawker Siddeley's share of the overall A300B costs was reduced to 20 percent (Muller 1989, p. 71). However, it quickly became apparent that:

> "the considerable English share of the wing could not be shifted. There was, firstly, simply a lack of expertise. Furthermore, there was a lack of industrial capacity: the large machines needed simply didn't exist in France and in Germany. That meant that we simply would have to begin a completely new program of investment, and we would certainly have lost time had we not kept the English with us" (Johann Schäffler, cited in Aris 2002, p. 45).

[133] After beginning his career at Ernst Heinkel Flugzeugbau GmbH and VFW, Johann Schäffler was appointed the first CEO of Deutsche Airbus in 1969 charged with developing the German part of the Airbus program. After the merger of VFW and MBB, he became a member of the MBB management, and director of the company's transport and commercial aircraft division. As such, he was also responsible for the Airbus production in Hamburg. In 1989, Schäffler was chairman of MBB Executive Board, charged with the company's integration into the newly founded DASA (Munzinger Online 2011b). He left his positions as MBB chairman and vice-chairman of DASA by December 1992 (Deutsche Aerospace 1992, p. 5)

Deutsche Airbus thus subcontracted the wing development and assembly to Hawker Siddeley Aviation (20110127/CE/4). The private company financed 40 percent of the wing-development costs internally. Since the French government refused to support the British company, the German government agreed to assume the remaining 60 percent (Kirchner 1998, p. 238).[134]

With the aim of filling a market niche at the lowest possible costs, the A300B program was designed as a technologically conservative (Muller 1989, p. 175; Thornton 1995, p. 159) but commercially innovative aircraft. The design changes to the A300 adapted the A300B program to the requirements of airlines. For the first time, market imperatives had prevailed over political considerations (Muller 1990, p. 27).

> The new program "represented a fundamental change in approach in that it stressed cost, commercial, and market factors above other considerations" (Mark Lorell, cited in, Thornton 1995, p. 79).

Accordingly, the A300B was designed for a market segment that the American manufacturers Boeing, McDonnell Douglas (MDD) and Lockheed had left open. Equipped with only two engines, the A300B was intended for high frequency, medium-haul distances and for carrying a maximum of 250 passengers.

> "One of the main reasons behind the decisions concerning the number of engines and the size of the aircraft was that the American manufacturers (Douglas and Lockheed), aiming for greater operating range (transcontinental) and higher performance (Denver airport), had opted for a trijet formula, which led quite naturally to a larger aircraft (over 300 seats). With Boeing devoting its efforts to the 747, the Europeans hoped to avoid, at least initially, direct competition, allowing them to more easily penetrate the market" (Béteille 1995, p. 6).

The A300B's wide-body fuselage, twin-aisle and twin-engine design was commercially innovative (Thomas 2003, p. 5; Mehdorn 2010a).[135] In contrast to the prevalent trijets, the twin-

[134] According to an interviewee, this can be considered a "stroke of luck" for Deutsche Airbus. This governmental funding gradually allowed the Deutsche Airbus consortium to get involved in wing production. As a result, the Bremen site today participates strongly in Airbus' wing production (20110127/CE/4).

[135] The A300B was designed as a single program and was officially launched in 1969 (Muller 1990, p. 29). Even if important launch customers, such as Lufthansa, were gained for the A300B program and the twin-engine design offered a real cost advantage for airlines in times of the first oil price shock, sales were only picking up slowly. The first plane was only handed over to

engine aircraft significantly reduced airlines' operating costs. Apart from the twin-engine innovation, the A300B was, however, technically conceived as a conservative plane (Muller 1989, p. 175; Thornton 1995, p. 159). The program did not incorporate major technological innovations: For fuselage construction, proven solutions were chosen, the position of the cockpit's flight-engineer was maintained and flight controls functioned by control yoke and wire-rope hoist (20110127/CE/4). In order to reduce costs and development times of the new program, the national manufacturers drew upon numerous American subassemblies, among them General Electrics' GE-CF6 engine (Hayward 1986, p. 75; Thornton 1995, p. 79).

5.2.2 The actors

The relevant groups of actors of the first critical juncture were able to exert much influence on the first A300B work-share negotiations. These were: the program's design office, which became Airbus Industrie GIE, Hawker Siddeley Aviation, the Deutsche Airbus consortium and Sud Aviation/Aérospatiale, the latter both strongly supported by their respective national governments. At the time of the A300B configuration, the AI organization had not yet been founded. In 1968, it was little more than a project design office. After the withdrawal of the British government, the French and the German governments appointed their respective manufacturers to establish the basis for their mutual collaboration. After 18 months of negotiations, Deutsche Airbus and Aérospatiale, the successor to Sud Aviation, agreed to found the AI consortium to manage the aircraft program. Accordingly, the work shares of the program were assigned to the French state-owned manufacturer and the Deutsche Airbus consortium.

Despite the withdrawal of the British government, Hawker Siddeley Aviation stayed committed to the Airbus program, and designed and manufactured the wing for the A300B. As co-founder of AI, Hawker Siddeley Aviation remained a privileged subcontractor of the A300B and took part in the program's work-share negotiations (20110127/CE/4). In contrast to the British company, Spanish CASA became a shareholder of AI after work-share allocation had been determined. CASA was assigned a 4.2 share of the A300B program and its work-share

Air France in 1974 (Thomas 2003, p. 5). With the delivery of the last cargo aircraft in 2007, Airbus ceased the production of the A300/310 family in July that year (Lagasse 2010, p. 58). For further details on the A300 program, see for example Hayward (1986, pp. 54ff.); Muller (1989, pp. 176ff.); Thornton (1995, pp. 77ff.); Thomas (2003, pp. 5-6).

allocation was adjusted accordingly. In the end, CASA took over the horizontal tail plane from the German production site in Hamburg and the front cabin door from the French manufacturer (Kracht 1994, p. 68). Since CASA did not participate in the initial work-share negotiations and was assigned components after the overall decisions had already been taken, I do not consider the Spanish manufacturer as a relevant actor of the A300B allocation process, which will now be explained in detail.

5.2.3 The actors' interests, resources and strategies

Applying the third step of the strategic analysis, I now reconstruct the individual interests and resources of actors, and derive their strategies from the analysis of their attitudes, behaviors and choices. I begin by analyzing AI, before moving on to Aérospatiale, Deutsche Airbus and Hawker Siddeley Aviation.

5.2.3.1 Airbus Industrie: Using expert knowledge and mediation for implementing commercial imperatives

By means of their commercial expert knowledge, the program office, and then AI, aimed to build an aircraft that would sell on the world market and thereby ensure the survival of the organization. Initially, the design office was set up to conceptualize the aircraft program and organize its implementation. The first A300 version it presented was first and foremost determined by political imperatives (Thornton 1995, p. 77). Convinced that only an aircraft built in line with strict commercial criteria would stand a chance on the US-dominated world market, the management of the program office used its expert knowledge about airline requirements to secretly study a smaller program version. Under the lead of Roger Béteille and Felix Kracht the team developed the A300B program that filled a market niche the US manufacturers had left open. The A300B "represented a fundamental change in approach in that it stressed cost, commercial, and market factors above other considerations" (Mark Lorell, cited in, Thornton 1995, p. 79). After its presentation in December 1968, the A300B convinced airlines and the governments of France and Germany. The office management could thus insist on its commercially viable design and implement it in the newly founded AI organization. Under the 'Administrateur Gérant' Henri Ziegler, Roger Béteille became responsible for managing the A300

program, technical issues and coordination with the supervisory board.[136] Felix Kracht was charged with the organization of production, work sharing,[137] quality management and procurement (Kracht 1994, p. 70).[138]

The AI management strove to convince the national manufacturers through commercial expertise and acted as mediator between their various interests in order to enforce commercial imperatives (20100319/MS/6).[139] When the redesigned A300B program was accepted and the AI's creation decided by the governments of France and Germany, its new management attempted to introduce commercial imperatives within the organization. In this position, Felix Kracht for example used his expert knowledge to introduce commercial principles in the setting up of the Airbus production and transport system. He proposed a cost-efficient work-share allocation among the national manufacturers. In contrast to Concorde's duplication of tasks, Felix Kracht advocated that work ought to be divided among the national manufacturers and that the national governments were to be kept out of the programs work-share decisions (20110127/CE/4). On the basis of an internal peer-review procedure, the national manufacturers were to compete for the allocation of work shares. After a joint evaluation of the manufacturers' existing competencies, Felix Kracht proposed the work-share allocation of the program. Thereby Felix Kracht and the AI management often acted as a counterbalance to the different interests of national manufacturers (20100319/MS/6):

> "This attitude, which once again subordinated national interests to the common, higher goal, resulted in them consciously and repeatedly putting their own future at risk. They had the ability to analyze each problem that arose from the perspective of all parties involved, be they partners or customers, and search for a solution that was neither

136 Please note that Administrateur Gérant translates as managing director.

137 As one of AI's vice-presidents, Felix Kracht was responsible for Airbus' work-share allocation from 1969 to 1981 (Thomas 2003, p. 3).

138 Next to Roger Béteille and Felix Kracht, Hugo F. Krambeck and Didier Godeschodt were responsible for finance and administration as well as for sales and after-sales service in the first AI management (Kracht 1994, p. 70).

139 With the term commercial imperatives, I refer to an underlying functional logic that Pierre Muller termed 'market referential'. It implies that the actors involved consider market needs as key for the design of aircraft programs. Accordingly, an aircraft had to be first and foremost "conceived as a function of market demand, and not of the requirements of either state or engineer" (Muller 1990, p. 30).

> detrimental to the task at hand nor to the interests of the partners, but feasible and acceptable to everybody" (Kracht 1994, p. 8, translated by the author).

Realizing that only an aircraft built in line with strict commercial criteria would stand a chance on the US-dominated world market, the AI management strove to balance national vanities and to push cost saving and specialization among the national manufacturers.

5.2.3.2 Aérospatiale: Retaining technological leadership through expert knowledge and governmental support

With the aim of ensuring its technological leadership, Aérospatiale provided the Airbus collaboration with expert knowledge and continuous governmental support. After the Second World War, the French aerospace industry initially remained fragmented in various different companies. In 1965, for example, the development of fighter jets was assumed by Dassault and Bréguet. Nord Aviation built engines as well as military transport aircraft and Sud Aviation was specialized in the production of helicopters and the civil aircraft programs (Carlier and Sciacco 2001, p. 21). Due to the wide range in aircraft and engine production (Schmitz 1990, p. 552), the French industry became one of the leading European aerospace manufacturers (Schmidt 1997, p. 124). Nord Aviation was, for example, engaged in engine and the HBN-100 development while Sud Aviation was collaborating with Dassault and the British Aircraft Corporation on the civil Caravelle program (Kracht 1994, p. 50; Frigant et al. 2006, p. 39). In addition, French engineers occupied leading positions in the supersonic Concorde program. As a result, they were "probably the best system engineers of that time" (Roeder 2011, translated by the author).

After the government-induced merger of SEREB, Nord and Sud Aviation, Aérospatiale's activities covered all sectors of aerospace (Carlier and Sciacco 2001, pp. 30ff.). However, these many activities were costly and Aérospatiale's remaining financial resources were almost entirely tied up in the development of the Concorde program (Kracht 1994, p. 50). In order to reduce risks and share development costs, collaborative projects were thus intended by the industry and promoted by the French government.[140] Considered as a key industry for national independence (Schmitz 1990, p. 552), "the technocratic French elite planned to use cooperation as a means for

[140] Moreover, collaborative projects between different national manufacturers and governments increased the number of potential flag carrier or airline customers and expanded the market size of the Airbus project (20100507/CE/2).

strengthening the position of the nation's aerospace industry relative not only to its superpower rival but to its European collaborators as well" (Thornton 1995, p. 80).

Convinced of their technological superiority, Aérospatiale insisted on retaining the lead on the program's sophisticated subassemblies and systems. In 1969, when the German Airbus consortium and Aérospatiale negotiated the formula for their mutual collaboration, all parties involved were well aware of Aérospatiale's expertise and experience (20100322/CEO/4). Accordingly, Aérospatiale claimed responsibility for major technological domains, including flight testing. However, Deutsche Airbus wanted to see this function, where all important insights of research and development accrue, in the hands of the common organization (Muller 1989, p. 74). Negotiations on the assignment of flight testing serve as a good example for illustrating Aérsopatiale's attitudes at that time (Muller 1989, pp. 74-75).

Being used to asserting their leading role in collaborative programs, French engineers had difficulties in ceding responsibilities for this prestigious and sophisticated task. Leaving flight testing in the hands of the Airbus organization was considered as abandoning one of the main French competencies. This was all the more disruptive for the French given that Aérospatiale had always perceived Deutsche Airbus as a junior partner in virtually all technological matters (20100322/CEO/4). However, since the German consortium fiercely advocated joint implementation, Aérospatiale ultimately agreed to place flight testing under the joint authority of the mutual organization. Thus, at the end of the process, Aérospatiale agreed to abandon its dominant role and to formally acknowledge the equal footing of the German consortium. It remained to be seen if Aérospatiale was also willing to make concessions during the work-share negotiations, where its expert knowledge provided it with a key resource.

5.2.3.3 Deutsche Airbus: Paying to get in the game as an equal partner

Backed by the German government, Deutsche Airbus intended to regain technological expertise through a formally equal partnership with French Aérospatiale. At the times of AI's creation, the German aerospace industry was in a technologically weaker position compared to the French sector (20110331/IE/9). After the Second World War, the German industry had not only lost many of its production facilities, but also much of its manpower because of the post-war

production ban (Ecorys 2009, p. 111).[141] In order to regain technical competencies through participating in the Airbus project, the German industry pooled its resources in the Deutsche Airbus consortium. In 1967, it comprised all of the major German aerospace companies of that time, for example MBB and VFW, some of whom had already regained important competencies in fuselage design through the Transall program (20100503/CE/1; 20110127/CE/4). However, despite their Airbus-specific collaboration, the individual companies remained small in overall size and rivalries among them continued to be fierce (Kirchner 1998, p. 275; Mehdorn 2010a). When the German government decided to fill the financial gap caused by the British withdrawal, the Deutsche Airbus consortium was given a "unique opportunity to regain a foothold in the market for civil aircraft" (Muller 1989, p. 70, translated by the author).

Due to the provision of governmental funding, Deutsche Airbus' work share increased by 50 percent and the consortium was officially put on an equal footing with French Aérospatiale. "However, in terms of experience and expertise, the Germans were clearly the junior to the French" (Hayward 1986, p. 64). Well aware of Aérospatiale's technological advantage (20110127/CE/4), Deutsche Airbus wanted to ensure that governmental funding placed them in an equal position to Aérospatiale and was in this claim supported by the German government. Despite the absence of a political consensus on aerospace and constantly recurring differences in the Cabinet, a number of politicians, such as Franz Josef Strauß, strongly supported the German participation (Kirchner 1998, p. 279; 20100503/CE/1)[142] with the aim of regaining technological expertise and furthering European reconciliation after the Second World War (Muller 1989, p. 230; Thornton 1995, p. 81). In order to allow Deutsche Airbus to fulfill its

141 Suspended in 1955, the post-war production ban obliged many German aerospace engineers to either switch to other national industry sectors or to work in other European countries. Felix Kracht was, for example, employed at Nord Aviation for the Transall project (Thornton 1995, p. 77).

142 In addition to the particular important Franz Josef Strauß, Kurt Schmücker, economics minister from 1963 to 1966 and his successor Karl Schiller, economics minister from 1966 to 1972, have for example strongly supported the German involvement in the Airbus program (Roeder 2011). Moreover, Klaus von Dohnanyi and Helmut Schmidt were both strong advocates in favor of the German Airbus participation (Mehdorn 2010c).

obligations, the German government also agreed to co-finance wing development at Hawker Siddeley Aviation (Muller 1989, p. 71).[143]

In order to ensure a partnership amongst equals, Deutsche Airbus' strategy was to avoid French dominance in the Airbus program by all means possible. Acknowledging Aérospatiale's technological leadership, the German consortium wanted to make sure that program's responsibilities were equally split (20100324/IE/5). Their insistence on the fact that the Airbus organization was not dominated by the French partner exemplifies this aim (Muller 1989, p. 72). In order to reach an agreement on the formula for their mutual collaboration, Deutsche Airbus and Aérospatiale thus negotiated for 18 months. In contrast to Aérospatiale, who "wanted no more than a skeletal oversight body", Deutsche Airbus "saw a strong organ as the only means to protect their influence in the program" (Thornton 1995, p. 81). Accordingly, Deutsche Airbus claimed that AI was to become the sole interface with airlines and charged with the technological and industrial coordination of the project as well as flight testing (Muller 1989, pp. 73-74). Moreover, they demanded equality in all major areas, such as strategy and staffing.[144] Their claims were supported by the German government's majoritarian assumption of Hawker Siddeley's wing development cost. This move kept the British company in the Airbus project and "provided an important counterweight to a possible (or likely) French dominance of the program" (Thornton 1995, p. 81).

5.2.3.4 Hawker Siddeley Aviation: Staying in the game by contributing expertise and financial resources

After the withdrawal of the British government, Hawker Siddeley Aviation[145] mobilized their own financial resources in order to remain a key risk-sharing partner within the Airbus project.

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143 As far as we know today, the German government assumed 60 percent of Hawker Siddeley's wing-development costs (Kirchner 1998, p. 238).

144 After AI's creation, Aérospatiale and Deutsche Airbus were equally represented in the leading Airbus management or board positions (Kirchner 1998, p. 236). Following Felix Kracht, Jean Roeder, Jürgen Thomas and Hartmut Mehdorn, for example, all assumed key management positions at AI.

145 Hawker Siddeley Aviation was the civil aviation division of the Hawker Siddeley Group. The military division of the Group was called Hawker Siddeley Dynamics. Together with the British Aircraft Corporation and Scottish Aviation, both divisions merged into the British Aerospace in 1977 (Frigant et al. 2006, p. 39).

In 1969, the British government withdrew from the A300 definition phase and left its national manufacturer without public funding and support (20110127/CE/4). Since the German government was willing to fill the gap, financial contributions and work-share allocation were renegotiated between the French and the German governments as well as Sud Aviation and Deutsche Airbus. Both manufacturers attempted to take over as much of the wing development and assembly as possible. Due to a lack of expertise and industrial capacity, it, however, quickly became apparent that the work package could not entirely be relocated. "Convinced of the benefits of the program", the private company was willing to "risk a substantial part of its own funds to stay with the project as subcontractor with participation in risks" (Béteille 1995, p. 7).

Because Hawker Siddeley had greatly profited from a governmentally funded wing-development program in the early 1960s, it was at that time able to develop "the most modern wings in the world" (Jean Roeder, cited in Aris 2002, p. 45). In order to keep this expertise in the Airbus program, Deutsche Airbus decided to subcontract wing development and production to Hawker Siddeley. Since the private company was only capable of shouldering 40 percent of the wing-development costs, the German government agreed to assume the remaining 60 percent (Kirchner 1998, p. 238). As a result, Sir Arnold Hall, the chairman of Hawker Siddeley Aviation, signed the accords to continue the A300B program jointly with the chairmen of Deutsche Airbus and Sud Aviation (Thornton 1995, p. 80). As co-founder, Hawker Siddeley Aviation remained a privileged risk-sharing partner of the A300B and assumed an important role as observer and advisor in the program's work-share negotiations (20110127/CE/4).

In order to stay an important partner of the A300B project, Hawker Siddeley Aviation opted for the cooperative strategy of enhancing the benefits of all parties involved. With the mobilization of their own financial resources, the private company took a substantial risk (20110127/CE/4). Since it "also showed that a large industrial group judged the project sufficiently well directed and promising to invest heavily in it", Hawker Siddeley's resolution enhanced the program's credibility on the market (Béteille 1995, p. 7). In addition to financial contributions, the company agreed to share its knowledge in wing production with other partners. As a result, the company's continuing participation was beneficial to all of the parties involved and particularly beneficial to the German industry[146] (20110127/CE/4). It allowed all

[146] With regard to the Deutsche Airbus consortium, it profited from the British government's withdrawal. In order to reduce Hawker Siddeley's share of the overall A300B costs as far as

parties to keep indispensable "experience, work force, and industrial possibilities" within the project (Béteille 1995, p. 7).

5.2.4 A first cooperative game: Work-share allocation build on past experiences

Predetermined by initial decisions on the A300 allocation, the A300B's work-sharing negotiation centered on commercial imperatives, technological expertise and a formal balance of the manufacturers' industrial contributions. For the A300 design, French and British administrations had determined their national manufacturers Sud Aviation and Hawker Siddeley Aviation for developing the cockpit with related systems and wings, respectively. At that time both manufacturers had acquired profound experience through work on the Caravelle, the Comet and the Concorde and were producing work packages in state-of-the-art technology (20100322/CEO/4; Roeder 2011). The withdrawal of the British government altered the actors involved in the program's work-share negotiations. After having promoted commercial imperatives in program design, Felix Kracht and his team advocated a cost-efficient work-share solution for the A300B. In contrast to Concorde's duplication of tasks, the program's work was to be divided among the national manufacturers on the basis of their expertise. Convincing all parties involved to exclude national governments from the A300B's work-share decisions, Felix Kracht for AI suggested a work-share distribution on the basis of the previous A300 allocation. Although Hawker Siddeley Aviation was sitting at the bargaining table as privileged risk-sharing partner, the A300B work-share negotiations proceeded primarily between Sud Aviation and Deutsche Airbus. During the process, the French company benefited greatly from the technological superiority of its national aircraft industry. Unlike the West German industry, which remained scattered and small in overall size following years of post-war prohibition and emigration of qualified personnel, French engineers were leading the design of the Caravelle and the supersonic Concorde (20100322/CEO/4). Naturally they also claimed program leadership for the Airbus program. Even if Deutsche Airbus did not contest Sud Aviation's leading

possible, components, such as flaps and rudders, were assigned to other manufacturers and consequently moved to German and Dutch production sites. As a result, Deutsche Airbus gradually became involved in wing production (Roeder 2011). In addition, because Deutsche Airbus was particularly attentive to maintaining a Franco-German balance, Hawker Siddeley's participation "provided an important counterweight to a possible (or likely) French dominance of the program", first and foremost during the work-share negotiations (Thornton 1995, p. 81).

technological role, the German consortium insisted on a 'fair-return' principle and a formal balance in the manufacturer's industrial contributions (Muller 1989, p. 72; Hayward 1986, p. 64).

The interaction between the individual strategies revealed that the actors played a cooperative game. The first step of the work-sharing negotiations ('configuration phase') involved the chief engineers of the national manufacturers that jointly specified the A300B's configuration. Presided over by the AI program manager, the engineering teams of the national manufacturers submitted proposals for the program's subassemblies. After critical peer-review evaluations in which AI's management had advocated commercially viable solutions, the chief engineers selected the most feasible and proven technological solutions. In the following second step of the work-sharing negotiations ('allocation phase')[147], the chief engineers divided the total amount of work into large manageable subassemblies and discussed their allocation. With the aim of building a cost-efficient aircraft program that met market requirements, the AI team argued in favor of an allocation built on past experiences. However, in consideration of the manufacturers' dissimilar starting positions, such an allocation rendered an equal distribution of technologically sophisticated work shares among the national manufacturers impossible (20110127/CE/4). Aérospatiale, sure of its technological superiority, supported this claim since it allowed the French company to retain the lead on the program's sophisticated subassemblies and systems (20100322/CEO/4). Conscious of its weaker position in terms of experience and expertise, Deutsche Airbus acknowledged the French technological leadership and its "junior role" (Der Spiegel 1972, p. 74, translated by the author).

In order to learn from knowledge transfers, the Deutsche Airbus consortium supported the allocation on the basis of competition among the national manufacturers. For avoiding Aérospatiale's technological dominance from the start, Deutsche Airbus, however, insisted on an equal allocation of quantitative work share[148] in terms of production costs. Given the German government's financial contribution to wing development at Hawker Siddeley Aviation,

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147 The analytical division of the work-share negotiations into the 'configuration phase' and the 'allocation phase' is taken from Mehdorn (2010b). For more information, see section 4.3.2.3.

148 I remind the reader that the term work share has a quantitative and a qualitative dimension. The quantitative dimension refers to the percentage of the overall production costs that is assumed by a national manufacturer. The qualitative dimension of work share describes the actual production, such as subassemblies and systems, produced by the national manufacturers. For the detailed definition, please see section 1.2.

Aérospatiale accepted being put on an equal footing with Deutsche Airbus, which each holding 36.5 percent of the program's quantitative work share respectively. In terms of the qualitative work share, i.e., the actual production in terms of subassemblies and systems assumed by the national manufacturers, an allocation on the basis of past experiences was agreed (20110127/CE/4). As a result, nearly all the high-tech work packages and overall system integration fell within the responsibility of Aérospatiale (Muller 1989, p. 72; 20100503/CE/1), while the German involvement concentrated on the development and the production of fuselage sections and cabin components (BMWi 2009, p. 9). Yet, the results reveal that both Aérospatiale and Deutsche Airbus made concessions during their cooperative work-sharing game.

At the end of the work-sharing negotiations, "Airbus ne sera pas un avion français"[149] in both the quantitative and the qualitative dimension of work share (Muller 1989, p. 72). In terms of the overall program costs, the quantitative work share was equally divided among the German and the French manufacturers, with Aérospatiale and Deutsche Airbus both accounting for 36.5 percent, Hawker Siddeley Aviation 20 percent and Fokker-VFW 7 percent of production costs (Flight International 1997). After Spanish CASA joined the Airbus venture in 1972, German MBB ceded 4.2 percent of its quantitative work share to the Spanish national manufacturer (Flight International 2006). As a result, the German share of production costs was reduced to 32.3 percent.

This quantitative dimension corresponded to a qualitative work-share allocation that respected the technological expertise of the manufacturers. As depicted in Figure 13, Hawker Siddeley Aviation was conferred responsibility for the wing. After the withdrawal of the British government, the wing box and the inner equipment remained within the responsibility of the British company whereas the production of all outer wing-parts such as flaps, ailerons and airbrakes, were assigned to Deutsche Airbus (Kracht 1994, p. 60).[150] In addition, the German consortium provided front and rear fuselage sections, the vertical and the horizontal tail and cabin interior furnishing (Kracht 1994, p. 58). With CASA joining the Airbus consortium, Deutsche Airbus (MBB) transferred responsibility for the horizontal tail and the first passenger

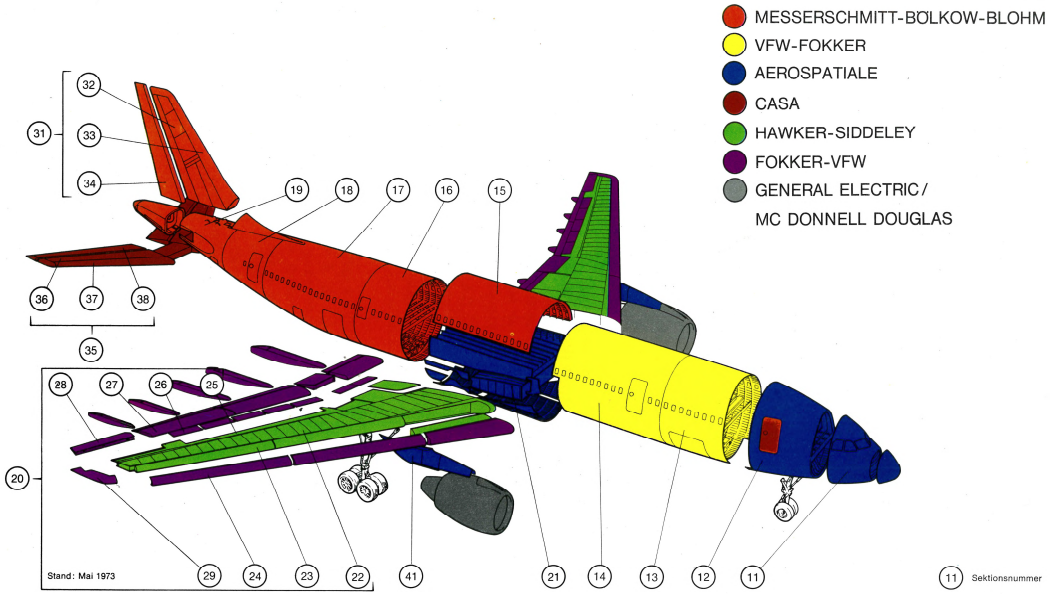
149 Please note that Muller's quote translates as „Airbus did not become a French aircraft".

150 Fokker that had become an associated partner of AI in 1971 supplied the moveable wing components in a joint-venture project with German VFW (Deutsche Airbus GmbH 1972, pp. 7-8).

door to the Spanish state-owned company. Due to its technological experience gained with Caravelle and Concorde, Aérospatiale was assigned the front fuselage section of the cockpit and the lower central fuselage section with the main plane structure of the center wing box.[151] Moreover, overall system leadership and final assembly were assigned to the French manufacturer. Since airspace and weather conditions for flight testing were good in Toulouse, the decision to locate final assembly at the Aérospatiale site had already been taken at the very beginning of the program (Kracht 1994, p. 58). As a result, nearly all crucial technological work packages, such as flight control, were Aérospatiale responsibility. However, German companies also obtained technological sophisticated work packages (Roeder 2011). After cockpit and wing, fuselage conception was, for example, considered as an essential work package at that time. Thus, the contributions of Deutsche Airbus were also indispensable for the success of the A300B program (20110127/CE/4).

[151] In addition to the expertise gained at Aérospatiale, the Caravelle and Concorde have promoted the development of a sophisticated supplier industry in Toulouse (Jalabert and Zuliani 2009, p. 35). This stands in sharp contrast to Germany, where the supplier industry was virtually absent after the Second World War and only gradually rebuilt due to military contracts (20110331/IE/9).

Figure 13 **Work-package allocation of the A300B**
(Source: Deutsche Airbus GmbH 1972, p. 7-8)[152] [153]



5.2.5 The rules of the first game: In-house competition and a juste-retour logic

In their first cooperative work-sharing game, the actors applied an 'in-house competition'[154] procedure and a 'juste-retour'[155] rule. During the configuration process, the national manufacturers presented their technological solutions for individual subassemblies and systems. In the following in-house competition, they then jointly decided on the work-share allocation on the basis of existing competencies. In order to employ the specialized expertise of the national

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152 Please note that the numbers in Figure 13 refer to the section numbers the Airbus partners employed for the A300B program. Because they are not explicitly named in Deutsche Airbus' company report, they cannot be described here in detail either.

153 Please also note that Messerschmit-Bölkow-Blohm and VFW-Fokker were members of the Deutsche Airbus. For a detailed description of the Deutsche Airbus, please refer to section 4.3.1.2.

154 Here and in the following text in-house competition is understood as a procedure in which the national manufacturers compete against each other for the allocation of work shares.

155 Juste-retour logic is defined as an approximate balance between an aircraft program's work-share allocation and the amount of AI / AIC capital shares held by the national manufacturers or national shareholders.

manufacturers for the A300B, an allocation on the grounds of the manufacturers' competencies was approved by all parties involved. Actors possessing expert knowledge and specialized engineering know-how thus controlled relevant zones of uncertainty and were able to use their resource for their own benefit. As a result, AI's management successfully integrated commercial imperatives into the in-house competition through their expert knowledge of market needs and airline requirements. In addition, technological expert knowledge explained Aérospatiale's leading position in high-tech work packages and overall system integration as well as Hawker Siddeley Aviation's lead in wing development and production.

> "The work-share allocation was the best possible solution one could think of and it put no manufacturer at a disadvantage. Every other allocation would have been unrealistic. The tasks had to be fulfilled by the manufacturers with the best qualifications" (Roeder 2011, translated by the author).

In order to compensate for its technological handicap, Deutsche Airbus mobilized its resources related to Airbus' relevant environment and demanded that the German government co-financed wing development at Hawker Siddeley Aviation. Since both Aérospatiale and Hawker Siddeley Aviation were lacking financial resources, they strengthened Deutsche Airbus' position. Through these financial contributions, the German consortium ensured that the A300B's quantitative work shares were balanced between the French and the German manufacturers and claimed work packages in their approximate amount. In this way, Deutsche Airbus introduced a juste-retour rule between the amount of AI's capital shares held by the national manufacturers and a program's work-share allocation. Although the German consortium and the German government had to pay at first to get into the game as an equal partner, the juste-retour logic, that also guaranteed a Franco-German balance, became one of the main rules for all future work-sharing negotiations.

5.2.6 Summary: Setting the basis for stability and change

By analyzing the first critical juncture with the help of Crozier and Friedberg's strategic analysis, the objective of this subsection was to highlight the influential role of actors in the work-share negotiations. The findings indicate that AI, Aérospatiale, Deutsche Airbus and Hawker Siddeley Aviation played a cooperative game, in which they mobilized all resources available to them in order to influence the A300B's allocation in their favor. While negotiating, they decided that the A300B's work-share allocation would be built on past experiences. Moreover, these groups of

actors established a competitive in-house procedure and a juste-retour logic as rules for their forthcoming interaction. The results of this first work-share negotiation (Table 7) are critical because they provide the basis for all of the subsequent work-share allocations.

Table 7 **The national manufacturers' A300B work packages**
(Sources: Deutsche Airbus GmbH 1971, p. 6; Kracht 1994, p. 58; Thomas 1999, p. 2)

National manufacturers	*Work packages*
Aérospatiale (France)	Cockpit up to first passenger door, center wing box, pylons, final assembly
Deutsche Airbus (Germany)	Front fuselage sections (VFW-Fokker), wing equipment (VFW-Fokker), upper middle and rear fuselage sections, vertical tail (MBB), cabin interior
Hawker Siddeley Aviation (United Kingdom)	Wings
CASA (Spain)	Horizontal tail, front passenger door

5.3 The second critical juncture: The A320 work-sharing negotiations

5.3.1 Introduction: Penetrating the single-aisle market with new, groundbreaking technologies at the lowest possible costs

After entering a neglected market segment with the A300B, the AI members debated the design of the next aircraft program, the A310. While Aérospatiale favored a new, single-aisle program, Deutsche Airbus advocated developing a smaller derivative of the A300B. On the basis of market prospects and demands of Lufthansa and Swissair, the German "conservative strategy" achieved acceptance of all parties involved (Thornton 1995, p. 101). Built on the A300B's design, the A310 was thus conceived as a wide-body, twin-engine aircraft for the transportation of about 200 passengers (Deutsche Airbus GmbH 1978, p. 9). After Lufthansa and Swissair had placed firm orders, the program was officially launched in July, 1978 (Thomas 1999, p. 5).

From a technological point of view, the A310 introduced important innovations (Roeder 2011). For example, the program presented a completely "new transonic wing, the first CRT cockpit displays with a unique electronic centralized aircraft monitor […], the electronical signaled slat/flap control system, which marked the first step into fly-by-wire, and the wide use of carbon-fiber structure" (Stüssel 2003, p. 5). As a result, the A310 "entailed a technology leap of nearly ten years" (Roeder 2011, translated by the author) and marked the start of Airbus' continuous innovation strategy.[156]

Allocation of overall costs and work packages hardly changed among the national manufacturers for the A310 production (Roeder 2011). In comparison to the A300B, Aérospatiale again produced the cockpit up to the first passenger door, center wing box, pylons and assumed final assembly. Deutsche Airbus provided fuselage sections, wing equipment, the vertical tail and cabin interior. The transonic wing was developed by the British industry, and CASA delivered the horizontal tail and the front passenger door.

Although a derivative of the A300B, the A310 can be considered as an "exceptionally important" program because it constituted the first step towards a family of aircraft (Roeder 2011, translated by the author). The A310 signaled to the industry that Airbus was no longer a one-product company but that it was set to expand and to create a complete range of airliners (Thomas 1999, p. 5). In view of these long-term objectives, the British government rejoined the Memorandum of Understanding and British Aerospace became a full member of the AI consortium (Thornton 1995, p. 163).

After introducing the A300B and the A310, discussions within AI centered on the configuration of Airbus' next project, the A320 (Muller 1989, p. 182). Presided over by the designated AI program manager, the chief engineers of the national manufacturers debated possible program configurations yet disagreed on the market segment the new aircraft was meant to target (Hayward 1986, p. 58). Deutsche Airbus wanted to challenge Boeing's 747-monopoly and advocated entering the long-haul segment with a wide-body, four-engined program (Thornton 1995, p. 163). In opposition to the German position, Aérospatiale argued in favor of a medium-haul, single-aisle design. After conducting market studies and evaluating sales

[156] The A310's technological developments were also used to remanufacture the A300 and the A300-600 derivative (Roeder 2011). Due to the long life cycle of aircraft, the progress achieved in developing a new program is constantly integrated into older models.

potentials (20110128/CE/5), AI's management also approved the single-aisle, 150-seat aircraft. Since demand for such a design was predicted to be huge, the manufacturers decided to implement the A320 program in June, 1981 (Hayward 1986, p. 58; Béteille 1995, p. 11).[157]

However, in contrast to the French government, neither the British nor the German government were willing to grant launch aid in the absence of orders (Thornton 1995, p. 115). Despite strong commercial concerns, the French government strongly supported the A320 and pressed their partners to give the project the financial and industrial go-ahead (Hayward 1986, pp. 59-61). For "diplomatic reasons" of Franco-German cooperation, the German government agreed to finance 90 percent of Deutsche Airbus' share in 1984 (Hayward 1986, p. 62). With the British government committing itself shortly afterwards, AI officially launched the A320 program on March 14, 1984 (Thomas 1999, p. 6). Continuing to develop the A310's technological improvements, the A320 implemented various innovations, most notably in the cockpit and the flight management system (20110127/CE/4). With electronic flight control systems (fly-by-wire) and full digitalized cockpit indications, the A320 constituted "a major technological leap" (Thornton 1995, p. 163). As challenger, Airbus planned to increase its credibility with technological innovations and firmly integrated them into its strategy for conquering the market (Muller 1989, p. 175).[158]

5.3.2 The actors

The relevant groups of actors for the A320's work-sharing negotiations were AI, Aérospatiale, Deutsche Airbus and the newly created British Aerospace. In addition to AI and its founding members, the British industry was now at the bargaining table with equal voting rights. Having

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157 From the outset, the A320 program was designed for establishing a family of aircraft (Thomas 1999, p. 10). Consisting of the A318, the A319, the A320 and the A321 programs, the A320 family now covers the whole single-aisle market spectrum. With over 8000 orders up to 2010, this family is the company's cash cow and its bread and butter business (Frankfurter Allgemeine Zeitung 2010, p. 16).

158 In the early 1980s, Boeing and MDD presented the 737-300 and the MD-80, both derivatives of existing aircraft, for the single-aisle market segment (Neven and Seabright 1995, p. 324). With Airbus differentiating its products technologically, the European consortium forced the American manufacturers to adopt a faster rhythm of innovation (Muller 1989, p. 174) and "gradually took the technological initiative from the established market leaders" (Thornton 1995, p. 165).

acquired Hawker Siddeley Aviation and its Airbus participation, British Aerospace became a full member of the Airbus consortium in January 1979 (Thornton 1995, p. 103). With this accession, the Airbus consortium united the three major European aircraft manufacturers (Thomas 1999, p. 5). As a result, AI's ownership structure had to be adapted. Accordingly, the 20 percent shareholding of the nationalized British company reduced the shares of Aérospatiale and Deutsche Airbus by 10 percent respectively. With both now holding 37.9 percent, the Franco-German balance was maintained and CASA's share remained at 4.2 percent. With AI's new ownership structure and the completely new program, there was much room for maneuver for the national manufacturers while bargaining for the work-share allocation. Due to this persistently small share, the Spanish manufacturer is not considered as a relevant actor in the A320's work-sharing allocation process.

5.3.3 The actors' interests, resources and strategies

5.3.3.1 Airbus Industrie: Promoting specialization through alliance formation and commercial arguments

With the aim of promoting commercial imperatives, AI used its expert knowledge and customer contacts to further specialization among the national manufacturers. AI had gained credibility on the market, following Eastern Airlines' purchase of several A300B in 1977 (Thornton 1995, p. 100). Striving to strengthen this credibility, AI's management pressed for introducing a next aircraft program as fast as possible. After having evaluated the market situation, AI's management decided to follow the German proposition and to configure the new program as a derivative of the existing A300B. With the launch of the A310 program one year later, AI was not only able to achieve its intention of expanding the product range of Airbus, but also to ensure the development of a family of aircraft. Through the expansion of the company's one-product portfolio, AI was thus able to ensure its long-term survival. Strengthened by the British return, AI attempted to promote commercial imperatives in the A320's design and work-share allocation (20100319/MS/6). In design, AI opted for a program configuration that promised the best sales perspectives. Following numerous talks with airlines and evaluations of potential sales, AI's management supported Aérospatiale's single-aisle A320 project. Arguing that the market demanded a medium-haul program, AI formed a coalition with Aérospatiale for the A320 program (Muller 1989, p. 128).

Since the A320 was designed to introduce technological innovations that entailed huge investments for all parties involved, AI advocated maintaining the A300B/A310's established work-sharing allocation. In order to save costs and benefit from existing experiences, AI thus favored an allocation based on the manufacturers' specializations (Hayward 1986, p. 74). Therefore, AI's management formed coalitions and appealed to the manufacturers' shareholder interests. AI and Aérospatiale had pursued similar interests since the early program configuration phase. With the aim of building a commercially viable plane, AI favored the French A320 project whose sales prospects were predicted to be huge. In line with Aérospatiale, AI's management was also opposed changing the established work-sharing allocation (20100319/MS/6). Arguing that only the development of specialized facilities and talents would maximize learning and facilitate savings, AI attempted to push specialization among the national manufacturers (Hayward 1986, p. 74). By emphasizing cost-reduction, AI appealed to the national manufacturers' capacity as shareholders within the Airbus consortium. As shareholders, the national manufacturers were interested in keeping costs down. Their shareholder function thus encouraged them to maintain the established allocation and promote specialization within the consortium.

5.3.3.2 Aérospatiale: Creating 'faits accomplis' to maintain the previous work-share allocation

Aérospatiale planned to use its expert knowledge to sustain the previous way of work-share allocation. After the implementation of the A300B/A310 programs, Aérospatiale was in a position of strength within the Airbus consortium. The French manufacturer assumed final assembly and the lead on numerous sophisticated subassemblies and systems for both programs. Furthermore, Aérospatiale introduced crucial cockpit innovations to the A320 program (20100322/CEO/4). Contributing key technological areas to the Airbus programs, Aérospatiale's know-how was highly valued by all parties involved (20100507/CE/2).

In addition to its expertise, the French 'national champion' mobilized the French governments' continuous support, which was so important to the Airbus venture (20100319/MS/6). The Mitterrand administration, similarly to all previous French governments, considered civil aerospace a special sector and particularly promoted the A320's implementation (Hayward 1986, pp. 59-61). Predisposed to interventionist policies in general, the socialist government was the first to grant funding to its national manufacturer and pressured its German

and British partners to do the same. Moreover, the national flag carrier Air France committed itself to becoming the program's first customer and President Mitterrand its "chief salesman" (Aris 2002, p. 124). In order to also prevent any kind of change in equipment contracting, the French government supported Aérospatiale with all possible means in retaining its leading position in Airbus' first single-aisle program. Backed by this support, Aérospatiale was not willing to accept changes in the program's work-share allocation (Hayward 1986, p. 74; Kirchner 1998, p. 240).

By creating realities and emphasizing its technological contributions to the program, Aérospatiale strove to maintain the established work-sharing allocation. Since the lion share of the A320's innovations was to be introduced in the cockpit, Aérospatiale's work package, the French manufacturer was opposed to any change in the work-sharing allocation. Appealing to the manufacturers' shareholder interests, the state-owned company stressed the benefit of its innovations for the program as a whole. Due to its high investments and acquired know-how, Aérospatiale openly insisted on keeping the program's lead on final assembly and on sophisticated subassemblies and systems (Kirchner 1998, p. 240). In order to further this goal, Aérospatiale had been conducting configuration studies since the early 1980s and started pressing ahead with important program tasks at an early stage of the design process (20100820/CEO/5). Striving to reinforce its position in the development process, Aérospatiale aimed at ruling out the idea of implementing the A320's final assembly in Britain or Germany from the very beginning (Muller 1989, p. 127). In addition, Aérospatiale pressed ahead by creating the industrial conditions and the production halls for the A320's final assembly at its Toulouse plant (Der Spiegel 1989, p. 141). Through establishing 'faits accomplis', the French company thus attempted to keep the A320 as French as possible and foster its technological leadership within the Airbus consortium.

5.3.3.3 Deutsche Airbus: Becoming an equal partner by changing the work-share allocation

Altering governmental support hindered Deutsche Airbus in its intention to modify the work-share allocation. Uncertain governmental commitment put Deutsche Airbus in a weak starting position in the A320's work-sharing negotiations. Political support for the Airbus project had declined strongly when AI's sales stagnated after the first oil price shock (20100319/MS/6). Since the mid-1970s, the social-liberal governments were divided over the German participation in the Airbus venture and recurrently debated the amount of public funding at the cabinet table

(20101130/CS/6). When AI's sales were picking up again, the Federal Government urged Deutsche Airbus to reduce the A310's development and production costs (Frankfurter Allgemeine Zeitung 1978, p. 11). For subsequent programs, the Schmidt government decreased the level of public funding and conditioned the granting of launch aid to commercial viability (Süddeutsche Zeitung 1982, p. 25). The German government had strong commercial concerns regarding the A320 program and was not willing to give the financial go-ahead in the absence of firm orders (Müller 1981, p. 9).

The new Kohl government was also divided on the Airbus issue. Since Deutsche Airbus had not repaid loans for the A300B/A310, the first Coordinator of Aerospace Policy, Martin Grüner, was, for example, reluctant to support the A320 single-aisle, a program whose commercial success he questioned openly (Aris 2002, p. 124). Supporters, such as the Prime Minister of Bavaria, Franz-Josef Strauß, however "publically argued that the A320 was crucial to the future of AI and thus also to the fate of the German aerospace industry" (Thornton 1995, p. 118). In order to preserve the jobs and advance the Franco-German cooperation, the Kohl government agreed to finance the Deutsche Airbus share in 1984 (Hayward 1986, p. 62).

As a consequence of the governments varying support, Deutsche Airbus was at first only able to claim 15 percent of the overall program costs and its work packages. Over the course of the work-sharing negotiations, the government changed its position and wanted to grant amounts of funding that allowed Deutsche Airbus to strive for 40 percent of work share (Hayward 1986, p. 74). In the end, these developments prevented Deutsche Airbus from pursuing a straightforward strategy for modifying the established work-share allocation. Attempting to convince its partners with cost arguments, Deutsche Airbus strove to acquire technologically sophisticated work packages and to become a competent, irreplaceable Airbus member.

Starting with the A320 program, Deutsche Airbus desired changes in the work-share allocation (Kirchner 1998, p. 239). With the aim of becoming a technologically equal partner to Aérospatiale and British Aerospace in the long term, Deutsche Airbus aspired to develop and produce work packages additional to current fuselage sections and cabin interior (20100312/CEO/3). In this way, the German consortium wanted to gain competencies in both the development and the production of technologically sophisticated work packages and thereby strengthen its position within the Airbus venture (20100820/CEO/5). Thus, Deutsche Airbus intended to convince the other manufacturers to alternate competencies, such as final assembly,

among themselves. By bringing forward the argument that transporting subassemblies all over Europe was inefficient and that final assembly would be more profitable when based in Hamburg, Deutsche Airbus strove to appeal to the manufacturers' shareholder interest of cost-effectiveness (Der Spiegel 1989, p. 140).

5.3.3.4 British Aerospace: From rotation to the preservation of work shares: Pursuing changing objectives by contributing expertise and own financial resources

With the A310 program, both the British government and the industry had returned to the Airbus venture. Now that it was back in the game, British Aerospace strongly supported the A320 program because "its own civil aircraft HS146 program[159] was stalled and the company badly needed the work to fill its empty plants" (Aris 2002, p. 125). In order to keep knowledge and people, British Aerospace strove to gain work packages additional to the wings from the Airbus collaboration. As a result, it was keen on changing the work-share allocation and advocated a rotation of core competencies. Arguing that "it was against the interest of the partners to specialize too narrowly and that the big jobs should be swapped around to give everybody experience of R&D and production" (Aris 2002, p. 123), British Aerospace claimed that the change of competencies would make better use of the expertise of all parties involved (Hayward 1986, p. 73). Thus, it demanded "responsibility for the nose and fuselage, final assembly and flight testing, hitherto French preserves" (Hayward 1986, p. 73). Due to its technological expertise in aircraft development, British Aerospace's arguments were influential at the bargaining table.

However, due to the absence of governmental support, British Aerospace could not pursue its interest in the alternation of core competencies between the national manufacturers. From the start, the Thatcher government was reluctant to back the national industry in general and the aircraft industry in particular. Hesitant to grant funding for development and production of the A320's wings, the British government was opposed to financing an increase of its national manufacturer's participation. With responsibility for cockpit, final assembly and flight testing, the British contribution would have risen to about 35 percent of the overall

[159] Please note that the development of the HS146 was stopped in the early 1970s. The program was, however, revived by British Aerospace under the name BAe 146 in the late 1970s. The BAe 146 "sold reasonably well throughout the 1980s, with more than 200 being delivered before production switched to the revamped version, the Avro RJ" (Flightglobal 2006).

production costs, an amount the British government was not willing to assume (Hayward 1986, p. 74). Given that it had to contribute own financial resources, British Aerospace adopted its strategy and claimed responsibility for its established work packages. In order to reduce costs and profit from gains of specialization, it opted for keeping the wings, its existing core competency within the Airbus consortium.[160]

5.3.4 A highly competitive game: A hard-fought compromise resolved by package deals

During the work-share negotiations, the actors formed two coalitions, one in favor of maintaining the previous allocation, and one in favor of changing it. The allocation of production and R&D activities for the A320 was highly competitive and difficult to resolve. As a result, it took the actors over a year to agree on a broad concept for the work-share allocation and detailed plans had still not been finalized two years after the program's official launch (Hayward 1986, p. 74). When the A310 was launched, there were no problems adopting a similar distribution of work packages as much of its design was common to the A300B (20110127/CE/4). The A320, on the other hand, as a new project requiring a new production line, provided an opportunity to reconsider the mode of work sharing employed to far (Hayward 1986, p. 73). Moreover, by introducing major technological innovations, in, for example, the cockpit and the flight management system, the program became a "technically highly developed" product (Béteille 1985, p. 11). Since these innovations were first and foremost attached to French work packages, both British Aerospace and Deutsche Airbus exerted pressures for a change in the core areas of responsibility among the national manufacturers.

Arguing that Aérospatiale "did not have a divine right to keep all the prestigious work to themselves" (Aris 2002, p. 122), British Aerospace claimed cockpit, front fuselage, flight testing and final assembly, also demanded by Deutsche Airbus. In collaboration with AI, Aérospatiale was naturally opposed to the British-German requests. Rejecting any kind of change,

[160] Drawing upon its expert knowledge and experience, British Aerospace was not only able to enforce its position during the work-share negotiations but also to convince its national government to fund parts of its Airbus' contribution. In addition to governmental launch aid, British Aerospace mobilized internal financial resources and venture capital from the City to generate the required funds (Thornton 1995, p. 118). When the Thatcher government unblocked its funding in March 1984, it requested the incorporation of the V-2500 engine in the A320 program (Muller 1989, p. 131). This engine was produced by a consortium in which Rolls-Royce, a national company the government truly supported, strongly participated.

Aérospatiale insisted that "Toulouse is the natural center of Airbus activity, customers come to Toulouse, and Toulouse is where the production line will be" (Hayward 1986, p. 73). In a coalition with Aérospatiale, AI's management also fiercely objected the alternation of core work shares. For the A320 project, which was completely new, AI did not want to take the risk of rearranging final assembly and losing credibility on the market because of production delays. Moreover, it disapproved of the additional costs and inefficiencies created by installing several operational facilities for the A320 (Hayward 1986, p. 74). Roger Béteille thus argued against "playing musical subassemblies": "We are strongly against people saying 'we have made the wing, now we want to make a fuselage'" (Roger Béteille, cited in Hayward 1986, p. 74).

Competition among the manufacturers had already emerged during the early program-configuration phase. Contrary to Deutsche Airbus who were in favor of a long-haul, wide-body program, Aérospatiale opted for a single-aisle design. On the basis of market studies, AI management convinced the manufacturers of the medium-haul, single-aisle version. Subsequently, the engineering teams of the national manufacturers submitted proposals for the subassemblies. Presided over by the AI program manager who recommended commercially viable solutions, the national chief engineers chose the most feasible and innovative technological subassemblies after critical peer-review evaluations (20100319/MS/6). In the phase that followed, the chief engineers divided the program's total amount of work into large subassemblies and bargained for their allocation.

Forming two coalitions, all parties at first insisted on their position. Requesting a change in core work packages, both British Aerospace and Deutsche Airbus claimed technologically sophisticated French domains and final assembly. Since Aérospatiale was not willing to abandon its leading position, it fiercely opposed such claims by emphasizing the extra costs of moving competencies and final assembly. Responding to Aérospatiale's arguments, Deutsche Airbus also used efficiency concerns to describe the costs of transporting subassemblies all over Europe as too expensive (Der Spiegel 1989, p. 140). As all manufacturers were eager to obtain sophisticated subassemblies and final assembly, negotiations could not proceed, and Aérospatiale started to expand its Toulouse facilities in order to reinforce its claims. However, changes in the British and the German strategy helped AI and Aérospatiale to achieve their aims. Since both British Aerospace and Deutsche Airbus did not receive their governments' backing, the manufacturers were not able to assert their positions. Forced to adopt their goals, British Aerospace and Deutsche Airbus had to give in to AI's and Aérospatiale's claims for an allocation grounded on

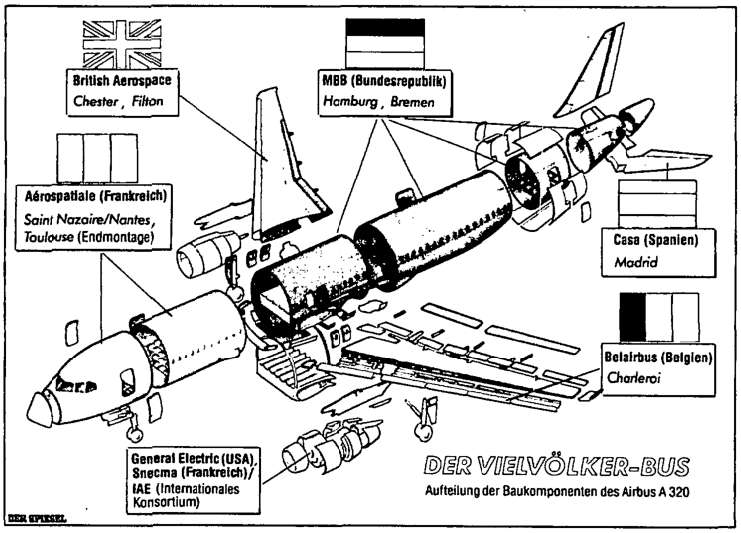
past experiences. AI thus was able to establish the A320's work-share allocation in line with the previous A300B and A310 distribution (Muller 1989, p. 131).

At the end of the negotiations, the A320's work-share allocation for the most part resembled the A300B distribution, yet introduced some minor changes (Hayward 1986, p. 74; Bugos 1993, p. 22). Compared to the former twin-aisle programs, the A320 revealed a slightly different qualitative and quantitative work-share allocation. In terms of the quantitative work share, Aérospatiale held 36 percent, Deutsche Airbus 32 percent, British Aerospace 26 percent and CASA 6 percent of the A320 (Hayward 1986, p. 90). Deutsche Airbus thus contributed a little less to the program's overall costs than Aérospatiale. With the French manufacturer remaining at its previously established amount, both British Aerospace and CASA increased their quantitative work share by 6 and 2 percent, respectively (Muller 1989, p. 131). Since they were skeptical of the A320's commercial success prospects against Boeing's 737, the German government did not assume the amount of funding, equal to the French (20110128/MS/9). As a result, Deutsche Airbus provided a reduced percentage of the program's overall costs and British Aerospace absorbed the remaining German shares (Aris 2002, p. 123). The qualitative work shares were adapted accordingly.

As depicted in Figure 14, Aérospatiale was assigned the cockpit up to the first passenger door and the front fuselage sections. Moreover, the French manufacturer provided the center wing box, the pylons and final assembly. Deutsche Airbus was assigned responsibility for the upper-middle and rear-fuselage sections, the vertical tail and cabin interior (Der Spiegel 1989, p. 140). While CASA remained in charge of the first passenger door and the horizontal tail, British Aerospace was given responsibility for the entire wing (Aris 2002, p. 124). This implied that, in addition to making the wing box, wing equipment was transferred from Bremen to Chester (Aris 2002, p. 123).[161] As a result, the A300B's allocation was modified by a package deal in terms of wing equipment and the front fuselage sections.

[161] The moveable wing parts, previously produced by Fokker-VFW, were now contributed by the associated AI partner Belairbus.

Figure 14 **Work-package allocation of the A320**
(Source: Der Spiegel 1989, p. 140)



5.3.5 The rules of the game: In-house competition and a juste-retour logic

During their highly competitive game, the actors used in-house competition for the allocation of work packages. As with the previous programs, the chief engineers of the national manufacturers discussed their individual solutions and jointly strove to determine the allocation of individual subassemblies and systems. However, British Aerospace and Deutsche Airbus challenged an allocation on the basis of existing competencies, in which actors possessing expert knowledge controlled relevant zones of uncertainty and were thus able to use resources for their own benefit. Since Aérospatiale was not willing to cede its leading position, bargaining was fierce. However, British Aerospace and Deutsche Airbus were forced to adapt their interests and strategies. Due to the absence of political backing, they again accepted an allocation on the grounds of expert knowledge and specialized engineering know-how.

In addition to the significance of expert-knowledge, the juste-retour rule was respected by the national manufacturers. This balance between a program's work-share allocation and the amount of AI's capital shares held by a national manufacturer had been introduced by Deutsche Airbus in the A300B negotiations and was again considered during the A320 work-share allocation. However, the German government refused to assume an amount of funding equal to the French (20110128/MS/9). As a result, Deutsche Airbus provided a reduced percentage of the program's overall costs and was not able to maintain the juste-retour rule as well as the Franco-

German balance. Since this slight imbalance had been deliberately chosen by the German government, it did not challenge the overall legitimacy of the juste-retour logic within Airbus' work-sharing negotiations.

5.3.6 Summary

The analysis of the second critical juncture indicates that British Aerospace and Deutsche Airbus exerted pressures for change that resulted in a highly competitive game. Aiming to gain more conceptual responsibility and sophisticated work packages, British and German engineers argued for a change of their assignments within the consortium. As a completely new program, the A320 required a new production line and thus provided an opportunity to reconsider the previous A300B's work-share allocation. At the end of the competitive game, which was again governed by an in-house competition and a juste-retour logic, the A320's work-share allocation deviated only slightly from that of the A300B (Table 8). Compared to this first program, Deutsche Airbus ceded wing equipment to British Aerospace and front-fuselage sections to Aérospatiale. In line with this, Deutsche Airbus provided a reduced percentage of the program's overall costs and British Aerospace absorbed the remaining German shares. Despite these minor modifications by means of package deals, the actors ultimately opted to organize the A320 work-share allocation in line with the previous A300 distribution.

Table 8 **The national manufacturers' A320 work packages**
(Sources: Der Spiegel 1989, p. 140; Aris 2002, p. 123)

National manufacturers	*Work packages*
Aérospatiale (France)	Cockpit up to first passenger door, front fuselage sections, center wing box, pylons, final assembly
Deutsche Airbus (Germany)	Upper middle and rear fuselage sections, vertical tail, cabin interior
British Aerospace (United Kingdom)	Wings, wing equipment
CASA (Spain)	Horizontal tail, front passenger door

5.4 The third critical juncture: The A330/A340 work-sharing negotiations

5.4.1 Introduction: Expanding into the long-range market with a twin program in order to minimize both costs and risks

Only shortly after the A320's launch all of the national manufacturers and AI's management were in favor of introducing a long-range, wide-body program (Hayward 1986, p. 85). In the absence of such an aircraft, the Airbus consortium was losing market shares in the mid-1980. Unable to offer airlines package deals between short and long-range programs, the European consortium did not have the benefit of covering all market segments (20110128/CE/5). Deutsche Airbus had already argued for filling this gap and for entering the long-haul segment in the early 1980s. Now, it once again pressed for an agreement on a four-engined program. Since Lufthansa had demanded such a design (Muller 1989, p. 134), the German government believed in the commercial success of the A340. Due to the German support and the A320's growing sales, governmental funding for the long-range programs was more easily raised than for the previous single-aisle program (Aris 2002, p. 146). As a consequence, AI was able to officially launch the A330 and the A340 at the Paris Airshow in June, 1987 (Muller 1989, p. 137) in order to break the US monopoly in the long-range market segment.

By founding two versions of a long-range, wide-body aircraft on a single fuselage and wing design, AI continued its commonality[162] policy of developing different designs around one basic aircraft program (Thomas 1999, p. 9). The twin-engined A330 and the four-engined A340 differed in range and seating capacity. While the A330 is designed for transporting about 250 to 300 passengers on medium- to long-range flights, the A340 serves long-range and ultra-long-range routes for a maximum of 380 passengers. In order to minimize risks and development

[162] Understood as "a set of common characteristics across several types of aircraft which permit cost-saving standardization of aircraft handling" (Alcouffe 2005b, p. 176), commonalities among different programs significantly reduced Airbus' production costs over time. Since Airbus used to apply a design commonality off up to 70 percent (Mehdorn 2010a), the company achieved important cost savings through the production of several similar aircraft programs. Due to these economies of scope, the costs of a single aircraft program decrease when an aircraft manufacturer starts building numerous similar aircraft programs (Hornschild 1992, p. 53). Since the similar work packages of future Airbus programs were mostly allocated to the production sites that had previously assumed its responsibility, commonality again engendered economies of scale.

costs, the twin-programs integrated the A300B/A310's fuselage cross-section (Stüssel 2003, p. 6) and the A320's avionics and flight control technology (Thornton 1995, p. 125). Keeping commonality high and development costs as low as possible, the twin program did not incorporate major technological advances (Muller 1989, p. 185). Contrary to the A320's innovative design strategy, the twin-program was intended to consolidate Airbus' market position by imposing the single-aisle's technological breakthroughs as new market standard (Muller 1989, p. 185; Thornton 1995, p. 164).

5.4.2 The actors

AI, Aerospatiale[163], Deutsche Airbus and British Aerospace constituted the influential groups of actors in the A330/A340's work-share negotiations. AI's membership and ownership structure had not changed since the launch of the A320. As a result, the shares of both Aerospatiale and Deutsche Airbus remained at 37.9 percent. British Aerospace held 20 and CASA 4.2 percent. The introduction of two aircraft programs, which required the set-up of completely new production facilities, gave the actors much room for bargaining during the A330/A340 work-sharing negotiations. As a result of this continuing small share, the Spanish manufacturer will, however, not considered during this now described process.

5.4.3 The actors' interests, resources and strategies

5.4.3.1 Airbus Industrie: Promoting a cost-efficient allocation through mediation and persuasion

Strengthened by the A320's launch, AI mediated between the national manufacturers for a cost-efficient work-share allocation. The A320 "had generated powerful industrial momentum, which made it hard, even if clearly not impossible, to resist demands for further investment" (Hayward 1986, p. 63). As a result, opting out of the Airbus project had become nearly impossible for the national governments (20100319/MS/6). With governmental funding for future Airbus programs being almost certain, it was not difficult for AI and its national manufacturers to convince governments to grant aid for extending the product range. However, the A330/A340

[163] Since SNIAS, or Aérospatiale in its short form, was officially renamed to Aerospatiale (without accent) in 1984 (Carlier and Sciacco 2001, p. 25; Eurocopter 2011a), I refer to the company as Aerospatiale from now on.

negotiations among the national manufacturers were filled with conflict (20100312/CEO/3). Throughout the process, AI advocated a work-share allocation that kept overall costs and risks as low as possible. It used its expert knowledge of market demands to convince the national manufacturers of a modified but commercially viable allocation. "Managing by persuasion" AI balanced the actors' diverging interests and sought a solution acceptable for all the actors involved (Muller 1989, p. 206).

5.4.3.2 Aerospatiale: Fighting for continuity by all possible political and industrial means

Aerospatiale once again attempted to maintain continuity in the new programs' work-share allocation by drawing upon its expert knowledge and governmental support. Having occupied a leading position in the A300B and the A320 program, Aerospatiale had a position of strength within in the work-sharing negotiations. It had contributed the A320's key innovations, which AI also intended to apply in the new twin program. Although its leadership claim was increasingly contested, Aerospatiale's know-how was highly appreciated and its significance for the success of the program was obvious to all parties involved (20100507/CE/2). In addition to its expert knowledge, Aerospatiale had no difficulties in organizing governmental support (20100312/CEO/3). As usual, the French governmental was "relatively quick to embrace the new [twin] program" (Hayward 1987, p. 15). Due to the national consensus on aerospace, governmental actors were also committed to supporting Aerospatiale by all means possible. Since other manufacturers had already fiercely challenged Aerospatiale's leading position during the highly competitive A320 work-sharing negotiations, governmental actors were, for example, willing to intervene on the political level in order to prevent any kind of change. Strengthened by this support, the French 'national champion' defended continuity and rejected any kind of change in the long-range programs' work-share allocation. Consequently, Aerospatiale was neither willing to give up final assembly nor the lead on numerous sophisticated subassemblies and systems.

5.4.3.3 Deutsche Airbus: Build up big industrial and political pressure to finally achieve change[164]

After failing in the attempt to gain new, sophisticated work packages of the A320, Deutsche Airbus wanted "to play a larger and more significant part" and made a strong claim for Airbus' twin program (Aris 2002, p. 146). In order to underline this claim, the scattered German aircraft industry had begun to consolidate under the leadership of MBB in the early 1980s and was integrated into the national aerospace champion DASA in 1989 (20101130/CS/6). This pooling of resources placed the German partner in a new position of strength within the work-sharing negotiations. In addition, political support for an increased German Airbus participation did not only come from the regional governments of Northern Germany, but also from the Federal government (Süddeutsche Zeitung 1990, p. 26). For instance, the Coordinator of German Aerospace Policy, Erich Riedl, passionately promoted a "stronger German position" (Oehler 1989, p. 11) and together with the regional prime ministers subsidized research funding particularly for high-tech components. Strengthened by this joint political support, the German aircraft industry strove to gain responsibility for technologically sophisticated work packages and final assembly of the A330/A340 program (Aris 2002, p. 146).

> "The German strategy was that every time a new aircraft program came along, we would try and change the work share a little bit to increase our understanding of the building of airplanes: not to be the idiot who makes the landing gear and maybe the cargo hold and maybe the wing tip. And since we had no independent aircraft development in Germany, I thought it was good to have a situation whereby at one time we make the wing box, the fin, and in the next aircraft we make the rear tail and in the next aircraft we make the center section. It was a softly, softly approach and the aim was to be a competent Airbus partner" (Hartmut Mehdorn, cited in Aris 2002, pp. 146-147).[165]

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164 The expression "we made big pressure" was coined by Hartmut Mehdorn (cited in Aris 2002, p. 146).

165 As head of MBB's transport division and chairmen of Deutsche Airbus, Hartmut Mehdorn was one of the decisive people for Deutsche Airbus' interests and strategy in the A330/340 work-sharing negotiations. A graduated engineer, Hartmut Mehdorn started his career at VFW in Bremen, where he became program director of the A300, plant manager and head of manufacturing (Zabka and Mehdorn 1997, p. 14). In 1980, he was appointed head of production in the AI management team. As Felix Kracht's successor and "candidate of choice" (Kracht 1994, p. 71), Hartmut Mehdorn was responsible for production, procurement and quality management until 1984 (Mehdorn 2010a). After becoming head of manufacturing at

By threatening to withdraw governmental funding, Deutsche Airbus pursued an aggressive strategy of maximum demands and 'faits accomplis'. Deutsche Airbus aimed at strengthening the German position within the Airbus venture and therefore demanded a major change in the A330/340's work-share allocation (20100312/CEO/3). Thus, Deutsche Airbus claimed final assembly for both the twin program and the planned A321, an extended version of the A320 (Aris 2002, p. 146). In order to add weight to their claims, the German consortium threatened to refuse acceptance of governmental funding and thereby deprive AI of resources crucial to the organization. By emphasizing its control over this key zone of uncertainty, Deutsche Airbus argued that Airbus "had to organize things in such a way as to keep everybody in Europe happy. If you want everybody to take part, there has to be something for everybody" (Hartmut Mehdorn, cited in Aris 2002, p. 147).

In addition to threatening to withhold funding, Deutsche Airbus also strove to shore up its claims by underlining its expert knowledge and the cost savings they could offer to AI as a whole. Due to substantial investments in production facilities and exchanges of experience with American manufacturers, MBB had acquired considerable expertise in organizing a cost-efficient final assembly line (20100312/CEO/3). By stressing the benefits of its newer and faster final assembly line, Deutsche Airbus argued that Aerospatiale was not able to manage the production of both the twin program and the future A321. Backed by the Federal government and the Hamburg region, Deutsche Airbus started to create 'faits accomplis' although it did not have the approval for certain work packages (20100312/CEO/3). Since the prescribed program schedule would not have been met otherwise, Deutsche Airbus began to purchase land and invest in its facilities in order to provide a real alternative to Toulouse and establish Airbus' "narrow body center" in Hamburg (Deutsche Aerospace 1992, p. 38; Mehdorn 2010a).

MBB's transport and commercial aircraft division in Hamburg, he was appointed head of this division in 1985. In 1986, he joined MBB's management board in Munich and Airbus' Executive Board in 1989. In December that year, he was also appointed chairmen of Deutsche Airbus. As head of DASA's aviation division (comprising Airbus, regional aircraft, military aircraft, Fokker and Eurocopter), he joined the management board of the newly formed company in 1992 and remained in these positions until 1995, when he became CEO of Heidelberger Druckmaschinen (Munzinger Online 2011a).

5.4.3.4 British Aerospace: Contributing expertise and own financial resources for keeping the wings

Due to the absence of governmental support, British Aerospace adapted its interests in obtaining new work packages to a strategy that consisted of maintaining its core competencies within the Airbus venture. When, only shortly after the A320's launch, the national manufacturers and AI agreed to expand the product range by two new aircraft projects, British Aerospace once again demanded a change in the established work-share allocation.

> "The British renewed the request they had made three years earlier during the row of the work share on the A320 that all the big Airbuses should be built in Britain" (Aris 2002, p. 146).

Arguing in favor of a rotation of competencies, British Aerospace was, however, not supported by its government. Even before the programs' official launch, the British government had refused to grant additional funding to its national manufacturer (Hayward 1986, p. 85). In the absence of full governmental support, British Aerospace altered its strategy and demanded to keep responsibility for its established work packages. Drawing upon its expert knowledge and experience, British Aerospace aimed at maintaining the wings, its acknowledged core competence within the Airbus consortium. With the contribution of own financial resources, British Aerospace intended to keep Deutsche Airbus, and especially its Bremen site, who had already indicated great interests in assuming wing development, out of its established work package (Hayward 1986, p. 90).

5.4.4 A tremendous battle[166]: Compensating (path-) breaking tendencies through package deals and minor changes in other program's work-share allocation

During the work-share negotiations, the conflict between Aerospatiale and Deutsche Airbus assumed such alarming proportions that it threatened to put the future of the European consortium at stake (Rodier and Charbonnières 1990, p. 1). Competition among the national manufacturers had already emerged during the A320 negotiations. With Airbus' product line continuing to grow, British and German pressures to change the existing work-share allocation

[166] This expression was coined by Bob McKinlay, a former British Aerospace representative in the AI supervisory board (cited in Aris 2002, p. 146).

reemerged at the very beginning of the A330/A340 negotiations. Because the twin project, just like the previous A320 program, required new production lines, the British and predominantly the German engineers demanded their shares of the "high value added systems integration work such as cockpit design and final assembly" (Thornton 1995, p. 126). Deutsche Airbus aimed to acquire Aerospatiale's former responsibilities, and thus claimed final assembly of both the A330/340 and the planned A321.[167] Backed by strong political support, the German consortium aggressively pursued this strategy of maximum demands by threatening to withhold necessary funding: "It was something I was driving for very hard" (Hartmut Mehdorn, cited in Aris 2002, p. 146). Emphasizing the important cost savings it would bring to the program as a whole, Deutsche Airbus insisted on getting final assembly and started expanding its Hamburg facilities (20101111/CEO/6).

Deutsche Airbus' pressures triggered Aerospatiale's full resistance. Calling final assembly in Hamburg "an economic and industrial absurdity" (Henri Martre, Aerospatiale's president cited in Frankfurter Rundschau 1990, p. 7, translated by the author), Aerospatiale's management launched a press campaign and promulgated that relocation would not only cost 100 million dollars but also generate additional operating expenses (Süddeutsche Zeitung 1989, p. 36). Furthermore, Aerospatiale delayed Airbus' Board decisions as far as possible in order to overstretch German commitment and to endanger the prescribed program schedule of the Hamburg site (20100312/CEO/3). In this strategy, Aerospatiale was supported by both its trade unions, who threatened to go on strike, and by the French government, who put the issue on the political agenda of Franco-German summits (Le Monde 1990). This did, however, not calm the situation. Because the political actors stood firmly behind their respective manufacturers, they were also unable to resolve the emerging battle. At the end, Aerospatiale and Deutsche Airbus were so irreconcilably opposed on the work-share allocation that the negotiations became blocked completely.

Because neither Deutsche Airbus nor Aerospatiale were willing to give in, negotiations stalled at a certain point in time. "The atmosphere in meetings of the Toulousian Airbus Executive Board was freezing cold at that time" (Mehdorn 2010a, translated by the author).

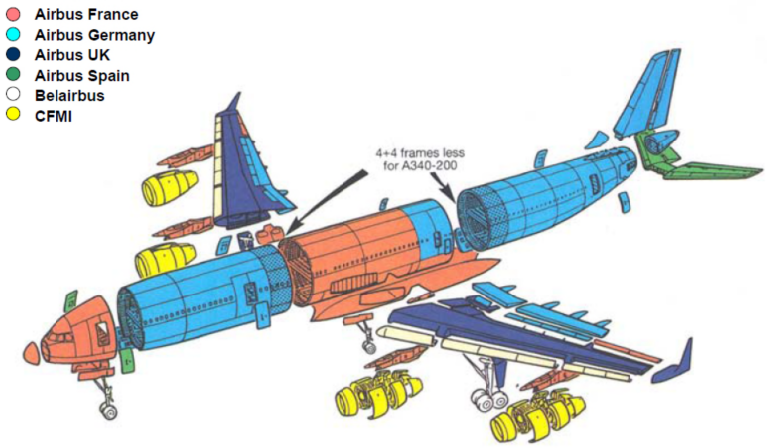
[167] The A321 is a stretched, 186-seat derivative of the A320. In order to expand the well selling A320, it was officially launched by the Airbus Board on November 24, 1989 (Thornton 1995, p. 132).

British Aerospace and CASA were concerned about the negotiation deadlock and commissioned a study to resolve the question if Hamburg's facilities were able to assume final assembly. The study ultimately recommended the relocation of final assembly, however, also expected production disruptions due to the set-up of new facilities and processes (Süddeutsche Zeitung 1989, p. 36). Since this evaluation did not help to calm the heated situation, British Aerospace and CASA suggested setting up a special working group that was to develop solutions for the ongoing conflict (Frankfurter Allgemeine Zeitung 1989, p. 13). The group was appointed by the Airbus Board and had five members, one representative of each manufacturer and one of AI (Süddeutsche Zeitung 1989, p. 36). In its final report, the working group recommended dividing final assembly of the A330/A340 and the forthcoming A321 between Toulouse and Hamburg and suggested reorganizing the previous A320 work packages as compensation in return (Thornton 1995, p. 132). In line with this, Deutsche Airbus got a larger piece of the previous A320 fuselage (Aris 2002, p. 146). With this compromise, work-share allocations for all of the twin-programs could finally be determined.

Since the quantitative work share varied slightly in comparison to the previous allocations, the A330/A340 program also introduced minor changes to the qualitative work-package allocation. Compared to the A320 quantitative work-share allocation, the A330/340's percentage of the overall production costs was again more or less equally divided among the German and the French manufacturers, with Aerospatiale holding 37.5 percent, Deutsche Airbus 34 percent, British Aerospace 23.5 percent and CASA 5 percent (20110128/CE/5). However, the qualitative work-share allocation introduced a "reshuffling" of work packages within the Airbus consortium (Thornton 1995, p. 132). As depicted in Figure 15, Aerospatiale kept responsibility for the cockpit up to first passenger door, the center wing box and the pylons. In addition to upper middle fuselage sections, Aerospatiale maintained final assembly for the A330/340. Deutsche Airbus, who had claimed the twin-program's final assembly, could thus not assert its position, but was ex post compensated with a larger piece of the A320 fuselage (Aris 2002, p. 146). Moreover, in line with the working group's recommendation, the Airbus Board decided to undertake final assembly and cabin interior at only one production site due to costs and efficiency reasons (Le Monde 1990; Süddeutsche Zeitung 1990, p. 26). As a result, Aerospatiale gained cabin outfitting for the wide-body programs (Kracht 1994, p. 73). In return, the German

consortium regained wing equipment from British Aerospace.[168] In addition, it got responsibility for final assembly and cabin interior for the upcoming A321 program (Le Monde 1990), which was both provided by MBB's transport and commercial aircraft division in Hamburg (Kracht 1994, p. 73). In the end, with the exception of cabin interior, final assembly and the upper middle fuselage section the A330/340 and also the A321 upheld continuity in comparison to previous allocations. Since they were in part compensated through future program's allocation and since the use of large integrated subassemblies in Airbus' production system reduced the importance of final assembly to 4 percent of total work (Hayward 1986, p. 71; Kracht 1994, p. 58), these changes can, however, not be considered as breaking with the established allocation.

Figure 15 **Work-package allocation of the A330/A340**
(Source: Rendigs 2005, p. 8)



5.4.5 The rules of the game: In-house competition and a juste-retour logic among different programs

In their highly conflictual game, the actors employed in-house competition for work-share allocation. As in the previous negotiations, the actors adopted a competitive in-house procedure for the allocation of work packages, in which actors possessing expert knowledge controlled relevant zones of uncertainty. Since expert knowledge was crucial to the organization as a whole, these actors were thus able to use the resource for their own benefit. The chief engineers of the

[168] The program's moveable wing parts were again contributed by the associated AI partner Belairbus.

national manufacturers presented their individual solutions for the programs' work packages and rigorously peer-reviewed the proposals of the others. This time, however, a joint decision on their allocation seemed impossible because British Aerospace and especially Deutsche Airbus contested an allocation on the basis of existing competencies.

While British Aerospace withdrew its requests, Deutsche Airbus insisted on gaining hitherto French work packages with the help of its government. The German consortium claimed final assembly and argued on the basis of its expert knowledge and specialized engineering know-how it had gained from American manufacturers. In addition to its expert knowledge, Deutsche Airbus committed itself to invest in modern technology in order to provide an optimized and cost-efficient final assembly that would ultimately bring savings to the Airbus consortium as a whole (20100312/CEO/3). However, Aerospatiale considered final assembly as its "ancestral work package", which it was not willing to abandon because it ensured Aerospatiale's unique position within the Airbus venture (Mehdorn 2010a, translated by the author).

The manufacturers were only able to resolve this conflict by once again committing themselves to a juste-retour logic. This balance between a program's work-share allocation and the amount of AI's capital shares held by a national manufacturer was not only achieved through compensations on previous but also through compensations on past and future programs' work-share allocation. In addition to these compensations among different aircraft programs, the compromise also involved a package deal that reshuffled work packages between Aerospatiale and Deutsche Airbus. Thus, the manufacturers maintained the Franco-German balance and counterbalanced (path-) breaking tendencies by means of a juste-retour logic that introduced changes to past and to previous work-package allocations.

5.4.6 Summary

The third critical juncture reveals Deutsche Airbus' strong pressures for change, which resulted in a highly conflictual work-share allocation. The battle was again governed by in-house competition and pacified by a juste-retour logic. The latter was applied over time, incorporating both previous work-share allocations as well as upcoming ones. As depicted in Table 9, the A330/A340 work-package allocation was in line with previous allocations, but also revealed different responsibilities for cabin interior and the upper middle fuselage section.

Table 9 **The national manufacturers' A330/340 work packages**
(Sources: Thornton 1995, p. 132; Aris 2002, p. 146; Rendigs 2005, p. 8)

National manufacturers	*Work packages*
Aerospatiale (France)	Cockpit up to first passenger door, upper middle fuselage section, center wing box, pylons, cabin interior, final assembly
Deutsche Airbus (Germany)	Front and rear fuselage sections, vertical tail, wing equipment
British Aerospace (United Kingdom)	Wings
CASA (Spain)	Horizontal tail, front passenger door

The "reshuffling" of work packages in the A330/340 program (Thornton 1995, p. 132) was compensated for by relocating final assembly of the upcoming single-aisle program. As a result, with the exception of cabin interior and final assembly, both the A330/A340 and the A321 continued to apply a work-package allocation that was in accordance with previous distributions. In line with this qualitative work-package distribution, the quantitative work-share allocation of the A330/340 program varied accordingly, namely slightly in comparison to previous allocations.

5.5 The forth critical juncture: The A380 work-sharing negotiations

5.5.1 Introduction: Completing the product range by breaking the last US monopoly

The A380 program constituted the last step of AI towards a complete product range of aircraft. After the A330/A340 and A321, airlines' demands for medium or short-haul programs grew (20100503/CE/1). Airbus reacted by extending the single-aisle family to the A319[169] and the

[169] The A319 is a shortened, 130-seat derivative of the A320. With reduced seats and engine power, it "rounds out the lower end of the product range" (Deutsche Aerospace 1993, p. 15). It was launched in June 1993 at the Paris Airshow.

A318[170] derivatives. In order to serve the increasing traffic on Asia's intercontinental routes, the airlines also asked for a very large aircraft program (Braunberger 2006, p. 132). Since it was extremely risky to build an aircraft larger than Boeing's 747, Airbus started to collaborate with Boeing on the 'Very Large Commercial Transport' (VLCT) project in 1992 (Deutsche Aerospace 1993, p. 16). Due to its enormous development costs and the uncertainty on whether airline demand was large enough for two competing products, the two rivals jointly assessed the commercial and the technological concerns of this 600-seat project under the lead of Jürgen Thomas.[171] But, in 1995, negotiations stalled and Airbus decided to continue the large-scale program on its own.

However, the A3XX project was too risky and expensive to be realized with AI's joint liability and governmental funding (20110128/CE/6). In order to implement the project and generate funds from the capital market, AI needed to be turned into a stock corporation (20110128/MS/9). Having agreed on the need to complete the product range, the governments of France, Germany, Britain and Spain were willing to contribute a third of the program's development costs (20101116/CS/5). In addition to these repayable loans, the new Airbus Corporation was able to raise funds from both the capital market and industrial partners (Braunberger 2006, p. 136). In order to minimize risks, the program was developed in close cooperation with 20 major airlines and launch customers (Thomas 1999, p. 10).

After "a decade of studies and 5 years of intensive pre-launch activities", the program was launched on 18 December, 2000 (Stüssel 2003, p. 6). In its final design, the basic A380 version was conceived as a twin-deck, four-engined program that can transport 525 passengers in a typical three-class seating over long-range distances.[172] Competing directly with Boeing's 747, the

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170 The A318 is the smallest single-aisle program. As a shortened A319 version, it is designed for 107 passengers and was launched in 1999 (DaimlerChryler Aerospace 1999, p. 11).

171 As head of the joint working committee, Jürgen Thomas was one of the decisive people for the VLCT project (Aris 2002, pp. 174-175). A university-educated engineer, he started his career at VFW in Bremen. From 1976 until 1988 he was appointed chief engineer of the A310 program and subsequently joined the Airbus management as head of the A300/A310 program. Soon after the VLCT project, Thomas was appointed chief engineer of the A380 program. In line with this, he is today often referred to as the "father of the A380" (Aris 2002, p. 172). Accordingly, the Hamburg Delivery Center of the A380 was named after him in 2008 (20100319/MS/6).

172 In order to easily allow further developments, the A380 program was designed to establish a family of aircraft from the outset (Thomas 2003, p. 7). Therefore, "the basic version was

A380 had to introduce "new technology, to improve aircraft performance, economy and environmental friendliness" (Stüssel 2003, p. 6). With the A380 program, Airbus completed its product range, which now covers all capacities and range spectrums from a short-haul, 100-seater to the high-capacity, long-range aircraft (Thomas 2003, p. 6). As a result, airlines can now meet all their fleet's requirements from Airbus (20110128/CE/5). With the A380, Airbus has thus taken the final step towards breaking Boeing's worldwide 747-monopoly with its guaranteed monopoly gains and package deals (Der Spiegel 1996, p. 102).

5.5.2 The actors

The relevant groups of actors in the A380's work-share negotiations were AI, Aerospatiale, DASA[173], British Aerospace and the Spanish CASA. Although AI's membership and ownership structure had not changed since the A330/340 negotiations, and Aerospatiale's and DASA's shares of AI remained at 37.9 percent, while British Aerospace held 20 percent and CASA 4.2 percent, Spanish CASA played an important role during the A380 work-sharing negotiations. With its small 4.2 share of the AI, CASA was able to increase its work share to 10 percent of the overall program (Flight International 2006). The example of CASA shows that the relevant groups of actors were able to exert much influence in the program's work-share negotiations, which will now be explained in detail.

5.5.3 The actors' interests, resources and strategies

5.5.3.1 Airbus Industrie: Balancing tensions for a work-share allocation built on past experiences

After the end of the VLCT project, AI's management was firmly convinced that the consortium had to pursue the very large aircraft project in order to complete its product range and to

conceived in such a way that it can be extended both in size and in range without exceeding crucial dimensions or runway loadings imposed by major airports" (Stüssel 2003, p. 6). A stretched version, with a passenger capacity from 600 to 800 is currently under study (20110127/CE/4).

173 In 1989, the Daimler Benz AG acquired MBB and incorporated all of the activities of Deutsche Airbus in its Hamburg-based 'Deutsche Aerospace Airbus GmbH' (Deutsche Aerospace 1992, p. 16). As the aerospace subsidiary of Daimler Benz, the major German aerospace manufacturer operated under the acronym DASA from 1989 to 2000.

strengthen Airbus' standing on the world market. However, the goal of solely developing an aircraft able to compete with Boeing's 747 "from above" (20110127/CE/4) was a very risky project that, in the event of failure, had the potential to threaten the very existence of the Airbus venture.

> "I think that everybody knows that [it] is extremely high risk from every point of view: technologically, airframewise, enginewise, moneywise, certificationwise. It is outside the normal Airbus family. With the traditional step-by-step Airbus approach you have a commonality of anything between 60 to 80 percent between one plane and the next. But with the superjumbo you have a commonality close to zero. Airbus has to be very careful with what's coming up" (Hartmut Mehdorn, cited in Aris 2002, p. 182)

Moreover, with the start of the program's configuration process, it quickly became apparent to all the actors involved that such a huge program could not be implemented in the AI organization. Jean Pierson, AI's managing director at that time, initiated a board committee to examine different proposals for reform (Le Figaro-Economie 1995, p. 6). Thus, while in-house discussions about the future of the Airbus organization were picking up, the work-sharing negotiations began.

During the configuration process, AI used its airline contacts to discuss and assess the demand for various program versions with 480, 550 and 650 seats respectively (20110128/CE/5). By contributing this commercial expert knowledge, AI management played an important role in the final configuration of the program. During the allocation process that followed, AI's management endeavored to keep program costs and risks of the very large aircraft program as low as possible for the consortium as a whole (20100503/CE/1). AI was thus in favor of a work-share allocation on the basis of manufacturers' specializations. In the upcoming conflict situations AI acted as a counterbalance and strove to balance the diverging interests of the national manufacturers (20100319/MS/6).

5.5.3.2 Aerospatiale: A grand coalition for continuity with the aim of regaining final assembly

After the assignment of the A319's and A321's final assembly to DASA, Aerospatiale strove to maintain the previously established division of work and regain final assembly for Airbus' biggest project. However, the aerospace industry recession of the time hit Aerospatiale hard (20100324/IE/5). Since the 1991 gulf war, the French national aerospace champion had shown

structural and financial difficulties. For its restructuring, Aerospatiale urgently needed new capital and, since the French government was neither willing nor able to supply all the required funds, mergers within the French aerospace industry were intensively discussed (20100328/IE/7).[174] In line with this, Aerospatiale's management abandoned its initially opposed position and agreed to transform AI into a limited company (Le Monde 1995, p. 18). Despite its structural and financial difficulties, Aerospatiale was determined to maintain responsibility for its previous work packages. Moreover, it aimed at regaining final assembly.

After its previously strong involvement in the A330/340 negotiations, the French government was again committed to support its 'national champion' by all possible means. In accordance with the national consensus on aerospace, governmental actors were willing to take action against any kind of change (20100629/CS/3). In line with its commitment to the Toulouse site, the government subsidized the expansion of facilities and infrastructure (Morgenstern 2008, pp. 28ff.; 20100324/IE/5). Drawing on this strong governmental support, Aerospatiale fiercely rejected any attempts to modify its lead on numerous sophisticated subassemblies and systems. Claiming that long-range programs were naturally assembled in France and that the required expert knowledge was concentrated in Toulouse (20100810/CS/4), Aerospatiale also insisted on keeping final assembly for the A380 program.

5.5.3.3 DASA: Combining all its strength to aggressively promote change

With the aim of establishing Hamburg as Airbus' narrow-body center, DASA had secured its position after the A330/A340 negotiations and had enforced that the A319 program maintained the A321's work-share allocation pattern. Accordingly, final assembly and cabin interior for the A319 were taking place in Finkenwerder (Thomas 1999, p. 10). In order to further strengthen its position, Daimler Benz also strategically realigned its affiliate. DASA expanded its know-how on full systems capability by acquiring the regional aircraft manufacturer Fokker in 1993 (Braunberger 2006, p. 119). Moreover, after privatizing and restructuring DASA, Daimler Benz rationalized its affiliate with the "Dollar Low Rescue" restructuring program (Aris 2002, p. 180). Although the program introduced severe cutbacks and reduced the labor force by a third (20100216/CEO/2), the reorganization and the single-aisle program's assembly put DASA in a

[174] During the following state-guided restructuring process, Aerospatiale was placed in a pivotal position (20100324/IE/5). For detailed information, please see section 4.3.1.2.

new position of strength within the Airbus consortium in general and the work-sharing negotiations in particular.

DASA aggressively pursued a strategy of maximum demands and claimed sophisticated work packages, such as British Aerospace's wing development, as well as final assembly and delivery center (Aris 2002, p. 209, p.213). In these demands DASA was strongly backed by both the federal government and the regional governments of Northern Germany (20090723/IE/2). The regional government of Hamburg, for example, also massively supported investments in Airbus' production facilities, infrastructure and qualification (20100208/CS/1). Moreover, the level of funding of local universities for cabin and cabin-system research was increased (20100208/CS/1). In addition to these resources, DASA also used its position of strength to build up pressure for gaining sophisticated work packages. Thus, DASA stressed its expert knowledge as well as its potential for cooperating with other partners in future projects (20110128/MS/9). Emphasizing this new autonomy, DASA aggressively strove to push through its demands for a change in the work-share allocation.

5.5.3.4 British Aerospace: Governmental support and expertise for stability: Keeping the wings and keeping DASA out

British Aerospace readjusted its strategy and started to focus on the defense business in the early 1990's. Strengthened by its restructuring, the private company gained in importance in the ongoing discussion on AI's reform in particular and the reorganization of the European aerospace industry in general. Like DASA, British Aerospace proposed transforming AI into a limited company and favored a private solution for a joint European aerospace company (20091207/IE/3). While British Aerospace and DASA were discussing ways and means of such a transnational collaboration (Aris 2002, pp. 202-203), the two opposed each other in Airbus' work-share negotiations, in which DASA claimed the traditional British work package.

Naturally, British Aerospace demanded that they retain the wings. "Through a combination of weight savings and aerodynamic efficiency" the A380 wings were designed to reduce airline's operating costs […] "by at least 17 percent" (Aris 2002, p. 208). In line with this, the British company chose to argue on the basis of its existing expert knowledge and stressed that the difficult development work on the program's huge wings could only be performed by its experienced and skilled teams. In its claims, British Aerospace was supported by the British government. In order to ensure "that the wing work stayed in Britain", the British government

was the first to publicly announce its granting of launch aid (Aris 2002, p. 210). Backed by this strong governmental support, British Aerospace strove to keep its wing responsibility and thus argued for maintaining the previously established division of work.

5.5.3.5 CASA: Getting a bigger bite through expertise and governmental support[175]

With the aim of increasing its A380 work share, CASA had massively invested in its carbon-fiber expertise[176] and, backed by the Spanish government, aggressively pursued a strategy of maximum demands (20100810/CS/4). In order to foster its competencies in aerospace, state-owned CASA became a member of the Airbus venture with full liability and decision-making rights in 1972. Acquiring a small 4.2 share, the Spanish manufacturer was able to broaden its expertise from licensed production to national aircraft projects. From the A300 to A330/A340 programs, CASA had always assumed work shares that were roughly in accordance with 5 percent of the overall production costs and had produced the front passenger door and the horizontal tail.

In order to gain in importance within the Airbus venture, the Spanish manufacturer had massively invested in carbon-fiber materials and the required manufacturing know-how in the run-up to the A380's work-sharing negotiations (20110128/CE/5). Specialized in these materials, they claimed the lead on the program's composite parts and a bigger overall work-share (20110128/CE/6). In this, the state-owned manufacturer was strongly supported by its government, which was not only eager to contribute the necessary financial resources but also promoted CASA's growing work share on the political level (20100810/CS/4). This allowed CASA to drive a hard bargain and aggressively claim maximum demands. CASA put all its eggs into one basket and threatened to either veto or even exit the venture by not joining the new, integrated company, if its demands were not met.

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175 Please note that in this context the expression "bigger bite" was taken from Flight International (2006).

176 In order to replace heavy aluminum structures, the application of carbon-fiber materials in civil-aircraft production has recently increased "because of their stiffness and low weight in comparison to conventional metals. Although initially used for military applications, increases in fuel prices, as well as demands to reduce emissions and improve overall aircraft efficiency, are leading to the wider deployment of composite technology in civil aircraft" (House of Commons 2007, p. 10)

5.5.4 War of all against all: Compensating conflicts through package deals and additional program's work-share allocation

Prior to the A380 negotiations, severe conflicts essentially between the French and the German manufacturers had already disrupted the A330/A340 negotiations. In order to resolve this severe conflict, manufacturers found solutions involving package deals and changes in the A320, A321 and the A319's work-share allocations. The A380, just like the previous programs, required a new production line and again the German engineers were quick to request their shares of the program's highly sophisticated work packages. Targeting former responsibilities of Aerospatiale and British Aerospace, DASA claimed the A380's wings, final assembly and delivery center. Supported by massive investments from both the federal government and the regional governments of Northern Germany, DASA was able to aggressively pursue a strategy of maximum demands. Bringing forward the argument that "it was much simpler and more economical to build such a huge plane in a place that had access to the sea", DASA argued against Toulouse as the location for final assembly and insisted on getting it itself (Aris 2002, p. 213). With public support for infrastructure and qualification, DASA started to invest in its Hamburg facilities (20100208/CS/1).

Naturally, Aerospatiale was determined to take over the program's final assembly in Toulouse (20110128/CE/5). Fiercely rejecting all criticism of its "land-locked location", Aerospatiale insisted that Toulouse had to be "supplied by air as usual" (Aris 2002, p. 213). In order to reduce risks of the program, AI's management supported Aerospatiale and argued that final assembly "know-how is in Toulouse" (Noël Forgeard, Airbus managing director since 1998, cited in Aris 2002, p. 214). However, in addition to the "Franco-German duel" on final assembly (Braunberger 2006, p. 136), CASA aggressively bargained for a significant increase in its work shares and British Aerospace struggled to retain its established work package.

As a result of the diverging interest and strong pressures for change, the A380's work-share negotiations were long and difficult. Ending the 'war of all against all' was again only possible through various package deals and compensations from other program's work-share allocation. Moreover, questions on AI future organization and ownership structure further complicated the situation since they also had to be resolved among the manufacturers.[177] It was

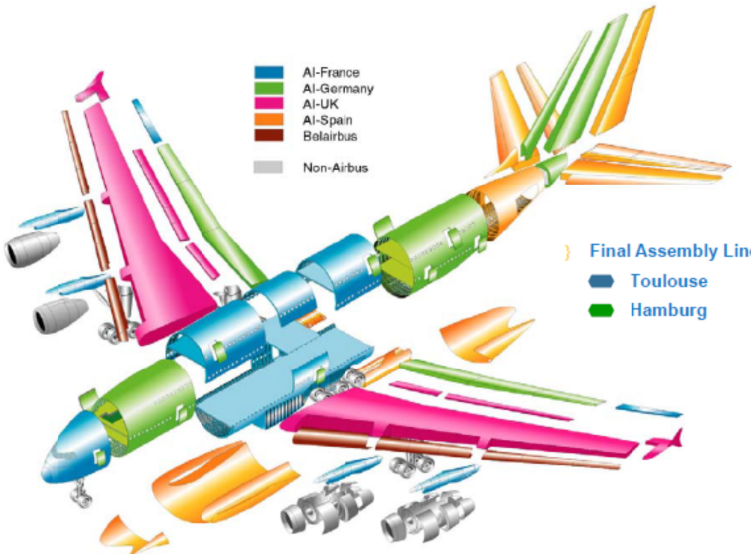
[177] In 1995, an internal commission, presided over by Edzard Reuter, at that time president of the Airbus supervisory Board, started to elaborate on possible changes of the AI organization (Le

only after they had found a compromise on these issues that the work-share allocation of the A380 program could be decided.

In the end, the A380's quantitative and qualitative work-share allocation again introduced minor modifications to previous divisions. In comparison to the A330/A340 quantitative work-share allocation, the A380's percentage of the overall production costs was, once again, equally divided between the French and the German manufacturers, with both holding 35.6 percent. This time, however, British Aerospace's percentage decreased slightly to 18.8 while CASA's share rose to 10 percent (Mühlnickel 2004, p. 21). In line with these adjustments, the qualitative work-package allocation necessitated changes. As illustrated in Figure 16, Aerospatiale retained responsibility for the cockpit up to first passenger door, the center wing box and the pylons. Moreover, it gained upper middle fuselage sections and parts of final assembly. Since DASA insisted on this work package, final assembly ultimately had to be divided between Hamburg and Toulouse (20100208/CS/1). In a package deal, the manufacturers again decided to split these work packages, thereby reversing the decision made during the A330/A340 negotiations that final assembly and cabin interior were to take place at one production site (20100507/MS/8). As a result, the A380 is finally assembled in Toulouse, but is painted and cabin outfitted in Hamburg. Moreover, depending on the geographical origin of the customers, delivery of the aircraft takes place in Hamburg or Toulouse (Braunberger 2006, p. 136).

Figaro-Economie 1995, p. 6). After the commission had submitted its recommendations, the manufacturers were publicly debating the reorganization of GIE structures. Unable to agree on a company statute of the new corporate entity from the start, the manufacturers decided to resolve all open questions by 1999 (Daimler-Benz Aerospace 1996, p. 10).

Figure 16 **Work-package allocation of the A380**
(Source: Mühlnickel 2004, p. 21)



This time however, further package deals involving DASA were necessary in order to resolve the 'war of all against all'. Since CASA aggressively pushed to increase its work share, it got responsibility for the A380's rear fuselage sections 19 and 19.1 (Flight International 2006). Moreover, due to its specialized knowledge of carbon-fiber materials, the Spanish manufacturer kept the horizontal tail and obtained lower fuselage sections as well as parts of the vertical tail (Figgen 2008, p. 19). As a result of the work packages it received from DASA, CASA's work share of the overall program climbed to 10 percent. In return, CASA ceded the first passenger door to DASA, which thus produced all the doors (Figure 16). Moreover, wing production was divided between DASA and British Aerospace. British Aerospace kept the "inner-wing, the so-called wing box that contains the fuel tanks" and DASA provided the "outer wing beyond the engines" and wing equipment (Aris 2002, p. 209). In addition, DASA was also compensated by gaining final assembly and cabin interior of the upcoming A318 program (DaimlerChrysler Aerospace 1999, p. 9).

5.5.5 The rules of the game: In-house competition and a juste-retour logic among different programs

Even though the manufacturers were discussing AI's reorganization parallel with the work-sharing negotiations, they agreed to determine the A380's work share under the GIE

organization (20091207/IE/3) and its rules of the game. Before creating the single corporate entity, the actors thus continued to apply the in-house competition rule, in which they competed among themselves, for the allocation of work packages. As previously, manufacturers possessing the necessary expert knowledge controlled zones of uncertainty in question and were able to take advantage of this resource. The chief engineers of the national manufacturers, presided over by the Airbus program manager, presented their solutions for subassemblies and systems.

Because the A380 was a completely new high-tech program and commonality with previous programs was low, the project's development risks were extremely high (20100312/CEO/3). There were two main sources of this risk. Firstly, the program introduced numerous innovations during the configuration process. The program was also on a much larger scale than had previously been attempted and the manufacturers often disagreed on the best technological solution for certain components (20100503/CE/1). Secondly, in addition to these technological disputes, the manufacturers once again fought very hard for the allocation of sophisticated work packages (20100810/CS/4). As in the A330/A340 negotiations, a joint decision was extremely difficult to reach since both DASA and CASA aggressively demanded a change in work shares. Backed up by expert knowledge and governmental resources, both manufacturers insisted on work packages hitherto produced by others.

When these conflicts paralyzed progress, the actors made use of a juste-retour logic in order to unblock the negotiations. This balance between a program's work-share allocation and the amount of AI's capital shares held by a national manufacturer was reached through package deals. These deals maintained a Franco-German balance, and reshuffled and even split work packages between the manufacturers. Moreover, the compromise also involved compensations between the current and another program's work-share allocation. This juste-retour logic among different aircraft programs introduced changes to the previously established work-package allocation, but ultimately made the work-sharing agreement possible.

5.5.6 Summary

Analysis of the forth critical juncture shows that DASA and CASA's strong pressures for change resulted in a 'war of all against all' work-share allocation game. This game was again governed by in-house competition and a juste-retour logic. These rules allowed actors to resolve their conflict by the decision to keep the A380's work-share division mostly in line with previous allocations while at the same time introducing minor changes through package deals and the allocation of

future programs' work packages. Table 10 illustrates these minor changes. For instance, final assembly and vertical-tail production were divided among the national manufacturers. Moreover, important lower and rear fuselage sections were accorded to CASA. In line with these qualitative changes, the quantitative work-share allocation also slightly varied in comparison to previous allocations.

Table 10 **The national manufacturers' A380 work packages**
(Sources: Mühlnickel 2004, p. 21; Alcouffe 2005b, p. 174; Figgen 2008, p. 20)

National Manufacturers	*Work packages*
Aerospatiale (France)	Cockpit up to first passenger door, upper middle fuselage section, center wing box, pylons, parts of final assembly
DASA (Germany)	Front and rear fuselage sections, parts of the vertical tail, wing equipment, passenger doors, cabin interior, parts of final assembly
British Aerospace (United Kingdom)	Wings
CASA (Spain)	Horizontal tail, parts of the vertical tail, lower and rear fuselage sections

5.6 The fifth critical juncture: The A350 XWB centralized work-share allocation

5.6.1 Introduction: Responding to Boeing's advance and airlines' demands

The A350 XWB was the first program launched in the new integrated company organization with its modified work-share allocation process (20100312/CEO/3). Since the early 1980s, the AI organization had regularly been subject to strong criticism for its lack of transparency, its inefficiency as well as its opaque government involvement.[178] Attempts to reform had, however, remained unsuccessful until the implementation of the large-scale A380 program required the

[178] For a detailed recounting of the discussion process, see section 4.4.1.1.

AI organization to restructure. After long discussions, AI's supervisory board decided to convert the consortium into a 'single corporate entity' in 1997. Four years later, the national manufacturers Aerospatiale-Matra, DASA and CASA merged their Airbus-related assets into the 'Airbus Integrated Company'. Introducing a single management and transparent accounts, the new company abolished the work-sharing negotiations among the national manufacturers together with their nontransparent pricing practices and in-house competition between a limited number of partners (20110128/CE/5). Since the integration, the national manufacturers and sites are no longer directly involved in program configuration and work-share allocation (20100216/CEO/2). Today, the program's work shares are allocated exclusively by the AIC headquarters in Toulouse. After AIC's program manager and his team have configured the program, they put work packages out to tender and assign them to Airbus facilities or outside suppliers based on quality, price and time criteria (20110128/CE/5).

As the first program to be configured in this new organization, the A350 was initially designed as a modified version of the A330. In order to respond to Boeing's newly developed wide-body, medium-capacity 787 'Dreamliner', AIC proposed integrating new technology and materials in its earlier A330 long-range program (Braunberger 2006, p. 160). However, after important airlines publicly criticized this design, the Airbus management decided to reengineer the program (20100507/MS/8). In order to not lose market shares in the profitable wide-body market (Jalabert and Zuliani 2009, p. 97), Airbus presented a completely newly developed program in December 2006, the A350 XWB, with an extra-wide fuselage and wings, both largely fabricated out of carbon-fiber materials (Hegmann and Haake 2010).[179] This program was again conceived with the intention of establishing a family of aircraft.[180] And, although the A350 XWB incorporated the A380's cockpit and electronic systems, it introduced a new cross-fuselage section, "new materials, new processes, lower weight, delivery time" (Thomas Enders, CEO of Airbus, cited in Münchenberg 2010). As a result, the A350 XWB, like its larger predecessor, once

179 In order to clearly differentiate the new program from the former version, Airbus' management added the suffix XWB, for extra-wide body, to the program's name (20090724/MS/4).

180 The A350 XWB family was launched in December 2006 consisting of the "A350-800 which can fly 270 passengers in a spacious three-class configuration up to 8,500 nm/15,750 km, the A350-900 seating 314, and the A350-1000 which is designed for 350, both with ranges of up to 8,300nm/15,400 km" (Airbus 2006).

again brought about an increase in complexity both in development and production (20100507/MS/8).

5.6.2 The actors

The relevant groups of actors in the work-share allocation process of the A350 XWB were AIC, Airbus Operations S.A.S (France), Airbus Operations GmbH (Germany), Airbus Operations Ltd. (UK) and Airbus Operations SL (Spain). The consortium's integration in 2001 changed both the role of key groups of actors and the functioning of the work-share allocation process. With the national manufacturers merging their assets into one integrated company, they abolished their collective work-share negotiation (20100216/CEO/2).

Putting this key task in the hands of the new company, AIC became the central actor in the work-share allocation process. After a tendering procedure, AIC determines the work-share and assigns it to its specialized facilities or outside suppliers. Despite this key role of AIC, the former national manufacturers, now Airbus Operations S.A.S (France), Airbus Operations GmbH (Germany), Airbus Operations Ltd. (UK) and Airbus Operations SL (Spain) continue to play a reduced but important role during the allocation process. The former national manufacturers retain a privileged position via their majority ownership of Airbus' parent company EADS, and continue to act as "controlling shareholders" through veto rights in the EADS Board of Directors (20100810/CS/4). The shareholders make use of these veto rights, and closely monitor if Airbus' work-share allocation corresponds more or less to their amount of EADS shares (20100216/CS/2).

5.6.3 The actors' interests, resources and strategies

5.6.3.1 Airbus Integrated Company: Enforcing a cost-efficient work-share allocation through centralized control

Through its integration, AIC became the main actor in the work-share allocation process and it implemented its goal of a cost-efficient work-share allocation by all possible means (20110128/CE/5). The integration of AI shifted control away from the former national manufacturers towards the international headquarters. Step by step the national manufacturers became subsidiaries of AIC by conferring all of their assets and decision-making authority the Toulouse-based single entity (20100216/CEO/2). The direct influence of the former national

manufacturers was thus gradually abolished and AIC centralized decision-making powers in work-share allocation. Thus, AIC's engineering department now configures future programs, decides on the integration of new technology and divides the total amount of work into large manageable subassemblies. AIC subsequently puts the work packages out to tender by calling for bids from Airbus facilities and outside suppliers and then decides upon their assignment as well as outsourcing decisions (20100322/MS/7). As a result, AIC controls communication and information flows and sets the organizational rules, which decide program configuration and allocation. Moreover, AIC, and not the former national manufacturers, now approaches the national governments after having developed a work-sharing concept. With this, AIC enters into negotiations with authorities and demands funding or launch aid in the approximate amount of work share (20100216/CS/2). By also controlling sources of power related to the organization's relevant environments, AIC thus possesses all relevant resources of the strategic analysis. Due to these sources of power, AIC's management could easily apply commercial imperatives it had always pressed for during previous negotiations to this new way of work-share allocation. Striving to keep cost and risks of new programs as low as possible, AIC used its central position to enforce a cost-efficient allocation.

In addition, AIC used the upcoming Power8 restructuring program in order to put a cost-efficient work-share allocation into practice (20100324/IE/4). In 2006, insufficient communication and coordination between sites and management problems culminated in severe construction problems with the A380 (20100503/CE/1). These problems resulted in the A380's budget shortfall. In order to finance the A380's delays and the A350 XWB production ramp-up, AIC management presented the Power8 restructuring program. It aimed at reducing the costs of all company operations while simultaneously improving their performance (Airbus 2007).[181] Power8 was applied to the A350 XWB and introduced a focus on 'core business'[182], which

[181] Announced on February 28, 2007, the objective of the Power8 restructuring program is "to make Airbus more efficient and competitive" (Thomas Enders and Louis Gallois, at that time CEOs of EADS, cited in Airbus 2007). In order to reduce costs and improve performance, Power8 introduced seven modules: "develop faster, smart buying, lean manufacturing, reduce overhead, maximize cash, restructure industrial set up/focus on core, streamline final assembly lines" (Airbus 2007). For further information on the introduction of restructuring program, see Behrens and Clouet (2009, pp. 10ff.).

[182] In the Power8 announcement Airbus defined its core business as "activities that are critical for the integrity and safety of the aircraft, or vital for technological and commercial differentiation,

intensified competition in the work-share allocation process (20100322/MS/7). Accordingly, AIC involved large numbers of risk-sharing partners or outside suppliers in its tendering procedure in order to share the risks and costs of development. As a result, 50 percent of the aerostructure work of the A350 XWB was, for example, outsourced to such risk-sharing partners (Airbus 2007).

5.6.3.2 Airbus France: Mobilizing all possible industrial and political means for preserving Airbus Industrie's former work-share allocation pattern

Airbus France drew upon its expert knowledge as it strove to maintain AI's previous work-sharing pattern in order to retain a leading position inside the new company. For the creation of AIC, Aerospatiale had conferred all of its Airbus-related assets and decision-making authority to the new single entity. As an AIC subsidiary, Airbus France was no longer directly involved in decisions concerning program configuration and work-share allocation. Instead, Airbus France had to engage in AIC's tendering procedure and to bid for work packages in a competitive process against other Airbus facilities and outside suppliers.

However, Aerospatiale's former work packages were not strongly affected by the Power8 core competence focus. In fact, many of its subassemblies and systems were considered to belong to AIC's core business and were thus not strongly affected by outsourcing decisions (20110128/CE/6). Thus, Airbus France was in a comfortable position at the beginning of the centralized work-share allocation process. During the internal tendering procedure, Airbus France used its expert knowledge in order to keep its former work packages and retain a leading position in the new organization. For instance, it made a strong bid for the cockpit, the center wing box and the final assembly based on the expertise it had gained in Airbus' wide-body programs. In addition, Airbus France submitted a bid for cabin outfitting and thereby challenged Airbus Germany that had traditionally assumed responsibility for this work package (20110128/CE/5).

Airbus France's claims were strongly supported by the French government. Since Power8 was announced during the presidential campaign, the company's restructuring program became

> for the operability and reliability of the aircraft and its maturity at entry into service. These activities include overall aircraft and cabin architecture, systems integration, as well as the design, assembly, installation, equipping, customization and testing of major and complex components or manufacturing of new technology parts" (Airbus 2007).

a major issue for the two main candidates, Ségolène Royal and Nicolas Sarkozy, who both "spoke out against the cuts, and promised to intervene in the company's restructuring" (House of Commons 2007, p. 14). Since the work-share allocation had to be finally approved by the EADS Board of Directors, where the French state acts as shareholder, political backing reinforced Airbus France's position (20100629/CS/3). Strengthened by this governmental support and its expertise, Airbus France thus strove to retain the lead on its numerous subassemblies and systems as well as the final assembly.

5.6.3.3 Airbus Germany: Bidding for other facilities' work packages based on expert knowledge and strong political support

After DASA's restructuring and the A380 work-share allocation, the German Airbus facilities occupied a strong position within the Airbus company. Gaining important A380 work packages as well as the A318's final assembly was in keeping with the German objectives of becoming a competent Airbus partner and establishing Hamburg as the company's narrow-body center. However, the announcement of Power8 revealed that various German Airbus activities were now considered as non-core businesses (20100503/CE/1). As a result, numerous fuselage sections were, for example, at risk of being outsourced to risk-sharing partners. Concerned about outsourcing decisions, the abolition of the "national negotiators" had exacerbated the situation for the German sites (20100216/CEO/2, translated by the author). In its new role as AIC's subsidiary, Airbus Germany no longer played a part in the Company's decisions on program configuration and work-share allocation. Just like the other company facilities, German sites had to engage in AIC's tendering procedure and bid for the assignment of work packages. Due to this intensified competition, Airbus Germany strove to gain technologically sophisticated work packages that were not in danger of being assigned to outside suppliers, such as wing development and center fuselage sections (20100319/MS/6).

Political support for these claims did again not only come from the regional governments of Northern Germany, but was also provided by the Federal government (Rinke 2007). As in the A380 process, both federal and regional politicians strongly engaged in the struggle for Power8 and the A350 XWB work-share allocation (House of Commons 2007, p. 10; 20100810/CS/4). In order to add weight to its demands, the German federal government threatened to "cancel military contracts with EADS if they did not receive a satisfactory outcome" (House of Commons 2007, p. 17) and to veto decisions in the EADS Board. By

threatening to either block the decision-making process or to deprive EADS of resources crucial to the whole organization, the government underlined its control over this key zone of uncertainty. Strengthened by this political support and its acquired expert knowledge, Airbus Germany was able to exert strong pressures for gaining sophisticated work packages and core-business activities with the aim of strengthening the position of the German facilities in the new company.

5.6.3.4 Airbus UK: Keeping the wing through expertise and strong governmental support

Drawing upon its expert knowledge, Airbus UK argued for retaining the wing responsibility in the integrated company. Just like the other national manufacturers, the successor of British Aerospace, BAE Systems, had transferred its Airbus-related assets to AIC in 2001. Since the British company was not willing to merge into EADS with the other three national manufacturers, BAE Systems kept 20 percent of AIC's shares, in line with its previous AI shareholding. Deciding to exclusively focus on the defense business, BAE Systems sold its AIC shares to EADS (EADS 2007, p. 23) before the beginning of the work-share negotiations in October 2006. This sale, however, weakened the British bargaining position (House of Commons 2007, p. 16) and fears of losing responsibility for the wing to the German Airbus facilities reemerged. Moreover, since the Spanish facilities had heavily invested in carbon-fiber know-how in recent times, Airbus UK was alarmed at the prospect of Airbus Spain bidding for the wing's composite work (House of Commons 2007, p. 10). In order to keep the work package, Airbus UK placed a strong bid for the A350 XWB wings by making use of all of its expert knowledge. Therefore Airbus UK designed a modern, lighter wing that largely integrated carbon-fiber materials and incorporated all the knowledge the facilities had gained from the A380's wing (20110128/CE/6).

The British government strongly supported these claims. In order to "make up for the lack of leverage bestowed by share-ownership", it strove to "make the case for the UK by other means" (House of Commons 2007, pp. 16-17). Therefore, the government stayed in a "continuous dialogue with Airbus and its parent" EADS (House of Commons 2007, p. 11), raised "the level of funding for civil aerospace R&T"[183] and invested heavily in carbon-fiber materials

[183] Please note that R&T stands for Research and Technology.

through its "National Composites Network" (House of Commons 2007, p. 18). Moreover, it is assumed that the British government, just like the German one, threatened to cancel military contracts it had already signed with EADS in the event of unsatisfactory results (House of Commons 2007, p. 17). Backed by this strong governmental support, Airbus UK was able to make a strong bid to retain wing responsibility and for keeping the German as well as the Spanish facilities out.

5.6.3.5 Airbus Spain: Keeping the bigger bite through expert knowledge and governmental support

After its significant increase in the A380 work shares, Airbus Spain strove to maintain the quantitative amount of work and gain additional sophisticated work packages through expert knowledge and strong governmental support. CASA had already massively invested in its carbon-fiber expertise before the A380 work-share negotiations with the intention of obtaining work shares. During the process, the former Spanish national manufacturer bargained hard and aggressively pursued a strategy of maximum demands (20100810/CS/4). Backed by the Spanish government, CASA was consequently able to double its work shares from 5 to 10 percent of the program's overall production costs (20110128/CE/5). Accordingly, CASA gained important work packages that were previously held by German DASA (20100506/IE/8). After AIC's integration and the introduction of the centralized work-share allocation process, Spanish facilities aimed maintaining their quantitative amount of work shares while obtaining additional sophisticated work packages.

Since AIC planned to produce a large proportion of the A350 XWB fuselage and wings out of carbon-fiber materials, Spanish facilities that were specialized in composite technologies bid to assume rear fuselage sections and parts of the wings that were previously assumed by DASA and British Aerospace, respectively. Moreover, with the experience of the A380, Airbus Spain also strove to gain the lead on development and manufacturing of the program's carbon-fiber subassemblies (20110128/CE/5). The Spanish government again strongly supported these claims. For example, it promoted massive investments to further the facilities' composite expertise and even threatened to veto decisions in the EADS Board of Directors if its demands were not met. As a result, Airbus Spain was able to play for high stakes in the work-share allocation process.

5.6.4 Intense competition between Airbus facilities and outside suppliers: Compensating imbalances by future work-share allocation

After the creation of the integrated company, the A350 XWB was the first program whose work shares were allocated through a centralized work-share allocation process. The program was redesigned after major criticism of airlines and was unveiled in December 2006. Before the program launch, AIC's marketing department had calculated the price of a single A350 XWB aircraft and from that deduced the price of its subassemblies and systems (20110128/CE/5). These were put out to tender after the program launch. Applying Power8 to the program's work-share allocation, AIC called for proposals from risk-sharing partners and outside suppliers (20100322/MS/7). As a result, Airbus facilities directly competed with several outside manufacturers for the allocation of certain work packages.

Occupying the central position during this process, AIC controlled communication and information flows, set the organizational rules by which the program's allocation was decided upon and presided over the whole tendering procedure. During the process, the AIC program manager and his team accepted bids for subassemblies and systems and determined their allocation on the basis of quality, price and time criteria (20110128/CE/5). However, they also considered the interests of AIC's shareholders represented in the Board of Directors EADS (20110128/MS/9). Bidders that possessed expert knowledge crucial to the A350 XWB or that were represented in the EADS Board of Directors controlled relevant zones of uncertainty for AIC and were able to derive advantages from these resources. Work shares were thus ultimately allocated by AIC on the basis of price, quality, time as well as shareholding criteria.

In line with this, Airbus facilities competed with several outside manufacturers for the work shares. Airbus France was in a good position, as it bid for cockpit, upper middle fuselage sections, center wing box and pylons. Possessing specialized engineering know-how for the final assembly of long-range programs, Airbus France also submitted a bid for the A350 XWB final assembly and its cabin outfitting (20100507/MS/8). In doing so, it exerted pressures for change by challenging Airbus Germany that had generally assumed responsibility for the cabin interior and outfitting. Airbus Germany also had to compete directly with Spanish facilities, which placed competitive offers for rear fuselage sections made out of carbon-fiber materials (20100208/CS/1). Specialized in these materials, Airbus Spain also submitted proposals for wing parts that were previously assumed by DASA and British Aerospace. However, both Airbus Germany and Airbus UK placed strong bids for wing development, equipment and production.

For instance, Airbus UK, made use of all the expert knowledge the facilities had gained from the A380 to present a modern wing that largely integrated carbon-fiber materials. As was the case for all Airbus facilities, Airbus UK was strongly supported in its claims by its respective government. However, since Airbus UK was no longer represented in the EADS Board of Directors given that BAE Systems had sold its shares, the British facilities were indeed in a weaker bargaining position than their competitors. Against this background, the A350 XWB program manager and his team allocated subassemblies and systems to either Airbus facilities or outside suppliers. On the basis of quality, price and shareholding criteria, they resolved outsourcing decisions and decided all of the A350 XWB subcontractors.[184] In the end, it only took the program manager and his team nine months to determine the program's work-share allocation (20110128/CE/5).

The quantitative and the qualitative work share of Airbus' facilities introduced changes to previous allocations. In comparison to AI's work-share allocation pattern, the A350 XWB's percentage of the overall production costs initiated changes to the previous approximate Franco-German balance. Although Airbus officially announced that "work-share responsibility for the development of the A350 XWB will be split equitably among the founding nations with about 35 percent for Germany and France, 20 per cent for the UK and 10 per cent for Spain" (Airbus 2007), the final work-share results revealed an imbalance in the allocation between the French and the German facilities (20100312/CEO/3; 20110128/CE/6). As a result, Airbus France is believed to contribute 38 to 40 percent of the program's quantitative work shares, whereas Airbus Germany's share is estimated at 31 to 34 percent (Hegmann 2009b). In line with this, the British facilities had to accept a reduced share of about 18 to 19 percent, while the quantitative work shares of Airbus Spain remained at around 10 percent (20100506/IE/8; 20110128/MS/9).

This change in the quantitative work-share allocation resulted in the reshuffling of some work packages. Airbus France will provide final assembly and cabin outfitting in Toulouse (Airbus 2007). However, Airbus Germany is still responsible for development and manufacturing of cabin interior (Hartmann et al. 2010). Moreover, Airbus Germany maintained various front and rear fuselage sections, but again had to cede parts of the vertical tail as well as lower and rear fuselage sections made out of carbon fiber to Airbus Spain. While Airbus UK

[184] In contrast, the national manufacturers had assigned all of their subcontracts individually to suppliers of their choice in the times of AI (Hartmann et al. 2010).

retained "overall leadership of wing development, manufacture and assembly for the A350 XWB" (House of Commons 2007, p. 3), German facilities regained the inner wing and wing equipment (House of Commons 2007, p. 11). In addition, Airbus Germany once again provided the passenger doors and shared the vertical tail production with Spanish facilities. However, with the cockpit, the center wing box and the pylons Airbus France kept many of the program's sophisticated work packages (20100820/CEO/5).

Considering the balance of work-share packages as a whole, the German share ultimately decreased, but was compensated for by future work-share allocation. The changes brought about by Power8 revealed the weaknesses of the scattered German supplier industry which is traditionally organized in small and medium enterprises (20110128/CE/6). Because AIC now demanded big risk-sharing partners that deliver fully equipped subassemblies and that assume the risk and costs of development, AIC was not able to assign as much of its work share to the German supplier industry as to, for example, the French one. In order to compensate for this imbalance, the German government insisted on gaining final assembly and the development center of the future A30X program[185] (Mihm and Braunberger 2009; Hartmann and Hildebrand 2010). In exchange for launch aid for the A350 XWB, AIC has confirmed to make Hamburg the company's single aisle competence center by assigning final assembly and development competencies to the Finkenwerder site (Ecorys 2009, p. 157; Süddeutsche Zeitung 2009). If all promises are kept, this will again reshuffle work packages between French and German facilities and introduce some minor changes to Airbus' work-package pattern.

5.6.5 The rules of the game: Intensified competition limited by a juste-retour logic among different programs

By including numerous outside suppliers and risk-sharing partners, the competition for work shares was severely intensified. AIC's centralized work-share allocation abolished the "national negotiators" (20100216/CEO/2) and the in-house competition between a limited number of partners. Moreover, AIC is increasingly concentrating on its core business because of Power8 (Jalabert and Zuliani 2009, p. 91) and thereby modifying the consortium's former production

[185] The A30X is the successor of the A320 program. It is supposed to successively replace the A320 program by 2024, although the A320 was only recently modernized (A320neo) by incorporating new efficient engines and wing tips (Hartmann and Hildebrand 2010).

model (Kechidi 2008).[186] By integrating major risk-sharing partners and outside suppliers from all over the world to the allocation process, Power8 thus intensified the competition for Airbus facilities. Moreover, due to global-sourcing practices and offset deals (20101209/CE/3), the work share of Airbus facilities on the aircraft is generally decreasing.[187] Despite this increased competition, the manufacturers possessing expert knowledge controlled relevant zones of uncertainty for AIC and were thus able to benefit from this resource during the work-share allocation process. Since the AIC program manager and his team decided the allocation on the basis of existing competencies, the number of interfaces, price and time criteria, expert knowledge was key for deciding work packages in their favor. At the end of the process, the work share that was allocated to the Airbus facilities introduced minor changes to the previous allocations.

However, in order to keep all Airbus facilities and their respective governments "on board", AIC assured to compensate this imbalance by the A30X future work-share allocation (20110128/CE/5). These compensations include a package deal that will reshuffle work packages, such as the A30X's final assembly and the development center, between French and German facilities. AIC thus counterbalanced threats of losing governmental funding and support by a juste-retour logic among different programs that again introduced minor changes to the work-

186 Another reason why aircraft manufacturers, such as Airbus or Boeing, are increasingly focusing on core competencies is that aircraft are becoming increasingly complex both in terms of their components and in their production process (Frigant et al. 2006, p. 53). As a result, a steadily growing number of risk-sharing partners are integrated at all stages of the value chain (Jalabert and Zuliani 2009, p. 123). Their involvement will probably continue to grow in the future because aircraft manufacturers are currently striving to outsource more and more systems and fully equipped subassemblies. For further details on the integration of suppliers to Airbus' production, see Mazaud and Lagasse (2007); Mazaud (2007, pp. 274ff.); Kechidi (2008); Jalabert and Zuliani (2009, pp. 125ff.); Lagasse (2010, pp. 135ff.).

187 Interview and press analysis on the work share of the A350 XWB revealed a high assignment of work shares to non-Airbus countries in comparison with previous programs (Flightglobal 2005; 20090727/MS/5; 20091016/EC/1; 20100324/IE/4). In order to reduce costs and gain market shares in growing markets such as China and the Middle East, AIC currently pursues a global-souring strategy. As a result, it increasingly involves local, low-cost producers in aircraft production and development. Moreover, since "global sales imply global manufacturing" (Jürgen Thomas, cited in Herb 2010, translated by the author), offset deals are made. The A320 and the A319 aircraft, which are destined for the Chinese market, are, for example, already assembled in the first final-assembly plant outside of Europe, in Tianjin (Flottau 2008).

package pattern. As a result, the juste-retour logic and with it the Franco-German balance of the former AI organization was maintained in the AIC ownership and decision-making structure until 2010.[188]

5.6.6 Summary

Analysis of the fifth critical juncture indicates that the intensified competition in the work-share allocation procedure provided the Airbus facilities with further room for exerting pressures for change. Airbus France, submitted a bid for the A350 XWB's cabin outfitting and Airbus Spain placed offers for rear fuselage sections — work packages previously assumed by Airbus Germany. The latter again challenged Airbus UK's previous work packages: wing development, equipment and production. Because this intensified competition was limited by the juste-retour logic, the A350 XWB ultimately only introduced minor qualitative and quantitative changes to previous allocations. Table 11 reveals a largely identical work-package allocation in comparison to previous allocations in spite of the division of cabin interior as well as the accordance of final assembly to French Airbus facilities. In line with these results, the quantitative work shares in terms of production costs also revealed some minor changes. Through the prevailing juste-retour logic these were compensated for with commitments on future program's work-share allocation.

[188] Please note that the period of investigation ends in 2010.

Table 11 **The Airbus A350 XWB work packages**
(Sources: Airbus 2007; Hartmann et al. 2010)

Airbus facilities	*Work packages*
Airbus Operations S.A.S (France)	Cockpit up to first passenger door, upper middle fuselage section, center wing box, pylons, final assembly of cabin interior, final assembly
Airbus Operations GmbH (Germany)	Front and rear fuselage sections, parts of the vertical tail, wing equipment, passenger doors, development and manufacturing of cabin interior
Airbus Operations Ltd. (UK)	Wings
Airbus Operations SL (Spain)	Horizontal tail, parts of the vertical tail, lower and rear fuselage sections

5.7 Summary

In sum, findings reveal that actors have maintained overall stability in terms of the qualitative and the quantitative dimension of work share despite continuous countervailing pressures for change. These pressures have initiated minor changes at each critical juncture. As a result, the work-share pattern established by the A300B was largely maintained up to the A350 XWB, with the exact work share differing slightly in each program. This largely stable pattern was renegotiated by actors at every critical junctures. Due to pressures for change, actors have adjusted the pattern through package deals and the allocation of the work share of past or future programs. This adjustment was made possible through the juste-retour logic.

Findings indicate that actors have established in-house competition and a juste-retour logic as rules of their games at the first critical juncture and that they have continued to adhere to them in the times of AIC. Despite the major organizational changes of the integrated company, the rules of the game were maintained, with one of them even being intensified. AI's in-house competition between a limited number of partners was opened to outside suppliers. Competition was thus intensified for the parties involved. The juste-retour logic, however, continued to be applied unchangeably as all parties involved respected an *approximate* balance

between an aircraft program's work-share allocation and the amount of AIC's capital shares held by the national shareholders. Commitments on work-share allocation in future programs served to uphold this approximate balance. As a result, the work shares of the A350 XWB also preserved the broad work-share pattern while introducing some minor changes. These empirical findings are now critically discussed in the light of how actors maintain stability under pressures for change (chapter 6).

6 Explaining Airbus' work-share allocation (A300-A350 XWB)

6.1 Introduction

This chapter discusses how organizational stability in the case of Airbus' work-share allocation is maintained by actors despite continuous pressures for change. The first section summarizes the empirical findings by highlighting the overall stability of Airbus' work-share allocation, continuous pressures for change and the resulting minor changes. The second section discusses these empirical findings in the light of path dependence theory and elaborates on the reasons why conventional path dependence falls short in explaining the simultaneous development of overall stability and minor change. The third section discusses this development through the analytical structurationist framework suggested. As a result, this last section presents a more complex view on path-dependent developments and introduces the concepts of 'path maintenance' and of 'path bending' for explaining Airbus' largely persistent work-share allocation and its changes over time.

6.2 Airbus' work-share allocation: Overall stability despite constant pressures for change

6.2.1 An overall stable work-share allocation pattern

Despite the continuous pressures for change, the empirical findings presented in chapter 5 reveal an essentially stable work-share allocation pattern both in terms of the quantitative and the qualitative work-share dimension. In terms of the quantitative work packages, Table 12 shows that the percentage of the overall production costs attributed to national manufacturers oscillated around a stable distribution pattern. German manufacturers as a rule assumed between 31 and 35.6 percent of production costs while French producers accounted for costs ranging between 35.6 and about 40 percent. These five percent variations are slightly exceeded by British (18 to 26 percent) and Spanish (4.2 to 10 percent) shares, which varied between 8 and 6 percent, respectively.

Table 12 **Essentially stable allocation of quantitative work shares: A300 to A350 XWB**
(Sources: A300: Flight International 1997; A320: Hayward 1986, p. 90; A330/A340: interviews; A380: Mühlnickel 2004, p. 21; A350 XWB: Hegmann 2009b)

	A300 (1969)	A320 (1984)	A330/340 (1987)	A380 (1999)	A350XWB (2006)
	36.5%	36.0%	37.5%	35.6%	38-40%
	32.3%	32.0%	34.0%	35.6%	31-34%
	20.0%	26.0%	23.5%	18.8%	18-19%
	4.2%	6.0%	5.0%	10.0%	10.0%
Total	**93% ***	**100%**	**100%**	**100%**	**100%**

* Fokker-FVW: 7%

In line with these findings, the qualitative work-package allocation also shows an essentially persistent pattern from the A300 to the A350 XWB program. Accordingly, core work packages were always distributed in the same way, as illustrated in Table 13. French manufacturers assumed the cockpit up to the first passenger door, the center wing box and pylons. German companies were consistently responsible for front and central fuselage sections. While British manufacturers provided wings, Spanish producers contributed the horizontal tail. A high-ranking Airbus employee described these developments in the following way:

> "The A300B's first work-share allocation has strongly influenced the division of work of all subsequent programs. The A300B's allocation was always referred back to: Once allocated, we continued in this way. Today, this can be seen in the company's Centres of Excellence (CoE), which are labeled 'transnational', but essentially maintain former national specializations: the CoE wing is located in Great Britain and Bremen, the CoE fuselage

and cabin in Germany, Spain hosts the CoE aft fuselage and empennage and France the CoE for aerostructures" (20100319/MS/6, translated by the author).[189]

Thus, the core division of work persisted from the A300B to the A350 XWB program (Hayward 1986, p. 73; Hornschild 1992, p. 70; Kracht 1994, pp. 58ff.; Schmidt 1997, p. 40; Salot 2006, p. 61; Mazaud 2007, p. 249; Figgen 2008, p. 19).

Table 13 **Stable allocation of core work packages: A300 to A350 XWB**
(Sources: A300: Deutsche Airbus GmbH 1971, p. 6; Kracht 1994, p. 58; Thomas 1999, p. 2; A320: Der Spiegel 1989, p. 140; Aris 2002, p. 123; A330/340: Thornton 1995, p. 132; Aris 2002, p. 146; Rendigs 2005, p. 8; A321: Deutsche Aerospace 1992, p. 38; A380: Mühlnickel 2004, p. 21; Alcouffe 2005b, p. 174; Figgen 2008, p. 20; A318: DaimlerChrysler Aerospace 1999 p.9; A350 XWB: Airbus 2007; Hartmann et al. 2010; A30X: Mihm and Braunberger 2009; Süddeutsche Zeitung 2009; Hartmann and Hildebrand 2010)

	A300	A320	A330/340, A321	A380, A318	A350XWB, A30X
					
Cockpit up to first passenger door, center wing box, pylons					
Front and back fuselage sections					
Wings					
Horizontal tail					

189 The Power8 restructuring program introduced four transnational centers of excellence: wing and pylon, fuselage and cabin, aerostructures as well as aft fuselage and empennage. Today, each center is responsible for managing the production of its attributed aircraft sections. The four centers of excellence replaced the previous eight Centres of Excellence that were structured along national lines (House of Commons 2007, p. 15).

6.2.2 Stability despite constant pressures for change

This overall stability is all the more astonishing in the light of the intense pressures for change emanating constantly from actors involved in the Airbus project. In the times of AI (1970-2001), pressures for change originated from national manufacturers that aimed at gaining more technologically sophisticated work packages. For instance, Deutsche Airbus and its successor companies intended to alter the work-package allocation since the A320 program by continuously exerting strong pressures for change.

After its accession to the Airbus consortium in 1979, British Aerospace also made some attempts for changing the work-package allocation, yet was ultimately never supported by its national government for making the necessary investments. In the absence of governmental support, British Aerospace was forced to align its strategy to one that consisted of sustaining its core competencies within the Airbus venture. The British wing competency was continuously challenged by German efforts for wing development, equipment and production, and later on also by Spanish attempts for furnishing wing-related components. Spanish pressures for change mainly emerged in the A380 work-share negotiations where they strove to gain work packages CASA was previously not involved in. In the times of AIC (2001-2010) the pressures for change were intensified as the integration of the company introduced increased competition among the former national manufacturers.

6.2.3 Marginal changes in non-core work packages

Although the overall work-share distribution has to be regarded as stable over time, the analysis also showed minor changes in qualitative and quantitative terms at every critical juncture as a result of actors' pressures for change. In the quantitative dimension of work share, Table 12 illustrates that the percentage of the overall production costs assumed by national manufacturers has over time fluctuated around certain values. While the fluctuation of German and French manufacturers added up to a maximum of five percent, Spanish and British shares varied by 6 to 8 percent, respectively.

The qualitative work shares also differed slightly. As depicted in Table 14, some non-core work packages were over time assigned to different manufacturers. For instance, after Aerospatiale had assumed final assembly for the first Airbus programs, German manufacturers gained the work package in the A330/A340 negotiations for all future single-aisle programs. In

exchange for ceding the A321's final assembly to Hamburg, Aerospatiale was assigned the A330/A340 cabin interior. A similar exchange was agreed for the A350 XWB and the future A30X, attributing the A350 XWB's final assembly and cabin interior to France and the A30X's final assembly and cabin interior to Germany. Airbus' biggest program, the A380, also introduced some changes to the previous work-share allocation. The program's final assembly was, for example, split between two main production sites, Toulouse and Hamburg, for the first time in the company's history. Furthermore, the vertical tail of the A380 was also divided between German and Spanish companies. Finally, responsibility for different fuselage sections was transferred from German to French manufacturers, just as responsibility for wing equipment was relocated from German to British companies. As a result of the reshuffling of these work packages, the exact work-share allocation of each manufacturer differed with each aircraft program.

Table 14 **Changing allocation of non-core work packages: A300 to A350 XWB**
(Sources: A300: Deutsche Airbus GmbH 1971, p. 6; Kracht 1994, p. 58; Thomas 1999, p. 2; A320: Der Spiegel 1989, p. 140; Aris 2002, p. 123; A330/340: Thornton 1995, p. 132; Aris 2002, p. 146; Rendigs 2005, p. 8; A321: Deutsche Aerospace 1992, p. 38; A380: Mühlnickel 2004, p. 21; Alcouffe 2005b, p. 174; Figgen 2008, p. 20; A318: DaimlerChrysler Aerospace 1999 p.9; A350 XWB: Airbus 2007; Hartmann et al. 2010; A30X: Mihm and Braunberger 2009; Süddeutsche Zeitung 2009; Hartmann and Hildebrand 2010)

	A300	A320	A330/340, A321	A380, A318	A350XWB, A30X
					
Final assembly					
Cabin interior					
Wing equipment					
Vertical tail					

Because these changes remain rather marginal, they cannot be considered as breaking up Airbus' stable work-share allocation pattern. From a technological perspective, the changing work packages depicted in Table 14 do not belong to the core of aircraft production, as was confirmed by several interviewees (20100319/MS/6; 20100322/MS/7; 20110127/CE/4). Due to Airbus' special production system, even final assembly does not belong to the technological core work packages. In the A300's definition phase, Felix Kracht determined work-share partition to first and foremost rely on the pre-fabrication of fully integrated subassemblies. Manufacturers were not only made responsible for the development and production of certain subassemblies such as fuselage sections, but they also had to equip them with the required hydraulic or electronic systems. This use of large integrated subassemblies reduced the importance of final assembly to only four percent of the total amount of work (Hayward 1986, p. 71; Kracht 1994, p. 58). Interviews with high-ranking Airbus employees confirmed that the relocation of final assembly from Toulouse to Hamburg did not disrupt the previously established allocation:

> "Moving final assembly [from Toulouse] to Hamburg did not constitute a break in the usual allocation. The A321 and the A319 and A318 that followed are niche products. Their final assembly cannot be considered as important in the production process and accounts for only four percent of the total costs of a single-aisle aircraft because all subassemblies are already fully outfitted. Final assembly and its associated flight test were good for Hamburg's image and for attracting suppliers to the Finkenwerder site, which created jobs" (20100503/CE/1, translated by the author).

> "Final assembly was first and foremost brought to Hamburg for image reasons, thanks to [Hartmut] Mehdorn, in order to make Airbus more visible and attract a few suppliers related to final assembly" (20100319/MS/6, translated by the author).

To conclude, empirical findings for each of Airbus' critical junctures revealed the stability of core work packages and the coinciding change of non-core work packages. Over the forty years of study, we thus constantly observed the allocation of key work packages to the same countries and sites, while at the same time we also identified the ongoing reshuffling of other marginal, yet symbolically important, work packages. In line with overall stability and minor change of this qualitative work-share dimension, the quantitative dimension revealed that the manufacturers' shares constantly fluctuated around a stable distribution with minor changes only.

6.3 Explaining Airbus' work-share allocation pattern: Shortcomings of path dependence theory

The development of overall stability and minor change at Airbus cannot be sufficiently explained by 'conventional' path dependence theory. First, organizational path dependence cannot adequately explain Airbus' generally stable work-share allocation because it overemphasizes the role of self-reinforcing mechanisms for the development of stability. As a result, path dependence theory overlooks that actors have continuously renegotiated the stability of Airbus' work-share allocation and that they have strategically employed learning effects in order to achieve their goals of either stability or change. Second, organizational path dependence falls short in explaining the minor changes in Airbus' work-share allocation because it cannot capture them with its radical path-breaking explanations.

6.3.1 Shortcomings in explicating the overall stability of work shares

Organizational path dependence falls short in explaining the overall stability of Airbus work-share allocation because it exaggerates the role of self-reinforcing mechanisms for the preservation of stability, and thereby ignores actors' interactions. According to organizational path dependence, self-reinforcing mechanisms gradually restrict the scope of action available to organizational actors. Due to the unfolding positive feedback of complementarity effects, coordination effects, learning effects and adaptive expectation effects, actors are limited in their choices of action to such an extent that they become locked-in to a specific action pattern (Sydow et al. 2009, pp. 699-701). In order to explain the maintenance of stability in the case of Airbus' work-share allocation, organizational path dependence would thus draw on one of its self-reinforcing mechanisms, namely learning effects. These are indeed helpful to explain 'path maintenance' in the case of Airbus. However, the following discussion will elucidate that self-reinforcing learning effects alone are not sufficient to unravel the phenomenon as a whole.

It is widely agreed upon in the literature that "the more often an operation is performed, the more efficiency will be gained when operating subsequent iterations" (Sydow et al. 2009, p. 699). This generates important productivity gains for an organization. Learning effects are especially crucial in aircraft production: "direct labor hours required to assemble each aircraft decrease significantly" (Argote 1999, p. 1). In 1936, Theodore Paul Wright had already observed that aircraft production runs more smoothly when performed by the same people over time

(Wright 1936). Subsequent literature on aircraft production has confirmed that learning effects generate decreasing average unit costs due to a more efficient operation of tasks (Asher 1956; Alchian 1963; Hartley 1965; Bletschacher and Klodt 1992, pp. 74-75; Hornschild 1992, p. 54; Neven and Seabright 1995, p. 322; Argote 1999, p. 2; Hill 2008, p. C23).[190]

In the case of Airbus production sites, increasing experience allowed for a more efficient operation of tasks at the site level. As a result, the cost for each unit diminished over time. Learning effects also encouraged further investments in certain technologies and the hiring of specifically trained engineers. Former German site managers confirmed that these specialized resources again resulted in additional investments in the sites' existing technologies and competencies, which further reduced production costs and developmental periods (20100216/CEO/2). While sites gradually built up specific equipment and immaterial assets, such as knowledge and competencies, their switching costs increased significantly. Over time, the allocation of work packages to the same production sites has thus generated learning effects, which resulted in the specialization of facilities and nations in specific components and interrelated aircraft systems (Muller 1990, p. 35; Schmidt 1997, p. 40; Tore Prang, Airbus spokesman in Hamburg, cited in Herb 2010).

AI has from the very beginning aimed at exploiting learning effects at the site level and at fostering specialization among the national manufacturers through the specific set-up of its production system. Under the leadership of Felix Kracht, a production system was established that took into account the competencies the national manufacturers Aérospatiale, Deutsche Airbus and Hawker Siddeley had acquired prior to their Airbus involvement (Hayward 1987, p. 20). Building on these already existing competencies, each national manufacturer was made responsible for specific work packages, which allowed them to concentrate their development and production efforts on specific components over time (20100216/CEO/2). French and British engineers that had already acquired much development and production experience with cockpits and wings through their work on Caravelle, Comet and Concorde, were also accorded

190 The exact learning rate reached in Airbus' production cannot be calculated because the company's cost data are of course not publicly available. Based on Hartley (1965) and data from Boeing's B737 production, literature, however, generally assumes a learning rate of 0.2 when the cumulative output doubles (Bletschacher and Klodt 1992, p. 74; Benkard 2000, p. 1036; Hill 2008, p. C23).

responsibility for these work packages in the A300B (20110127/CE/4). Today, in the A350 XWB program French and British manufacturers still assume responsibility for cockpit and wings.

However, self-reinforcing learning effects are not sufficient for explaining the maintenance of Airbus' overall stable work-share allocation. The case of Airbus' work-share allocations draws attention to the key role that actors play in upholding path-dependent processes over time. Empirical evidence from Airbus reveals that stability does not just occur through the unfolding effects of self-reinforcing learning mechanisms. Instead, actors have collectively renegotiated the work-share allocation of every aircraft program. During their work-share negotiations they acted strategically, argued for stability or exerted pressures for change in order to achieve their interests. While, for example, French manufacturers mainly aimed at maintaining things the way they were, German manufacturers were interested in altering previous work-share allocations.

Still, learning effects played an important role in the work-share negotiations because they placed manufacturers that had acquired them in a better starting position in the in-house competition procedure. During this procedure, national manufacturers bid for the allocation of work packages on the basis of their existing competencies. Manufacturers that were most advanced and were thus able to offer the best cost-quality ratio gained work packages in the competitive process. The more often certain manufacturers were accorded a certain work package, the more they learned how to develop and to produce it most efficiently. Over time, the allocation of work packages to the same production sites generated learning effects, which resulted in the specialization of facilities in specific components and interrelated aircraft systems. These gains from specialization made it especially hard for other manufacturers that had not yet accumulated expertise and thus started at a lower level of the learning curve to bid competitively for knowledge-intensive, high-tech components. However, with the support of their respective governments, some manufacturers invested massively in order to acquire competencies that would allow them to place competitive bids in the context of the in-house competition procedure. For instance, DASA invested much for gaining the A321's final assembly line, just as CASA did for obtaining some of the A380's lower and rear fuselage sections. However, manufacturers not only invested for receiving new work packages. Confronted with German and Spanish pressures for change, British Aerospace, for example, also invested for advancing its wing development, equipment and production competencies in order to keep its 'traditional'

work packages. As a result, actors actively influenced learning effects and strategically employed them for achieving their goals in the work-share negotiations.

6.3.2 Shortcomings in capturing minor changes in work shares

In addition to failing to capture the full complexities of preserving stability, organizational path dependence cannot explain the minor changes empirical findings reveal in the case of Airbus' work-share allocation (see Table 14).[191] This is because path dependence theory assumes that actors gradually become extremely restricted in their scope of action due to the unfolding effects of self-reinforcing mechanisms. At a certain moment in time, actors become locked to a previously defined, inflexible decision-making pattern. Following this line of thought, actors renegotiating a program's work-share allocation would be bound to replicate decisions they made in the past. Accordingly, actors would identically reproduce the A300B's work-share allocation over time. Consequently, there would not be any changes in Airbus work-share allocation during the forty-year period covered by the study.

With regard to the relationship of stability and change, organizational path dependence only differentiates between full path stability and radical path breaking. Thus, the only way path dependence scholars can account for change is through their conception of path breaking. This "effective restoration of a choice situation" (Sydow et al. 2009, p. 702) can only be initiated by external shocks since organizational actors are considered to be locked-in to a certain action pattern. In the case of Airbus' work-share allocation, however, the continuous minor changes we observe do not come from outside of the organization. Instead, these modifications are continuously renegotiated by actors from inside of the organization.[192] To conclude, the minor

[191] Because these changes remain of minor nature, they allow rejecting sunk-cost arguments as alternative explanations for Airbus' stable work-share allocation. Sunk costs are defined as capital bound to specific investments, which cannot be recovered or reused for other purposes (Bletschacher and Klodt 1992, p. 73, translated by the author). Due to the huge investments, the long-term resource commitments and the high exit barriers, the aircraft industry seems especially prone to an accumulation of sunk cost. However, the changes this study has uncovered, reveal that even "ancestral work packages" that were previously considered to belong to one party, can move from one site to the other (Mehdorn 2010a, translated by the author).

[192] For a detailed description of the Airbus organization and its actors in the old Airbus Industrie GIE organization (1970-2001) and in the new Airbus Integrated Company organization (2001-2010), please refer to chapter 4.

changes in Airbus' overall persistent work-share allocation pattern can thus neither be captured by path dependence theory nor its path-breaking explanations.

6.4 The Airbus' work-share allocation path: Explanations from a structurationist perspective

6.4.1 Stable work-share allocation as the result of repeated negotiations

By applying a structurationist perspective to the case of Airbus, this study shows how organizational stability was actively maintained by actors under constant pressures for change. The analysis of Airbus' work-share allocations reveals that actors have collectively renegotiated the division of work of every aircraft program. The details of this process are illustrated by explicitly highlighting the threats to stability over forty years. In the times of AI (1970-2001), the work-share allocations for the programs A300, A320, A330/340 and A380 were exclusively determined by the national manufacturers in line with AI's commercial guidelines and governments' financial commitments. During their work-share negotiations actors behaved strategically. Depending on their respective interests they exerted pressures for stability or for change. For instance, French Aérospatiale mostly strove to preserve the status quo while Deutsche Airbus and its successor DASA put strong pressures on French and British work packages. In the times of AIC (2001-2010), the work-share allocation procedure was modified by placing AIC in the position to centrally distribute work shares. For the A350 XWB program, the newly created national facilities thus entered into a tendering procedure on a cost-quality basis and AIC ultimately assigned work packages to specialized Airbus sites or outside suppliers. This centralized allocation procedure intensified the pressures for change because such pressures were not only exerted by the limited number of Airbus facilities but also by the outside suppliers. Against this background, it is all the more astonishing that Airbus' work-share pattern continues to endure up until the A350 XWB program.

6.4.2 Work-share negotiations guided by common rules

The empirical findings reveal that the actors involved have agreed on common rules for negotiations at the very beginning of the Airbus project and that they have reproduced these rules, with only recently introduced modifications, until today. During their first work-share negotiation (A300B), the national manufacturers decided to apply an in-house competition

procedure, i.e., a procedure in which they competed against each other on the basis of their competencies. Furthermore, they followed a juste-retour logic understood as an approximate balance between an aircraft program's work-share allocation and the amount of AI / AIC capital shares held by the national manufacturers or national shareholders. Despite the major organizational changes of the integrated company, these rules were only slightly modified for the allocation of Airbus' latest program (A350 XWB). Both rules are now elaborated on in detail.

6.4.2.1 In-house competition

Originally set up during the A300B work-share negotiations, the in-house competition procedure governed the A320, A330/A340 and A380 negotiations and was even intensified for the allocation of Airbus' latest program, the A350 XWB. Due to their experiences from other previous collaborative projects, the national manufacturers agreed on an in-house competition procedure for Airbus' work-share allocation. This competitive procedure was approved for the A300B by all parties involved in order to avoid the costly duplication of work, for instance experienced in the Concorde program, and make use of the manufacturers' existing technological expertise. This procedure thus conferred work packages to actors that possessed expert knowledge and specialized engineering know-how. In-house competition was applied in all of the examined programs and even intensified for the A350 XWB. For this program, AI's in-house competition between a limited number of partners was opened to outside competitors. As a result, competition increased for the former national manufacturers, who now, as newly created national facilities, did not only have to compete among themselves but also had to enter into a tendering procedure on a cost-quality basis with outside suppliers.

6.4.2.2 Juste-retour logic

Deutsche Airbus initiated the juste-retour logic in the A300B's work-share negotiation in order to counterbalance the effects of the in-house competition procedure. The national manufacturers were in very dissimilar conditions in the late 1960s. The post-Second World War production ban[193] and the loss of qualified personnel had left the West German industry scattered and small

[193] After the war, the German industry's production facilities were destroyed and much of its manpower lost. A post-war production ban prohibited aircraft development and production in

in overall size. In contrast, French and British engineers had acquired profound experience through their work on the Caravelle, the Comet and the Concorde and were producing state-of-the-art technology (Roeder 2011). In order to compensate for its technological handicap, Deutsche Airbus mobilized financial resources other partners were lacking. Through these contributions, the German consortium ensured that the A300B's quantitative work share was balanced between the French and the German manufacturers and claimed work packages in their approximate amount. In this way, Deutsche Airbus introduced a juste-retour rule between a program's work-share allocation and the amount of AI's capital shares held by the national manufacturers. This juste-retour logic, which also guaranteed the Franco-German balance, was reproduced by the national manufacturers and in this way became one of the two rules for all future work-sharing negotiations.

6.4.2.3 In-house competition and juste-retour logic: Two rules combined in Airbus' coordination effect

Because the two rules increased the efficiency of the work-share negotiations and significantly reduced the uncertainty for the actors involved, their joint reapplication is considered as the self-reinforcing coordination mechanism on which Airbus' work-sharing path was built. Path dependence theory defines a coordination mechanism as a self-reinforcing effect that generates increasing returns due to the "benefits of rule-guided behavior" (Sydow et al. 2009, p. 699). These generate positive feedback for actors because "behavior that is guided by rules can be anticipated, and the likely reactions can be taken into account. That is, the more actors adopt and apply a specific institution (such as an organizational rule or an interorganizational road map), the more efficient the interaction among these actors, thereby reducing the coordination costs" (Sydow et al. 2010, p. 177).

The two rules increased the efficiency of the work-share negotiations. This was because not all manufacturers within the Airbus consortium possessed the capability and the ambition to deliver every subassembly or component of an aircraft program. As, for example, not every manufacturer placed a bid for supplying the cockpit in the in-house competition, the national chief engineers did not have to renegotiate its allocation for every new program. The existing

West Germany until 1955, obliging aerospace engineers to either switch to other national industry sectors or to work in other European countries (20110331/IE/9).

competencies thus restricted the possible distributions among the four manufacturers. Gains from specialization made it increasingly difficult for manufacturers that had not yet accumulated a certain expertise to bid competitively for knowledge-intensive high-tech components. A new program's work-share allocation was thus largely determined in line with previous allocation decisions (chapter 5). This was confirmed by a high-ranking Airbus employee. According to him "a great deal of the work share was already set" (20100319/MS/6, translated by the author). This restricted solution space accelerated the negotiation process as a whole. The juste-retour logic also contributed to making negotiations more efficient. Due to this rule, the national manufacturers were certain to receive work packages in accordance with their AI or AIC capital shares. As a result, not all manufacturers placed bids for all work packages. For example, Spanish CASA with its 4.2 share of AI did not submit offers for the cockpit because its production costs would have by far exceeded the Spanish quantitative work share. Negotiations could thus be finalized more quickly.

In addition to speeding up the negotiation process, the juste-retour logic reduced the uncertainty of investments for all parties involved. This was because the juste-retour logic guaranteed certain returns to the manufacturers. Thereby, it significantly reduced the risks of the huge investments generally required in aerospace. This allowed the national manufacturers to invest in, for example, new technologies without taking risks that threatened their very existence. Due to the juste-retour logic, the national manufacturers had the 'quasi-certainty' of the return on their investments.

Rule-guided behavior thus increased the efficiency of negotiations over time and reduced the risks of uncertainty for all parties involved. The reapplication of the in-house competition and the juste-retour rule made negotiations faster and more predictable for the actors. In addition, the risks of investments were significantly reduced by the actors' abiding to their self-defined rules. Due to these positive effects, actors have chosen to reapply the two, at times conflicting, rules over the forty years covered by the study. As a result, Airbus work-share allocation can indeed be understood as a path sustained by the positive feedback of a self-reinforcing coordination mechanism.

6.4.3 Path maintenance through path bending: Preserving stability by permitting minor modifications

Today, it is widely agreed that Airbus constitutes a European success story (see, for example, Watzke 2010; Hamburgisches WeltWirtschaftsInstitut 2012). The collaborative project has grown from a one product company to a worldwide successful aircraft manufacturer that broke the "US monopoly of the skies" (20100319/MS/6, translated by the author). Since 2000, Airbus and Boeing have alternated as the market leader, depending on the measurement used to determine market share: orders or sales.[194] A current 70 percent sales share and new order records, especially for the A320neo[195], underline that Airbus as former European challenger to date acts on an equal footing with its major rival the Boeing Commercial Airplanes (Köhn 2012a, p. 12).[196]

Airbus' stable work-share allocation path is regarded as one of the key reasons for Airbus' success. Industry experts acknowledge that "the work-sharing formula is one of the key elements of the Airbus story" (Aris 2002, p. 20). Over the forty years covered by this study, this 'formula' resulted in an essentially stable work-share allocation pattern both in terms of the quantitative and the qualitative dimensions (chapter 6.2.1).

This stable work-share allocation path was maintained by actors through their rules of the game. With regard to the quantitative work shares, stability was maintained because the difference between an aircraft program's work-share allocation and the amount of AI / AIC

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194 For Airbus' and Boeing's current orders and deliveries, please refer to http://www.airbus.com/company/market/orders-deliveries, for Airbus, and to http://active.boeing.com/commercial/orders/index.cfm, for Boeing (last accessed 15 December 2012).

195 The A320neo ("new engine option") is a modernized derivative of the A320 program and first and foremost incorporates new more efficient engines (Hartmann and Hildebrand 2010). Thereby, it is said to reduce the programs' overall fuel consumption by "15 per cent" (Airbus 2013). The A320neo was officially launched on 1 December 2010 (Airbus 2013). An exact date for its entry into service and the first delivery to launch customers was, however, not specified at the termination of this study.

196 Together, Airbus and the American Boeing company today jointly dominate the world market for civil aircraft. Nevertheless, new competitors in the BRIC countries are challenging Airbus and Boeing by targeting the short-haul, single-aisle market segment for aircraft with more than a 100 seats (see, for example, Ecorys 2009, pp. 157ff.; Theurer 2010; Hamburgisches WeltWirtschaftsInstitut 2012, pp. 8-9). However, even if these competitors succeed in entering this market segment, the established manufacturers' duopoly will continue to persist in the long-haul market segment for the next decades to come (20091207/IE/3).

capital shares held by the national shareholders should not exceed the approximate balance promulgated by the juste-retour logic. In order to keep all actors 'on board', every national manufacturer and with them their national governments had to get their fair share of Airbus' work share. For the national manufacturers this meant keeping a significant part of R&D and production. For the funding national governments it meant substantial effects on national employment (20090430/IE/1):

> "Airbus had to organize things in such a way as to keep everybody in Europe happy. If you want everybody to take part, there has to be something for everybody" (Hartmut Mehdorn, cited in Aris 2002, p. 147).

In order to assure that all actors stayed committed to the program, the *approximate* balance between an aircraft program's work-share allocation and the amount of AI or AIC's capital shares held by the national manufacturers or national shareholders was always maintained from the A300B to the A350 XWB program. The juste-retour logic thus largely generated stability in Airbus' work-share allocation over time.

As the juste-retour logic, the in-house competition rule mainly contributed to replicating a stable work-package distribution among sites and countries over time. The in-house competition procedure allocated work packages to manufacturers whose sites possessed specialized competencies. Gains from specialization made it increasingly difficult for manufacturers that had not accumulated a certain expertise to bid competitively for knowledge-intensive, high-tech components. The existing competencies thus restricted the possible work-package distribution among the four manufacturers. As a result, core work packages, such as the cockpit, the wings as well as front and central fuselage sections, were constantly distributed in the same way. The reallocation of these core work packages to the same manufacturers increased the specialization of facilities and thereby facilitated technological innovation within the Airbus organization. In this way, specialization established nothing less than the "European technical excellence in aerospace" (Hayward 1987, p. 19).

The work-share allocation path was thus extremely positive for the Airbus company as a whole. As discussed, the stable distribution contributed greatly to Airbus' success by on the one hand keeping all actors 'on board'. With the contribution of different resources, such as expert knowledge or financial means, the national manufacturers were all important for the success of the project. The withdrawal of one manufacturer would have deprived the Airbus consortium of

resources key to its survival, especially at the outset of the project.[197] In addition to assuring that all actors stayed committed to the project, the stable work-share distribution on the other hand fostered specialization among the national manufacturers. By providing a protected space for investment, it spurred innovation and allowed Airbus to pursue a market entry strategy of technological excellence (Muller 1989, p. 175). Accordingly, Roger Béteille, one of the founding fathers of AI, already emphasized in the late 1970s that the "key to Airbus' success lay in specialization" (Roger Béteille, cited in Hayward 1986, p. 74). As a result, the work-share allocation path is one of the reasons why Airbus today is on a par with Boeing.

However, in order to maintain this beneficial work-share allocation path, minor modifications in the qualitative and the quantitative work-share dimension were necessary. This was due to actors' constant pressures for change (chapter 6.2.3). In addition to reproducing stability, the rules of the game permitted actors to react to such pressures by inducing minor changes to Airbus' work-share allocation path.

The in-house competition rule, for example, allowed actors to initiate minor changes when manufacturers had strategically invested in new competences and had thereby reached a competence level that allowed them to offer work packages on a competitive cost-quality basis. National and regional governments generally supported their respective manufacturers in such aims through their industrial policies. Since the costs for building up new competencies remain huge in aerospace in general and in civil aviation in particular, such strategic investments were only made in a few, symbolically important work packages, such as final assembly. Moreover, actors exerted pressures for change during the in-house competition when the value of their work packages was altered due to, for example, technological developments (Mehdorn 2010a). For example, cabin interior is today considered a key work package for airlines and has therefore also gained in importance among the manufacturers (20110128/CE/6). As a result, French Airbus facilities bid for this work package for the first time in the allocation process of the A350 XWB (chapter 5.6.3.2). The in-house competition thus functioned as an internal market mechanism. The possible bidding of different manufacturers for the same work packages incited

[197] Spanish CASA with its small share of 4.2 percent can of course not be considered as being equally important to Airbus' success as the big shareholders Deutsche Airbus and Aerospatiale. However, through its participation CASA provided the European aircraft program with a larger sales market (20100610/EC/2) and thereby did indeed contribute a resource crucial to Airbus success especially at the outset of the project.

the national manufacturers to strive for an efficient production (20100216/CEO/2) and to invest in work packages they wanted to keep or to gain. The competitive pressures prevented them from resting on their accomplishments because the internal market did not allow any weaknesses. Competencies needed to be continuously improved for the next work-share negotiations. Because the in-house competition rule also allowed the reshuffling of work packages, it thereby helped to correct inefficiencies at least in the non-core work packages.

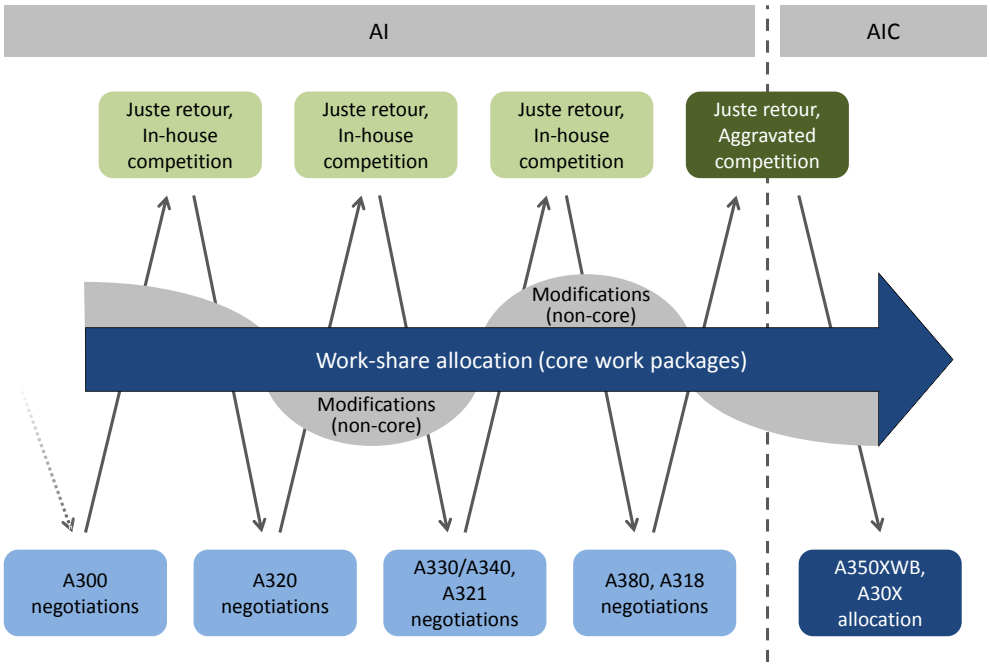
The juste-retour logic allowed actors to introduce minor change to the previously established work-share pattern, for instance, when one of them had obtained additional work packages in the in-house competition procedure through strategic investments in new competencies. In this case, the juste-retour logic required the manufacturer to cede responsibility for other work packages and thus compensate others for its gains inside the Airbus system (Mehdorn 2010a). Thus, the juste-retour logic attenuated the competitive pressures of the in-house competition among the national manufacturers. Functioning as an internal compensation mechanism, the juste-retour logic limited the possible results of a program's work-share allocation. For example, even if one manufacturer was significantly better in producing all of a program's subassemblies and systems, the juste-retour logic limited the manufacturer's work-share allocation to his overall amount of AI / AIC capital shares. The in-house competition rule and the juste-retour logic thus stood in a relation of mutual tension.

Taken together, the two rules provided the partners with the flexibility they needed in order to resolve their conflicts by adapting every new work-share allocation to its specific circumstances. Because all the manufacturers intended to conserve their competencies and to expand their activities in areas they had strategically invested in, the work-share negotiations were long and hard-fought. In these rigorous and sometimes deadlocked conflicts on the basis of in-house competition, the national manufacturers constantly made use of the juste-retour logic in order to unblock the situation. In times when their conflicts paralyzed the progress, the juste-retour logic allowed actors to negotiate package deals and compensations between current and past/future program's work-share allocation. These compromises often introduced minor changes in non-core work packages to previous allocations. For example, when Deutsche Airbus wanted to gain final assembly for the A321, it needed to compensate Aerospatiale for its gains by ceding the A330/340 cabin interior to the French manufacturer (chapter 5.4). Although the juste-retour logic, and with it the Franco-German balance, was continuously contested within the negotiations (20100324/IE/5), this rule allowed the flexible adaptation to the changed

interests of partners. The same holds true for the in-house competition. In their specific combination, the two rules thus provided the manufacturers with the flexibility to adjust to specific circumstances. Thereby the rules of the game made agreements among the partners possible and countervailed path-breaking tendencies.

To conclude, the empirical findings reveal in detail how actors maintained and modified Airbus' work-share allocation path through the rules of the game. Figure 17 illustrates that the two rules were reapplied from the A300 to the A350 XWB's negotiations, with the in-house competition rule being aggravated in AIC's most recent work-share allocation process. The juste-retour logic, however, continued to be applied unchanged. With the help of these two rules, the national manufacturers actively maintained a stable distribution of core work packages across sites and countries. Due to the constantly re-emerging pressures for change, this 'path maintenance', however, proved to be challenging for the actors involved. In order to handle them, the manufacturers recurrently made use of the rules of the game. In addition to reproducing stability, the rules also provided the actors with the flexibility to adjust Airbus' work-share path when necessary. As illustrated in Figure 17, this resulted in constant modifications of non-core work packages. These recurring changes must not be regarded as path-breaking disruptions. Instead, the observed phenomenon of 'path bending' reveals how actors situationally adjusted the stability of Airbus' work-share allocation. Such minor modifications appeared necessary for preserving the beneficial path over time.

Figure 17 **The Airbus work-share allocation path and its minor modifications (1970-2010)**



To conclude, the case of Airbus' work-share allocation showed that the maintenance of stability over long periods of time required modifications. Overall stability, which was crucial for Airbus' success, could only be preserved through minor adaptations over time — stability thus required change.

6.5 Summary

The objective of this chapter was to discuss the study's empirical findings. While findings revealed minor changes over time, they first and foremost disclosed a persistent core work-share allocation pattern that did not change over the five critical junctures examined, despite continuous pressures for change. The development of overall stability and minor change at Airbus' work-share allocation was first discussed in the light of 'conventional' path dependence theory, which falls short in explanations these developments. Path dependence theory cannot adequately explain Airbus' generally stable work-share allocation because it underestimates the key role that actors play in upholding path-dependent processes over time. In addition, the theory falls short in capturing the observed minor changes with its radical path-breaking explanations.

By discussing the developments of overall stability and minor change through Crozier and Friedberg's structuration perspective, it became visible that actors have repeatedly renegotiated Airbus' work-share allocation on the basis of two closely coupled rules of the game. The in-house competition and the juste-retour logic jointly increased the efficiency of actors' interactions and significantly reduced their uncertainty over time. The joint reapplication of these two rules gave rise to the self-reinforcing coordination mechanism by which Airbus' beneficial work-sharing path was actively maintained. Furthermore, they provided the actors with the necessary flexibility to counterbalance path-breaking tendencies through minor modifications, a phenomenon conceptualized as 'path bending'.

7 Conclusions

7.1 Introduction

This concluding chapter outlines the study's findings and discusses the conclusions. After a brief summary, the theoretical and practical implications of the empirical findings are discussed. While the theoretical implications relate to organizational path dependence in general and to its understanding of stability and change in particular, the practical implications address whether Airbus can serve as a role model for similar multinational joint ventures and how the study's findings relate to Airbus' future work-share allocations. The chapter then addresses the limitations of the study and concludes by formulating directions for further research.

7.2 Summary of the study and its empirical findings

The objective of this study was to advance our understanding of the developments of stability and change as a result of the interaction of actors over time. To shed light on these scarcely researched developments, this study asked: *how is organizational stability maintained by actors over time despite countervailing pressures for change*? In order to explore this research question, the study draws upon a structurationist interpretation of organizational path dependence and thereby explains the upholding of organizational stability with a coordination effect based on common rules for actors' interactions.

By criticizing 'conventional' path dependence theory for its underemphasized role of agency in the examination of such processes, this study builds on previous more actor-centered approaches to advance organizational path dependence with a more detailed conceptualization of actors. The structurationist approach of Michel Crozier and Erhard Friedberg (1977, 1980, 1995) is particularly valuable for analyzing the action of organizational actors in the context of structures they negotiate collectively and thereby allows to shed light on the complexities of organizational stability and change. This study applies Crozier and Friedberg's strategic analysis as the analytical framework. A qualitative longitudinal case-study design was conducted to examine the work-share allocation of the European aircraft manufacturer Airbus. This case shows evidence of a largely persistent work-share allocation pattern that emerged as a result of the interactions of different groups of actors in spite of recurring pressures for change. Five critical junctures in the history of Airbus were studied as embedded sub-cases, which were then

compared to investigate and to theoretically account for the developments of organizational stability and change over time.

The study's empirical evidence shows that actors have maintained the broad work-share allocation pattern established by the A300B up to the A350 XWB, with the exact work share differing slightly in each program. This overall stability and its minor changes emanated from actors that have always renegotiated a new aircraft program's work share with the help of common rules. By the reapplication of the in-house competition and the juste-retour logic, actors maintained and partially adjusted the qualitative and the quantitative work-share allocation. These two rules, reapplied together, functioned as the self-reinforcing coordination mechanism on which the Airbus' work-sharing path is built. In addition to permitting stability, the rules also provided the actors with the flexibility to recurrently introduce minor changes through package deals and intertemporal compensations on future programs' work shares. In order to situationally resolve their conflicts, actors thereby bent the overall beneficial work-sharing path over time. These main empirical findings are now translated into the theoretical discussion on organizational path dependence.

7.3 Theoretical implications

The empirical findings have several implications for the academic discourse on organizational path dependence. Evidence from studying stability and change in the case of Airbus contributes to enhance the theory of organizational path dependence in several domains.

7.3.1 Path dependence as "agentic phenomenon"

First, the study confirms that "path dependence is essentially an agentic phenomenon" (Sydow et al. 2010, p. 190). By rethinking path-dependent developments from a structurationist perspective, this study draws attention to the significant role that actors play in path-dependent developments and reveals that the maintenance of such processes is more complex than the conventional literature on organizational path dependence suggests. As a result of the differentiated perspective on the interactions of actors in the context of structures they have collectively determined, actors are not conceived of as being locked-in to a certain action pattern. Instead, actors are understood as intelligent and strategically behaving beings that mobilize resources in order to achieve their differentiated goals. Such actors interact within the context of organizational structures, i.e., the rules of the game, which they have previously

agreed upon. Although these rules restrict the number of strategies actors can choose from, actors remain free to select and implement their specific strategies within the rules' boundaries. Therein, actors always retain room for maneuver, not least because of the "dialectic of control" (Giddens 1984, p. 374), and can adjust their behavior to the strategies of others. By situating path-dependent developments in the context of the "reciprocal constitution" (Sorge 2006, p. 183) of strategic actors and structures within organizations, this study sheds light on the complex organizational bargaining processes actors engage in for negotiating stability and change. Thus, it supports the argument of Sydow et al. that "by identifying different types of structures and actions, as well as the relationships among them, structuration theory opens up the black box of path dependence to help explain how actors negotiate their involvement […] and how they reflexively assess, adjust, or resist their own and others' engagements" (Sydow et al. 2010, p. 190).

7.3.2 Interlinked rules as self-reinforcing coordination mechanism

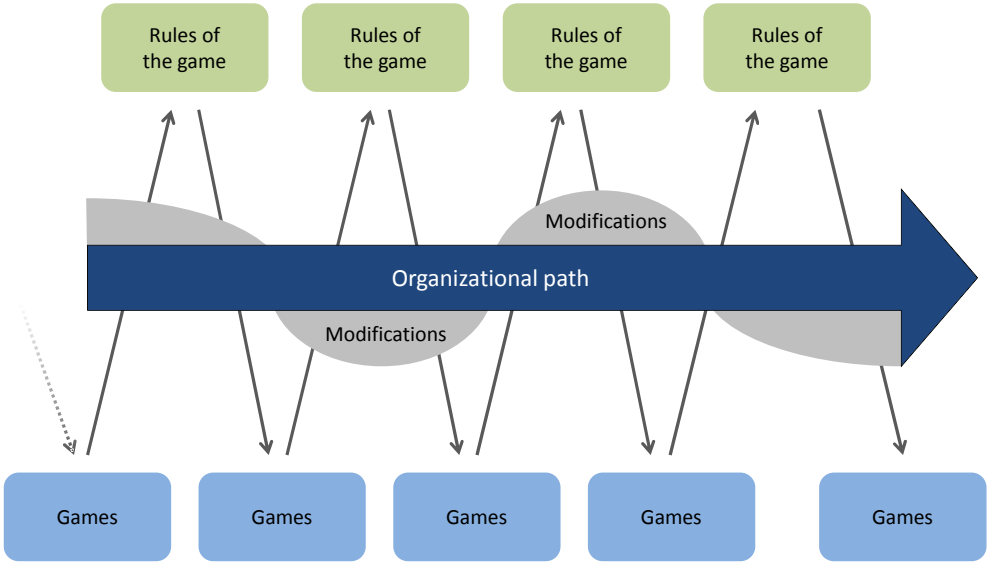
Second, this study draws attention to the fact that self-reinforcing mechanisms are more complex than organizational path dependence suggests. Empirical findings reveal that the depicted coordination mechanism is comprised of two strongly interlinked rules that governed the negotiations. Only in their specific combination did the two components provide the actors with the flexibility they needed for resolving their conflicts. Applied together, both rules can thus be understood as a coherent pattern "in which the pieces fit together in a complementary fashion, making the other pieces more valuable" (Milgrom and Roberts 1995, p. 202). Such an understanding adds to Botzem (2010, p. 220), who highlighted that organizational path dependence should conceptualize its mechanisms as complex phenomena which are affected by the actions and the decisions of actors. This study's empirical evidence confirms that path dependence theory requires a more differentiated conception of its self-reinforcing mechanisms. As the findings indicate, it is worth studying them in detail with the help of structurationist approaches because such a perspective has much to offer for actor-centered reinterpretations of established self-reinforcing mechanisms.

7.3.3 The notion of path bending: A less radical conception of change

Third, the study brings to light that actors maintain organizational stability by rules that allow them to situationally induce minor changes to a path. The study demonstrates in detail how actors reproduce stability and how they thereby deal with pressures for change that emanate

constantly from the actors involved. With its in-depth analysis of five critical junctures, the study reveals that actors recurrently make use of the rules of the game in order to react to path-breaking tendencies by introducing minor changes to the previously established pattern. Figure 18 depicts this phenomenon which is defined as path bending. Path bending illustrates how strategic actors interact in the context of repeated games, governed by rules of the game which simultaneously enable and constrain the action of actors.

Figure 18 **Conceptualizing path bending**



The phenomenon of path bending draws attention to the fact that path-dependent trajectories are more complex and more difficult to uphold than conventional path dependence theory suggests. Path bending challenges its understanding that a once established path is automatically and identically reproduced over time. It is because of this belief that organizational path dependence tends to overlook minor modifications and to focus solely on the reproduction of stability. Path bending, on the contrary, especially highlights minor but crucial changes to a previously established pattern. It demonstrates that stability proves to be relative rather than absolute (Sorge 2005, p. 234) when actors situationally adjust a path in order to uphold it. Such modifications appear necessary for responding to path-breaking tendencies and for maintaining a path, which is conceived of as beneficial by all actors involved. The presented empirical findings indicate that paths might not only be worth "planning for", as suggested by Sydow et al.

(2010), but also worth preserving by actors once in place. Following this line of thought, the introduced concept of path bending should encourage scholars of organizational path dependence to rethink their negative conception of paths.

Furthermore, this study advocates a less radical conception of change to overcome the dichotomy of either complete stability or radical breaking. The conventional theory of organizational path dependence and its path-breaking explanations to date fall short of explaining the simultaneous developments of overall stability and minor changes over time. According to scholars of conventional path dependence, path breaking, defined as the "restoration of a choice situation" (Sydow et al. 2009, p. 702), can only be initiated by forces coming from outside of the organization. External shocks trigger change processes, which are then abrupt and radical in nature. The empirically observed changes of this study are, however, negotiated by organizational actors and remain small on the whole. Because scholars of conventional path dependence neglect change that comes from inside of the organization, they would most probably not consider the depicted process as being path-dependent and would therefore exclude it from further examination. However, such a way of proceeding narrows the possible application of organizational path dependence. With the notion of path bending, this study offers a less radical conceptualization of change that explicitly takes minor changes into account. Such a line of thought is in keeping with scholars of institutional path dependence that have observed similar developments in form of on-path and off-path changes (Thelen 1999). Accordingly, it appears worthwhile for organizational path dependence to overcome the dichotomy of either complete stability or breaking. A theoretical refinement concerning the nature of change and its origins promises to contribute much to its enhancement.

7.3.4 Stability requires change

Fourth, the study presented an empirical setting where stability over time required change. It thereby offers a way to reconcile the seemingly contradictory relationship of the two phenomena. Actors collectively decide to implement minor changes they judge compulsory for achieving overall stability. Thereby actors "come to combine [the] conceptual opposites" of stability and change (Arnold and Sorge, p. 2). In order to capture the complexity of organizational developments, stability and change must thus not be considered as "paradoxical; they need not be mutually exclusive or interfering but can enable each other" (Farjoun 2010, p. 221). With the concept of path bending, "the incorporation of stability and continuous change in the same

theory" should thus no longer present "a paradox" (Poole and Van de Ven 1989, p. 564). This study showed that researchers can unravel the developments of stability and change when applying a structurationist perspective (Schreyögg and Sydow 2010, pp. 1256-1260). Sydow et al. (2010, p. 190) confirm that "the analytical value of structuration theory is that it makes visible how actors enact structures […] and realize existing institutions, either to reproduce or to modify them. This makes this theory a valuable interpretative framework for understanding the processes that are implicated in path dependence". Crozier and Friedberg's nearly forgotten structurationist approach to organizations (Crozier and Friedberg 1977, 1980, 1995) has much to offer in this respect.

7.4 Practical implications

After having discussed the theoretical implications, this section addresses the study's practical implications. First, the application of the identified rules of the game to other industries is elaborated. Second, the impact of the intensified in-house competition in the A350 XWB negotiations as well as the effect of AIC's internationalization efforts on future work-share allocations are laid out. Third, I comment on recent government interventions that aim at maintaining the juste-retour logic in the light of these new developments.

7.4.1 In-house competition and juste retour: Best practices for collaboration?

The empirical findings reveal the best practices of Airbus' work-share allocation over the 40 years of study. As an Airbus pioneer stated "work sharing was born with Airbus and has been an integral part of the company since the very beginning" (20100319/MS/6, translated by the author). As a result, the work-share allocation among its industrial partners constitutes one of the key elements for understanding Airbus (Aris 2002, p. 20) and for explaining why the complex and federated organization of Airbus still exists today. In the times of AI (1970-2001) and AIC (2001-2010), in-house competition and juste-retour logic governed the work-share negotiations of the Airbus company. Taken together, the rules of the game combined an internal market mechanism with the 'quasi-certainty' of the return on investments. In their specific combination, the rules allowed specialization in core work packages (chapter 6.2.1) and generated competition in non-core work packages (chapter 6.2.3) while guaranteeing a fair return for the partners involved. Thereby the rules promoted innovation and helped Airbus to grow from a one product company to a worldwide successful aircraft manufacturer with a

complete product range of aircraft. Through their innovative and balancing effects, the rules thus contributed much to Airbus' success.

Apart from Airbus, in-house competition paired with a juste-retour logic could serve as best practices for collaboration in multinational joint-venture projects in sectors where government involvement is traditionally high. Airbus is often cited as an example for transnational collaboration in general and for Franco-German joint ventures in particular. For instance, Airbus was referred to as a model for a potential collaboration in torpedo production between Atlas Electronik, a joint company of ThyssenKrupp and EADS, and the French naval shipbuilder DCNS as well as an example for a joint-venture company in naval shipbuilding between ThyssenKrupp Marine Systems and DCNS (Frankfurter Allgemeine Zeitung 2011b, p. 12; 20110816/IE/10). In order to be successful, other transnational projects could learn from the case of Airbus in order to establish and to maintain efficient work-share allocations combined with enduring stakeholder support.

7.4.2 Intensified in-house competition and internationalization: Aggravating work-share competition?

In the case of Airbus, the actors involved have recently modified the rules of their work-share allocations. For the A350 XWB, in-house competition was intensified among the Airbus facilities by opening the work-share allocation to outside suppliers. The result was a major difference in French and German facilities work shares (Hauser and Schubert 2012; Tauber and Wüpper 2012). After strong criticism from the German government, AIC has committed itself to the juste-retour logic by promising to compensate the imbalances of the A350 XWB by the future A30X work-share allocation (Ecorys 2009, p. 157; Süddeutsche Zeitung 2009). The difficulty of these commitments is, however, that they seem somewhat uncertain from today's perspective. This is because the launch and the work-share allocation of the A30X lie far in the future. In the times of AI, the reshuffling of work packages among different Airbus programs took place in short periods of time. In the case of the A330/340 and the A321, compensations were, for instance, implemented within two years (chapter 5.4). Compensations between the A380 and the A318 occurred almost simultaneously (chapter 5.5). The case of the A350 XWB and the A30X shows a somewhat different picture. The A30X as the successor of the A320 program is supposed to start to replace the A320 by 2024. Its launch has, however, already been postponed several times to at present 2030 (Flightglobal 2011). In addition, the A320 program was only recently

modernized (A320neo) by incorporating new efficient engines and wing tips (Hartmann and Hildebrand 2010). In the light of the A320neo's current sales success, some industry experts even question if the A30X will remain a market necessity in about ten years' time (20110331/IE/9). A reconfiguration of the program would, however, also call the previously promised compensations into question. Additional studies could investigate this issue when data on A30X's work-share allocation will become available in the future.

Competition for work share among the former national manufacturers is also reinforced by AIC's current business strategy. In addition to the intensified in-house competition, AIC is strongly promoting the internationalization of R&D and production. This is because the demand for passenger aircraft with more than a 100 seats is expected to be strongest in Asia, especially in China, and North America (Airbus 2012, p. 10). In order to gain market shares in growing markets and to reduce costs, AIC is pursuing a global-souring strategy. As a result, AIC increasingly involves low-cost producers in aircraft production and development and gradually refocuses its attention to these fastest growing regions by, for example, opening final assembly lines in Tianjin, China (Flottau 2008) and in Mobile, USA (Hegmann 2012): "Global sales imply global manufacturing" (Jürgen Thomas, cited in Herb 2010, translated by the author). Due to these global-sourcing practices and offset deals, the work share of Airbus facilities on the aircraft is generally decreasing. In comparison to previous programs, the work-share allocation of the A350 XWB already revealed a high assignment of work shares to non-Airbus countries (20090727/MS/5; 20091016/EC/1; 20100324/IE/4). The competition for Airbus' work shares is thus aggravated for all of the actors involved.

7.4.3 Government interventions: Attenuating competition and maintaining the juste-retour logic?

In the light of these developments, the Airbus facilities and their respective governments strive to reduce the competition they face by ensuring that the juste-retour logic will be maintained in Airbus' future work-share allocations. For example, the British government intended to secure the British Airbus facilities' work shares through a merger of BAE Systems with EADS. Although the British facilities possess a core competency with the wing responsibility, they are in a weaker bargaining position than their competitors since BAE Systems has sold its AIC shares in 2006 (House of Commons 2007, p. 16). BAE Systems and EADS had been negotiating secretly before making their intention to merge public at the Berlin Air Show 2012 (Köhn 2012b). The merger

was, however, canceled four weeks later due to the rejection of different shareholders, among them the German government (Süddeutsche Zeitung 2012). The current Coordinator of German Aerospace Policy, Peter Hintze, welcomed the end of the merger talks (Tauber and Wüpper 2012). In an interview with the Frankfurter Allgemeine Zeitung he commented that "the merger would have changed the character of the company and would have shifted its balances. […] EADS' current setup is better for the company and for Germany" (Schubert et al. 2012, translated by the author).

In the context of intensified in-house competition and the ongoing internationalization of the company, former national manufacturers that possess an indispensable competence virtually gain a technological monopoly within the company. Airbus France, for example, holds a quasi-monopoly on the development and the production of the cockpit with the primary flight control system. However, other Airbus facilities that develop and produce components which can be built by outside suppliers are confronted with intensified competition. In the context of Airbus' work-share allocation process, they have an ever weaker bargaining position. For example, Airbus Germany is in such a position with regard to the supply of front and rear fuselage sections. In order to cope with this new situation and to secure the Franco-German balance, the German government has for the first time decided to become a direct shareholder of EADS (Handelsblatt 2012; Bundesministerium für Wirtschaft und Technologie 2013, p. 7). In the short term, this action will help to attenuate competition for the national facilities. In addition, the governments' shareholding will contribute to maintaining the juste-retour logic and to preserving the Franco-German work-share balance. However, the only way to ensure this balance in the medium and in the long term is to "place the national facilities in a position of technological excellence" in AIC's work-share allocation process (20110128/CE/6, translated by the author).

7.5 Research limitations

This section discusses limitations of the study. A first potential limitation which has to be acknowledged addresses the level of detail of the empirical analysis. The work-share allocation of the national manufacturers and future Airbus facilities was only analyzed at an aggregated level. Interviews with former and current chief engineers revealed that each work package of an Airbus program is typically divided in seven different levels (20100503/CE/1). It is believed that in order to answer the research question, it was not necessary to go into that level of detail. Furthermore,

no empirical data was gathered on work packages which are not directly related to civil aircraft production. Although such trade-offs, for example between civil and military aircraft programs (20101209/CE/3), could potentially be important, they were deliberately excluded from the scope of the study for two reasons. First, such detailed data, especially on the military programs, is not publicly available. Second, the additional complexity of integrating all of the decided trade-offs would have gone far beyond the scope of this study and would only have contributed limited additional insights for answering the research question at hand. However, future research is invited to refine the work-share definition when more detailed data may become available.

A second potential limitation is related to methodological questions. As discussed in chapter 3.6, the presented findings should not be generalized to other cases of work-share allocation. It is precisely because the results of Crozier and Friedberg's strategic analysis are always closely linked to a specific empirical setting that they "cannot be transferred from its original context of production to a new one" (Crozier and Friedberg 1995, p. 88). However, in the eyes of the authors this "is in no way discouraging" (Crozier and Friedberg 1995, p. 87). For them, the "usefulness of an analysis depends on the pragmatic value […] of its results, that is, on their capacity to induce learning processes in a number of relevant actors and thus to increase their cognitive and reflexive capacities about their own situation" (Crozier and Friedberg 1995, p. 88). This study has examined a case which has up to today not been studied in this detail. The study's findings reveal the particularities of Airbus' work-share allocation and thereby bring to light the specific functioning of this process within the company over the last 40 years. Although the transferability of findings, for instance to Boeing's work-share allocation process, is out of the question, the conclusions that can be drawn from this study can be generalized to theoretical propositions (Flyvbjerg 2006, p. 224; Yin 2009, p. 43). By formulating propositions for the theory of organizational path dependence, findings contribute to theory enhancement and open up interesting avenues for further research

7.6 Directions for further research

With regard to the theoretical implications, this study has revealed that organizational paths prove to be more flexible than path dependence suggests. In the light of this finding, future research should focus on reexamining well-known examples for stability with particular attention to minor modifications. As discussed in the introduction, organizational path dependence has overlooked minor adaptations to specific circumstances also in its most

prominent example for stability, namely the character arrangement of the QWERTY keyboard. Future research should therefore reexamine the case of QWERTY by taking the idea of 'path bending' into account. One way of doing this could be to investigate the reasons for the minor keyboard modifications in different countries, for example, the AZERTY character arrangement in France and the QWERTZ arrangement in Germany. Comparing these local path adaptations to situations in other countries where no modifications took place could yield additional insights on the rationale for path bending. In addition, it would be interesting for the scientific community to explore whether the QWERTY keyboard standard would have prevailed without permitting adaptations to local circumstances. Such a counterfactual study could, for example, be conducted with the help of an agent-based simulation. This relatively new method is apt for investigating the complex interactions of actors in an artificial world, and would therefore allow researchers to model the causal relationship between local adaptations and QWERTY's technological dominance (see, for example, Meyer 2012, pp. 66ff.). In addition to the QWERTY character arrangement and the work-share allocation of Airbus, it appears very likely that the dialectical relationship of stability and change can also be found in other cases of path dependence. This study thus invites other researchers to further investigate path bending on additional cases through qualitative and quantitative studies and thereby continue to challenge "irreversible state[s] of total inflexibility" (Sydow et al. 2009, p. 691) in a social world.

As a second avenue for further research, this study advocates the application of Crozier and Friedberg's strategic analysis to other empirical settings for analyzing path-dependent processes in organizations from a structurationist point of view. The presented findings exemplified that researchers can gain insights that organizational path dependence has so far overlooked by performing a consistent analysis of the actor's strategies and structures. For this purpose, strategic analysis has to be employed in the way the authors have outlined in "Actors and Systems" (Crozier and Friedberg 1980, pp. 259-272). In doing so, and by comparing its results over time, this study has, for example, uncovered the simultaneous development of stability and change. With these insights, this study hopes to inspire additional investigations on other cases of path dependence. In addition to revealing stability and change, strategic analysis offers numerous opportunities for performing actor-centered research on organizational paths. Future research could, for example, apply strategic analysis to study path breaking in order to shed light on the role that actors play in such a processes.

The case of Airbus' work-share allocation suggests itself for studying this question. With regard to path breaking, the findings of this study indicate that one part of the coordination mechanism was recently modified in the A350 XWB negotiations. Future research should explore the effects of this modification. Will the coordination mechanism continue to sustain Airbus' work-share allocation path? Or will the coordination mechanism cease to be effective as suggested by Milgrom and Roberts (1995)? The authors understand mechanisms as a coherent pattern "in which the pieces fit together in a complementary fashion" (Milgrom and Roberts 1995, p. 202). When one part of the coherent pattern is modified, will this then result in breaking up the path? If this is not the case, what exactly has to happen for path breaking to occur in the case of Airbus' work-share allocation? In line with these questions, the work-share allocation of the forthcoming A30X program provides fertile ground for future research.

This dissertation studied the period between 1970 and 2010. However, since 2010, EADS has decided "the most important change since the creation" of the company (Thomas Enders, cited in Flottau 2012, translated by the author). In December 2012 the stakeholders announced a reform which "aims at normalizing and simplifying the governance of EADS while securing a shareholding structure that allows France, Germany and Spain to protect their legitimate strategic interests" (EADS 2012). In this new structure, the German government became a direct shareholder of the company by acquiring a 12 percent share. The French state reduced its stakes to 12 percent and thereby ensured "equal ownership positions" among the two governments (EADS 2012). Together the German, the French and the Spanish state, with a reduced four percent share, will hold less than 30 percent of the EADS shares. Since Daimler and the Lagardère group will progressively sell their participation, the remaining 70 percent can become free-float shares in the hands of external investors (Flottau 2012). In addition to the reduced state ownership, EADS announced that "under the new governance scheme, no veto right will be given to any group of Directors in the Board or to any shareholder at the Shareholders' Meeting" (EADS 2012). The consequences of this new governance and shareholding structure on future work-share allocations cannot be assessed today but are expected to have a strong impact. In the light of these new developments, will Airbus become an example for path breaking? Time will tell and other researchers are very much invited to continue to examine the development of Airbus' work-share allocation path.

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Appendices

Appendix A: Program launches of Airbus

Program	*Year*	*Source*
A300	1969	Muller 1990, p. 29
A310	1978	Thomas 1999, p. 5
A320	1984	Thomas 1999, p. 6
A330/A340	1987	Muller 1989, p. 137
A321	1989	Thornton 1995, p. 132
A319	1993	Deutsche Aerospace 1993, p. 15
A318	1999	DaimlerChryler Aerospace 1999, p. 11
A380	2000	Stüssel, 2003, p. 6
A350 XWB	2006	Airbus, 2006

Appendix B: Interview guide

This interview guide shows the standard structure of the interviews conducted and the themes addressed. Because interviews were semi-structured, themes were adapted to the interviewee's position and the period of involvement.

Personal Information of the interviewee
1. Role and position in the organization visited 2. Role in the work-share negotiations

Historical information about the company
1. What was the motivation for the creation of Airbus? 2. Who were the main actors during the process and what were their interests?

Information about the work-share negotiations 1970-2001
1. Please detail the process of the work-share negotiations 2. Who were the main actors in the A300 negotiations? What were the interests of these actors? How did the actors interact? What were the major issues? How were they solved? 3. Who were the main actors in the A320 negotiations? What were the interests of these actors? How did the actors interact? What were the major issues? How were they solved? 4. Who were the main actors in the A330/A340 negotiations? What were the interests of these actors? How did the actors interact? What were the major issues? How were they solved? 5. Who were the main actors in the A380 negotiations? What were the interests of these actors? How did the actors interact? What were the major issues? How were they solved?

Information about the work-share allocation 2001-2010
1. Please detail the process of the work-share allocation 2. Who were the main actors in the A350 XWB negotiations? What were the interests of these actors? How did the actors interact? What were the major issues? How were they solved?

Views on the company's development 1970-2010
1. Why did the European collaboration work? 2. How do you assess the political involvement?

Views on the company's future development
1. How do you assess the current situation and the future development of the company? 2. How will the political involvement evolve in the future?

Appendix C: List of interviews

Interview number (total)	*Interview date*	*Short form of interview category*[198]	*Interview number (chronologically per category)*	*Code*
1	21.04.2009	MS	1	20090421/MS/1
2	30.04.2009	IE	1	20090430/IE/1
3	12.05.2009	CEO	1	20090512/CEO/1
4	12.06.2009	MS	2	20090612/MS/2
5	21.07.2009	MS	3	20090721/MS/3
6	23.07.2009	IC	2	20090723/IE/2
7	24.07.2009	MS	4	20090724/MS/4
8	27.07.2009	MS	5	20090727/MS/5
9	16.10.2009	EC	1	20091016/EC/1
10	07.12.2009	IE	3	20091207/IE/3
11	08.02.2010	CS	1	20100208/CS/1
12	16.02.2010	CS	2	20100216/CS/2
13	16.02.2010	CEO	2	20100216/CEO/2
14	12.03.2010	CEO	3	20100312/CEO/3
15	19.03.2010	MS	6	20100319/MS/6
16	22.03.2010	CEO	4	20100322/CEO/4
17	22.03.2010	MS	7	20100322/MS/7
18	24.03.2010	IE	4	20100324/IE/4

[198] I remind the reader that I classified the interviews in six categories. For the sake of clarity, the names of the categories are shorted in the codes. Former CEO of Airbus' national manufacturers are referred to as CEO, former Chief engineers of AI and AIC as CE, Airbus/EADS management staff as MS, German and French civil servants as CS, European Commission Staff as EC and industry experts as IE.

Interview number (total)	*Interview date*	*Short form of interview category*[198]	*Interview number (chronologically per category)*	*Code*
19	24.03.2010	IE	5	20100324/IE/5
20	28.03.2010	IE	6	20100328/IE/6
21	28.03.2010	IE	7	20100328/IE/7
22	03.05.2010	CE	1	20100503/CE/1
23	06.05.2010	IE	8	20100506/IE/8
24	07.05.2010	CE	2	20100507/CE/2
25	07.05.2010	MS	8	20100507/MS/8
26	10.06.2010	EC	2	20100610/EC/2
27	29.06.2010	CS	3	20100629/CS/3
28	10.08.2010	CS	4	20100810/CS/4
29	20.08.2010	CEO	5	20100820/CEO/5
30	11.11.2010	CEO	6	20101111/CEO/6
31	16.11.2010	CS	5	20101116/CS/5
32	30.11.2010	CS	6	20101130/CS/6
33	09.12.2010	CE	3	20101209/CE/3
34	27.01.2011	CE	4	20110127/CE/4
35	28.01.2011	CE	5	20110128/CE/5
36	28.01.2011	CE	6	20110128/CE/6
37	28.01.2011	MS	9	20110128/MS/9
38	31.03.2011	IE	9	20110331/IE/9
39	16.08.2011	IE	10	20110816/IE/10

Appendix D: Abstract / Kurzfassung

Abstract

This dissertation addresses a fundamental problem of organizational path dependence, namely the underspecified relationship between stability and change of organizational trajectories. Up to today, most scholars of organizational path dependence consider stability and change as two independent and yet opposing developments. In contrast, this study argues for a less radical conception of the two phenomena and highlights their interdependent and enabling nature. By applying Crozier and Friedberg's strategic analysis in the context of a qualitative longitudinal case-study design, I examine the work-share negotiations of the European aircraft manufacturer Airbus between 1969 and 2007. The empirical analysis reveals that the national manufacturers actively maintained a stable distribution of core work packages across countries in spite of recurring pressures for change. However, preserving stability, which was crucial for Airbus success, required ongoing modifications to countervail path-breaking tendencies. Adding to the actor-centered literature on organizational path dependence, this dissertation further conceptualizes the role of actors in path-dependent processes by extending path dependence theory with Crozier and Friedberg's structurationist approach to organizations. The study shows how interlinked rules give rise to a self-reinforcing mechanism on which organizational paths are built. Moreover, I introduce the concept of 'path bending' and thereby contribute to a better understanding of the complex and seemingly paradoxical developments of stability and change of organizational trajectories.

Kurzfassung

Diese Dissertation befasst sich mit einer grundlegenden Forschungslücke der organisationalen Pfadforschung — dem bislang nicht ausreichend präzisierten Zusammenhang von Stabilität und Wandel von organisationalen Prozessen. Bis heute werden Stabilität und Wandel in der Literatur überwiegend als zwei voneinander unabhängige oder gar gegensätzliche Phänomene betrachtet. Diese Arbeit vertritt im Gegensatz dazu ein weniger radikales Verständnis und zeigt die interdependente Beziehung von Stabilität und Wandel in Organisationen. Mit Hilfe von Crozier und Friedbergs strategischer Organisationsanalyse, die im Rahmen einer qualitativen longitudinalen Fallstudie angewendet wird, werden die Verhandlungen zur innerkonzernlichen Arbeitsverteilung beim europäischen Flugzeughersteller Airbus zwischen 1969 und 2007 analysiert. Die empirische Untersuchung zeigt, dass die nationalen Herstellerfirmen über den gesamten Untersuchungszeitraum eine stabile Verteilung von Kernarbeitspaketen trotz anhaltendem Veränderungsdruck aufrechterhalten haben. Die aktive Aufrechterhaltung von Stabilität, die als zentral für den Erfolg von Airbus angesehen werden kann, erforderte jedoch immer wieder geringe Modifikationen, um Pfadbruchtendenzen entgegenzuwirken. Die Arbeit erweitert die organisationale Pfadtheorie mit Crozier und Friedbergs strukturations-theoretischem Ansatz und stellt die zentrale Rolle von Akteuren in pfadabhängigen Prozessen detailliert heraus. Darüber hinaus wird die Wirkungsweise von sich herausbildenden, eng miteinander verbundenen Verhandlungsregeln verdeutlicht, die als selbstverstärkender Koordinationsmechanismus den organisationalen Pfad begründen. Die Dissertation führt ferner das Konzept des „path bending“ in die Literatur ein und trägt dadurch zu einem besseren Verständnis der komplexen und scheinbar paradoxen Entwicklung von Stabilität und Wandel organisationaler Prozesse bei.

Appendix E: Publications and conference papers

Arnold, L. M. and Sorge, A., 2010. Institutional Change and Continuity in Complex Federated Organizations: The Case of Airbus Industrie. Working Paper prepared for the 26th EGOS Colloquium, Sub-Theme 08 on Institutions and Knowledge: Sources and Consequences, Universidade Nova de Lisboa, Portugal, June 28-July 3rd.

Arnold, L. M., 2011. Getting the Actors on Board: Actor-Centered Research on Organizational Paths in Airbus Industries. Conference Paper prepared for the 2nd International Conference on Path Dependence, Freie Universität Berlin, School of Business and Economics, March 3-4.

Arnold, L. M., 2011. Airbus at the Crossroads. What does the Future hold? Contribution prepared for the ICAROS Workshop "The Future of Aviation: The Airline Industry at the Crossroads", University of Surrey, School of Management, July 1.