

Managing the intellectual property disassembly problem

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Abstract

This article deals with the *intellectual property (IP) disassembly problem*, which is an increasingly important problem in various contexts. The IP disassembly (IPD) problem is defined as the problem of finding a contractual arrangement for allocation of IP rights and licenses that allows for separating and disintegrating a business unit, company, project entity, or IP unit in order to enable a transaction, organizational transfer, or dissolution of it. Based on a comparative case study of corporate transactions of Saab Automobile and Volvo Car Corporation this article conceptualizes and characterizes the problem and then develops an IPD framework for managing it.

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On December 12, 2011, the long-time ailing Swedish car manufacturer Saab Automobile filed for bankruptcy in Sweden. Saab's previous owner General Motors (GM) had already in early 2008 indicated its intentions to shut down Saab Automobile, but a number of moves had been taken by the Saab Automobile management and others in order to save the company. In early 2010 GM agreed to divest Saab Automobile to the Dutch sports car manufacturer Spyker Cars. Spyker Cars subsequently needed capital in order to finance Saab Automobile's business and approached the Chinese automotive manufacturer Youngman for partnering. However, such a deal could never be finalized as GM wanted to control future competition on the Chinese market. An important deal breaker that finally made Saab Automobile file for bankruptcy was an intellectual property (IP) issue in form of change of control clauses (CCCs) in the contracts related to the sale of Saab by GM to Spyker Cars, giving GM the option to withdraw its technology licenses in case of changes in the ownership of Saab Automobile (or parent firms), thereby limiting future financing and exit opportunities for Saab Automobile and its owners.

Less than 100 km from the Saab Automobile headquarter is the Volvo headquarter. Volvo had sold its passenger car business Volvo Car Corporation (VCC) to Ford Motor Company in 1999 in order to concentrate on trucks and heavy vehicles. A later financially troubled Ford sold VCC to the Chinese firm Geely Holding Group in 2010, a deal in which a large number of IP interdependencies had to be cleared.

The similarities of these two cases of corporate transactions are palpable indeed, including a number of transactions of Swedish automotive firms during the same time span and involving giant American automotive firms and Chinese (potential) acquirers, and the cases prompt an important question: *How could more skillful IP management be developed in order to cope with IP issues and avoid IP-related market failures on the global market for corporate control?* With this article we aim to probe this question by focusing on a problem related to IP management in corporate transactions in form of divestments and mergers and acquisitions (M&As), which

is a specific case of a problem we refer to as the *IP disassembly problem* (arising also in other contexts, e.g., in open innovation processes and in “naked” IP transactions on the market for IP control). The article contributes to the available literature by (1) describing this important managerial problem and giving empirical illustrations of it, and by (2) providing an intellectual property disassembly (IPD) framework with managerial solutions to the problem at hand.

Background

Economists have since long realized the implications of assigning property rights to resources in general¹, for example to scarce resources that could otherwise be diluted, misused or preempted by overuse if multiple individuals were to act freely and independently. The latter has been described as a *tragedy of the commons*.² *Common goods* are then typically defined as goods that are rivalrous (in consumption) and non-excludable, and property rights could be used for turning such goods into *private goods* that are rivalrous and excludable. In contrast, a *public good* is a good being both non-rivalrous and non-excludable. Knowledge is a type of resource that has the characteristics of a public good.³ Investing in the creation of new and valuable knowledge, i.e., investing in R&D and *innovations*, then creates a problem for the investor/innovator in appropriating or securing sufficient returns on its investment by excluding others for some time from also commercializing the innovations. Innovators then typically use various forms of intellectual property rights (IPRs) in order to enable value appropriation⁴ together with other means, such as controlling complementary and excludable assets⁵, thereby enabling excludability, in turn leading to knowledge with characteristics of an *impure public good* in the common case where the excludability is less than perfect.⁶ Since most of the IPRs have only temporary validity (by statutory law), the corresponding privatized knowledge eventually becomes publicly owned.

Since the processes of knowledge creation, implementation, and innovation are mainly cumulative and combinatorial in nature and often involve multiple contributions from multiple interacting contributors, the resulting IPRs related to new knowledge, such as new technologies, are commonly dispersed across different IPR holders.⁷ Users of such technologies for commercial aims (for example the aim to introduce and/or produce new products or processes covered by IPRs owned by multiple IPR holders) then face the problem of acquiring and integrating the necessary technologies and their associated IPRs and licenses from various owners in order to ensure the *freedom to operate* (FTO) for a company, business unit, or project entity. We will refer to this problem as the *IP assembly problem*.⁸ This problem in turn might possibly lead to underuse of knowledge from a social welfare point of view, i.e., a type of *tragedy of the anticommons* (which refers to the underuse of resources due to too many holders of exclusion rights).⁹ The IP assembly problem is a fairly well-known but nevertheless often difficult managerial problem that can be managed through an explicit or implicit contractual arrangement for technology and IP acquisition in general, and more specifically through M&As, organizational integration, standardization efforts, licensing schemes, patent pools, etc.¹⁰

This article will however focus on another problem related to propertized knowledge, a problem of reverse nature that we will call the *IP disassembly problem*. The IP disassembly problem is here defined as the set of problems involved in separating and disintegrating (disentangling) the intellectual properties of two or more firms/business units/individuals/resource sets that previously have been contractually and/or organizationally integrated in some way. More specifically the concept refers to the problem of finding an explicit or implicit contractual arrangement for allocation of IPRs and licenses that allows for separating and disintegrating a company, business unit, project entity, or IP unit in order to enable a transaction, organizational transfer, or dissolution of it. The very nature of knowledge (with technology, i.e., technical knowledge, as a special case) and IP, allowing it to be shared but not physically transferred

between transacting parties, then calls for contractual arrangements between parties that meet their needs for ownership, control, and access for a substantial period of time, in contrast to a physical property transaction that enables exhaustion of ownership rights. Managing this problem becomes increasingly important for technology management and corporate management, since a number of current trends, further described below, increase the frequency and size of the problem.

Table 1 summarizes the two opposing legal (institutional) problems ('tragedies') and the two opposing managerial problems. It should be noted that both of the managerial problems are typically magnified by the numbers of related rights and rights holders, i.e., by the tragedy of the anti-commons, but management could face these problems also with few but strongly related rights and rights holders. In an anti-commons situation licensing solutions become more relevant for the IP assembly problem, while IP disassembly processes might be encumbered by a complex license web created by previous IP assembly processes. This is so for IP embedded in corporate transactions or naked (disembodied) IP transactions, IP in open innovation and various other IP disassembly contexts.¹¹ Market and management failures in dealing with the IP assembly/disassembly problems then impede the market for corporate control and the market for IP control, as well as innovation processes.¹²

[Table 1 here]

Underlying trends and examples of IP disassembly problems

A number of trends increase the frequency and size of the IP disassembly problem. The numbers of corporate transactions in form of M&As and divestments (MADs) have increased in the last few decades¹³, especially cross-border ones, along with globalization, increasing foreign direct investments, and MADs in and from emerging economies. Further, new products and innovations become increasingly based on multiple technologies (i.e., they become "mul-tech",

not only “hi-tech”¹⁴, leading to a technology assembly problem¹⁵, and new technologies become increasingly propertized with IPRs distributed across different IP owners, leading to an IP assembly problem.¹⁶ At the same time IP regimes are being strengthened globally¹⁷. In addition, new generic (general purpose, multi-product) technologies emerge, for example information and communication technologies or new material technologies (e.g., graphene). Finally, innovative companies increasingly use various forms of open innovation¹⁸, in which resources distributed among multiple resource holders are combined and integrated, and technological alliances and R&D partnerships as one particular form become increasingly common and important.¹⁹ All in all this leads to an increasing amount of interdependencies between different technology areas, businesses areas, and resource holders (firms), interdependencies that must be managed in cases of MADs, but also in other cases of structural changes in the industrial organization, or in cases of open innovation or corporate venturing.

The IP disassembly problem may then typically arise in large technology-based firms with many cross-cutting business and technology links when a business unit, a technology unit, or an IP unit is to be “carved out” (separated and disintegrated) and sold, transferred, or dissolved. However, there are a multitude of other contexts besides corporate transactions and IP transactions in which the IP disassembly problem occurs, such as when a research joint venture (JV), a technology collaboration, an R&D contract, or an open innovation project is terminated, when a party wants to leave a collaboration (e.g., in standardization), when a key employee leaves an organization, when a project or a business is spun off, exited, sold, or transferred (as in corporate venturing), when a firm is bankrupted and sold in pieces, and more generally when a package of certain IP assets is disintegrated from a portfolio (or an organization) with interdependent IPRs.²⁰ The IP disassembly problem is actually unavoidable as soon as some form of IP is involved in some form of transaction, since by the very nature of human embodied ideas, knowledge, and information, IP as a resource cannot be physically transferred but only

shared.²¹ In other words, a buyer/user of IP cannot dispossess the seller/producer from it and the transacting parties thus have to resort to control over each other through other means, including IPRs, which typically then are transferrable but restricted in time and in business and technology space.

Previous literature

Despite the importance of the subject, academic literature related to IP management in MADs is scarce. A structured literature search in Web of Science gave 245 records in the subject area ‘business economics’ and 50 records in the subject area ‘government law’.²² However, out of these records only a few were actually related to IP management issues in relation to MADs.²³ Nevertheless, these few records point at the importance for buyers of assets and business units to ensure that all necessary IP is included in the purchase, but also at the importance for sellers to ensure that the rights to use the IP that is necessary or desirable in remaining businesses are retained within the seller, for example by some form of co-ownership or license arrangements.²⁴ These activities could be seen as involving buyer and seller IP clearance, respectively, which is closely related to the IP assembly/disassembly problems. Legal scholars have then for example emphasized implications from M&A processes for license agreements²⁵, an important area as will be proven by our cases. The increasing frequency of corporate and IP transactions offers opportunities for managerial learning by doing (i.e., learning by transacting) while the lack of coverage in the academic literature as described here so far offers few opportunities for managerial learning by reading, to which end this paper aims to contribute.

Empirical cases from the automotive industry

We now turn to two contrasting cases of the IP disassembly problem, picked from the automotive industry. The automotive industry is, as many other industries operating in systems

technologies, characterized by a kind of worldwide web of technological and IP interdependencies (an “IP WWW”).²⁶ In the automotive industry these interdependencies arise from shared technological platforms and architectures as well as from shared supplier networks and manufacturing tools. In addition, there are frequent “carve-outs” and changes of ownership and control such as Ford’s divestments of Jaguar and Land Rover to Tata Motors (2008) and VCC to Geely (2010) and GM’s divestment of Saab Automobile to Spyker Cars (2010).²⁷ The interdependencies, the long-lasting and overlapping product and technology generations, the long life times of IPRs, and the frequent changes of control make the IP disassembly problem common and complex in the automotive industry. Here we use the cases of Saab Automobile and VCC for illustrating the IP disassembly problem and its complexity, and for providing examples of managerial solutions. Such solutions can then be structured into a generalized framework, which we will return to after the case presentations.

The choice of Saab Automobile as the first case was opportunistic, as it presented a current and clear high-profile case of the IP disassembly problems related to the disintegration of businesses. VCC was then selected as a comparative case, as it exhibits one clear dissimilarity in the outcome in terms of success/failure in disentangling the business as well as a rare number of similarities in background variables. For example, both cases include Swedish passenger car manufacturers of relatively small size in a global comparison that were struggling with the financial downturn in 2008, see Figure 1. Additionally, they were first disintegrated from Swedish industrial groups and sold to American automotive groups (GM and Ford, respectively) in the 1990s, and were subsequently sold again in 2010 during the financial crisis. Thus, each of these company cases actually involves two IP disassembly cases. A summarizing comparison of the cases is presented in Table 2.²⁸ These cases have provided valuable input for understanding and describing the IP disassembly problem, but maybe more importantly they have illustrated a range of managerial provisions useful for solving it. This range of provisions

can be structured in a managerial IPD framework, as we will return to after the cases, and the applicability and usefulness of this framework has been validated with a number of practitioners, as well as with the involved case companies.

[Figure 1 here]

Saab Automobile

In 1990, the Swedish industrial group Saab-Scania decided to divest its passenger cars division after many years of large losses. 50% of the Saab cars division, Saab Automobile AB, was divested to GM in 1990, and the remaining 50% was divested in 2000.²⁹ In this divestment process the technological overlaps between Saab Automobile and the remaining Saab-Scania were very limited, as described by one of the involved managers at Saab-Scania at the time (around 1990): “there were no major discussions about this, it was clear to which unit different patents belonged”³⁰. Patents that were passenger car-related were transferred to the newly established Saab Automobile in 1990 while the rest were kept within Saab-Scania.

The Saab trademark was kept within Saab-Scania initially, and within Saab AB when Scania, the truck and bus division, was also divested (in 1996). Saab Automobile received a license to use the Saab trademark.³¹ This license was limited neither in time nor in ownership structure of Saab Automobile, i.e., no CCC was included in the license. A similar license to use a logo depicting a griffin was received from Scania.³²

In 2003, GM’s massive organization had initiated processes in order to integrate R&D³³, production, etc., and in 2005 ownership of all technologies were collected in a US company called GTO. All previous as well as future technological IP was to end up with GTO.³⁴ However, due to tax reasons GM allowed Saab Automobile’s IP obtained up until 2005 to be

kept within the Swedish subsidiary³⁵, a circumstance that would have important implications later on.

A second divestment of Saab Automobile

By 2006 the future looked promising for Saab Automobile, with record sales of 133 000 cars and a plan for product diversification, according to an executive in the top management team.³⁶ However, in connection with the financial crisis in 2008 when the sharp downturn in demand hit the automotive industry, GM faced a possible bankruptcy and had to cut costs and then indicated its intentions to either close down or sell Saab Automobile (as well as other brands/businesses within GM, such as Pontiac and Saturn).³⁷ In June 2009, the Swedish extreme sports car manufacturer Koenigsegg (backed by Norwegian and US investors) initiated negotiations with GM about purchasing Saab Automobile and later declared its intentions to go through with the acquisition.³⁸

However, the negotiations were delayed due to the complexity of the deal and the complex actor network related to it, but also due to frequent recontracting since separation agreements had not been established *ex ante*.³⁹ Additionally, Saab Automobile's current and future product line had important technological interdependencies with GM. For example, the Saab 9-3 shared the Epsilon I platform with other GM models, the Saab 9-5 introduced in 2010 shared the Epsilon II platform with Opel Insignia, and the 9-4X was a "licensed vehicle" owned and produced by GM in Mexico. In addition, Saab's platform architecture for the future product line, the so called Phoenix architecture, had some important interdependencies that needed to be cleared, despite being mainly independently developed by Saab Automobile.⁴⁰ However, the necessary licenses could never be secured from GM at a reasonable price before Koenigsegg had to pull out from the deal in November 2009, much due to the delayed and extended

negotiations with various stakeholders (including financiers such as the European Investment Bank).⁴¹

Part of the intended Koenigsegg deal involved selling technology to the Chinese automotive manufacturer Beijing Automotive Group (BAIC). After Koenigsegg pulled out, Saab Automobile was in severe need of cash. The management of the firm was by its legal advisors suggested to independently approach BAIC with an offer to sell parts of the “old” technology.⁴² BAIC accepted and Saab Automobile collected about 200 MUSD for technologies related to old sedan versions of their two main product lines⁴³ (the larger 9-5 and the smaller 9-3), and this capital injection bought some time for Saab Automobile’s management in relation to GM in order to find a new buyer of the firm.⁴⁴ A second European sports car manufacturer, the Dutch firm Spyker Cars, soon thereafter became the new potential acquirer, and after relatively quick negotiations, pushed by GM’s threat to close down Saab Automobile, Spyker Cars finalized the acquisition on February 23, 2010, including licenses to GM technologies necessary for Saab Automobile’s business.⁴⁵

The IP disassembly problem unsolved

A year later, Spyker Cars was in urgent need of financial capital to finance the ongoing losses within Saab Automobile. The solution presented by Victor Muller, CEO and founder of Spyker Cars, was to let the Chinese firms Pang Da and Youngman invest in Saab Automobile.⁴⁶ Fredrik Sidahl, CEO of the Scandinavian automotive supplier association, remembers the meeting at which the solution was presented: “I remember this meeting with the creditors very well, the euphoria that was in the court room. [...] Finally, there is a buyer; he is financially strong, and he stands here and says that he will go through with this [investment and continued business of Saab Automobile]. Then, when I later that day talked to Victor Muller, he says to me ‘GM is a concern’. And that’s when I understood that they had not cleared everything backwards.”⁴⁷

The concern was valid, as expressed in a statement from GM spokesman James Cain on November 4, 2011: “GM would not be able to support a change in the ownership of Saab which could negatively impact GM's existing relationships in China or otherwise adversely affect GM's interests worldwide”. An investment by Pang Da and Youngman would imply a change of control, and both the IP license agreements and the supplier agreements between Saab Automobile and GM had to be cleared with GM. The agreements included CCCs⁴⁸, and in order to protect its own interests on the Chinese market GM clearly stated its intentions to execute their rights to terminate the agreements in case of a change of control implying direct or indirect Chinese ownership of Saab Automobile.⁴⁹ Maud Olofsson, Swedish Minister for Enterprise and Energy at the time, comments upon the situation: ”GM entered the Chinese market to sell their cars with that platform, and then Saab also wanted to enter [...] with the same platform and the same technology, but under the Saab brand. GM did of course not approve of that. That’s just how it is. And Victor Muller had signed that. That was one of the prerequisites [of the deal between GM and Spyker Cars].”⁵⁰

In the end, the CCCs in the agreements between Saab Automobile and GM implied that Saab Automobile was strongly dependent upon GM, and the IP necessary for Saab Automobile’s business had not been sufficiently disentangled in the second divestment to go forward with a third one.⁵¹ Thus, continuous financing of Saab Automobile’s business was impossible, exit opportunities were severely limited, and the firm filed for bankruptcy on December 12, 2011.⁵²

Post-bankruptcy issues

On June 13, 2012, it was announced that an electric car consortium, National Electric Vehicle Sweden AB (Nevs), mainly backed by Chinese investors, was to acquire most of the assets from the bankruptcy estate in order to start up production of electric cars based on Saab Automobile’s technologies in the old facilities.⁵³ Licenses to GM technologies and Saab and Scania

trademarks were however not included in the deal, since these had been terminated by the bankruptcy⁵⁴ and/or CCCs. Thus Nevs also needed to clear a number of IP interdependencies to restart production, as described by a Saab manager: “Just take the right to produce car seats. GM still holds the IPRs related to the seat frames and the supplier Faurecia to other parts.”⁵⁵ According to Kjell AC Bergström⁵⁶, CTO and Vice President of Nevs and previous CEO of Saab Automobile Powertrain, the chosen solution to this problem was to invent around those parts of the first generation Phoenix architecture that had previously been licensed from GM (such as the electronic architecture). Additionally, the firm managed to secure a new license to the Saab trademark from Saab AB.⁵⁷ However, as of March 2013, it was still highly uncertain whether actual car production would ever be started again.

Volvo Car Corporation

More than 70 years after the production of its first automobile, the Swedish industrial group AB Volvo decided to divest its passenger cars division VCC to Ford in order to focus completely on commercial vehicles.⁵⁸ At the time of the divestment, in 1999, all patents were owned centrally within AB Volvo. Before the divestment to Ford was finalized, negotiations were made regarding how to deal with the IPRs in a process lasting more than half a year. Volvo’s patents had to be reviewed in order to structure the transfers and licenses of IP. Patents of main importance to passenger cars were to be transferred to Ford, while the rest were to be kept within AB Volvo. Roughly 70% of the patents were obvious in terms of whether they were related to passenger cars or AB Volvo’s other businesses, so the main negotiation work was related to the remaining 30%. After this process, patents that were clearly relating to passenger cars were transferred to Ford, and more specifically to the subsidiary Ford Global Technologies (FGT). Patents that were less clear in terms of which business they were related to were kept within AB Volvo. Any dependence on such patents from VCC’s side was cleared by a collective

license, stipulating that VCC and Ford could keep using all IP that was used by the passenger cars business at the time of the purchase. The IP disassembly problem related to trademarks was solved by placing the Volvo trademarks within a holding company, Volvo Trademark Holding AB, a firm co-owned by AB Volvo and VCC from which the trademarks were licensed to the shareholders.⁵⁹

Apart from the trademarks, all IP that was purchased together with VCC was placed within FGT, and ownership to all new IP was also placed within FGT⁶⁰, enabling cross-border income shifting by intra-firm licensing schemes.⁶¹ Despite this, and despite a resistance among VCC engineers to integrate with Ford, patenting increased within VCC after Ford's purchase. The patent culture was much stronger within Ford, as described by one of the most senior executives at VCC: "They [Ford] were very good at handling patents and IPRs. [...] They looked after their house like Americans do."⁶² This patent culture was transferred to VCC during the time of Ford's ownership.⁶³

By the middle of the first decade of the 2000s, the VCC product line was closely interrelated with other parts of Ford's product line. Volvo's smaller models were built on Ford's C1 platform, as were a number of Ford and Mazda models, and Volvo's larger models were built on Ford's midsize platform EUCD, being shared with models such as Ford Mondeo, Galaxy, and S-MAX.⁶⁴ Thus, by the end of the first decade of the 2000s there were large technological overlaps and IP interdependencies between Ford and VCC, both for smaller (based on C1) and larger vehicles (based on EUCD or P2/D3).⁶⁵

The second divestment process and the disintegration from Ford

At this time, Ford initiated a process of dissolving the Premier Automotive Group (PAG), in which VCC had been placed after the purchase. Aston Martin was divested in 2007⁶⁶, and in 2008 the process continued with the divestment of Jaguar and Land Rover to Tata Motors⁶⁷.

Thus, by 2008/2009, when the divestment process of VCC (the last remaining business within PAG) picked up pace, Ford had extensive experience from managing the IP disassembly problem and other disintegration issues during its previous divestments, and the firm employed a structured approach to deal with them.⁶⁸

Nevertheless, the separation process took roughly two years and required large amounts of management resources. Paul Welander, Senior Vice President at VCC, describes: "An external lawyer said that she had never seen anything like this [in terms of the number and comprehensiveness of IP contracts]. [...] We had busloads of consultants and lawyers coming here each week to handle the separation. [...] [It] required a massive amount of resources during a time at which resources were severely limited."⁶⁹

Ford's approach to managing the IP disassembly problem included a categorization of different technologies and IP. Pre-acquisition technologies that were owned by VCC at the time of Ford's purchase in 1999 (background technologies) were to accompany VCC to its new owner, and were thus transferred back to VCC ownership if previously transferred to Ford/FGT. Post-acquisition technologies developed after the purchase in 1999 (foreground technologies) were in general kept within Ford, while VCC received licenses for the technologies that were used by VCC at the time of the divestment. Such technologies were categorized as either Limited License (roughly 50% of all overlapping technologies) or Broad License Technologies (the remaining 50%) according to their importance to Ford, as described by John Öster, the director who oversaw this process at VCC: "Ford decided what technologies to be categorized as Limited License Technologies based on what were of core importance for their business, and what could hurt Ford if it ended up in the wrong hands, e.g., C and CD-platforms, Ford and Gemini engines, and roughly 50 other technologies that were developed during the Ford/Volvo time."⁷⁰

Thus, Ford's most important technologies were licensed to VCC by "limited licenses", meaning that there were strict limitations to the licenses, for example that the technologies could only be used in Volvo-branded vehicles built in VCC plants.⁷¹ This was a major potential deal-breaker, probably much due to the concern that Ford's technologies would otherwise leak to Chinese competitors. Geely, who eventually purchased VCC, acknowledged this concern, as expressed by the founder Li Shufu: "I want to emphasize that Volvo is Volvo and Geely is Geely."⁷²

The less important (non-core) technologies were licensed by "broad licenses" that were, e.g., sub-licensable with Ford authorization.⁷³ Finally, technologies developed by VCC after 1999 but completely without Ford involvement (sideground technologies) were to be transferred back to VCC (if formally owned by Ford).⁷⁴

As explained by several VCC interviewees⁷⁵, any technologies transferred to VCC were to be licensed back to Ford. VCC's vehicle architecture, Scalable Platform Architecture (SPA), and its engine architecture, Volvo Environmental Architecture (VEA), both to be used in VCC's future models, were exceptions that did not include licenses back to Ford, since Ford had no need for or plans to use these technologies. The licenses were typically royalty-free and without time limitations, and included both patent and knowhow licenses on patented and non-patented technologies. VCC's use of trademarks was still overlapping with the former owner AB Volvo, but VCC's trademark interdependencies with its former owner AB Volvo could easily be handled thanks to the previous setup of Volvo Trademark Holding, co-owned by AB Volvo and VCC, since VCC's 50% ownership (one out of two available shares) of the holding company followed the firm in the deal.

In October 2009 Geely Holding Group was introduced as the preferred buyer.⁷⁶ In contrast to the Saab case, separation agreements were mainly established before initiating negotiations, thus limiting negotiation-related transaction costs and hold-ups by clearly defining the business

for sale and its technology and IP base *ex ante*. In the end, the deal was finalized when Geely acquired the VCC shares from Ford on August 2, 2010.⁷⁷

[Table 2 here]

A framework for managing the IP disassembly problem

So far we have characterized the IP disassembly problem, and related it to some of its causal factors and trends as driving forces in general and then illustrated it in some detail with a couple of cases in the specific context of corporate transactions. Now, based on our current knowledge of the problem at hand, can a generalized solution approach be developed to guide management in dealing with the IP disassembly problem in general?

It is clear from all our cases that the combined IP portfolio of the selling firm (SF) and the business for sale (BFS) needs to be evaluated in order to identify the importance of the different IPs in the portfolio for the SF and the BFS, respectively, and to identify any overlapping interests in the portfolio at hand.⁷⁸ A simple distinction can be made between (1) IP of core importance, (2) IP of non-core importance, and (3) IP of no importance, see Figure 2.⁷⁹ Such a two-dimensional approach was successfully used in both the first and second divestment of VCC as well as in the first divestment of Saab Automobile, while the second divestment of Saab Automobile was one-dimensional in that it was mainly focused on the interests of GM.

Each combination of importance for the SF and for the BFS, respectively, can then be matched with various types and combinations of IP contract provisions. Such provisions include (a) IP ownership transfers, (b) IP licenses, and (c) IP holding JVs. The suitability of various provisions depends partly on the symmetry of the importance for the SF and BFS, respectively, and Figure 2 provides a general IPD framework for the design of deal structures that could subsequently be subjected to negotiations.

[Figure 2 here]

An IP that is of roughly equal or symmetric importance for the SF and the BFS, i.e., an IP on the diagonal of the IPD framework, typically requires a contract setup with roughly symmetrically distributed access and control (but not necessarily ownership) of the IP across the SF and the BFS. Direct co-ownership of IPRs is typically not recommendable (despite its symmetry) since each party's control over the other's use of the IPR is then limited⁸⁰, unless additional contract agreements are made. Shared ownership of IP can instead be accomplished by co-ownership of an IP holding JV, as illustrated by Volvo Trademark Holding, formed to handle the overlapping use of trademarks by VCC and its former owner AB Volvo. Still, supplementary contractual agreements are necessary, for example shareholder and/or consortium agreements and license provisions⁸¹, also regulating the access and control of future technological improvements or future technological substitutes (such as invent-arounds).⁸²

An alternative to the IP holding JV is a license agreement, which was also an important part of the contractual solution in the case of VCC, as illustrated in Figure 3. When licensing in a symmetric relation, and especially for IP of core importance for both actors, the licenses can be designed to safeguard the interest of the licensee, but also of the licensor, by stipulating various clauses such as grant-back clauses⁸³ or grant-forward clauses⁸⁴ regarding future improvements in relevant technologies. This type of clauses that regulate the use of and changes in related technologies can be collectively called Change of Technology Clauses (CTCs), which deal with the objects (technologies) of a license, while CCCs deal with the subjects (i.e., the licensor and/or the licensee) of a license. When Spyker Cars acquired Saab Automobile, the licenses were clearly not designed to obtain symmetry in terms of access and control for GM and Saab Automobile, respectively, and this had severe consequences for the latter (but possibly desirable ones for the former).

When an IP is of different or asymmetric importance for the different actors, i.e., it is off-diagonal, the IP is preferably transferred to or kept with the actor where it is of most importance, while possibly licensed to the other actor (if of any importance for the latter). In the case of VCC, ownership of the SPA vehicle platform and the VEA engine platform was transferred to VCC without a license back to Ford, since these architectures were of no importance to the latter, while most other technologies transferred to VCC involved a license back to Ford, see Figure 3.

A by-product from the categorization work of available IP is finally the identification of IP of little or no importance to any of the involved actors. Such IP can then possibly be monetized by divestment or licensing to third parties, as illustrated by the sales of some old technologies in the case of Saab Automobile, leading to a 200 MUSD income.

[Figure 3 here]

Important sources of risk and uncertainty when managing the IP disassembly problem are the long life time perspectives ranging both backward and forward⁸⁵ for old and new patents and design rights, well-kept trade secrets, copyrights, and trademarks, the business and technology dynamics, and the frequent ownership and control changes. A specific technology will not keep its importance in relation to the SF and the BFS forever. For example, it is likely that a divested BFS utilizing a firm-specific platform technology of the SF will eventually switch this technology for something else, such as a technology of the acquirer or a BFS-specific technology, as illustrated in both our cases. The categorization of IP will therefore change over time, and the IP contract provisions designed at the time of the divestment should preferably consider such dynamics by contingency clauses, option provisions (for, e.g., license migration or license conversion, see below) and renegotiation triggers. Additionally, new and future

technologies with uncertain valuations and interdependencies must also be handled, implicitly or explicitly,

In the case of VCC, a number of measures were taken in relation to the dynamics and uncertainties of the IP disassembly problem. A few examples can be given here. Firstly, IP of core importance to Ford was licensed to VCC with a “limited license”, with strict limitations on how the IP could be used. However, such licenses typically included clauses stipulating that the license would convert to a “broad license”, with much fewer limitations for the licensee, at a certain date in time at which the importance for Ford was forecasted to have declined, see Figure 3. Secondly, the licenses typically included provisions stipulating rights of first refusal or options to overtake ownership of patents held by any of the parties if the current holder was about to terminate them, thus safeguarding the interests of the licensee if the patent would lose its importance for the licensor and patent holder. Finally, emerging and future technologies were reviewed internally at Ford by surveying R&D personnel, classifying the technologies either into the “limited license” (for core technologies) or “broad license” (for non-core technologies) category.

Discussion

The main question to discuss now is how applicable the IPD framework is more generally. Does the framework apply across industries, technologies, IPRs, etc., and what features of it ought to be removed or added in different transactional and organizational contexts? In this paper we limit the discussion to generalizability across industries, technologies, and IPRs in the context of corporate transactions with some occasional comparisons with the contexts of IP transactions and open innovation.

The major conceptual distinctions in the framework (core importance, non-core importance, and no importance) apply to any technology or intellectual asset owned or controlled by any

transacting party. They also apply to any market, be it defined in terms of regions, applications, or segments, as IPRs and their licenses could be defined in similar terms.⁸⁶ Bilateral transactions then result in the matrix categories in Figure 2, and multilateral transactions, like in multi-party open innovation, standardization collaborations, and patent pools, in more elaborate (multi-dimensional) matrix combinations of the basic categories.⁸⁷ The solution approaches for the symmetric (on-diagonal) and non-symmetric (off-diagonal) categories also apply across industries, technologies, and IPRs, but not directly for multilateral transactions, which require a more refined framework, depending upon the heterogeneity among the transacting parties, the type of transaction (one-to many, many-to-one, or many-to-many) and the type of transaction object.

Even if industry and technology differences do not invalidate the proposed framework, they do matter for the details in the solution approaches. Manufacturing tools are key physical assets in automotive industries, and they are often platform-specific. The IP to be disassembled then typically has close complementarities with a related set of manufacturing tools. Research tools, on the other hand, are more important in pharma and bio-tech industries, but they are widely sharable assets, calling for provisions for controlled sharing. The extended hierarchical supplier networks in automotive industries call for more complex vertical upstream provisions than, say, in pharma and bio-tech industries, and the oligopolistic nature of automotive, chemical, computer, and telecom industries calls for more complex horizontal licensing provisions and so on. Such provisions, and detailed licensing schemes in general, are then typically more important in deals including competing SFs and BFSs, as illustrated by the second round of divestments in both our cases.

Industries (and companies) also differ regarding their technological diversity or the range (number) of technologies they are operating in, as well as regarding the dispersion (number) of IPRs and the dispersion of IPR holders (including licensors and licensees). These (three) factors

all add to the complexity of the IP disassembly problem and its solution approaches, which may call for additional distinctions, but they do not require alterations of the basic features of the proposed framework, at least not for bilateral transactions. Different patent configurations in the technology landscape⁸⁸ (thickets, blankets, fences, strategic patent girdles, etc.) could be dealt with, as long as they are controlled by the transacting parties. A more difficult task is to deal with outside licensors or co-owners of important technologies. A technological area could get flooded by patents so as to resemble a patent jungle, mine-field, thicket, or the like, while a multitude of license agreements could connect agents, as to resemble a messy cob-web.⁸⁹ When such a 'license web' falls outside the control of the transacting parties, for example through CCCs or limited sub-licensing rights⁹⁰, the IP disassembly problem is not only magnified but could be unmanageable, as illustrated by the case of Saab Automobile.⁹¹

Due to the intransparency of the IPR system IP encumbrances relevant to a deal might not only fall outside the control, but even outside the awareness, of one or more of the transacting parties, leading to difficulties to properly evaluate and value the transaction object. Even though there are possibilities to obtain information about ownership of IPRs, the possibilities for IP owners who want to hide information about their ownership are many (see Appendix A). Information about license webs and other IP encumbrances such as inherited litigations and liabilities (including post-contractual obligations if any) is even more difficult to obtain. This implies the need for technology and competitor intelligence in managing the IPD problem. A particular managerial implication in case of corporate transactions is then to bring in IP managers and IP specialists early on in the process. In contrast to naked IP transactions, corporate transactions are often managed with corporate lawyers and other specialists for whom IP issues are not the major concern.

As to different major IPR types – patents, trade secrets, trademarks, copyrights, and design rights – there are significant and well recognized differences across them, but by and large they

could be fitted into the framework.⁹² Still, different provisions in the license agreements must be fitted to different types of IPRs, for example to cater to the long lifetimes of trademarks, trade secrets (possibly), and copyrights, compared to patents and design rights, or to cater to codified and registered IPRs on one hand and unregistered IPRs on the other hand, trade secrets then in particular. Trade secrets in turn could be embodied in humans, in which case special laws apply, limiting the control employers can exercise over the knowledge of employees. Tacit or poorly codified knowledge is difficult to separate, transfer and trade, which calls for further provisions, such as for engineering support, R&D service agreements or management agreements, although still possible to accommodate in the IPD framework in case of corporate transactions. However, further research is needed to detail the matching of trade secrets and human embodied IP with suitable provisions.⁹³

This article has focused on a specific empirical context for the IP disassembly problem, namely corporate transactions. The IP disassembly problem might occur in numerous other situations, as mentioned in the beginning of the article, such as in technology transfers, naked IP transactions, corporate venturing, and not the least in connection with terminations of or exits from open innovation projects. The IPD framework is applicable to terminations of bilateral innovation collaborations, but managing the IP disassembly problem in multi-party (distributed) open innovation is more complex and must be left for further research. As to naked IP transactions, there is not a business for sale with the IP embedded in complementary resources, which simplifies or even eliminates the IP clearance for the buyer. The seller IP clearance might still be difficult, however. The major distinctions in the framework are still applicable, since they are not violated by a hypothetical removal of complementary resources, but the framework may have to be complemented, especially in case of multi-party IP transactions, which again is in need of further research.⁹⁴

Often, monetary compensation also has to be contemplated which brings in the whole issue of

valuation and pricing of IP assets in managing IP disassembly. Competitive gaming and bargaining may then easily lead to a bargaining breakdown, especially in presence of strong complementarities. Therefore, agreement on some principles of fairness to be used in valuation, fair sharing, and fair pricing is conducive for deal-making and lowering transaction times and costs. There are a number of such principles, for example for determining FRAND terms in licensing.⁹⁵ The pricing of IP is contingent upon the contractual solution of the IP disassembly problem, however, and complex contractual designs thus make fair valuation a challenging task in both practice and theory, and much of this task has to be left for further research as well. Strategic importance of the deal for one or more of the parties may reduce this problem, however, especially if the buyer is rich of cash while the seller is not.

Finally, while there is a wide range of contractual means to handle the IP disassembly problem, contingent claim contracting is costly and imperfect⁹⁶, as also illustrated by our cases. Personal relationships, allowing for trust and recurrent implicit contracting between the SF, the BFS, and the acquirer, are therefore playing an important role when managing the IP disassembly problem in corporate transactions (while probably less so in naked IP transactions). In the case of Saab Automobile, the lack of personal relationships arguably played an important role in why a deal in the end could never be reached. By contrast, personal relationships and eventually mutual respect between Ford, VCC, and Geely, despite numerous initial suspicions, were arguably important in the case of VCC. Assigning experienced managers with good connections in the SF, the BFS, and the acquiring firm to deal with the IP disassembly problem and related negotiations can substantially decrease transaction costs. Then, a related problem of self-interest (i.e., a principal agent problem) often occurs, but likely in deal-conducive ways, in that senior managers on one hand are negotiating for the SF, while they on the other hand are negotiating for the good future of the BFS in the acquiring firm, a future in which they also might have career interests after a successful transaction, for example interests in form of

management positions, bonuses, or shared success fees.⁹⁷ On the acquiring firm's side, buyers should consider possibilities to hire advisors with good connections in the SF and BFS. Hans-Olov Olsson, VCC's former CEO, was hired by Geely as senior advisor in the acquisition process of VCC, probably also mitigating the related transaction costs.⁹⁸ Post-divestment disagreements and other issues regarding the separation were handled by a formalized business relationship group, and issues that could not be agreed upon were then raised to a CEO meeting. The fact that the CEO of Ford Europe, Stephen Odell, was the former CEO of VCC then also limited potential friction. A management lesson is thus that transaction costs can be mitigated not only by the use of the IPD framework, but also by, and preferably in combination with, negotiations based on trust and mutual respect, and a fair amount of diplomacy rather than militancy, especially in cross-border negotiations, in short by building relational capital for the successful sharing of intellectual capital.

Summary and conclusions

The IP assembly problem, being related to but not determined by the tragedy of the anti-commons, has a reverse problem of disentangling or disintegrating IPRs between parties transacting on markets for technology and corporate control. In this article we have defined the concept of IP disassembly problem to denote the problem of finding an explicit or implicit contractual arrangement for allocation of IPRs and licenses that allows for separating and disintegrating a company, business unit, project entity, or IP unit in order to enable a transaction, organizational transfer, or dissolution of it. This article has conceptualized and characterized the IP disassembly problem, analyzed it in a study of empirical cases from the automotive industry, and then developed a generalized IPD framework for managing it in corporate transactions, applicable across industries, technologies, and IPRs. The managerial approach is partially applicable also in other contexts, such as IP transactions and open

innovation, although further research on the nature and management of the IPD problem in such contexts is needed.

Just as the IP assembly problem increases transaction costs and thereby might impede product markets, the IP disassembly problem increases transaction costs and might, and in fact does as our cases show, impede the market for corporate control. IPRs, being ever more frequently used by ever more actors, could be criticized for creating these types of problems, but they could also be part of the solution.⁹⁹ In fact, the solution approach suggested here in form of the IPD framework is to actually use IPRs and IP contracting as governance tools for reducing coordination and transaction costs and market inefficiencies. This approach is in line with viewing IPRs not only as incentivizing innovation investments and innovation disclosure but also as governance tools in and of innovation systems.¹⁰⁰ The economic perspective is then not only on correcting a failure of market mechanisms to provide sufficient innovation investments but also on transaction and coordination costs, while the legal perspective is not only competition law but also contract law and property law.¹⁰¹ The management perspective has to be shifted accordingly from not only R&D and technology management but also to technology markets and licensing. Just as technologies are two-edged in the sense that new technologies could solve the problems that old technologies have created, IPRs are two-edged in the sense that IPR contracting can be used to solve the problems that IPRs create, which calls for further contractual and managerial developments. This article with its managerial lessons and suggested IPD framework is then a small but hopefully useful step in that direction. A few suggestions for further research steps have also been forwarded. However, in the end skillful management of the IP disassembly problem does not rest so much upon “management rocket science” as upon structured experience, simple frameworks, solid homework, thoughtful guesswork, and managerial artwork.

Abbreviations

AOTW	Assignment on the Web
BAIC	Beijing Automotive Group
BFS	Business for sale
CCC	Change of control clause
CEO	Chief executive officer
CTC	Change of technology clause
CTO	Chief technology officer
DPMA	Deutsches Patent- und Markenamt (German Patent and Trademark Office)
FGT	Ford Global Technologies
FRAND	Fair, reasonable and non-discriminatory
FTO	Freedom to operate
GM	General Motors
IP	Intellectual property
IPD	Intellectual property disassembly
IPFS	Intellectual property for sale
IPR	Intellectual property right
JV	Joint venture
M&A	Merger and acquisition
MAD	Merger, acquisition, and divestment
Nevs	National Electric Vehicle Sweden AB
NPE	Non-practicing entity
OHIM	Office of Harmonization in the Internal Market
PAG	Premier Automotive Group
R&D	Research and development
SF	Selling firm
SPA	Scalable Platform Architecture
TESS	Trademark Electronic Search System
USPTO	United States Patent and Trademark Office
VCC	Volvo Car Corporation
VEA	Volvo Environmental Architecture
WIPO	World Intellectual Property Organization

WWW World Wide Web

Table 1 Key concepts and descriptions

Concept	Description
Tragedy of the commons	Overuse of scarce, rivalrous, and non-excludable resources due to absence of exclusionary rights and owner control
Tragedy of the anti-commons	Underuse of resources due to presence of too many exclusionary rights and rights owners
IP assembly problem	The problem of acquiring and integrating the necessary technologies and their associated IPRs and licenses from various owners in order to ensure FTO for a company, business unit, or project entity
IP disassembly problem	The problem of finding an explicit or implicit contractual arrangement for allocation of IPRs and licenses that allows for separating and disintegrating a company, business unit, project entity, or IP unit in order to enable a transaction, organizational transfer, or dissolution of it

Table 2 Case comparison

	Saab Automobile	Volvo Car Corporation
Founded	1937 (first car produced in 1949)	1927 (spun out from SKF in 1935)
Turnover 2010 (2000) ¹⁾	MSEK: 6 301 (30 453) MUSD: 875 (3 320)	MSEK: 97 626 (92 365) MUSD: 13 550 (10 071)
Employees 2010 (2000)	3 208 (9 077)	13 684 (17 219)
First divestment	1990/2000 to GM No competition between SF (Saab-Scania) and BFS (Saab Automobile)	1999 to Ford No competition between SF (AB Volvo) and BFS (VCC)
Second divestment	2010 to Spyker Cars SF (GM) and BFS (Saab Automobile) became competitors	2010 to Geely Holding Group SF (Ford) and BFS (VCC) became competitors
Size and deal structure of overlapping patent portfolio in second divestment	Several hundreds of patent families Typically kept by GM and licensed to Saab Automobile	Several hundreds of patent families Either kept by Ford or transferred to VCC and licensed to the party without ownership
Key trademarks and related deal structure in second divestment	Saab trademark and griffin logo Kept by original owners (Saab AB and Scania, respectively) and licensed to Saab Automobile	Volvo trademarks and logos Kept by Volvo Trademark Holding AB since the first divestment, an IP holding JV co-owned by AB Volvo and VCC
Focus for SF in license agreements	Limit competition on the Chinese market	Limit competition on the Chinese market
Outcome of second divestment	Intentional success for GM Failure for Saab Automobile and Spyker Cars	Success for Ford, VCC, and Geely (as of January 2013)
Key factors in second divestment outcome ²⁾	Limited financial strength of buyer combined with CCCs Lack of incentives and personal interest in relation to the business of Saab Automobile from GM's side	Careful and competent preparations and <i>ex ante</i> deal structuring Negotiations with vested interests and diplomacy

	Competition between SF and BFS	
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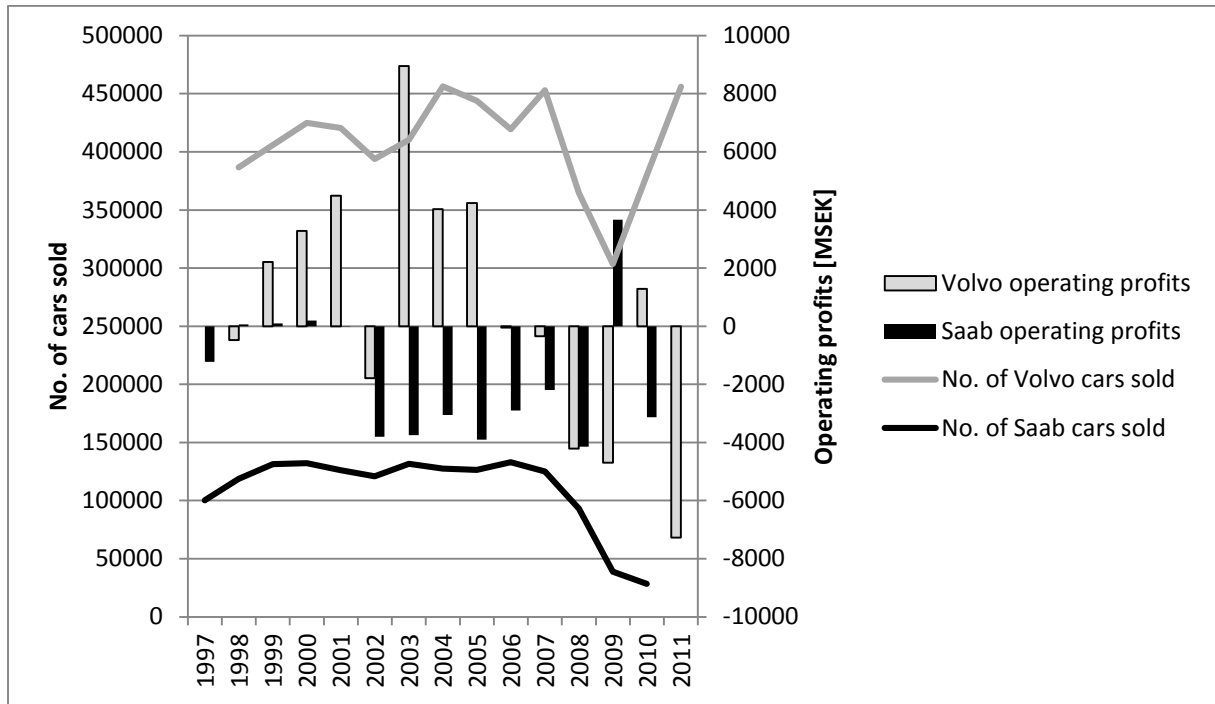
Notes:

1) Average exchange rate for 2000: 1 USD = 9.1718 SEK

Average exchange rate for 2010: 1 USD = 7.2049 SEK

Source: Sveriges Riksbank (Sweden's central bank)

2) Only a simplified and general set of factors can be presented here, considering the high complexity of both cases. Nevertheless, these factors provide valuable managerial lessons for similar deals.



Source: Adapted from annual reports

Figure 1 Number of cars sold and operating profits

Importance for selling firm (SF) Importance for business for sale (BFS)	Core	Non-core	No importance
Core	License IP holding JV with supplementary agreements	Transfer to / keep with BFS and license to SF	Transfer to / keep with BFS
Non-core	Transfer to / keep with SF and license to BFS	License IP holding JV with supplementary agreements	Transfer to / keep with BFS
No importance	Transfer to / keep with SF	Transfer to / keep with SF	Divest License to 3 rd party Store

Figure 2 The intellectual property disassembly (IPD) framework with dynamics over time *t*

Importance for selling firm (SF) Importance for business for sale (BFS)	Core	Non-core	No importance
Core	<i>Volvo trademarks:</i> IP holding JV <i>C1 + EUCD platforms:</i> Licensed from Ford (limited licenses)	<i>Technologies developed solely by VCC:</i> Transferred to VCC with license back to Ford	<i>SPA + EVA architectures:</i> Transferred to VCC without license back to Ford
Non-core	(License conversion clauses)	<i>Electronics + interior design technologies:</i> Licensed from Ford (broad licenses)	<i>Background IP:</i> Transferred to VCC with license back to Ford
No importance	<i>Ford trademarks:</i> No action	<i>Background and sideground IP:</i> No action	<i>Background and sideground IP:</i> No action

Notes: Background IP here refers to IP independently developed before the integration of the SF and the BFS, as opposed to foreground IP being jointly developed by the SF and BFS while being integrated.

Sideground IP here refers to IP developed independently by either the SF or BFS while being integrated, as opposed to postground IP being independently developed after disintegration.

Figure 3 Illustrative examples of IP provisions from the VCC case

Appendix A – Secondary data and data sources

Especially in the case of Saab Automobile (but also in the case of VCC), secondary data in form of newspaper articles, press releases, annual reports, and other company and media documentations were used to complement the primary data from interviews. The Chalmers University of Technology library database search was used to search for secondary information across multiple databases simultaneously, such as ProQuest and ABI/INFORM. Searches were typically performed by combining various words in the content of the available data sources. In the case of Saab Automobile, such content words included the combinations Saab and GM, Saab and Koenigsegg, Saab and Spyker, Saab and negotiation, Saab and change control clause (Swedish local media can be searched in a similar manner, e.g., by utilizing the Affärsdata database). Some of the most important (mainly English) publicly available secondary sources retrieved from these searches regarding the divestment of Saab Automobile from GM and subsequent problems are listed in Table A.1, ordered by date to give a quick introduction to the developments of the case.

[Table A.1 here]

Additionally, IPR data can to various extents be retrieved from different public databases (see, e.g., Table A.2) to complement the primary data. This was especially useful for the case of VCC. TMView of the Office of Harmonization in the Internal Market (OHIM) can be used to search for trademarks related to 25, primarily European, trademark offices (as of March 2013). To search for registered (i.e., excluding filed, expired, and ended) trademarks with the term “Volvo” in the name of the trademark the search term “tm:volvo AND sc:Registered” was used, resulting in 230 registered trademarks in the OHIM database. 194 of these are owned by Volvo Trademark Holding, validating this IP holding JV’s role of holding trademarks of joint interest to AB Volvo and VCC.

Combined trademarks, including both the corporate trademarks (Volvo) and business trademarks (such as BM, Cars, or Penta) or product trademarks (such as C30, S80, V70, or XC70), are typically also owned by Volvo Trademark Holding, while individual business or product trademarks are owned by the separate firms (AB Volvo or VCC), again illustrating how the IP holding JV functions to govern joint interests. An example relates to Volvo C30, VCC's smallest car model (as of 2013). The search term "tm:c30 AND anm:*volvo* AND sc:Registered" can be used to retrieve all registered trademarks in the database with an applicant name including "Volvo" and a trademark name including "C30". The results show that out of six registered trademarks with these criteria, one trademark includes the word Volvo ("Volvo C30"), and that trademark is also the only one owned by Volvo Trademark Holding. The rest of the trademarks (without any other links to AB Volvo) are owned directly by VCC.

The trademarks owned by Volvo Trademark Holding can in turn be studied to see former ownership transfers, for example by retrieving information from the individual trademark offices, such as the German one (DPMA). As an example, requests for changes in registered ownership from AB Volvo to Volvo Trademark Holding for German Volvo trademarks registered before 1999 (a few examples include trademarks with registration numbers 720057, 1093162, 39712056, and 39740061) were received and recorded by DPMA throughout 1999. This in turn validates the ownership transfers of trademarks from AB Volvo to Volvo Trademark Holding in connection to the divestment of VCC in 1999.

Similar results (but including different offices such as the US one) are received if instead searching for brand:Volvo and status:active in the Global Brand Database of World Intellectual Property Organization (WIPO), resulting in 120 active trademarks, almost all owned by Volvo Trademark Holding. Again, if looking closer at these trademarks, especially those registered before 1999, it is clear that trademarks of joint interest to AB Volvo and VCC were reassigned to Volvo Trademark Holding in connection to the divestment of VCC in 1999. For example,

US trademarks 0636128 and 0636129 can be investigated by utilizing the Trademark Electronic Search System (TESS) of the United States Patent and Trademark Office (USPTO). The database shows that ownership of these trademarks was reassigned on February 26, 1999, in an agreement including 27 other registered US trademarks plus two applications. By performing a trademark query in the USPTO Assignment on the Web (AOTW) database for the Reel/Frame number 2236/0792 the actual reassignment agreement and registration document can be obtained. In fact, all 17 currently active US trademarks owned by Volvo Trademark Holding (according to WIPO's Global Brand Database) and registered before 1999 were reassigned in that same agreement.

The trademark situation in the case of VCC can be contrasted to the case of Saab Automobile, where the former owner Saab AB owns the corporate trademark "Saab" (with a few minor local exceptions) while Saab Automobile owned (at least some of) the combined trademarks such as "Saab Biopower" (374285), "Saab Aero" (359162), and "Saab XWD" (394617) (Swedish trademark numbers within parentheses). Ownership was however reassigned to Saab AB in early 2013 (after Saab Automobile's bankruptcy). The figurative trademark depicting a griffin is owned by Scania (see, e.g., German trademark registration number 39526285), meaning that Saab Automobile was dependent upon licenses from two different trademark owners, supporting the findings from the interviews.

Patent data have to some extent less transparency than trademark data. Registration of ownership reassignments is typically voluntary (as is the case for trademarks in many jurisdictions). In the case of patents there are probably weaker motives (compared to in the case of trademarks) speaking in favor of registering reassignments (such as securing a stronger position in case of infringements) and stronger motives speaking against it (such as enabling privateering¹⁰² and decreasing technology intelligence operations of competitors, such as patent mapping).

Nevertheless, the results from various searches validate the information from our interviewees. A patent query for assignor name “Volvo Car Corporation” in the AOTW database returns a list of US patents (and applications) assigned away from VCC, typically to FGT. Most of these were reassigned back to VCC after the divestment from Ford, in a reassignment registration that can be obtained by searching for Reel/Frame number 24915/0795 in the AOTW database (e.g., US patent numbers 6583973, 6631703, 7195574, and 8152345). This reassignment includes 177 utility and design patents (and applications) filed after Ford’s purchase that were typically at some point assigned to FGT, and subsequently reassigned back to VCC on August 26, 2010.

Complementary results can be obtained from the DPMA patent database, where all German patents in force and owned by VCC that were previously owned by FGT can be found by the following search string in the Expert database search of DPMA: ”(INH = "volvo" (L) "car" (L) "corporation" or IN = "volvo" (L) "car" (L) "corporation") and (SART = patent) and ST = anhaengig-in-kraft and {(INHF="ford" (L) "global" (L) "technologies")}”. The results include 220 patents, all of them filed after Ford’s purchase of VCC in 1999, and typically reassigned from FGT to VCC throughout 2011 and 2012 (e.g., DE file numbers 603 08 878.3, 60 2004 014 207.7, and 601 17 751.7).

Finally, data on interorganizational contracts and agreements are typically not available in the public domain (apart from some IPR ownership reassignments as described above and some court case data, although such data increasingly becomes sealed upon requests from the parties involved), mainly leaving us to rely on primary data sources for this type of information (and other types of secondary sources than IPR data). This is also true for the large and important share of non-registered IP, especially trade secrecy rights and knowhow.

Overall the use of secondary IPR data is insufficient for this type of studies, but useful for validating results obtained from primary sources. Increased transparency of ownership (e.g., by

reassignment registration requirements) and usage rights (e.g., by license registrations) would improve the usefulness of these sources, although never diminish the need for primary data sources on the actual management and economics of IP.

[Table A.2 here]

Table A.1 Selection of secondary sources for the case of Saab Automobile

<p>Divestment from Saab-Scania and Investor: Brown, Warren. "GM Agrees to Buy Half of Saab's Car Operations." <i>The Washington Post</i>, Dec 16, 1989. "Jaguar and Saab: Leather, Luxury and Losses." <i>The Economist</i> 328, no. 7820 (Jul 17, 1993): 65-66. Meredith, Robyn. "G.M. Takes Option to Buy Rest of Saab; Sales Push Set." <i>New York Times</i>, Jun 25, 1996. White, Gregory L. "GM Plans to Buy Remaining 50% of Sweden's Saab." <i>Wall Street Journal</i>, Jan 11, 2000.</p> <p>Divestment from GM: Stoll, John D. "Corporate News: Saab Speeds Up Talks with Suitors." <i>Wall Street Journal</i>, Mar 03, 2009. Terlep, Sharon and Ola Kinnander. "Corporate News: GM Appears to Close in on a Deal to Sell Saab." <i>Wall Street Journal</i>, Jun 12, 2009. Dougherty, Carter. "Saab is Said to be Close to a Sale." <i>New York Times</i>, Jun 12, 2009. Jolly, David. "G.M. Sells Saab to Swedish Automaker." <i>The New York Times</i>, June 17, 2009. Marr, Kendra. 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"GM Puts Saab Back on Death Watch; Spyker Hopes Fade." <i>National Post</i>, Dec 26, 2009. Bunkley, Nick. "G.M. Extends Deadline for Bids on Saab, but Proceeds with Plan to Shut it." <i>New York Times</i>, Dec 31, 2009.</p>	<p>"GM Reaches Agreement to Sell Saab to Spyker." <i>PR Newswire</i>, Jan 26, 2010. Sharon, Silke Carty. "Spyker Grants Saab a Reprieve." <i>USA TODAY</i>, Jan 27, 2010. Harro, Ten Wolde. "Spyker Cars Prevails in Battle for Saab; Deal Unexpected Transaction Valued at \$400 Million U.S." <i>The Gazette</i>, Jan 27, 2010. Taylor, Paul. "Spyker Acquires Financing to Secure Purchase of Saab Unit from GM." <i>National Post</i>, Feb 09, 2010.</p> <p>Post-divestment problems: "Saab Signs Funding Deal with Hawtai Motor Group." <i>Wall Street Journal (Online)</i>, May 03, 2011. Saltmarsh, Matthew and Yolly, David. "Troubles at Saab Continue as Chinese Deal Collapses." <i>New York Times</i>, May 13, 2011. Chen, Shirley, Clare MacCarthy, and Patti Waldmeir. 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"Pang Da, Youngman Water Down Ownership Proposal to Buy Saab." <i>China Business News</i>, Dec 08, 2011. Kleja, Monica. "Saabs väg mot diket." <i>Ny Teknik</i>, Dec 14, 2011. Reed, John. "Saab Files for Bankruptcy After GM Veto." <i>FT.Com</i>, Dec 19, 2011. Hugo, Linus. "Nytt försök ta över." <i>Göteborgs-Posten</i>, Dec 21, 2011. "GM's Final no to Saab's Restructuring Plan Kills Saab." <i>China Business News</i>, Dec 27, 2011. "Swedish Delegation Visits China to Talk about Saab Deal." <i>China Business News</i>, Jan 30, 2012. Larsson, Gerhard. "Saab trögstartat." <i>Dagens Industri</i>, Feb 22, 2012. Castonguay, Gilles. "Tata Denies Report of Interest in Saab." <i>Wall Street Journal (Online)</i>, Mar 06, 2012. Karlberg, Lars Anders. "Giganternas kamp om Saab." <i>Ny Teknik</i>, Apr 4, 2012. Macéus, Karolina P. "Idag möts de i rätten." <i>Dagens Industri</i>, Apr 16, 2012. Karlberg, Lars Anders. "Trollhättan redo för ny Saab-ägare." <i>Ny Teknik</i>, May 23, 2012. 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Table A.2 Selection of databases containing IPR ownership and reassignment data

Trademark databases:	Internet addresses:
AOTW (USPTO)	assignments.uspto.gov
DPMA trademark search	register.dpma.de/DPMAREGISTER/marke/uebersicht
Global Brand Database (WIPO)	www.wipo.int/branddb/
TESS (USPTO)	tess2.uspto.gov
TMView (OHIM)	tmview.europa.eu
Patent databases:	Internet addresses:
AOTW (USPTO)	assignments.uspto.gov
DPMA patent search	register.dpma.de/DPMAREGISTER/pat/uebersicht
Patent Application Information Retrieval (USPTO)	portal.uspto.gov/pair/PublicPair

Notes

¹ Harold Demsetz. "Toward a Theory of Property Rights." *The American Economic Review* 57, no. 2 (1967): 347-59.

² Garrett Hardin. "The Tragedy of the Commons." *Science* 162, no. 3859 (1968): 1243-48.

³ Paul A. David. "Intellectual Property Institutions and the Panda's Thumb: Patents, Copyrights, and Trade Secrets in Economic Theory and History." In *Global Dimensions of Intellectual Property Rights in Science and Technology*, edited by M.B. Wallerstein, M.E. Moguee and R.A. Schoen. 19-61. Washington DC: National Academy Press, 1993.

⁴ Gary P. Pisano, and David J. Teece. "How to Capture Value from Innovation: Shaping Intellectual Property and Industry Architecture." *California Management Review* 50, no. 1 (2007): 278-96.

⁵ David J. Teece. "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy." *Research Policy* 15, no. 6 (1986): 285-305.

⁶ Joseph E. Stiglitz. "Knowledge as a Global Public Good." In *Global Public Goods*, edited by Inge Kaul, Isabelle Grunberg and Marc A. Stern. 308-25. Oxford: Oxford University Press, 1999.

⁷ An automobile or an electronic device may be covered by thousands of patents with hundreds of patent holders, and many times more for, e.g., a mobile communication system. Some products moreover consist of technological components with multiple applications. All of this might lead to a "jungle" of patents and patent owners, tied together by a "web" of usage rights transferred in form of licenses and cross-licenses.

⁸ A stronger form of this problem is when rights are assembled with the aim to limit the FTO of others in addition to the aim to ensure one's own FTO.

⁹ Michael A. Heller. "The Tragedy of the Anticommons: Property in the Transition from Marx to Markets." *Harvard Law Review* 111, no. 3 (1998): 621-88; Michael A. Heller, and Rebecca S. Eisenberg. "Can Patents Deter Innovation? The Anticommons in Biomedical Research." *Science* 280, no. 5364 (May 1, 1998): 698-701.

¹⁰ See also Carl Shapiro. "Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting." In *Innovation Policy and the Economy*, edited by Adam B. Jaffe, Josh Lerner and Scott Stern. 119-50. Cambridge, MA: MIT Press, 2001.

¹¹ The commons/anti-commons dimension could be operationalized in more detail in terms of number and nature of ownership and usage rights to various IPRs in various configurations with various types of rights holders and business interests, or the number of IP encumbrances, which besides license obligations also could include inherited liabilities, litigations, and post-contractual obligations. The sales of the IP portfolios of Nortel (2011), AOL (2012), and Kodak (2013) as examples of naked IP transactions provide a case in point, which could be compared to the corporate transactions described in this paper. Both the Nortel and Kodak IP sales were part of bankruptcy processes, which changed the opportunity costs of the selling party, but the level of IP encumbrances (in terms of licenses) was much higher in the Kodak case, which magnified the IP disassembly problem just as in the Saab Automobile case (as presented in this paper), while the transactions went speedily in the Nortel case, as in the AOL case, cases which involved less IP encumbrances. These cases of IP transactions have been covered in the business press; e.g., Josh Rubin, "Nortel Patent Deal Worth \$4.5B Approved", *Toronto Star*, March 13, 2012;

John Jannarone and Shalini Ramachandran, "AOL's Deal Eases Pressure - In Selling Patent Portfolio to Microsoft, Struggling Internet Company Buys Time", *Wall Street Journal*, April 10, 2012; Shira Ovide and Geoffrey A. Fowler, "Facebook Buys AOL Patents from Microsoft for \$550 Million", *Wall Street Journal (Online)*, April 23, 2012; Dana Mattioli and Mike Spector, "Kodak to Sell Patents for \$525 Million", *Wall Street Journal (Online)*, December 19, 2012.

¹² While corporate transactions and the market for corporate control have a long history, IP transactions have not, and the secondary markets for patents and other IPRs have emerged only in recent decades. This latter type of markets could then be referred to as the market for IP control. It is still a bit early to characterize this young type of market and compare it with the market for corporate control (thus calling for further research), but a few differences can be pointed at, as indicated by, e.g., the high-profile IP transactions by Nortel (2011), AOL (2012), and Kodak (2013). Corporate transactions, as studied in this paper, involve a business for sale (BFS) with IP embedded in complementary resources, and they are typically managed by M&A specialists for which IP is a consequential and often secondary concern, although buyer and seller IP clearance is needed. Further, the market for corporate control is typically thin. The market for IP control is usually thicker, and the transactions are managed by IP specialists with IP as a primary concern. There are no complementary resources bundled with the IP for sale (IPFS) (although complementary and/or substitute IPRs can be bundled together) and there is therefore less need for buyer IP clearance. Buyers and buyer motives are typically heterogeneous, including intermediaries, non-practicing entities (NPEs), and privateers, together with "traditional" entities with R&D and manufacturing who are willing to pay for the FTO that the IPFS would give them, for reducing the FTO of their competitors, or for simply blocking the sale to an NPE who could otherwise leverage the IPFS against them. (The Kodak digital imaging patents were sold to a consortium of industrial firms led by a couple of NPEs - Intellectual Ventures and RPX Corporation - illustrating the buyer heterogeneity.) Since the seller may have preferences regarding the buyer, the market for IP control may become two-sided in the sense that both buyer and seller preferences matter. This is often the case also for the market for corporate control, as illustrated in the automotive cases in this paper, especially regarding the sellers' concerns of selling/leaking technologies to Chinese competitors. However, reselling may occur on both markets, as illustrated by the Microsoft resell of IP to Facebook while keeping a back-license, as a way to cherry-pick and refinance.

¹³ Dennis W. Carlton, and Jeffrey M. Perloff. *Modern Industrial Organization*. 4th ed.: Pearson Addison Wesley, 2005.

¹⁴ Ove Granstrand, Pari Patel, and Keith Pavitt. "Multi-Technology Corporations: Why They Have 'Distributed' Rather Than 'Distinctive Core' Competences." *California Management Review* 39, no. 4 (1997): 8-25; Deepak Somaya, David J. Teece, and Simon Wakeman. "Innovation in Multi-Invention Contexts: Mapping Solutions to Technological and Intellectual Property Complexity." *California Management Review* 53, no. 4 (2011): 47-79.

¹⁵ Ove Granstrand. "Multi-Technology Management." In *The Economics and Management of Technological Diversification*, edited by John Cantwell, Alfonso Gambardella and Ove Granstrand. 296-332. London: Routledge, 2004.

¹⁶ See, e.g., Ove Granstrand. *The Economics and Management of Intellectual Property: Towards Intellectual Capitalism*. Cheltenham: Edward Elgar Publishing, 1999; Bronwyn H. Hall, and Rosemarie Ham Ziedonis. "The

Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995." *The RAND Journal of Economics* 32, no. 1 (2001): 101-28.

¹⁷ Ove Granstrand and Marcus Holgersson. "Multinational technology and intellectual property management - is there global convergence and/or specialisation?" *International Journal of Technology Management* (forthcoming).

¹⁸ Henry W. Chesbrough. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Press, 2003.

¹⁹ John Hagedoorn. "Understanding the Rationale of Strategic Technology Partnering: Interorganizational Modes of Cooperation and Sectoral Differences." *Strategic Management Journal* 14, no. 5 (1993): 371-85; John Hagedoorn. "Inter-Firm R&D Partnerships: An Overview of Major Trends and Patterns since 1960." *Research Policy* 31, no. 4 (2002): 477-92; Grazia D. Santangelo. "Corporate Strategic Technological Partnerships in the European Information and Communications Technology Industry." *Research Policy* 29, no. 9 (2000): 1015-31.

²⁰ A type of unmanaged or unplanned IP disassembly also occurs when IP is simply dissolved or diffused more or less spontaneously without necessarily presenting a clear decision problem to any decision-making body or being a direct result from a disassembly decision. An example is when the likelihood of an exit or termination of an R&D project becomes imminent and key scientists and engineers and holders of human embodied IP in form of know-how leave to start their own business or are hired-over by competitors. Exit interviews, debriefings, and disembodiment (tapping) employees of their know-how might slow down such a "spontaneous" disassembly process but only up to a point, as a number of "hostile spin-offs" demonstrate.

²¹ Kenneth J. Arrow. "Economic Welfare and the Allocation of Resources for Invention." In *The Rate and Direction of Inventive Activity: Economic and Social Factors*, edited by National Bureau of Economic Research. 609-25. Princeton, NJ: Princeton University Press, 1962.

²² The search was made on May 3, 2012, searching for Topic=("intellectual propert*" OR patent*) AND Topic=(merger* OR acqui* OR divest* OR "M&A*").

²³ Most records instead focus on the impact from M&As upon innovativeness of firms and individuals, see e.g. Gautam Ahuja, and Riitta Katila. "Technological Acquisitions and the Innovation Performance of Acquiring Firms: A Longitudinal Study." *Strategic Management Journal* 22, no. 3 (2001): 197-220; Marianna Makri, Michael A. Hitt, and Peter J. Lane. "Complementary Technologies, Knowledge Relatedness, and Invention Outcomes in High Technology Mergers and Acquisitions." *Strategic Management Journal* 31, no. 6 (2010): 602-28; Srikanth Paruchuri, Atul Nerkar, and Donald C. Hambrick. "Acquisition Integration and Productivity Losses in the Technical Core: Disruption of Inventors in Acquired Companies." *Organization Science* 17, no. 5 (2006): 545-62.

²⁴ Terje Gudmestad, and Ove Tobia Gudmestad. "Protecting Intellectual Property During Divestitures and Acquisitions." *Research Technology Management* 41, no. 5 (1998): 36-39.

²⁵ Ziff, E.D. (2002) 'The effect of corporate acquisitions on the target company's license rights', *The Business Lawyer*, Vol. 57, No. 2, pp. 767-792.

²⁶ In contrast to technologies that might be complex but have less systems complexities in form of interdependent components, standards and interfaces, as in pharmaceuticals, sometimes referred to as discrete technologies. See,

e.g., Wesley M. Cohen, Richard R. Nelson, and John P. Walsh. "Protecting Their Intellectual Assets: Appropriability Conditions and Why Us Manufacturing Firms Patent (or Not)." In *NBER Working Paper 7552*, 2000.

²⁷ Land Rover was owned originally by British Leyland, then BMW, then Ford, then Tata Motors; and Saab Automobile by Saab, Saab-Scania, (Investor), GM, and Spyker Cars.

²⁸ All in all 18 interviews with 17 interviewees have been conducted in the two case companies, covering current and/or previous CEO and CTO positions as well as other important executive/management/R&D positions for the study at hand, such as legal, IP, market, key scientists and engineers, etc. Additionally, 5 interviews with 7 interviewees were conducted covering large law firms and other automotive company personnel and observers. The interviews were extensive, typically lasting in between one and three hours and performed face to face (with a few exceptions of shorter telephone interviews) between December, 2011, and January, 2013. Some interviews were followed up by e-mail questions. In addition to primary data through interviews, secondary data in the form of hundreds of newspaper articles, press releases, annual reports, and other company and media documentations have been studied, especially regarding the case of Saab Automobile (see Appendix A). Additionally, the authors were during the divestment-years around 2010 physically located in Gothenburg, i.e., in the close proximity of both Saab Automobile and VCC headquarters, which enabled insight in the local media coverage and the frequent discussions of these deals in the region. This was especially important in the Saab Automobile case, which rendered a lot of local media coverage. Finally, IPR data was used to validate the data obtained from primary sources (see Appendix A). Two additional high-profile cases of IP disassembly problems have also been studied (one from the chemical industry with low systems complexity and one from the electronics industry with high systems complexity), but space limits and sensitivity of the matters prevents us from disclosing them.

²⁹ E.g., Warren Brown, "GM Agrees to Buy Half of Saab's Car Operations", *The Washington Post*, December 16, 1989; Gregory L. White, "GM Plans to Buy Remaining 50% of Sweden's Saab", *Wall Street Journal*, January 11, 2000.

³⁰ Interviewed on August 27, 2012. Quotes in Swedish have been translated by the authors throughout the paper.

³¹ As described by Knut Simonsson, Vice President at Saab Automobile (interviewed on July 3, 2012), this license was only valid for automobile business, and only as long as the company stayed within this business. Therefore, in cases where Saab Automobile wanted to connect to its airplane heritage, which was commonly done in commercials, permission had to be received from the trademark owner Saab AB.

³² See also Appendix A.

³³ See, e.g., Saab Automobile annual report 2005.

³⁴ According to an interviewee with an R&D executive at Saab Automobile on June 19, 2012. The reasons for this were arguably more related to practicalities in managing the large technology portfolio than to tax issues and cross-border income shifting, even if opportunities for the latter came as a result of the new organizational setup.

³⁵ According to an interview on January 19, 2012, with a legal interviewee at Saab Automobile.

³⁶ Interviewed on May 15, 2012. See also Saab Automobile annual report 2006.

³⁷ See, e.g., John D. Stoll, "Corporate News: Saab Speeds Up Talks with Suitors", *Wall Street Journal*, March 3, 2009; Monica Kleja, "Saabs väg mot diket", *Ny Teknik*, December 14, 2011.

³⁸ See, e.g., David Jolly, "G.M. Sells Saab to Swedish Automaker", *The New York Times*, June 17, 2009.

³⁹ Both GM and Saab Automobile were or had been subject to reconstruction, and besides GM, Saab Automobile, and Koenigsegg, other important stakeholders to consider in negotiations were the US and Swedish governments, the European Investment Bank (EIB), owners of the Saab-related trademarks, the financial investors backing Koenigsegg, GM's partner in China (Shanghai Automotive Industry Corporation), etc. This complexity was confirmed by several interviewed Saab Automobile executives and advisors. See also, e.g., Peter Whoriskey, "Saab's Future Uncertain as Swedish Buyer Pulls Out; GM to Reassess Brand's Fate Swedish Government may have to Kick in", *The Washington Post*, November 25, 2009; Robert Channick, "GM Likely to Shut Down Saab Division", *Chicago Tribune*, November 25, 2009.

⁴⁰ As described in interviews with several Saab Automobile executives, including in interviews with Kjell AC Bergström, CEO of Saab Automobile Powertrain at the time, on December 27, 2011, and May 11, 2012. See also, e.g., Eddie Pröckl, "Saab: Vi äger Phoenix", *Ny Teknik*, November 16, 2011.

⁴¹ See, e.g., Koenigsegg press release, November 24, 2009.

⁴² As explained by Kjell AC Bergström (CEO of Saab Automobile Powertrain at the time) and several other interviewees, ownership to this technology was retained within Saab at the time of the integration within GM in 2005 when technologies were collected in GTO, which opened up for this opportunity to disintegrate the technologies. See also Norihiko Shirouzu, "Chinese Car Maker to Get Part of Saab", *Wall Street Journal*, December 14, 2009.

⁴³ This price tag was more a result of Saab Automobile's financial needs at the time than a result from a thorough valuation, according to several interviewees within the firm. Independent commentators have been impressed by the amount of cash Saab Automobile managed to raise from these old technologies, especially since having more producers of the same platform means having larger total volumes of spare parts and thus lower prices of spare parts for Saab Automobile, as explained in an interview on June 19, 2012, with an interviewee with a number of former top management positions in the Swedish automotive industry.

⁴⁴ According to a member of the general management team of Saab Automobile interviewed on May 15, 2012, the sales process had from the outset been driven more by Saab Automobile management than by GM management, and had actually been presented by executives at Saab Automobile to GM management as an alternative to closing down the business.

⁴⁵ See, e.g., "GM Reaches Agreement to Sell Saab to Spyker", *PR Newswire*, January 26, 2010; Paul Taylor, "Spyker Acquires Financing to Secure Purchase of Saab Unit from GM", *National Post*, February 9, 2010; "Spyker Cars Finalizes the Purchase of Saab," *PR Newswire*, February 23, 2010; John Reed, "Spyker Closes Purchase of Saab from GM", *FT.Com*, February 23, 2010.

⁴⁶ See, e.g., Christina Zander, "Corporate News: Saab Auto has Deal to be Sold", *Wall Street Journal*, October 29, 2011. The first solution presented, which involved the Russian investor Vladimir Antonov, had been refused by

both GM and EIB. See, e.g., Matthew Saltmarsh, "Saab Suffers New Round of Financial Difficulties", *New York Times*, April 8, 2011.

⁴⁷ Quote from *Saabs sista strid*, TV4, April 24, 2012.

⁴⁸ See, e.g., "Swedish Automobile Says no to Takeover Offer by Chinese Partners." *Nordic Business Report*, October 21, 2011.

⁴⁹ See, e.g., Bernard Simon, "GM in threat to block sale of Saab to Chinese groups", *Financial Times*, November 5, 2011.

⁵⁰ Quote from *Saabs sista strid*, TV4, April 24, 2012.

⁵¹ CCCs are typically included in contracts to give either party increased protection through various rights (such as termination rights) in case of a change of control of the other party. The actual termination clause may typically be written: "The Parties may terminate the Agreement in the event that a Change of Control as hereinafter defined, shall occur at any time during the Term or Renewal Term hereof, without the prior written consent of the Parties". The Change of Control of a party is then separately defined, typically including changes of voting power of the party and sales of a substantial amount of (all) assets of the party. In this case a change of control of between 20% and 50% (depending on agreement) of Saab Automobile allowed GM to terminate its agreements with Saab Automobile. Thus, financial solutions implying a change of ownership of 20% or more of Saab Automobile had to be cleared with GM. Further, important CCCs were included both in IP license agreements and in supplier agreements, meaning that even if Saab Automobile would be able to invent around blocking patents or other blocking IPRs in case of a change of ownership, the firm would possibly have troubles finding alternative suppliers to a reasonable cost.

⁵² See, e.g., Monica Kleja, "Saabs väg mot diket", *Ny Teknik*, December 14, 2011; John Reed, "Saab Files for Bankruptcy After GM Veto", *FT.Com*, December 19, 2011.

⁵³ See, e.g., Christina Zander, "Asian Start-Up Acquires Saab Auto; Chinese, Japanese Investors Outline Plan to Build Electric Cars at Swedish Plant", *Wall Street Journal (Online)*, June 13, 2012.

⁵⁴ The impact from a bankruptcy on license agreements is subject to large uncertainties, however, and it is not clear that a bankruptcy estate is limited by the same license clauses (such as CCCs) as the pre-bankruptcy licensee. Such uncertainties are especially large in cross-border cases, in which contract laws and bankruptcy laws of multiple jurisdictions are involved and reciprocity is uncertain and limited.

⁵⁵ As quoted in Gerhard Larsson, "Riksgälden ivrig ta över Saab Parts", *Dagens Industri*, June 20, 2012.

⁵⁶ As interviewed on January 16, 2013.

⁵⁷ Nevs did not secure a new license to the griffin logo from Scania, however, as described in an interview on January 16, 2013, with Kjell AC Bergström, CTO and Vice President of Nevs and previous CEO of Saab Automobile Powertrain.

⁵⁸ Ford's President and CEO at the time, Jacques Nasser, acknowledged the engineering capabilities and the strong brand of Volvo, especially related to safety, as reasons for the acquisition: "What we are really buying here is generations of hard work and dedication and brand building and ingenuity that has been put together over decades

and decades [...] We are buying the strength of the brand, the reputation of the brand, and we are buying a team that is incredibly best in breed in terms of its worldwide capacity and research and development." See "Ford buys Volvo car arm", CNNfn, January 27, 1999. Web. December 12, 2012.

⁵⁹ This process was described by the CTO at the time, as interviewed on June 19, 2012. See also Volvo Trademark Holding annual report, 1999. Trademark reassignment data confirms this setup. As an example 29 registered US trademarks plus two applications were reassigned from AB Volvo to Volvo Trademark Holding on February 26, 1999. See also Appendix A.

⁶⁰ See Appendix A for examples of patents with ownership assigned to FGT.

⁶¹ As described by a senior executive at VCC in an interview on December 29, 2011.

⁶² Interview on December 29, 2011. This picture was confirmed by another (former) senior executive at VCC in an interview on June 19, 2012, stating that the patent culture at VCC was markedly strengthened under Ford's ownership.

⁶³ The opposite seldom happens in M&As in fact.

⁶⁴ The Volvo models C30, S40, V50, and C70 were all built on Ford's C1 platform (for small cars), within which VCC had not much competence. VCC's main competence was on the larger platform Volvo P2 (Ford D3), which was however replaced by Ford's midsize platform EUCD for VCC's larger models, including Volvo S60, V60, XC60, V70, XC70, and S80, during the second half of the first decade of the 2000s. The XC90 was at that time still based on VCC's P2 platform.

⁶⁵ This was confirmed by Hans Folkesson, VCC's CTO at the time, in an interview on June 19, 2012.

⁶⁶ See, e.g., Nick Bunkley and contributed reporting Micheline Maynard, "Ford to Sell Aston Martin to Group Led by Ex-Racer", *New York Times*, March 13, 2007.

⁶⁷ See, e.g., Bryce G. Hoffman, "Ford Unloads Jaguar, Land Rover to Tata", *Detroit News*, March 27, 2008.

⁶⁸ As described by several interviewees, including Paul Welander, Senior Vice President at VCC (interviewed on July 9, 2012).

⁶⁹ Interview on July 9, 2012.

⁷⁰ Interview on August 28, 2012

⁷¹ As explained by several VCC interviewees.

⁷² As quoted in Keith Bradsher, "Ford Agrees to Sell Volvo to a Fast-Rising Chinese Company", *The New York Times*, March 29, 2010.

⁷³ The value of these licenses to Ford technologies is illustrated by a new category of immaterial assets in VCC's annual report (Volvo Personvagnar annual report, 2010), saying that VCC holds assets in form of licenses booked at a value of 7.5 BSEK (1.1 BUSD as of December 31, 2010), becoming the second largest category of non-financial assets on the firm's balance sheet, corresponding to 12.6% of the booked value of VCC's total assets. It can also be related to the price tag of VCC at 1.8 BUSD when Geely purchased the firm in 2010 (see, e.g., Ford press release on August 2, 2010: "Ford Motor Company completes sale of Volvo to Geely").

⁷⁴ E.g., 177 US utility and design patents were reassigned to VCC on August 26, 2010 (e.g., US patent numbers 6583973, 6631703, 7195574, and 8152345). Similarly, 220 German patents were reassigned from FGT to VCC ownership, mainly throughout 2011 and 2012. Note however that reassignment registrations are typically not compulsory, meaning that this data by no means needs to be complete. See Appendix A.

⁷⁵ Including Paul Welander (July 9, 2012) and John Öster (August 28, 2012).

⁷⁶ See, e.g., Ford press release on October 28, 2009: “Ford confirms Geely as its preferred bidder for Volvo Cars”.

⁷⁷ See, e.g., Volvo Personvagnar annual report, 2010; Ford press release on August 2, 2010: “Ford Motor Company completes sale of Volvo to Geely”.

⁷⁸ One could in an extended framework also consider importance for the buying firm’s other businesses but we limit ourselves here.

⁷⁹ Similar distinctions are, e.g., essential vs. non-essential, primary vs. secondary, and unique vs. non-unique.

⁸⁰ For example, in the US and many other jurisdictions one of the owners can license a patent to a third party without the consent of any other owner. See, e.g., the special issue on “Joint Ownership of Intellectual Property Around the World” (2012) *les Nouvelles* 47, no. 4.

⁸¹ For example, according to the Articles of Association of Volvo Trademark Holding AB, the firm should not only own and protect the trademarks but also license them to its shareholders.

⁸² The latter can arise from invent around activities that an IP JV party otherwise might be incentivized to do to get out of the JV.

⁸³ A grant-back clause stipulates that the licensee must transfer or license any improvements on the licensed technology made by the licensee back to the licensor.

⁸⁴ A grant-forward clause stipulates that the licensor must offer the licensee a license on any improvements of the licensed technology made by the licensor.

⁸⁵ Consider an IP disassembly problem related to a patent portfolio. This deal must consider patents applied for up to 20 years back in time, and the deal structure then also impacts patents that are valid up to 20 years into the future (the life time of patents is typically 20 years), meaning that the time frame to consider in the deal is 20 + 20 years.

⁸⁶ A multinational corporation might for instance be mainly interested in securing the international patent rights to an invention developed in collaboration with a national government agency with the domestic market as its only core market, as was previously common in the telecom industry before deregulation in the 1980s.

⁸⁷ Note that in standardization the distinction essential/non-essential is typically used for patents, corresponding to core/non-core, and the business for sale rather corresponds to a technology portfolio for sale. Also note that more refined types of importance, as well as ordered scales of importance, say graded on a Likert scale (e.g., no importance = 0, 1, 2, 3, 4 = core importance) could of course be introduced, but matching contractual solutions then easily get swamped in a perfection mire with inhibiting transaction costs.

⁸⁸ See, e.g., Ove Granstrand. *The Economics and Management of Intellectual Property: Towards Intellectual Capitalism*. Cheltenham: Edward Elgar Publishing, 1999; Carl Shapiro. "Navigating the Patent Thicket: Cross

Licenses, Patent Pools, and Standard Setting." In *Innovation Policy and the Economy*, edited by Adam B. Jaffe, Josh Lerner and Scott Stern. 119-50. Cambridge, MA: MIT Press, 2001.

⁸⁹ Imagine the combinatorial explosion of possible license agreements when thousands of patents with hundreds of patent owners engage in licensing and cross-licensing with dozens of generic license types, such as exclusive, sole, simple, sub-, block-, cross-, grant back, grant forward, blanket, stand alone, convertible, etc., licenses with various restrictions and obligations.

⁹⁰ Or through intransparent activities of so called patent trolls for that matter.

⁹¹ Various remedies are then conceivable, for example in the spirit of efficient breach of contracts or laws allowing license agreements to be terminated in certain bankruptcy or insolvency situations. For the case of Sweden, see Bengt Domeij (2011). "Seizure of transferred intellectual property rights from an insolvent purchaser. A comment on the decision by the Swedish Supreme Court of 22 December 2010." *Nordiskt Immateriellt Rättsskydd* 80, no. 4 (2011): 414-421.

⁹² Note that industries also differ in their propensity to use different IPR types, like copyrights in creative industries, design rights in fashion industries, or patent rights in technology-based industries.

⁹³ IPRs of different types are not independent, but may have significant complementary and substitute effects. As elaborated by David Teece in particular, complementary assets, be they intellectual or physical, are of key importance for capturing private value from innovation. For a seminal paper, see David J. Teece. "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy." *Research Policy* 15, no. 6 (1986): 285-305.

⁹⁴ To mention an example, a conceivable situation is that a strategic patent fence is blocking a number of agents with no invent around possibilities (by definition). The patents in the patent fence are auctioned out by the seller, who could possibly face bankruptcy with low opportunity costs, in the hope to cash in on the winner's curse, based on the common value of the patents to the agents. The agents then form a JV to offset this risk of the winner's curse, and the JV bids and wins the whole patent fence, but at the cost of managing multi-party internal IP assembly/disassembly problems of quite a specific nature.

⁹⁵ See, e.g., Ove Granstrand and Marcus Holgersson. "The 25% rule revisited and a new investment-based method for determining FRAND licensing royalties." *les Nouvelles* 47, no. 3 (2012): 188-195.

⁹⁶ See, e.g., Oliver E. Williamson. *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York, NY: Free Press, 1985.

⁹⁷ This was certainly the case in the divestment of Saab Automobile from GM. Without the efforts taken by the management of Saab Automobile, GM would likely have closed down the subsidiary instead of selling it.

⁹⁸ It is even officially stated on the VCC webpage that having "spent over 6 years in Asia and with good relations to Ford, Hans-Olov could play an important role during the transaction period [as Geely's advisor]".

⁹⁹ A list of remedies to the IP *assembly* problem at policy and management level is provided in Ove Granstrand. *The Economics and Management of Intellectual Property: Towards Intellectual Capitalism*. Cheltenham: Edward Elgar Publishing, 1999. See also Ove Granstrand. "Are we on our way in the new economy with optimal inventive

steps.” Chap. 10 in *Economics, Law and Intellectual Property*, edited by Ove Granstrand. 223-58. Dordrecht: Kluwer Academic Publishers, 2003.

¹⁰⁰ See, e.g., Ove Granstrand. "Intellectual Property Rights for Governance in and of Innovation Systems." Chap. 10 in *Intellectual Property Rights: Innovation, Governance and the Institutional Environment*, edited by Birgitte Andersen. 311-43. Cheltenham: Edward Elgar Publishing, 2006; Marcus Holgersson. *Innovation and Intellectual Property: Strategic IP Management and Economics of Technology*. Gothenburg: Chalmers University of Technology, 2012.

¹⁰¹ IPRs such as patent rights with origins preceding industrialization have only in the recent century plus been regarded as property rights rather than privileges, exemptions, or concessions. This legal transition has been criticized for overly strengthening the patent system and facilitating its capture by corporate rather than consumer interests. However, a property approach to inventive and creative ideas in return for their disclosure conveys advantages as property rights facilitates governance of them through providing a contractual infrastructure for management of and markets for ideas. See, e.g., Robert Merges. *Justifying intellectual property*. Harvard University Press, 2011.

¹⁰² See, e.g., Thomas Ewing. "Indirect Exploitation of Intellectual Property Rights by Corporations and Investors: IP Privateering and Modern Letters of Marque and Reprisal." *Hastings Science & Technology Law Journal* 4 (2012): 1.