

Synergy Savings in the GM-Fiat Strategic Alliance

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LEGAL AND FINANCIAL ASPECTS OF THE AGREEMENT

The GM-Fiat industrial alliance aims at maximizing synergic effects provided by the commonality of most activities along the supply chain. Fiat Auto and GM are then looking for opportunities deriving from joint operations in purchasing, new product developments, production & assembly, financial and logistics on a worldwide scale while retaining commercial competition between their respective brands. Taking into account that the agreement between the two partners involves mainly the manufacturing areas, the various divisions managed by the two automakers will continue from a commercial standpoint to operate separately in Europe and in Latin America. This means that from the perspective of General Motors, the divisions involved are basically Opel, Vauxhall, Saab and Chevrolet (the latter for Latin America); while for Fiat, the business units involved are those directly controlled by Fiat Auto SpA: Fiat, Alfa Romeo and Lancia.

During the year 2000, the strategic industrial alliance has implied for Fiat Automobile Sector a reorganization of the company structure. Since 1st July 2000 Fiat Auto SpA (now Fiat Auto Partecipazioni SpA) has de-merged its operational activities which have been conferred to a new head company named Fiat Auto Holdings BV. At the same time General Motors Corporation acquired a stake in Fiat Auto Holdings BV for 20% and Fiat acquired a stake of approximately 6% in General

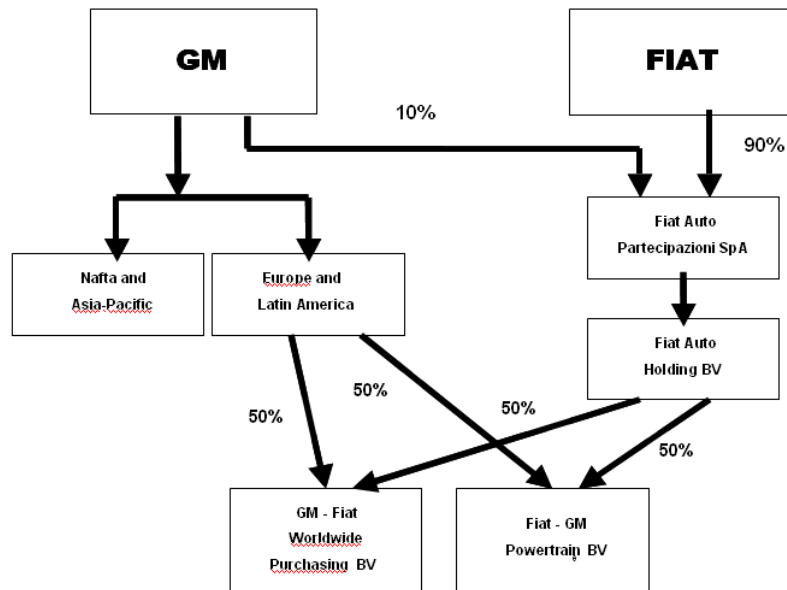
Motors Corporation itself¹. This situation changed after the Fiat financial crisis of 2002. Fiat sold its stock share to an international bank and GM has not decided yet whether to join or not the stock emission led by Fiat for gathering fresh money for a massive policy of investment in an industrial turnaround. At present the financial linkage between the two partners is reproduced in the Exhibit 1. As far as the industrial relationship, nothing has changed of the starting agreement. As previously stated, the equity of the two joint-ventures, the most relevant tool of the agreement, named: GM-Fiat Worldwide Purchasing BV and Fiat-GM Powertrain BV - is divided 50/50 between the two partners.

According to calculations proposed by the partners themselves, the savings deriving from the integration process began to materialize in 2001 and should systematically grow for an expected total savings for both partners of € 2 billion in 2005² (Exhibit 2). Those savings, if related to the sum of revenues highlighted by consolidated balance sheets of Fiat Auto, General Motors of Europe (GME) and General Motors activities of Latin America in 2000 that are equal to about € 53 billion, would provide a percentage of about 3%. It is a significant value in line with the rate of profitability of an automaker which financial analysts would certainly define “in good health”.

¹ On the first part of GM-Fiat Alliance see: Camuffo A., Volpato G. (2002).

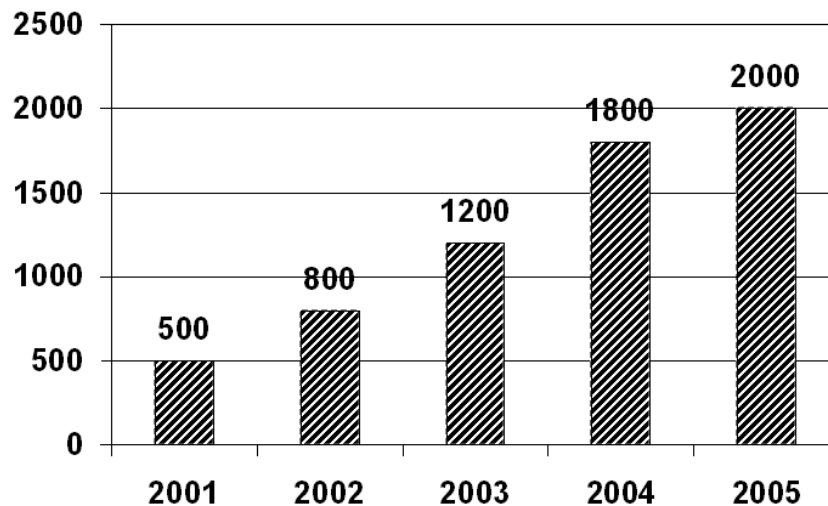
² In a previous evaluation, made at the time of the agreement, estimated savings for 2001 were € 188 million from combined purchasing for both partners.

Exhibit 1. FIAT - GM Partnership



Source: Fiat Auto

Exhibit 2. Global Savings for Fiat & GM (million of €)



Source: Fiat Auto

With respect to the break-down of cost economies, the data provided by the two partners highlight significant savings derived from the synergies in purchasing¹, which will materialize in

¹ In the calculation of savings the category "Purchasing" does not include the purchasing of parts and components linked to the development of "Powertrains" and of "Architectures".

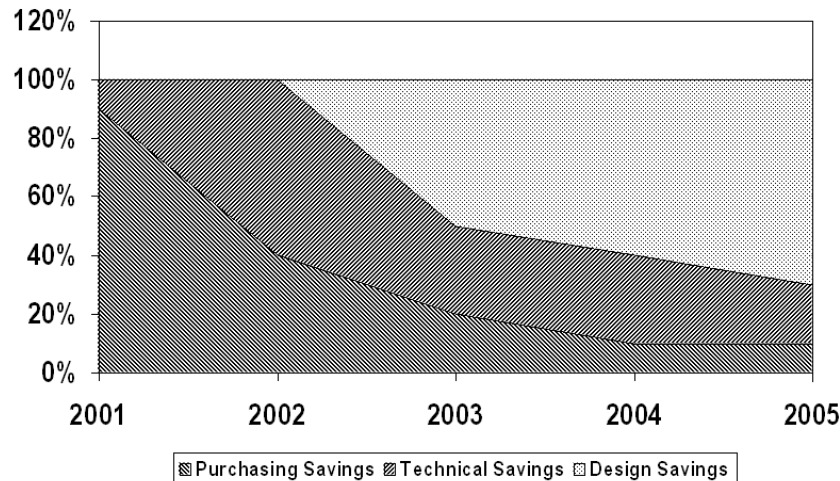
the early stages of the cooperation. Later one, albeit representing the largest source of savings in the timeframe considered, even the remaining savings should become considerable, mainly due to the plan of convergent use of engines and transmissions and the sharing of architectures (common platforms). It is significant that by adding Purchasing activities to Powertrain manufacturing

one obtains on average 80% of the total manufacturing cost of a vehicle, while the remaining 20% corresponds to the activities of final assembly of the product.

As a matter of fact three years after the public announcement of the alliance the project relies on 5

newly created joint entities, distinct from the parent companies: the Fiat-GM Powertrain and GM-Fiat Worldwide Purchasing joint-ventures already mentioned and three development teams in charge of designing some of the new car platforms: "premium", "large" and "small" respectively.

Exhibit 3. Synergy Savings Structure



Source: Fiat Auto

In other areas integration is carefully pursued, project by project, and distinctively by geographical area both along and beside the *filière*.

Synergy savings the GM-Fiat alliance aims to obtain can be effectively broken down as follows:

- ✓ short-term savings from purchasing activities;
- ✓ short and medium-term technical savings (part commonality);
- ✓ medium and long-term savings from common designed architectures (shared platforms).

This taxonomy emerges from a view shared by the GM and Fiat management itself and results from an activity analysis at the same time. Exhibit 3 displays the planned evolution of synergy savings in the 2001-2005 timeframe, with each type of savings changing relevance as time goes by. At the end of 2003, the alliance has achieved encouraging results. In fact it generated for Fiat Auto alone €251 million in 2001 and €630 million in 2003, providing for both partners "far greater benefits than originally anticipated" at the beginning of the agreement¹. The "alliance's perimeter" is currently limited to Europe and Latin

America operations but GM and Fiat Auto are looking at the possibility of implementing it elsewhere².

PURCHASING SAVINGS

General Aspects

Within the GM-Fiat WWP JV, "Purchasing savings" can be defined as economies stemming from joint purchasing activities, that is price reductions on components purchased for currently manufactured vehicles' parts obtained through direct negotiations with suppliers. These savings derive mainly from:

- ✓ larger purchasing volumes;
- ✓ greater negotiation power vis à vis suppliers;

¹ Press release for GM and Fiat Steering Committee held in Turin, December 11th 2003.

² For instance, in India cooperation between the two OEMs is still in the preliminary phase, focusing on "joint vendor development and spare part purchase". A further joint initiative is represented by Fiat Auto leveraging GM recently established assembly capability in Thailand. By means of an assembly contract agreement a plan has been set up to assemble Alfa Romeo 156 at GM's Rayong plant (Thailand) with an annual output of approximately 4,000 vehicles. Other projects regarding common initiatives under development are: the commonality of IT infrastructure and backoffice functions and the integration of some R&D programs (engine emission and fuel consumption, alternative fuel systems, new materials, safety components and solutions).

- ✓ supplier network optimization based on worldwide cross-partner procurement benchmarking.

As regards larger purchasing volume Fiat Auto verified average 2-3% efficiency gains in joint negotiations involving Fiat Auto and GM Europe, just as purchasing volumes double as a result of the alliance. Exhibit 4 displays that €14 million for Fiat and €15 million for GM have been combined and are jointly managed. Interviews with JV executives coming from Fiat Auto showed that these results fully comply with Fiat's expectations.

As concerns greater negotiation power *vis-à-vis* suppliers, this represented the biggest opportunity for Fiat, which for some specific parts was able to leverage on the worldwide scale of all GM operations and partners. In this case GM, Fiat Auto, Suzuki, Fuji Heavy Industries and Isuzu can leverage a joint purchasing volume of approximately \$130 billion a year. Such a scale of operations represents a critical mass against global suppliers and a powerful driver of cost reduction during negotiations. An example of this situation is the joint sourcing of tires for over \$500 million conducted by GM North America for all the alliance partners. In the past tires have been supplied by 5 tire producers (Pirelli SpA, Goodyear Tire & Rubber Co., Michelin Group, Continental AG and Bridgestone/Firestone Inc.) to the 5 OEMs divisions operating within the GM constellation. The inclusion of Fiat in negotiation process generated conspicuous savings for the Italian OEM, which managed to reach, through new agreements, an 8% of savings, almost 3 times the savings obtained through the GM-Fiat JV joint

operations on a European scale. Interviews revealed that for several years Fiat commercial negotiations with tire suppliers had been providing only limited and unsatisfying savings. The alliance with GM, instead, opened up new, interesting opportunities particularly when GM North America is involved.

Cross-partner benchmarking has been playing a strong role since the GM-Fiat JV started operations, in 2000. Both GM and Fiat managers underline that in many cases, despite globalization and ITCs new tools, suppliers' cost structure still remains *unknown* because assessing components' cost coherently with its technological content is not easy. But these difficulties resulted much more relevant when the partners were separate purchasing entities. Fiat and GM were seldom able to make comparisons with the price other OEMs were paying for the same or similar part. Each OEM basically took the price-for-value of a part, namely the one set by the supplier, or the one stemming from negotiations as a given. Thanks to the JV, instead, former Fiat Auto and GM purchasing organizations started sharing technical and economic information by comparing suppliers' prices and conditions they were paying for the same or a similar component and then making technical/cost cross-company comparisons. The result was that there were significant price differences not explained by technical differences. For example, electrical parts' prices could differ by even 10% to 20%. This cross-partner benchmarking activity paved the way to further commercial negotiations, spurred competition among suppliers and generated technical savings activities.

Exhibit 4. - Total Fiat-GME purchasing in 2001

	(Europe + Latin America) (€ million)		
	Fiat	GM	Total
Direct Materials	12.442	13.663	26.105
- Chemical components	3.492	4.549	8.041
- Electric components	3.097	4.082	7.179
- Metallic components	5.553	5.031	10.584
Indirect Materials	703	665	1.368
Sub-Total	13.145	14.328	27.473
Tools & Equipments	713	951	1.664
Total	13.858	15.279	29.137

Source: Fiat Auto

These relevant results, and the fact that they were obtained roughly within a year since the JV became fully operational, showed the effectiveness of the JV by reinforcing commitment by parent companies and motivating the JV personnel itself. Interviews with JV management from former Fiat Auto purchasing department indicated that some factors made the achievement of commercial savings extremely fast:

- ✓ cultures into GM and Fiat Auto purchasing departments were similar, specifically more similar than cultures in respective engineering departments. This way it was easier to identify and solve problems and to pursue common targets¹;
- ✓ GM culture, namely its “non-colonizing” attitude toward partners, has been recognized by former Fiat Auto personnel as effective in keeping Fiat Auto free from constraints in managing specific processes where needed. For instance Fiat keeps running its own supplier suggestion program, global sourcing applications, maintaining its specific development process;
- ✓ integration between different national and corporate cultures took place both at the top and at the bottom of the JV organization;
- ✓ the JV benefits from its organizational position: it makes independent decisions within its perimeter and at the same time it is part of GM Worldwide Purchasing organization, so that Fiat Auto at once leveraged both local and global opportunities.

GM-Fiat Worldwide Purchasing Structure

GM-Fiat Worldwide Purchasing employs about 2,100 people in more than 20 countries and 29 locations worldwide, dealing with 2,200 suppliers approximately. In 2001 it managed a turnover of more than €32 billion. The JV manages purchasing activities for 3 main customers: Fiat Auto; GM Europe & Latin America; Fiat-GM Powertrain. Its task is to globally supply them with direct and indirect materials, machinery, equipment and services. The GM-Fiat WWP JV acts as a purchasing agent and has neither assets, except for personnel, or revenues, since it does not receive any fee for its services. JV costs (augmented by a

¹ Problem solving is typically faster among buyers than among engineers. A typical situation may also be a standstill in development or in sourcing generated by complicated technical issues whose resolution may appear instead plain and clear to the buyer.

markup for tax compliance reasons) are allocated to parent companies according to their respective purchasing volume (i.e. turnaround as what has been purchased in the name and on account of) versus total purchasing volume. Actually the Rüsselsheim-based JV manages purchasing for affiliates and subsidiaries to Fiat Auto or GM in the automotive sector and for both joint and individual operations of parent companies. It doesn't operate for entities external to the parent companies. The master agreement included within JV's perimeter all GM and Fiat Auto operations in Europe and South America.

The JV's strategy is to quickly generate synergies from: common components, common supply base, common sourcing process, while preserving specific brand identities and competition between GM and Fiat Auto models. In order to implement this strategy former Fiat Auto and GM purchasing departments have been merged into a single global organization, trying to adopt the best purchasing practices of both parent companies and apply them at the service of all the brands. At the same time suppliers benefit from having a single interlocutor through which all GM and Fiat Auto brands may be reached.

The country-based layout mirrors the one characterizing former GM purchasing organization. In practice former Fiat Auto and GM locations have been maintained while simply becoming JV units and not much had to be done to avoid redundancies in this sense. For instance a rationalization in Fiat's organizational structure took place in Argentina where operations, formerly locally managed by Fiat Auto purchasing personnel, are now managed from JV's Brazilian organization. National units have a twofold role:

making “the most of local advantages, turning them into overall synergies, whether these be regional or global”². A local subsidiary leverages its knowledge about local suppliers' potentialities; supporting rollouts, sourcing tables and monitoring supplier performance at a national and plant level.

It has to be pointed out that among JV's national entities a sort of “specialization per-parent company” seems to persist even within the JV's perimeter, due to different GM and Fiat Auto vehicle assembly plants' geographic distribution. This is especially the case within Europe, where 7 Fiat Auto assembly plants in Italy cover the bulk of production; GM production in the same region instead is more evenly distributed among several

² García Verdou (2001).

plants in Germany, Spain, Belgium, UK, Sweden, Poland and Portugal¹.

In designing the JV organizational structure, the need to distinctively serve diverse Fiat Auto and GM development processes required both firm-specific and common support activities with corresponding organizational units. For instance the Platform Support unit specifically supports Fiat's development process; the Component Development unit supports activities linked to Fiat's TLPs (*Team Linea di Prodotto*, Product Line Teams) and SuPer program (Fiat's Supplier Suggestion Program); the International Development & Global Sourcing unit is in charge of scouting activities (aimed at finding global opportunities on prices, suppliers etc.) and of directly supporting Fiat's new production poles startup (local content rules related activities). On the other side the Advanced Purchasing unit is GM's department in charge of sourcing decisions regarding new business (current business is instead managed by buyers at a local level); the Supplier Development unit is in charge of GM cost engineering activity. A single Supplier Quality unit instead serves both parent companies.

It must be noted that two different purchasing structures, one "leaner" and one "heavier", have been integrated. It seems indeed that the aforementioned "specialization effect" tend to preserve some peculiarities accordingly. First of all, among 2,200 people employed in May 2001² 1,400 came from GM and only 800 from Fiat. GM has in fact a purchasing pole in each country where it has a vehicle assembly or an engine/transmission plant. Moreover a significant number of GM personnel is located in Germany where labor cost is higher. Secondly, GM decision-making system involving detailed procedures, meetings and teamwork resulted more complex than Fiat's³. However GM sourcing process has been adopted by the whole JV, required the scope of the project and the need to define objective assessment and choice parameters. Also, the overall purchasing approach of the two parent companies was different. During interviews emerged that GM is focused in leveraging suppliers' competition while Fiat insists on commercial negotiation with the suppliers.

¹ Only few Countries (Brazil, Argentina, Poland) host both Fiat Auto and GM assembly plants.

² Ciferri (2001).

³ GM's sourcing process complexity may be interpreted both as a way to mirror GM organizational complexity and a way to submit decisions to multiple evaluations, in order to avoid such suppliers' complaints as those spurred by hasty Lopez-like negotiating methods.

There are also differences between GM Long Term Contracts and Fiat Auto Annual Negotiation contracting practices. GM awards the supply and signs a long term contract (e.g. 3 or 5 years-long) already holding planned cost reduction deadlines (target costing); Fiat, instead, bargains an annual cost reduction target year by year. Notwithstanding Fiat approach may appear as inspired by a more flexible, short-term logic, it seems that the two methods don't always differ so much in practice. It is difficult in fact for GM that the cost reduction plan is implemented as a whole, since often planned cost cuts need to be re-defined later according to unexpected volume requirements, incoming quality issues and so on. For instance Saab recently came to avoid awarding 5-years long term contracts after it resulted that most suppliers couldn't respect planned targets for so long a time. Moreover each JV national unit may pursue different purchasing strategies towards suppliers. Re-negotiate initial conditions and demanding greater cost reductions than planned may be a choice at a brand level.

Although sourcing strategy is within JV's management responsibility, each parent company keeps discretion in establishing its general purchasing terms and conditions. The JV maintains a common policy towards suppliers but Fiat and GME have different general terms and conditions. For instance a compressor for a common platform might be supplied from a sole supplier and be contemporarily destined to a Fiat and a GM plant as well. In this case different terms and conditions would apply to each component supply according to its destination. It's important to note that the supplier benefits so much from supplying through the JV that it tends to accept not only different terms and conditions for each parent company but also different norms peculiar, for example, to each GM brand.

A common sourcing process for different product development processes

Different general terms and conditions between Fiat and GM basically reflect persisting differences in product development process. Fiat recently revised its general terms and conditions just to include specific norms on co-design, which GM doesn't use except for specific cases. The JV combined knowledge, expertise and systems of the two mother companies' former purchasing departments by developing a single sourcing process that acts as a bridge between Fiat and GM development processes that remain distinct and follow different approaches to new product

development. Typically, GM defines its project and then passes it on to the supplier. The supplier develops and manufactures the part for GM, which pays both for supplier's equipment and development costs. Moreover GM keeps project's propriety (tooling etc.) too.

Fiat's co-design approach is different, since it defines specifications teaming up with the supplier. The supplier not only has development responsibility, it also has equipment propriety. Suppliers then charge Fiat a full-cost-based price which includes investment amortization (design, equipment, machinery etc.). Such differences make suppliers' prices not easily comparable between Fiat and GM. Usually, a cost break-down analysis is needed to understand cost structures and perform cross-company comparisons.

If this is the process that typically applies for specific vehicles autonomously designed by the two partners, things are different in the case of new products derived from joint design efforts, namely common GM-Fiat platforms or architectures. In the three recent projects aimed at joint product design (the "Premium", "Small" and "Large" platforms/architectures considered later), joint design efforts and common development regards only part of the vehicle (typically the "rolling chassis" and the powertrain) while the remainder of the vehicle (body style and tires) is separately developed by the partners and thus remains within the brand's responsibility responding to its own peculiar identity and marketing strategy. On the whole, while the industrial/product development side stays different, the sourcing process tends to converge. In fact, sourcing is based on common and transparent procedures by which the GM-Fiat WWP JV:

- ✓ assesses current and potential suppliers;
- ✓ sets priorities among diverse objectives;
- ✓ determines which services are to be assured by suppliers.

Suppliers' evaluation criteria need in fact to be objective and independent on mother companies' different sourcing practices as well as unbiased by differences in customers' development processes. Common milestones allow to plan new assignments per single commodity and per single customer, so that the JV follows rollout and uses sourcing tables for both customers, managing specific Fiat and GM supplies.

The common sourcing process

The JV basically adopted the GM sourcing process, specifically the APQP (Advanced Product

Quality Planning) procedure, which covers both sourcing and development. APQP is required by QS9000 and consists in a standardized process entailing specific steps that should lead to improved performance in product development.

These are its main features:

- ✓ structured tasks;
- ✓ predefined meetings;
- ✓ clear allocation of ownership (responsibility) among actors involved;
- ✓ clear definition of output expected from each task;
- ✓ specific forms.

Thanks to APQP, the sourcing process should be more effective on a global scale and is strictly based on the product schedule according to clear parameters: technical performance; new technologies; quality; cost and service. Parameters for suppliers' assessment and selection are homogeneous both on current business and on new business.

On the other side the process itself allows to manage customer's peculiarities. For instance the "Request for Quote" package includes forms for technical specifications and for terms and conditions which are specific to each customer. In a similar fashion ownership or process control may be differently defined. Above all it is indeed relevant that it's the customer (Opel, Fiat, Saab, etc.) that drive the process, since each brand has full discretion in defining all type of requirements that the supplier has to meet

After the supply has been awarded each new vehicle is developed by a dedicated joint team (suppliers involved), which is responsible for achieving targets on quality, time, cost and performance. It is relevant that the APQP procedure includes a supplier's "risk assessment" activity which determine if the development of a certain component is to be "supplier-monitored" or customer-monitored". As a matter of fact, APQP, though providing a more robust support to sourcing decisions, tends to slow down decision making. Interviews with former Fiat's managers confirm that Fiat's former co-design approach allowed quicker decision-making in development since information flowed more frequently between the OEM and the supplier.

Managing Suppliers

It was not so difficult for the JV to create a common supply base. Fiat and GM Europe & Latin America had substantially an equal number of suppliers, and more than 70% of them were in

common. Fiat and GM had approximately the same negotiation capability as well as the same ability to analyze suppliers' cost structure. Two were the main differences when the JV started up. The first concerned suppliers' involvement in development. Fiat's co-design approach generated most of the differences in managing the supply base, such as vendor tooling, which is peculiar to sole Fiat among major OEMs and Fiat itself is considering stopping using it. The second difference was the stronger negotiating power which formerly GME/LA could benefit from by being part of GM WWP. With the JV, the latter difference vanished, while the former remained and caused Fiat and GM to run a specific cost break-down activity in order to evaluate suppliers performance and proposals. It is then likely that Fiat will follow GM's approach.

Fiat's adoption of GM sourcing process and of many GM work tools, other than GM demands of meeting integration, cost reductions, common processes and quality launches targets, at first caused some concern among Fiat suppliers who feared a "GM-ization" of procurement relationships. At present however it seems that, the new opportunities stemming from the JV have made the same suppliers more confident. Twice a year a meeting between JV Italia and its suppliers are also held in order to facilitate communication. A panel with Fiat, GM, and suppliers aims at identifying objective criteria upon which suppliers' proposals are to be evaluated. Creativity Teams evaluate proposals and are responsible of supplies' assignment.

Moreover a research study internal to Fiat shows that suppliers serving both Fiat and GM received most of the benefits from the JV. Supplier between Fiat and GM is in fact considered a powerful integration factor, and is facilitated by Fiat and GM choice to mutually accept respective quality systems until the introduction of TS 16949 standard¹. It is also to be considered that up to now the number of suppliers has not been significantly reduced since the JV startup. In this sense JV managers themselves do admit that strong efforts need to be done.

Suppliers' Suggestions Systems

GM and Fiat Auto maintain parallel suppliers' suggestion systems. In December 2000 GM launched a global annual cost reduction program aimed at saving \$1 billion. In 2001 Harold Kutner, then GM Vice-President WWP, underlined that GM was introducing a "efficiency gains sharing

process": for each suggestion approved savings would be shared between the supplier (35%) and GM (65%). SuPer, Fiat's supplier suggestion program, started in March 1999. If a supplier's cost reduction proposal is approved, generated savings are shared 50/50 between Fiat and the supplier for the first production year. Moreover suppliers fulfilling their "less 3%" target cost on sales to Fiat are awarded 75% (instead of 50%) of generated savings. In 2000 Fiat claimed that SuPer was achieving "encouraging results" nevertheless noting that most suppliers were far from their cost reduction targets. Proposals are assessed by a TLP (*Team Linea di Prodotto*, Product Line Team), teams (26, one for each sub-component) to which suppliers and Fiat's personnel from all functions participate. Substantially all TLP members from the JV simultaneously belong to a correspondent Creativity Team. Units mirroring Fiat's TLPs, called Cost Reduction Teams, have been created also by GM.

Quality

Integration on quality management took place easily and quickly within the JV. PPM has been in fact recognized as a basic standard measure for suppliers' quality and Fiat and GM's performance in terms of PPMs were already substantially equal. Nevertheless, steps have been taken to harmonize index construction in order to have matching measures and allow more thorough evaluations. In fact, parts having the same intrinsic quality may generate different PPM values according to the specific operating conditions of single OEMs (e.g. discard procedures, production process at plant level and so on). The JV has established a strictly defined quality process made up of 16 steps covering the time span from early assessment of potential suppliers (with a market analysis linked to new objects' requests) to the monitoring of quality parameters during vehicle life-cycle (supplier is put in discussion during all current production).

Written and specific procedures involving meetings, decisions and auditing activities assure quality during both development and production by continuously monitoring supplier's performance. Poor performance in current production conditions choices in development or new assignments. Considering differences in Fiat Auto and GM development processes in the launch phase for GM is very important validation of the new project. As regards quality management, Fiat adopted GM's supplier evaluation system. For every new assignment a common list including suppliers to be involved is compiled by a single team for each

¹ The ISO TS/16949: 2002 will completely replace QS 9000 on December 2006

product line. Quality have a relevant weight for the list definition. Suppliers are in fact rated by dividing them into 3 groups according to their ppm performance. Those targeting 250 ppm (200 ppm targets for Europe) are fully entitled to enter the list; between 250 and 1000 reaction capabilities and structural improvements are demanded; over 1000 participation to new assignments is denied. Supplier situation is synthetically indicated by color: Green, all's well; Yellow, improvements needed; Red, out of new assignments. If performance is negative supplier's is subject to a standardized procedure aimed at solving the problem: self-certification is suspended, temporary exclusion from new assignments is considered or current supplies are called into question. The JV intervenes on most critical suppliers with case-focused analysis and viable improvements are checked out for with the supplier itself.

Interventions mirror GMNA system: improvement plans are studied and then implemented through workshops at suppliers' disposal, with face-to-face meetings between JV purchasing personnel and supplier managers. Fiat uses Quality Tracking (QT) and TOC (*Test in Ottica Cliente*, Test from a Customer's Perspective) at plant level.

TECHNICAL SAVINGS

Technical savings are determined by the commonality of existing components on existing models, without newly designing ad-hoc common components. GM and Fiat Auto compare equivalent components of respective correspondent vehicles in pursuit of a match in requirements and technical specifications, so that a single component may equip vehicles of both partners. Since both vehicles and parts involved have already been developed it is more likely that homogenization is found not at a final component level but at a more general and less specific one. For instance door modules of an Opel and of a Fiat model might share the same internal structure; two door latches might be different in design but use the same material, lock, etc. Several benefits may be obtained:

- ✓ the cheaper component is chosen, since a price-benchmarking is made;
- ✓ higher sourcing volumes allows to obtain further price reductions from the supplier;
- ✓ specifications' harmonization allows an internal technical benchmarking activity. For instance the level of a specification may

be reduced after it had formerly being kept at a level higher than needed for reasons of habit or prudence.

Technical savings are then strictly linked to commercial savings. In 2001 the re-sourcing of a compressor in an HVAC system allowed Fiat Auto and GM to save €13.7 million out of previous €1 billion combined costs on HVAC modules. €6.1 million savings were due to the switching to a common compressor while further €7.6 savings were attributable to increased supply volumes (the same compressor was in fact being used by Isuzu, Fuji Heavy Industries and Suzuki). At the same time similar programs were intended to save €15.9 million on manual transmission costs and €7.9 million on automatic ones. In 2001 GM and Fiat switched to a common exhaust system for their brazilian-built Chevrolet Celta and Fiat Uno, cutting Fiat's costs by 30% (€ 5.04 million). In a similar fashion GM and Fiat also agreed to purchase the same interior mirror and clutch for 3 models produced in Brazil: GM's Chevrolet Corsa and Celta and Fiat Uno.

The Fiat-GM benchmarking activity described before is based upon a constant common teardown activity on current business through which Fiat Auto and GM confront all vehicle components. This adds to workshops held by Fiat Auto to find elements common to different vehicle families. Fiat successfully experimented this activity in Brazil, which requires strict collaborations from suppliers in elaborating a standardization plan.

THE FIAT-GM POWERTRAIN JOINT-VENTURE

Fiat-GM Powertrain is made up of previous Fiat Auto and GM engine and gearbox operations in Europe and South America. Fiat contributed its entire engine and transmission operations to Fiat-GM Powertrain at the end of June 2001. Annual turnover is pegged at €7 billion. Fiat and GM should pay the JV for engines and transmissions at a cost-plus-markup rate below full market prices¹.

Planned combined savings from the Powertrain JV should be €734 million in 2001-2005, €1.1 billion in 2006-2007. The JV should bring engine and gearbox rationalization, increasing their performance and providing development cost savings. Targets are to decrease gasoline engines from 14 to 8, diesels from 6 to 3, transmissions

¹ *GM-Fiat JVs foresee big savings for the road ahead*, Zoia, David E., November 6, 2001

from 12 to 8 as portrayed in Exhibit 5. In a press report Fiat declared that the engines, while sharing the same basic components, should be personalized according to individual brands' needs through fine tuning and tailored components (e.g. specific cylinder head). New engines developed by Fiat-GM Powertrain are equipping Fiat and Opel models since 2003. Their performance and fuel economy are on average 20-25% higher than Fiat Auto's current engines. The best example of the economies of scale this collaboration can produce is based on the new diesel engine, the 1.3-liter

Multijet common-rail of 70hp developed by Fiat, with the collaboration of the Centro Ricerche Fiat to equip the retyled version of the "Punto" presented in 2003. This engine will also be installed in Opel-Vauxall cars and is under consideration for use in European versions of Daewoo and Suzuki vehicles.

This engine, assembled in the Fiat-GM Powertrain BVs' plant of Tichy (Poland), could reach an annual volume substantially superior to half a million units.

Exhibit 5 - Fiat-GM Powertrain Convergence

	Fiat families	Convergence	GM families
Gasoline Engines	8	8	6
Diesel Engines	3	3	3
Transmissions	5	8	7
Total	16	19	16

Source: Fiat Auto

DESIGN SAVINGS

Design savings can be considered long term economies emerging from joint GM-Fiat Auto activities through which new components, systems or architectures are designed. At present three distinct joint GM-Fiat development teams are operational:

- ✓ Premium platform, initially set for developing Alfa, Saab and Lancia models for D and E segments, but later utilized by Alfa Romeo only (possibly for Lancia in the future);
- ✓ Small Common Components & Systems (Small) platform, a design center for small cars in Turin. First of all design savings are relevant because they operate upstream, by slashing development costs at an early development stage in the design phase;
- ✓ Epsilon platform, for developing GM and Fiat models for the D and E segments;

Currently Fiat Auto investment in new products already is based on 50% carryover parts and 50%

Fiat-GM commonly developed components. The immediate benefit is that component development investment costs and fixed capital for common parts are split in two. But maybe more important from a competition perspective is that combined resources, and additional ones coming from generated savings, allow the brands to accomplish more ambitious results creating better products.

A GM Europe executive declared that "there is enormous potential for synergies when we have a common component matrix. Each brand can then use whatever component it wants, while concentrating on developing brand identity and brand differentiation¹.

Common architectures make it affordable to develop costly subsystems when drivers are demanding more technological content even in small cars, such is the case in the European market. Hans Demant, head of Opel's ITDC in Rüsselsheim, in April 2001 explained how the volume effect generated by operates²: "We can

¹ Ostle (2002).

² Automotive Industries (2001).

combine sourcing of components such as navigation systems for small vehicles and premium North America vehicles and gain some leverage; this is the real value of a company of our size. The point is not negotiating cost out, [...] is developing products so that you have a critical mass, so you can urge your suppliers to develop the systems you need”.

Moreover joint design activities provide a “leverage effect” both in sourcing and in cross-partner technical benchmarking. As regards procurement, we may consider the Small platform. If we sum up Punto and Corsa production volume in Western Europe in 2000 (approximately 600,000 and 450,000 units respectively¹), procurement volume of common components may certainly generate significant “Purchasing” economies.

Cross-partner technical benchmarking may operate both at a product/component level and at a process/knowledge level. Learning effects are also to be considered. Fiat should start production of a SUV model as of 2005 by leveraging Suzuki’s expertise².

Some objectives may indicate design savings importance for Fiat Auto. Industrial plan presented on June 2003³ forecasts that by 2006 50% of Fiat models will be common Fiat-GM architectures’ derivatives, while by 2008 the same figure should achieve 90%, to be total in common before the end of 2012.

The design of common architectures clearly maintains brand-specific elements: engine; steering systems; suspensions. For instance the Turin-based center for future small cars is intended to focus on developing only “components and technology that will not impact brand specificity”. The center’s output itself will act as input and starting base for distinctive Opel and Fiat models developed by the specific engineering centers of the two automakers.

PREMIUM ARCHITECTURE: A FOCUS ON JOINT-PLATFORM SAVINGS

The background: reasons for joint architecture

Fiat Auto and GM gave Premium project the go-ahead in February 2001 with the aim of designing a common architecture from which the two mother companies could derive mass and niche models with common parts and joint platforms. The architecture is intended to allow a wide range

of vehicle dimensions and provisions for front-wheel-drive and all-wheel-drive models.

Initially parent companies selected Saab, Alfa Romeo and Lancia as the brands whose models would be derived from the architecture of the “Premium” platform. At first the same market criterion brought to exclude Opel and Fiat models from the project that will utilize the “Epsilon” platform. This clearly doesn’t rule out that models from the latter or other GM and Fiat brands will carry-over technologies, components, or subsystems developed within Premium project, and in fact successively the parent companies changed their minds as we will show..

Even if Lancia brand is part of the project, it is Saab and Alfa Romeo that account for the bulk of savings and production volume. Combining development resources gives the latter 2 brands specific opportunities coming from their position within respective automotive groups. Saab saw the opportunity of developing a platform according to its needs. This possibility was limited both by its dimensions and by its limited technical influence inside GM group. Alfa Romeo had previously adopted its underbodies by modifying Lancia platforms, which resulted in high investment costs. Moreover Alfa Romeo specifically has a point in making technical synergies between D and E segments. Saab and Alfa can then do what they would have never done alone.

The organization

The project team was headquartered in Pixbo, a suburb to Gothenburg, Sweden, and Paolo Sandri, former Fiat Auto Components Platform Director, was chosen as team leader. Personnel located in Pixbo totals about 160 persons, of which approximately 25 form the Core Team and 135 the Engineering Team. Premium organizational pattern, which lacks separate Fiat or Saab units, witnesses that there aren’t two different projects: it is a single project maintaining some diversities. About 60% of personnel is Swedish, 40% is Italian and 30-40% of engineering work (working hours) has been outsourced and consultants have had an important role. This has been facilitated by the fact that Saab has been heavily relying on consultants, persons under contract to Saab which are not Saab employees. Fiat too cherry-picked some consultants, mainly to cover positions such as CAD-designer (both junior designer and some senior but certainly not team leaders) or professionals with extremely specific skills. Teams have been formed, each team working on a system. Team leadership has been attributed according to

¹ Automotive News Europe (2001).

² Quattroruote (2002).

³ Fiat SpA Group (2003).

the system. In many positions it has been decided to assure double-voice, which means that the position is covered by both a Fiat person and Saab person. This way where it was necessary to “garrison” a role, the role itself was split in two where it was unthinkable to arrive at an harmonization and technical peculiarities specific to each brand needed to be taken into account. This is the case of performance engineer and of Quality positions, each covered at the same time by a Saab and a Fiat person. Sometimes team leadership is shared between the two, sometimes only one is team leader.

Main engineering teams are Body, Chassis, Interior, Electric and Powertrain PDTs units. Each team works separately, supported by teams constituting integration links such as Package Integration, Performance/Characteristic Integration etc. The Core Team has instead a functional structure and is responsible for staff and support functions, such as Purchasing, Quality, Human resources, Finance, Planning etc.

Organizational and technical interface with parent companies

The role of parent companies revealed fundamental in development speed and coordination. First of all they made choices on specific brands and models to include into the project, which Premium had to accept as inputs. Secondly Premium engineering team needs to receive secure and precise technical guidelines on how to proceed in development, especially when an impasse arises. These need to be unique, joint guidelines. Parent companies approve technical choices and intervene on subsystems. The electric steering system originally proposed was rejected. The decision on which electric system to adopt required 4 months in negotiations at the highest level between Fiat Auto and GM and this significantly slowed down development process.

The lack of secure 100% inputs from parent companies, and in some cases the lack of any input at all, compelled Premium organization to heavily involve Fiat Auto and GM in decision-making process. Since June 2001 so called “stakeholder meetings” have been specifically introduced to make up for such lack of inputs. SMs are participated by personnel from Premium, from Saab chassis department and from Fiat Auto chassis department, and discuss 3 subject matters: personnel/competence requests for specific skills; project advancement; road blocks sharing. This way choices regarding the architecture are 90-100% not only merely known by but above all

shared between Premium organization on one side and both Fiat Auto and Saab functions on the other side.

It is then relevant that common development in Pixbo specifically regards the chassis architecture so that Pixbo has to be constantly interfaced with development centers in Trollhattan and Turin for technical and coordination reasons with body and style departments. The same database is shared. The need to have the same product development requires UG-UG even if Premium uses GPDS and Turin uses Codet. This requires a person that speak with his homologue. Turin has a 939 responsible for upper body and overall vehicle. There is also a change request process imposed by Premium that keeps Pixbo and Turin in-line. It functions at 90%.

Developing a common architecture: between commonality and modularity

First of all Premium perimeter identifies the chassis. The project started in May 2001 and involves 18 months of common development in Pixbo. According to development schedule in the last week of October co-location split up takes place and 3 groups start working: 2 task forces lasting 8 weeks, Chassis Task Force in Italy and Body Task Force in Sweden, and an Architecture Maintenance Team located in Italy. Premium allowed Fiat and GM to reach a high common grade in design: between D and E segment it’s almost 80% in number of drawings.

The starting point has been a “Range Plan” which was an input for Premium engineers. Then a feasibility study took place in which given the models, their concept and content it was checked out if these elements could match within a single platform. The initial idea was to use GM Epsilon architecture as a whole but later on it was actually clear that Epsilon couldn’t match Premium performance requirements (NVH, crash, etc.). It was then a choice in development to change all Epsilon characteristics and the outcome is that Premium benefits very little from Epsilon carryover parts.

Premium perimeter and supplier integration in development

Premium perimeter identifies the vehicle elements that form the platform. They correspond to the so-called rolling chassis, which comprises 17 subsystems. Supplier integration in development is specific to each subsystem according to the way in which three types of development responsibility have been allocated among Premium and different suppliers.

It is then clear Premium role as system integrator, since it is responsible for the behavior of the vehicle ensemble. System suppliers are responsible for a specific subsystem, since they assure its functionality in itself and guarantee that it correctly interfaces with the rest of the vehicle. Development of engines and gearboxes is clearly completely under Powertrain JV responsibility, so that Premium is responsible only for integrating them. The integration of subsystems, engine and gearbox in order that they correctly interface forming the overall vehicle is Premium's responsibility. Wheels and tyres are out of Premium perimeter and their size and position merely serve as a reference in design and engineering. For the rest they are relevant for the style.

The single voice concept and the definition of the architecture

The single voice concept drove the search for a trade-off between commonality and modularity. This trade-off was specifically obtained by performance engineers, who received product profiles as inputs from the parent companies and then deployed technical specifications as targets to be achieved at further engineering stages. It was at that time that Premium program revealed to be both an integration and an evolution of existing parent company projects that "converged" to the new platform. This factor, coupled with the need for a fast development of new models, gave both the search for commonalities and the project itself an "in progress" character, since there was no time to plan an *a priori* technical optimization. In its turns this factor influenced the definition of models to be developed and the release schedule. For instance it resulted that the new Alfa Romeo 156 development was jeopardizing the 166, which has then been abandoned for the time being.

Since there was no time to find harmonization Fiat and Saab PEs together established where a single standard should be maintained (in this case one of the two, Fiat's or Saab's standard, has been adopted for models of both brands) and where distinct ones should remain instead. In the latter case different technical targets were established for the same characteristic and at the same time it was carefully avoided that different targets for the same characteristic were totally diverging or contradictory. This deployment phase was approved both by Fiat and Saab side and brought to the definition of a common architecture (project, crash) which underwent a unique development and remains the same for all models. The success of

development phase is confirmed by the fact that 90% of Premium characteristics have been accomplished whilst satisfying the requests of the two companies. Only cost objective is not on target (80-100 € more than a current 156 but with higher performance) but this is the case because Premium was the guideline. The designers have then translated these technical targets into detailed technical specifications. Given some hard points, for each subsystem has been then specifically determined an "in process" modularity: sometimes in tuning, sometimes dimensions vary, sometimes by allowing different components. After the initial work of performance engineers, different hard points were then established "in process" according to each subsystem: suspensions' geometry, steering system packaging, braking system architecture, seating structure are examples of hard points. Modularity has been obtained by varying underbody dimensions according to the model, and as a consequence scalability, tuning are specialization factors. The platform has been developed in order to receive further subsystems at different development stages. The motives are mainly 3: - subsystems constitute a relevant part of the car's value; - subsystems' technological development is far faster than vehicle lifecycle; - advanced technology knowledge and competences are in the hands of (unknown) suppliers. The platform is divided into 3 parts (front, rear, center) to provide dimension flexibility. The front structure is the same for all models while thickness may vary. The center section varies in length, according to the track needed, or in width according to the specific model. The rear section varies in dimensions. Some components (e.g. brake discs) or subsystems (hydraulic steering system, seat structure) characteristics depend on vehicle weight and dimensions and not on the model or the brand. Braking system is the same except for the scalability according to content/weights; Steering system has the same hydraulic device except for its dimensions, then packaging is the same. They're also working to have the same steering column.

Suspensions share the same architecture, the same geometry: to obtain peculiarities they are shifted according to the track and tuned according to the model. Suspension tuning easily benefits from working on "final" components such as bushings but maintaining the same architecture, so that it allows to accomplish different Fiat and GM technical targets easily. They're working to have the same seat structure. In this case Premium tried to use the system that Faurecia already developed for Epsilon. The development of electrical system

has been critical. Premium role at first was to be limited, since it had to simply integrate an electrical system provided by the parent companies. Later on Premium's responsibility evolved and comprised integration, development and sourcing of the entire system. The initial choice was in fact a 42V dual voltage system featuring a FAS/VAS system, derived from Saab technology. However soon after 2 problems emerged: a dual-voltage system is costly (€450-500 per-unit). Not all models need that power. Saab pushes a lot stop & start strategy, while Fiat believes fuel consumption can be decreased in other ways. At the end 2 distinct architectures, a 14V-one and a 42V- one, have been developed in order that they can be integrated following a rolling and upgrading concept. This solution came as a final compromise after long discussions at the highest management level between Fiat and GM executives into which the brands' philosophy had a role. Purely adopting a dual voltage system would have meant a secure loss for those models in which the subsystem's cost couldn't have been transferred on final price. This "wait-and-see" solution was considered less risky in that 42V system should be mounted only on certain models and when necessary.

A key point in development: integrating subsystems

A key point in platform development was putting subsystems together. In fact if we consider the light version model destined to the E segment, the base version, the whole chassis is worth c.ca €4,200. The platform accounts for c.ca €400 but suspensions account for c.ca €800. It's much more cost- and effort-effective to manage subsystems' evolution than to work hard in engineering in order to reduce platform cost. In fact it's easier to obtain cost reductions from purchasing organization. The same 3% cost reduction that may be easily obtained in price cuts from steel or aluminum suppliers through commercial negotiations would equal a strong engineering effort to cut platform weight by 10-15%. To go for commercial negotiations also puts more pressure on steel supplier to find lighter materials. Moreover the OEM can better concentrate in projecting an platform capable of receiving subsystems at further development stages during years (modularity in design) without losing a long time to have only insignificant improvements on framing processes or platform itself. The factors depend on high outsourcing, since are systems that provide significant scale economies and synergies. The first factor is that

platform is only 10% of variable cost of a car. The second is uneven technical evolution among subsystems. Suspensions are low-evolution systems, but an HVAC module costs between €200 and €300. Moreover there are choices about different electronic controls, sensors, etc., and this generates a marketing game linked to the client. Fast technical evolution is then required by the client whose needs are very accelerated. The third is cost evolution. A higher percentage of content are electronic parts instead of plastics, whose price dynamic is very high and incompatible with development time of a car covering the entire life cycle.

Resource pooling and learning effects

Within Premium organization some relevant peculiarities have been found. If development logic is the same between Saab and Fiat, Saab uses a much bigger calculations capacity. A benefit for Fiat Auto has been the sharing of Saab or GM resources. Fiat could share Saab's engineering resources, such as bigger calculation capacity. This comes from different reasons. First of all Saab benefits from GM's base research in North America, which involves 1,000-2,000 persons and maintain strong links with universities and probably imported some technology. Saab itself has then an engineering department comprising almost 2,000 persons. Moreover Saab's philosophy requires that a premium model has consistent premium crash and NVH standards, which are considered as a given. Premium used then "astronomical" calculation capacity compared to that usually employed at Fiat (ten times more). This results in much more faster calculations, particularly in the simulation phase¹. Another advantage for Alfa Romeo comes from the fact that there are specific plans to bring Alfa Romeo to U.S. market (in 2007) and Alfa Romeo can learn very much from Saab about it².

Sourcing methods and the role of suppliers

Sourcing has been made using a "guided" bid list. Thus correspondence to requirements have been considered taking into account that certain components had been already pre-developed for Fiat Auto or for Saab by suppliers before the same

¹ Sandri declared that "Here (in Pixbo) in 3 days the same calculations are made that we (in Turin) can't even make in a week."

² About 30% of Saab sales are in the United States.

models were included in the platform¹. Single sourcing has been chosen. Premium has responsibility for the Statement of Requirements form, the document on which sourcing is based and which demand suppliers to respect quality guidelines at 360°: technical specifications, objectives, requirements, manufacturing, bill of materials, bill of process, reliability, first and second grade responsibility, etc. Suppliers then has not only the development role but also a key validating role.

Premium discarded by Saab

In fact at the end of 2001 Saab decided to discard the Premium Platform for its 9-3 model to be presented in the late 2002 and to use the “Epsilon architecture” already in operation on the new “Astra” model which debuted at the Geneva Motor Show in 2001. The choice was been leaded by a research of a wider sharing of common parts and cost reduction. However this unexpected evolution doesn’t mean a crisis of the Fiat-GM alliance, but it underlines that the use of common architecture is a very complex matter that has to cope with a long list of different and sometime conflicting exigencies.

Fiat continued the development of the Premium Vehicle Architecture for the new generation of Alfa Romeo 157 (2005) and 167 (2007).

At the beginning of 2002 GM and Fiat announced the set up of a joint project center in Turin to work on a common platform named “Small Common Components System - SCCS” devoted to the B segment models of GM (“Corsa”) and Fiat (“Punto”). The first model to be based on this architecture will be the Punto in 2005 and Corsa will follow right soon in 2006. In the future there will be also a revised application of SCCS for smaller models (A segment) to use by the two companies also in emerging markets. So the utilization of the joint architectures are as presented in the Exhibit 6. There are press rumours about a new common platform for the “C” segment (Astra and Stilo) to put into operations at the end of 2006. At present this choice is considered very likely but not definitively confirmed.

¹ Sandri explained that “you clearly have to reward who worked well”

Brand	Platform "Small" (188)			Platform "Epsilon"			Platform "Premium"		
	Model	Segment	Presentation	Model	Segment	Presentation	Model	Segment	Presentation
Fiat	Nuova Panda	A	2003						
	Idea	B	2003						
	Nuova Punto	B	2005						
	Punto Coupé	B	2006						
	Nuovo Doblò	B	2008						
				Nuova Croma	D	2005			
Alfa Romeo							157	D	2005
							GTX	SUV	2006
							Spider/GTV	E	2006
							167	E	2007
Lancia	Ypsilon	B	2003						
	Y-MPV	B	2004						
				Lybra	D	2005			
						Thesis	E	2007	
Opel Vauxall	Corsa	B	2006						
				Vectra	D	2002			
				Omega	E	2005			
Saab				9-3	D	2003			
				9-3X	SUV	2005			
				9-5	E	2006			

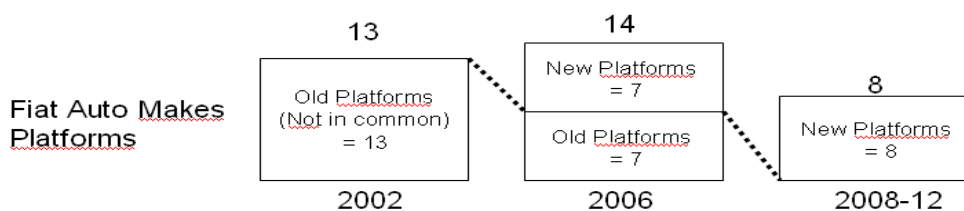
[Source: Global Insight (June 2003)]

CONCLUSIONS

Come si è cercato di mostrare il processo di integrazione, specialmente in quanto basato su due partner formalmente operanti in posizione di parità è lungo e complesso e quindi sottoposto anche a fasi di ripensamento e di deviazione rispetto agli obiettivi originari.

Tuttavia l'impressione che emerge da questa indagine è che comunque i vantaggi che entrambi i partner possono trarre da queste integrazioni sia a livello di progetto che di produzione sono senz'altro significativi e valgono gli sforzi che esse richiedono. In prospettiva i vantaggi più rilevanti dovrebbero derivare dalla crescita qualitativa del design dei singoli modelli realizzati in collaborazione.

Exhibit 7 – Platform Opportunities for Fiat Auto



Year	2002	2006	2008-12
Common platforms (with GM makes)	1 End of year	5-7	6
Models for platform (average)	1,3		1,8
Fiat – GM yearly units for each platform (average)	167.000		418.000
Fiat yearly units For each platform (average)	163.000		231.000

Source: Fiat Group

Ovviamente anche i vantaggi connessi alle economie di scala sono tutt'altro che trascurabili, specialmente per il partner di minori dimensioni che può attraverso la comunanza disporre di componenti il cui costo si distribuisce su quantità molto rilevanti come è ad esempio esemplificato

nell' Exhibit 7 che illustra tanto la concentrazione delle piattaforme che la produzione modera per modello che Fiat Auto ha in programma di realizzare come effetto diretto della collaborazione con GM.

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