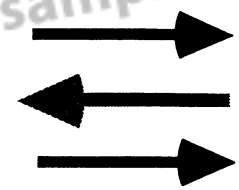

EARLY SUPPLIER INVOLVEMENT AT FUJI XEROX, EBINA PLANT

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It is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of a business situation.

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EARLY SUPPLIER INVOLVEMENT AT FUJI XEROX, EBINA PLANT

It was the end of April 1996 and Mr. Tatsuo Kobayashi, Head of the Production Engineering Department at the Fuji Xerox Ebina plant, located some 60 kilometers southeast of Tokyo, was reviewing the past several years of product development activities. Among various efforts related to utilizing suppliers' resources, the practice of involving suppliers early on in new product development, referred to as "Early Supplier Involvement (ESI)", was established at the Ebina plant in 1988.

Over the past few years, however, the environment surrounding Fuji Xerox had been rapidly changing. First, due to the high appreciation of the yen against the dollar, a number of manufacturing firms had moved their operation sites overseas. This trend was also affecting the suppliers of Fuji Xerox. For this reason, the early involvement of suppliers was becoming increasingly more difficult to implement. Second, with the appreciation of the yen, overseas procurement was being promoted not only at the Ebina plant but throughout Fuji Xerox as well. The Ebina plant even established a new department to accelerate overseas parts procurement, with the aim of reducing costs. As a result, traditional procurement policies needed to be re-evaluated. Thirdly, product life was rapidly becoming shorter. As a result, the total volume of production for a single product was decreasing, which meant that cost savings from mass production was likely to diminish. This trend also required the Ebina plant to re-examine its course of action with regard to building sound relationships with suppliers so that ongoing cost reductions would be ensured in the future.

It was time to review the various achievements and consider possible improvements. With a new series of projects appearing on the horizon, Mr. Kobayashi suggested to his management team that a thorough review could help them cope more effectively with the challenges ahead. He therefore set up a dedicated task force comprising representatives of several functional departments and product groups that were concerned with product/process development activities in general, and with the role of suppliers in particular.

The team had already analyzed the rationale for having ESI, its principles, its evolution, the benefits obtained and some of the concerns expressed. At the next meeting, they would discuss the findings of the task force and begin identifying lessons for the coming years.

The next time they met, at a location on the outskirts of Tokyo's metropolitan area, it was a sunny day at the peak of the cherry blossom season. As the members of the task force gathered in the meeting room, everyone was aware of the challenges ahead. With competition as fierce as ever, and with growing cost pressures, it was essential to push product development excellence even further.

Fuji Xerox: A 35-Year Success Story

A corporate brochure published in 1995 described FX's history and business mission: "Fuji Xerox has achieved phenomenal growth over the past 35 years by focusing on the working procedures of the Japanese office. Drawing on its extensive document processing, digital, network and other related technologies, the Company continually searches for ways to improve the document cycle and thereby accelerate decision-making processes, save time for staff, and give workers the freedom to concentrate on more creative tasks."

Fuji Xerox was established in 1962 as an equally capitalized joint venture between Fuji Photo Film corporation and Rank Xerox, itself a joint venture between Xerox Corporation, the American company which (under the name Haloid) had introduced electrophotography in 1948, and the Rank Organisation plc of the United Kingdom. The initial mission of Fuji Xerox (FX) was to produce the Xerox Corporation products under license and distribute them (through rental arrangements).

Over the years, FX developed distribution as well as manufacturing activities. In 1971, it acquired a chemical plant (Takematsu plant in the Kangawa Prefecture) for the production of toner and drums, and a camera plant (Iwatsuki in the Saitama Prefecture) for assembling photocopiers. The company also opened its own plant at Ebina. In 1973, FX introduced the first plain paper copier (PPC) to be entirely developed by the company (the FX 2200). Several other new product developments followed, and by 1978 the company was exporting copiers to other Xerox Group companies. In 1980, the Deming Prize was awarded to Fuji Xerox in recognition of its excellence in quality control.

Initially, FX rented its copiers to customers under long-term contracts and charged them for each copy made. In this way, FX created an excellent distribution network throughout Japan. In 1996, it owned seven MBUs (Marketing Business Units), each covering a certain geographical area, under which 32 domestic sales companies were formed in cooperation with prominent local

partners. In addition, 13 large-scale agencies were assigned to specific prefectures; they handled a wide range of sales activities and after-sales service (machine maintenance) operations.

In 1982, the Ebina plant became the home of the newly-established "Corporate Research Laboratories", marking a strong commitment by FX to research and technology. A large number of innovative technological introductions ensued in a variety of areas -- from copying and printing, to computing, networking and programming. These efforts demonstrated FX's intent to diversify its activities, while also establishing the reputation of the Ebina plant as the center of FX's technological excellence. In 1992, Fuji Xerox began internationalizing its R&D activities by creating an R&D unit at Xerox Corp.'s famous PARC (Palo Alto Research Center). Its commitment to technological development was proven by the continuous flow of innovative products: e.g., the Sharaku hand-held copier introduced in 1988; the Able 3010, a multifunction fax/copier/printer in 1990; the A-color high-resolution copier, a full-color digital copier launched in 1992.

In 1995, FX was still owned 50/50 by Rank Xerox Limited and Fuji Photo Film. Its total sales amounted to $7,654 million, with the domestic market (Japan) representing close to 93% (for more details on FX's financial performance, refer to Exhibit 1). As well, FX had become a global player; instead of having a geographical division of activity, Xerox Corporation concentrated on the U.S. market while Rank Xerox focused on Europe. In addition to a number of sales and manufacturing (mainly repair) sites throughout Asia, FX established XIP (Xerox International Partners) in a 49/51 joint venture with Xerox Corp., in order to sell low-end printers in North America and Europe. FX achieved further internationalization when it established a manufacturing subsidiary in China, jointly owned with Xerox Corp. This joint venture started assembly operations of low-end printers in early 1996.

The Photocopier Market

Photocopying was first created in 1938 with the invention of dry electrophotography by Chester F. Carlson. But it did not reach the market until the late '40s when Haloid launched its first copier in the United States. The photocopier -- often called "xerocopier" because of xerography, the name for the underlying technology -- became a prominent piece of office equipment in the second half of the twentieth century.

The Japanese market, of key importance to FX, had followed the same trend, with a period of rapid growth just after the company's creation. From 1990 on, however, this growth had been diminishing. In terms of units sold, the purchase of copiers had become essentially stagnant, with an economic depression in 1992 and 1993 that was only marginally compensated by better sales in the subsequent years. In terms of copy volume, however, the depression had had less impact. Indeed, the number of photocopies

made exceeded 100 billion per year for the first time in 1995. The domestic copy volume had nearly doubled over the last decade, whereas machine units sold had increased only by 30%. As a result, copy volume per machine unit had actually steadily increased (refer to Exhibit 2).

High-speed and ultra-high-speed, as well as color copiers, seemed to suffer less from the market recession than small and medium-speed systems. In addition, "digital" systems were gaining market share over "light lens" ones. Copiers could be classified by their input (i.e., reading) mechanisms and by the duplicating technology. The input mechanism was either a light lens (using electric bulbs) or an ROS unit (using horizontal scanning bars, hence often called "digital"). The light lens duplication process (FX called it MOP, i.e., "Marks on Paper") used a "heat-and-pressure" roll system (drum), while the ROS unit used a laser system. It was also, however, technologically possible to use the drum system with the ROS unit mechanism.

Various factors were determining the evolution of certain product and technological characteristics of photocopiers. First of all, there was ever-continuing pressure to merge several document handling processes: copying, printing, and telefax. As a result, copying machines needed to have the appropriate software capability for such functions as storing and combining original documents. This trend, in turn, also affected the style and demands of the Sales Department -- from the customary face-to-face push sales approach to being systems analysts or consultants with software knowledge. Second, the demand for color printing was driving the manufacturer to make innovative efforts to answer customers' desires for increasingly more effective copying results. Another niche, small "desktop" machines -- which were benefitting from the advances being made in miniaturization, was also growing in importance.

Smaller photocopiers (below a list price of ¥300,000), which were focusing on the needs of the small office/home segments, were also appealing to large organizations. These copiers were distributed through local dealers who also serviced them. The more expensive photocopiers (medium, high and ultra-high-speed, and full-color) were primarily leased to clients by the manufacturers, who were paid according to the number of copies made with their machines.

Fuji Xerox was one of the leading players in the Japanese market. Its market share represented 24% of units sold, placing FX in third position behind Canon and Ricoh, and 47% in terms of copy volume (number of copies made yearly using its systems), thereby placing FX in the top position. The gap between the two market share indicators was explained by the fact that FX was not present in small printers (below a list price of ¥300,000), but was quite strong in high-speed and ultra-high-speed systems (with close to 60% of the units sold).

The Product Development Process at Fuji Xerox

Development of new products at Ebina was essentially a cross-functional process which followed a series of "phases and gates". A manual called "Product Development Process Control Guide" defined, for each of the phases, the responsibilities of each department involved, the format of the documents to be produced, the data needed at the completion of each stage, and the criteria for assessing this data. Each stage had a designated purpose, type of model, and release document expected (refer to Exhibit 3).

The flowchart appeared to be a sequential one, but when a difficulty occurred during any given phase, the nature of the problem would be evaluated and a decision made on whether to proceed at once to the next phase or to wait until the problem was solved. Thus, in practice, there was an overlap between the different phases. In addition, the process was not systematically applied to all developments. They were called "programs" even though they typically were limited to one "product" rather than including a series of product generations. Complex development programs, those involving the creation of a new product that would use a new technology, did follow the six phases. But, simpler and shorter ones (e.g., facelifts) only involved a couple of phases.

The "Program Team" was another important organizational element in new product development. Typically, the team included representatives from the Development, Engineering, Production, and Sales and Service departments. The team, led by a member of the "Product Planning and Program Management" Department, was responsible for managing the different phases. This department was solely responsible for managing the project teams. Generally, its members were experienced people from the Sales Department or individuals previously involved in product development, at the section manager level (i.e., just below functional manager), with an average age of 40-45. Complex development programs, involving the implementation of new technology, could require up to 300 team members. Simpler developments might need only 10-20 people.

Developing a typical new FX product, i.e., one with no significant technology changes, would take around 30 months to complete. But, products that required designing new technology might take up to 10 years (5 years for concept configuration and another 5 for development). A case in point was the DocuColor photocopier. This new full-color copier, introduced in 1995, was the first ever to offer medium-high-speed color copying (40 pages per minute). Previously, full-color printing had been a relatively slow process (compared to B&W) because the paper had to pass by the fuser four times to receive each of the four fundamental colors (cyan, magenta, yellow and black). That method was the easiest way to ensure that the four colors were accurately superimposed. Fuji Xerox's engineers believed that it would be possible to print more rapidly by sequentially using four fusers that were precisely positioned. This adjustment would require that the metal frame

have a tolerance of 4 microns but, at that time, the best frame subcontractors could only achieve a tolerance of 15 microns. Reaching a tighter tolerance level would have to use new manufacturing techniques. This stage of the development process, including extensive testing, ultimately took around five years. It was only then that development of the actual product could proceed, because the FX engineers first wanted to be sure that the new technology was infallible.

The Program Leader was selected from the "Product Planning and Program Management" group on the basis of experience: the more complex/strategic the Program, the more senior the Program Leader. However, unlike in the automobile industry, the Program Leader was not the exclusive "boss". Often times, there were representatives from Development or Engineering who were even more senior, and decisions were usually made by consensus. Actually, Program team members typically had two bosses, with the functional managers generally carrying more weight. The team members only represented their particular functions for the purposes of the Program; however, decisions made by these representatives on the Program Team were normally accepted by the function heads.

Product Development at Ebina

Development of new products was one of the Ebina Plant's most important missions. But, over time, two trends had made fulfilling this mission increasingly challenging.

First of all, the number of new products being created was continually growing. The market demand for new technology meant that the plant had to design and manufacture a greater variety of products. In the late '80s, the first "multifunctional" machines (incorporating copying, printing and faxing capabilities) were added to an already large line of conventional photocopiers. Soon afterward, in 1992, the first full-color copiers were launched, which led to a series of product introductions in this new dynamic segment of the market.

The second factor was the "wave" pattern of product introductions at Ebina (refer to Exhibits 4 and 5). There was a rush in some years, while other years were more quiet. Consequently, the resources of the Engineering Department were put under extreme pressure in certain periods. In 1988, the 5000 series -- with 12 different models -- was introduced. In 1990-91, another major overload occurred when several "black & white" and full-color products were launched. In 1991 alone, four totally new products were introduced (Vivace 500, Vivace 200/210, Vivace 120, Able 3300); another three items were either derivatives of the above (e.g., Able 1300) or were "facelifts" of previous models (e.g., Vivace 800 replaced FX 5075). Another rush happened in 1995 with the renewal of these products, in addition to the launch of totally new ones, such as the A-Color and DocuColor lines. These

crises could not be blamed on poor planning. Rather, they were the result of having the manpower resources for each functional section distributed among numerous product development programs running in parallel, which meant that a delay in one program affected the progress of several other programs in ensuing stages. Thus, the launching of new products was not an evenly spaced process; instead, it comprised a series of peaks over time, thereby creating a vicious cycle that was difficult to exit from once it had begun.

These two factors motivated the management of Ebina's Engineering Department to explore new ways of developing products. To compensate for having only limited human resources, an optimum product development process was essential in order to achieve low costs and high product quality, as well as meet the short time to market. Several improvements were implemented to fulfill this aim. For example, management promoted the use of common parts across the different products (e.g., paper trays). Because the cost of purchased parts amounted to some 80% of the cost of FX's products, it became apparent that developing more effective relationships with suppliers would be instrumental in achieving this goal.

Involving the Suppliers in New Product Development at the Ebina Plant

Until April 1989, suppliers were not overly involved in product development at FX's Ebina plant. By and large, they were contacted only after the product design had been completed (i.e., after the prototype phase) to inquire about manufacturing possibilities. This system, it was felt, created unnecessary delays in the development process, especially between the design phase and the production ramp-up. Therefore, involving the suppliers, particularly in the development of tools early on, was expected to help speed up the entire process.

Xerox Corp., the American parent company, had been implementing "Early Supplier Involvement" since 1985 and by 1988 was actively promoting this concept amongst its sister companies throughout the Xerox group. Ebina's Engineering Department enthusiastically decided to adopt this approach.

The Basic Rules of ESI Activity

Early Supplier Involvement meant selecting suppliers at the beginning of the product development process, typically at the Product Planning stage when "make or buy" decisions were made. Essentially, the company would work with these suppliers on ways to improve the quality and cost of the part/s to be farmed out. The suppliers would be particularly involved in "Cost Management Activity", a cross-functional initiative intended to reduce costs by simultaneously involving the Design, Development, Production

Engineering, Procurement and Cost Management departments (refer to Exhibit 6). In ESI activity at FX, suppliers worked together closely with the company in a joint effort to meet targets for lower costs as well as to improve quality and time to market (refer to Exhibits 7 and 8). An internal FX document outlined the principles behind ESI as follows:

- Suppliers are to be selected at the early stage of product development in order to utilize the suppliers' design and manufacturing technologies more effectively;
- The selected suppliers and FX are jointly responsible for meeting the targets;
- The selected suppliers and FX are encouraged to work closely together in the development/design process and to exchange technical information freely and positively;
- Achieving quality must be the primary objective; therefore, the suppliers selected must be the best, with the capability to exceed all others in quality, cost and delivery performance;
- FX will seriously consider any proposal from the selected suppliers and feed back results in a timely manner;
- FX will consider recognizing successful supplier relationships by extending business transactions with those who aggressively participate in ESI activities and achieve high targets.

Not all parts (or sub-assemblies) were subject to ESI initiatives. The Engineering Department identified the part categories which should be targeted for ESI (refer to Exhibit 9). Other parts -- i.e., standard parts, parts that had been already used in other products, or ones that needed only minor modifications -- were not formally addressed by ESI initiatives. Rather, attention focused on parts and sub-assemblies that served an important function and were difficult to manufacture. FX set three criteria for selecting the parts that were appropriate for applying ESI: 1) those which would benefit from being designed by suppliers in order to achieve quality early on and to reduce costs. Such parts were the more expensive ones (i.e., over ¥1,000 per piece), for example, lenses; 2) those that could be easily designed by suppliers and thereby reduce FX's design workload and R&D expenses (typical items were plastic housings and frames); 3) those for which FX lacked technology at the time of development (i.e., expensive electric units, control display panels, and ROS units).

The nature of the supplier's design contribution depended on the type of part or sub-assembly. For parts that were simple to design (such as electric parts), FX provided the basic specifications, while the supplier designed and developed the parts and, once released, started the manufacturing process. For expensive parts, FX did the drawing in-house and then worked jointly with the supplier in Value Analysis/Value Engineering (VA/VE) activities. For "high-assy" parts (sub-assembly with a large number of components), FX

and the supplier would work together to improve the process costs, assembly time, labor rate, etc., along with the VA and VE activities that were performed for expensive parts.

ESI Activities between 1989 and 1991

The ESI policy that existed in 1995 at the FX Ebina plant had gradually evolved since the first experiments made in 1989. Three main periods could be distinguished in this evolution process (refer to Exhibit 10).

The first period extended from 1989 to 1991. At that time, FX implemented only one type of ESI activity -- known as "Type A", which was the lowest level of "supplier involvement". Suppliers started to work with FX in the middle of the "Feasibility Model" phase, after the drawings were nearly completed. They did not participate in the basic design process at all, and only gave input on the detailed design, usually through the VA/VE activities. At most, they might contribute to drawings of the details, but FX maintained responsibility for the design. The advantage of this approach was being able to apply the vendor's experience for making the design easier to manufacture and thus reduce the need for design changes at later stages in the development process.

This approach was applied extensively, with some 205 parts and 41 suppliers being involved during the 1989-91 period. As a result, the company benefitted substantially, particularly in terms of cost reduction. FX estimated that costs were 13.1% lower than in the pre-ESI period. However, there was some dissatisfaction. The initiative fell short of the cost reduction target of 21.5% that had been set. In addition, there were problems of cost increases during the initial production phase due to delays in the implementation of quality measurement. Also, high-assy parts that had been excluded from ESI did not reach their cost target. These problems occurred, basically, because "Type A ESI" involved only a single supplier working on design activities and manufacturing the part/sub-assembly. Therefore, FX decided to revise its approach by promoting competition among its suppliers at the earliest stages of product development.

ESI Activities between 1992 and 1995

The second ESI period spanned the years 1992 to 1995. The new aim was to extend the scope of ESI to high-assy suppliers and to establish a Cost Management System from trial to mass production. This objective required the introduction of a new "ESI" approach --called "Type B ESI" -- to complement (not replace) the previous one. The plan was that suppliers would become involved during the middle of the "Feasibility Model" phase. The major difference was that two suppliers (instead of one) became involved (if the required volume was sufficient). They would work jointly through the Feasibility Model and Engineering Model phases, and then they would compete on costs in order to obtain the long-term

supply contract. FX did not believe that suppliers might reject this idea because it would require an investment of several man/months worth of engineering work without being assured of ultimately receiving the order. FX knew that these suppliers did a lot of business with the company (at least ¥500 million per year). So, if one order did not materialize, they might well succeed on another and therefore feel only a limited impact on turnover.

FX had experimented with various approaches to the "Type B ESI" plan, with the major difference being the point in time when a choice was made between the two candidates for production supplier. It could be after the Feasibility Model ("Type B-1"), after the Engineering Model ("Type B-2"), or after the Prototype Model ("Type B-3") was completed. Clearly, "Type B-3" was more risky for the suppliers, as they had to "invest" more without having secured any orders from FX. However, from FX's viewpoint "Type B-3" was the most attractive, as it motivated the two candidate suppliers to compete on ways to reduce costs during the design phase until the point where a single vendor was selected.

During this second period, nine high-assy units and nine suppliers were involved, and the concept of "Cost Management Activity" was introduced. FX also initiated a "Defect Rate Improvement" system. The targets were not only achieved, they even exceeded expectations. FX was pleased with these results, but management felt that there was still some room for improvement. First, it seemed that the ESI approach did not really optimally utilize the suppliers' technological expertise, since they were involved only between the Feasibility and Prototype Model phases, which did not give them enough time to make a significant input to the part design. Second, FX thought that having the "competitive" bidding process take place at the end of the engineering phase was not entirely satisfactory, as the winner then did not maintain the same incentive to perform once the competition was over. In practice, it was important that costs continue to be reduced at the mass production level. Third, FX noted that ESI needed to be extended to the parts procured overseas, which represented a growing proportion of the process.

ESI Activities between 1996 and 2000

The third period was planned to cover the years 1996 to 2000. Essentially, the objective was to advance the ESI starting point to the concept/product planning phase in order to achieve better cost targets. The selected suppliers would thus contribute before the development of the "Bench Model". Building on the experience of the second period, which had proven so beneficial in terms of cost reduction, FX wanted to pursue the concept of having competition between two suppliers for each part/high-assy unit. Thus, FX would continue to invite two suppliers to participate in the concept/product planning, basic design and production design phases. Then, both suppliers would receive orders for production, thereby actually staying in the competition during the product life cycle. FX called this approach "Type C ESI".

"Type C ESI" was expected to ensure optimum cost reduction, thanks to the manufacturing suggestions by suppliers that were incorporated in the part design as well as through continuous price competition between suppliers throughout the product's life. The two suppliers involved in "Type C ESI" were always under pressure to reduce costs. In addition, management believed that involving suppliers early on would help them reach higher quality targets for manufactured parts. This new approach to ESI was not meant to replace the previous ones ("Type A" and "Type B"). Rather, it would complement them and be applied to parts or high-assy units whenever it was appropriate.

"Type C ESI" was handled in two different ways: 1) the "black box" approach, where only input/output specifications and the target costs were given to the suppliers, leaving the detailed design up to them (typical examples were low-voltage power supply and motor assembly); and 2) the "design issued" approach, where detailed design specifications as well as the target costs were given to the suppliers. The Engineering Department was concerned about increasing the "black box" approach, as it meant relying on suppliers for design and manufacturing technologies that FX did not have, a situation whereby the company might become dependent.

Actually, "Type C ESI" would only be practical for high-volume projects, as an investment in dies and tools had to be made for two vendors. For example, "Type C ESI" was implemented in the case of the Able 1320 which ran at 10,000 units a months, i.e., 360,000 units over a three-year life cycle. For this product, FX assumed that competition between two suppliers would reduce costs more effectively than economies of scale concentrated on a single vendor, even though FX had to pay for two sets of tools. "Type C ESI" was especially practical in situations where there was commonality of parts, i.e., the same part could be used in several photocopier models.

"Type C ESI" was considered very attractive by the Procurement Department, because of its emphasis on costs. A section manager from Procurement stated: "Competition among vendors is the basic principle for achieving cost reduction." But, the Engineering and Development departments were worried about the workload implications, since "Type C" meant interacting with two suppliers throughout the entire development and production stages. Therefore, these departments preferred selecting a single supplier early on, following the "Type B-1 ESI" approach.

Overall, the Development and Engineering departments feared that ESI might cause FX to lose some essential technological capabilities. Over time, suppliers could develop "black box" technologies which FX would have to use without being able to discuss or influence the content.

In this context, Mr. Kobayashi expressed his concern: *"Reliance on suppliers might result in losing opportunities to raise our*

know-how regarding new technology. We should not focus only on cost reduction. As a manufacturer, technological capability is our key competence. We should seek an appropriate balance between the issues of cost, technology, and shortage of manpower in the Development and Engineering departments."

The ESI Process

At the beginning of 1996, ESI was a fully developed, albeit evolving, policy at the Fuji Xerox Ebina plant. The ESI process had been set up so that the various departments concerned with product development could participate. A document specified which department was responsible for each task (refer to Exhibit 11).

The Development Department began the process by identifying the parts/sub-assemblies where ESI would be needed. It also defined the most appropriate type of ESI to be used and designated the other departments that would be involved. Then, the Procurement Department could proceed with selecting the vendors. At this point, Engineering and Procurement would set cost and quality targets for the suppliers to achieve. They would also be responsible for evaluating and, if necessary, providing support to the suppliers that were selected.

Among the various activities, setting cost targets played an important role. The basic procedure was as follows: for each new product to be developed, a target list price (retail price for the machine) was determined at the top management level, with assistance from the business strategy planning section, feedback from benchmarking, and the approval of the new product development program team. After subtracting the expected margin, a manufacturing cost target, referred to as the UMC (Unit Machine Cost), was authorized. Then, the UMC was broken down into other factors such as BOM (Bill of Materials), processing costs, tool costs, and packaging material costs. In this way, the breakdown target for each part/unit was determined.

As well, the achievable cost for each part/unit was affected by the availability of the technology needed to manufacture its required features and functions. In normal cases, the achievable cost exceeded the breakdown target, indicating the size of the gap that would need to be solved technologically. Finding a solution for this gap went onto the agenda of the Development and Engineering departments. At the same time, a cost management study was initiated so that ways could be found to reduce the purchasing budget and thereby help achieve the cost target, including the target for each part/unit to be sourced from vendors. The Procurement and Engineering departments set these targets based on such factors as previous cost reductions made, records of the respective vendors, the design configuration, and the technological complexity. The target was set by FX and, officially, was not negotiable by vendors.

A section manager in charge of Procurement commented: "*Evaluating the cost of new technology and the cost reduction capability of vendors is certainly important but also difficult. For brand new technologies, there is no criteria on which to base a claim that the cost is too high. Evaluating a vendor's cost reduction capability requires a considerable number of man-hours from the engineering section, whose resources are not abundant. Under these circumstances, it would be useful to stop and examine what, if any, should be the real technological capability of a manufacturing company like FX.*"

Supplier Selection

Clearly, selecting the suppliers was a key step in the ESI process. This task naturally fell in the Procurement Department's area of responsibility, although the selection process also involved the Engineering Department.

The first step in the selection process, for a given part or sub-assembly, was to list the criteria for evaluating the different suppliers. In the case of the DocuColor frame, it was decided to consider the capabilities of the various possible suppliers in terms of pipe cutting, edge finishing, prevention of heat distortion, recovery, welding, etc. In addition to their technical competencies, economic factors such as the estimated price, their attitude toward cooperating on cost reduction, location, etc. were also considered.

A few suppliers were contacted and asked to provide information regarding their ability to supply the part or sub-assembly. If FX already had a drawing completed, it would request a quote from the suppliers which included detailed information on cost breakdowns. This data, however, was not central in the selection process. For instance, in the case of the DocuColor frame, the firm "Sango Kogyo" was selected as the supplier even though it quoted costs (with details regarding BOM, welding, pipe processing, transport and margins) that were higher than another supplier which had refused to explain how its estimated low costs would be achieved. Another supplier, which had also submitted a lower price, was rejected because FX had no experience with this company and was not confident that it could achieve its proposal.

Obviously, the ability to evaluate suppliers with regard to the cost target was only possible when FX had already defined a sufficient number of the part/sub-assembly's specifications. In practice, this meant that the basic design, at least, had been completed, i.e., in either "Type A" or "Type B ESI".

Once a supplier was selected, Fuji Xerox played an ongoing role, which entailed much more than being a mere "buyer". The interaction between FX and its suppliers involved guiding, training, supervision and, obviously, continuous assessment. Because FX wanted to secure the best possible suppliers, it was interested in learning how they in turn were perceived as a "client" by their own

respective suppliers. Therefore, FX ordered a survey to be made that would assess the suppliers (refer to Exhibit 12).

Perspectives

Fuji Xerox was facing several challenges at the beginning of 1996. Its domestic market did not show strong signs of growth, making international expansion more necessary than ever. Also, given these market conditions, pressure from competition was mounting, and the company had to consider alternative sourcing opportunities. Overseas procurement had become essential, which meant that manufacturers who were not familiar with the Japanese style of "partnership" would be involved as vendors. Faced with these challenges, Mr. Kobayashi commented: *"We have developed several types of ESI in order to reduce costs and improve quality by utilizing suppliers' technological capabilities and engineering resources. However, our product line is expanding, life cycles are shorter, our overseas procurement is increasing, and cost pressures are fiercer than ever. In addition, the evolution of technology is speeding up, making new technology rapidly obsolete. We surely need to learn some lessons from our experiences which can be applied to further implementation of the ESI approach. What direction will be the most appropriate for FX and its vendors? Is it really possible to gain an advantage by introducing "Type C ESI"? What else should we do to rationalize our new product development process further? And, how shall we define core technological capability in this rapidly moving market?"*

Exhibit 1:
Five -Year Financial Summary
Fuji Xerox Co., and Consolidated Subsidiaries
Year-end October 20

	Millions of Yen					
	1990	*1991*	*1992*	*1993*	*1994*	*1995*
For the year						
Operating revenues	539,193	621,240	681,905	706,639	750,171	791,363
Operating income	54,081	50,989	51,054	50,887	54,328	55,761
Income before income taxes	54,173	48,573	38,869	39,448	43,511	48,978
Income taxes	30,263	25,482	22,203	21,743	24,272	26,360
Net income	23,201	22,258	13,554	16,683	17,841	20,623
Ratio of income before income taxes to total assets	12.10%	9.00%	6.30%	6.30%	7.00%	7.40%
At fiscal year-end						
Working capital	46,554	35,654	79,863	97,286	83,598	84,564
Shareholders' equity	193,655	209,688	217,964	223,335	235,911	252,368
Total assets	471,898	605,757	624,542	621,033	626,762	661,126
Total number of employees	21,027	24,167	25,632	26,484	26,854	26,952

Notes:
1. All financial data is calculated according to U.S. accounting standards.
2. Figures are rounded off to the nearest ¥1 million.
3. For the convenience of readers, amounts in U.S. dollars are calculated at the rate of ¥ 98.0 = US$1.00, the approximate rate of exchange on October 20, 1994.
4. As of October 20, 1994, consolidated subsidiaries totaled 53 companies, and companies in which Fuji Xerox maintained equity holdings totaled 16.
5. In December 1990, Fuji Xerox purchased subsidiaries in four countries in the Asian and Southern Pacific regions. Consequently, the results of these subsidiaries after the date of purchase are included in the above financial data.

Source: Corporate brochure of Fuji Xerox Co., Ltd., 1995

Exhibit 2-1:
Evolution of the Photocopy Market in Japan
(Plain Paper Copiers)

The Japanese Photocopy Market

Year	85	86	87	88	89	90	91	92	93	94	95
Units sold (thousands)	490	530	570	610	680	730	730	680	640	640	710
Copy volume(1990=1000)	637	689	746	815	911	1,000	1,085	1,148	1,178	1,235	1,310

The Share of Fuji Xerox in the Japanese Photocopy Market

Year	85	86	87	88	89	90	91	92	93	94	95
Units sold (thousands)	120	120	120	130	160	170	170	170	160	160	190
Copy volume (1990 Total Copy Volume =1000	319	352	380	414	463	503	547	579	591	618	654

"Early Supplier Involvement at Fuji Xerox, Ebina Plant"

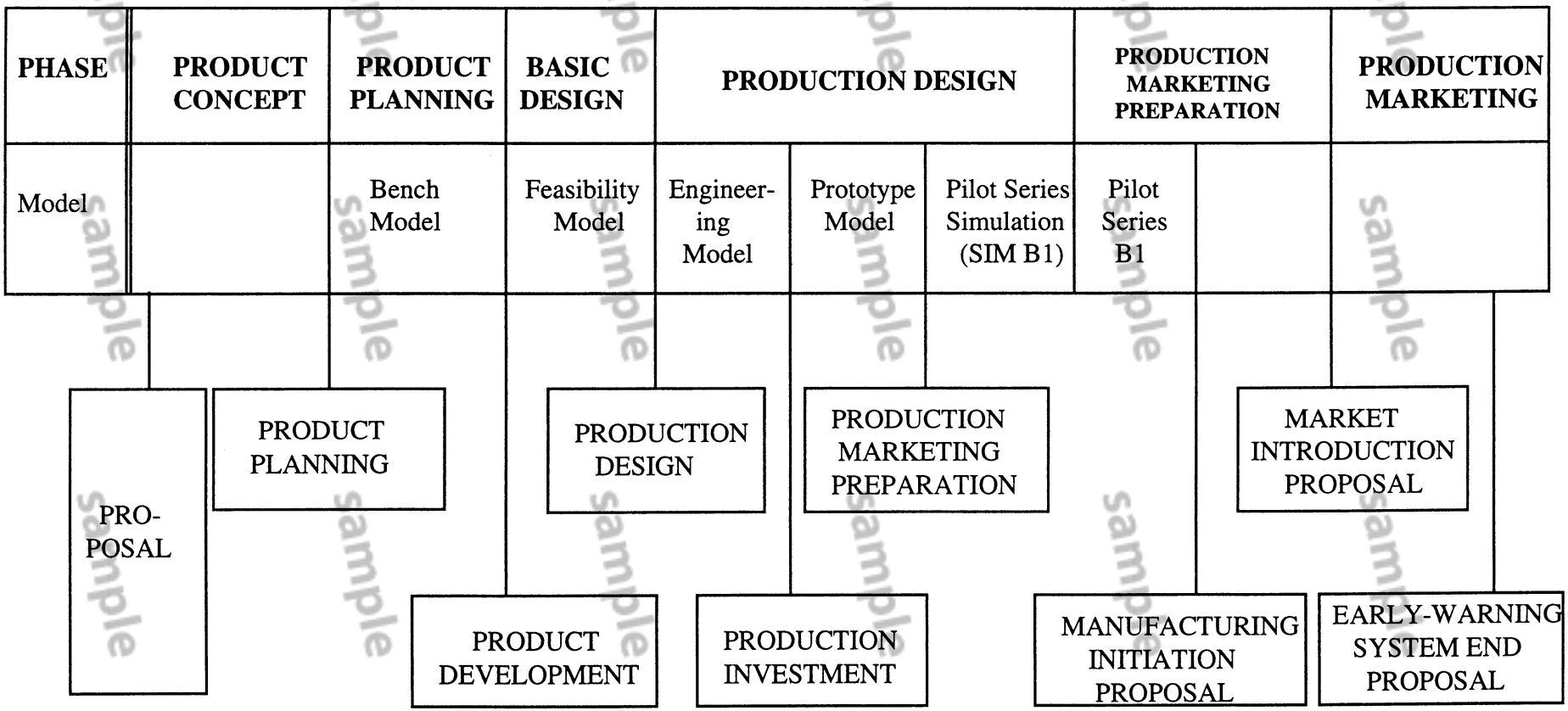
Exhibit 2-2:

Number of Photocopiers Sold in the Different Market Segments in Japan

		89	90	91	92	93	94	95
TOTAL	Thousands	680	730	730	680	640	640	710
Personal	Thousands	110	120	110	100	100	100	100
Low)	Thousands	130	110	100	90	90	90	110
Analog	Thousands	120	90	80	80	70	50	50
Digital	Thousands	10	20	20	10	20	40	60
Mid-Low	Thousands	300	360	360	330	310	290	290
Analog	Thousands	290	340	320	270	240	210	180
Digital	Thousands	10	20	40	60	70	80	110
Mid-high *	Thousands	100	90	100	110	100	110	150
High *	Thousands	20	20	20	20	10	10	20
Largesize	Thousands	10	20	30	20	20	20	20
Full-color	Thousands	10	10	10	10	10	20	20

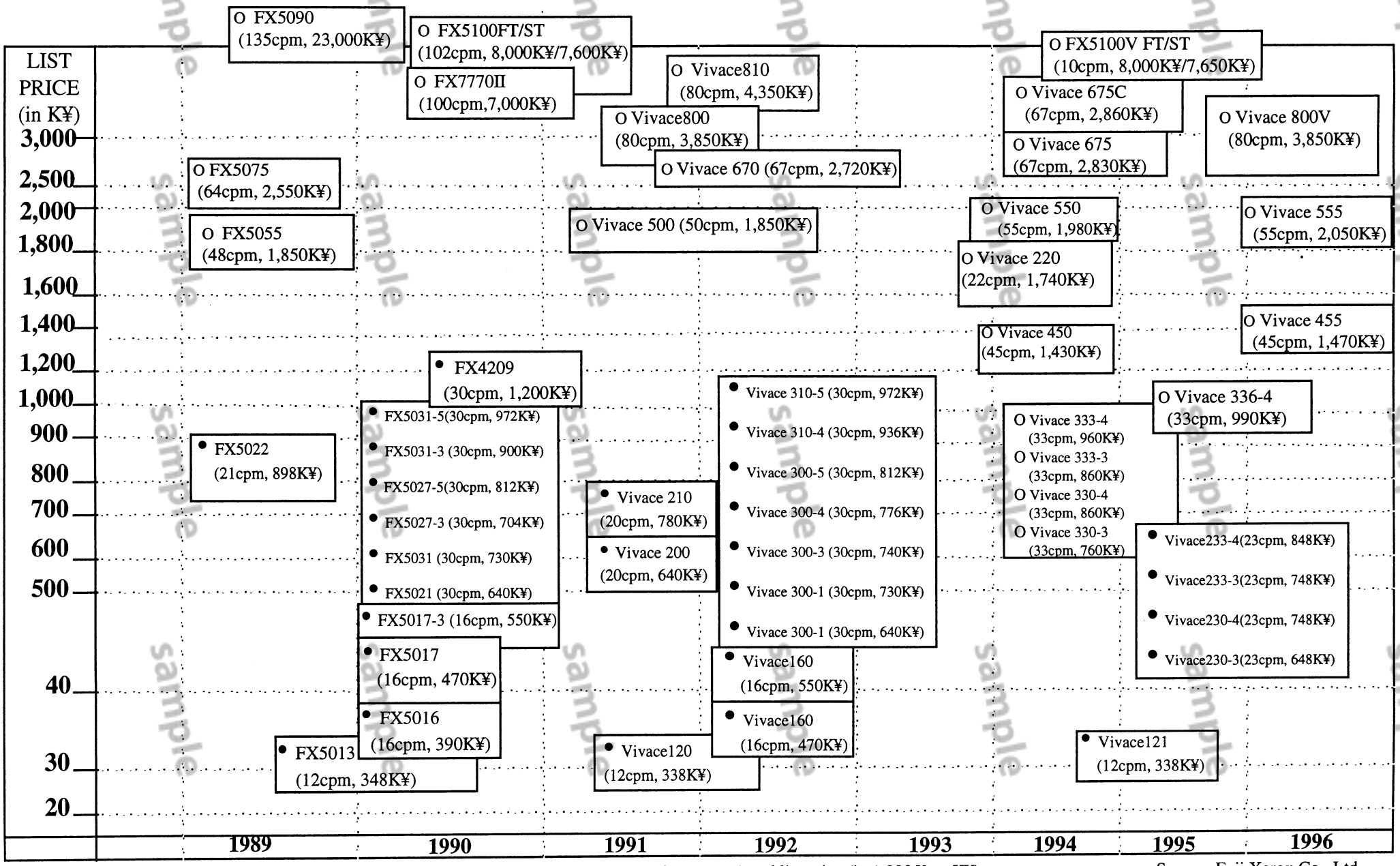
*** For Mid-high and High Digital is negligible except for 26,000 for Mid-high in 1995**

Exhibit 3:
Standard Product Development Process at Fuji Xerox



Source: Fuji Xerox Co., Ltd.

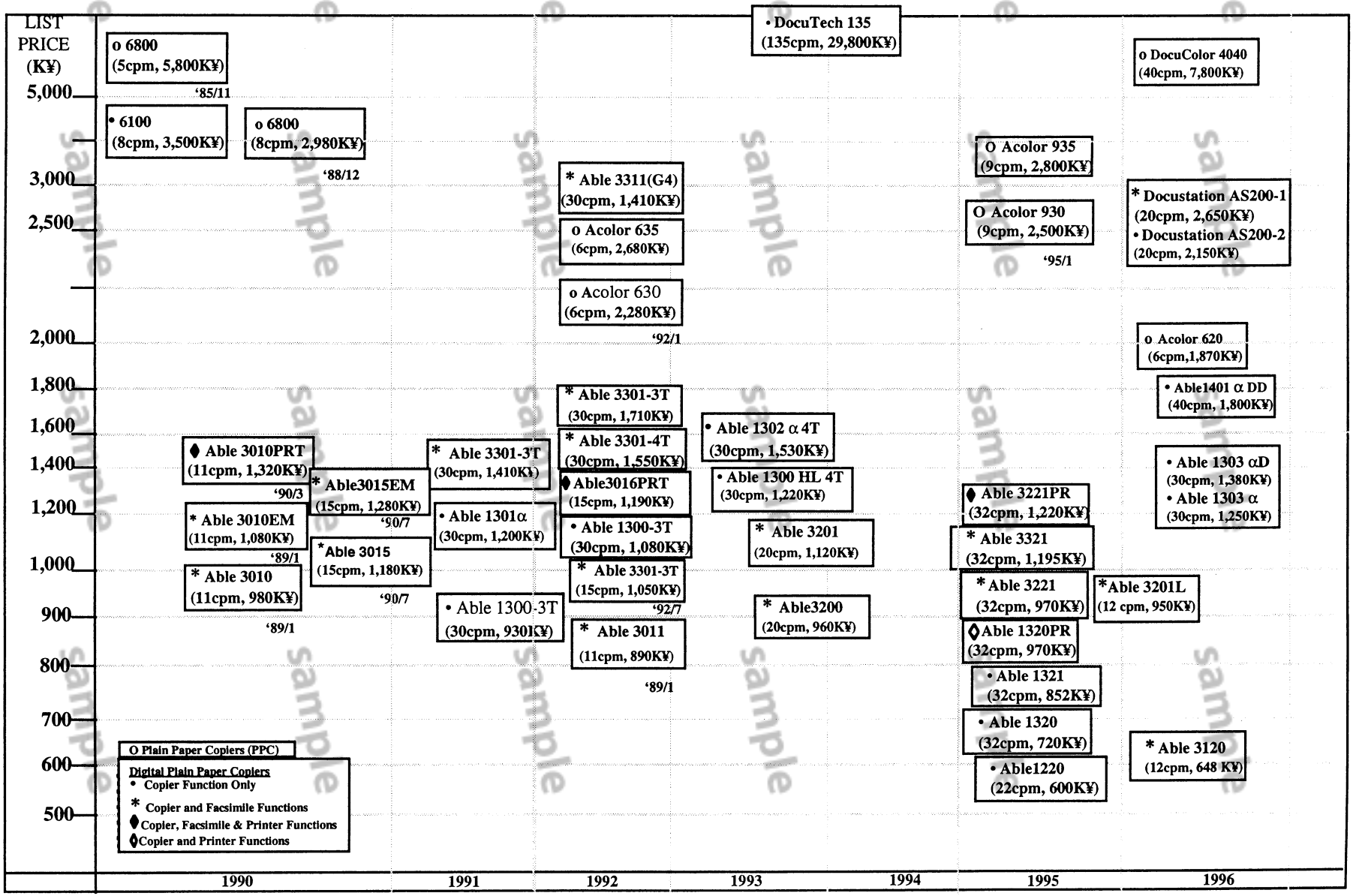
Exhibit 4: Introduction Schedule for New Products - Black & White Units



O desktop type, • console type. Figures in brackets indicate copy speed (in copies per minute, cpm) and list price (in 1,000 ¥en, K¥).

Source: Fuji Xerox Co., Ltd.

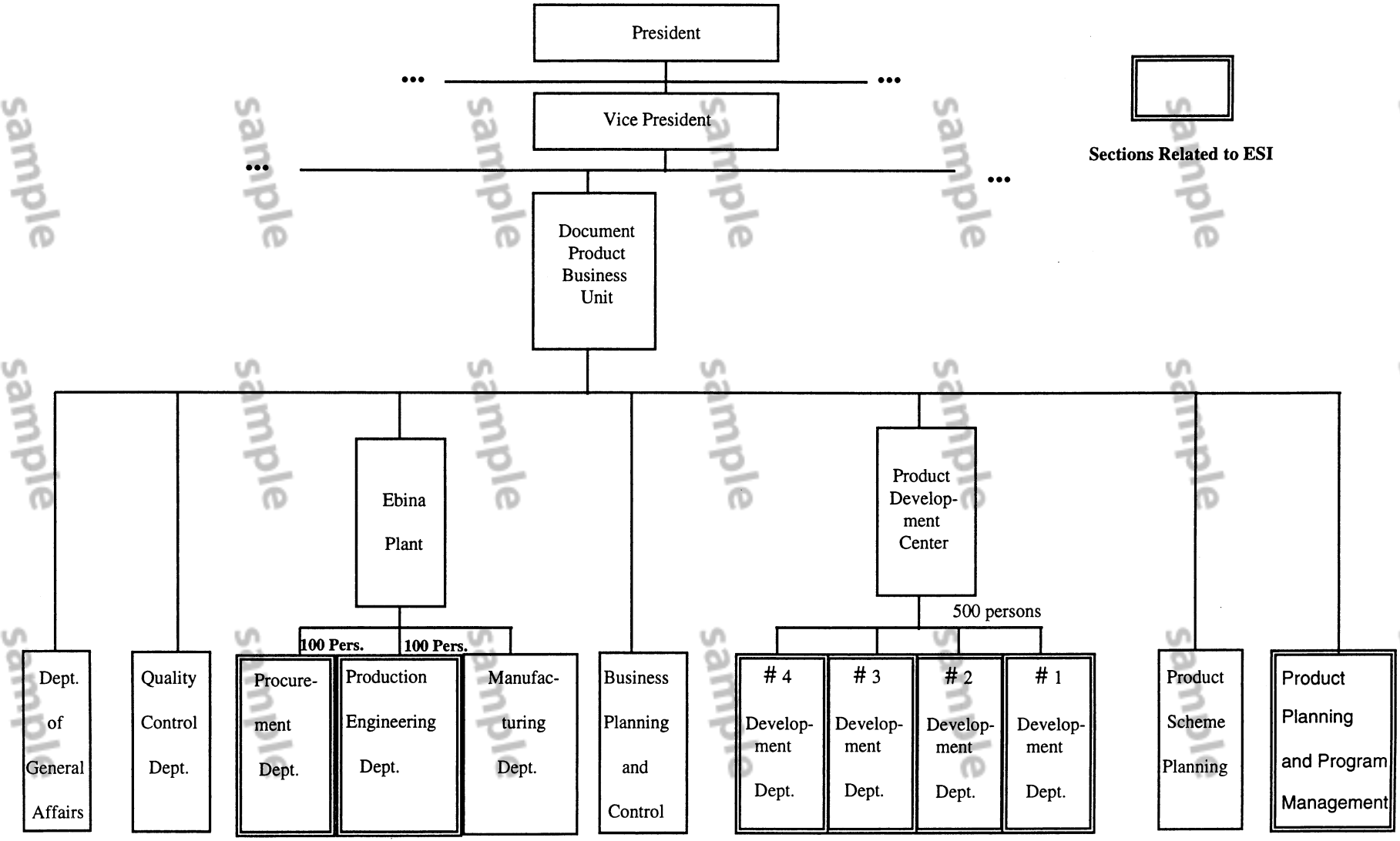
Exhibit 5: Introduction Schedule for New Products - Digital Full-Color Units



Figures in bracket indicate copy speed (in cpm) and list price (in 1,000 ¥en K¥)

Source: Fuji Xerox Co., Ltd.

Exhibit 6-1: 1990 Organization Chart
Fuji Xerox, Ebina Plant



Source: Fuji Xerox Co., Ltd.

Exhibit 6-2: 1996 Organization Chart
Fuji Xerox, Ebina Plant

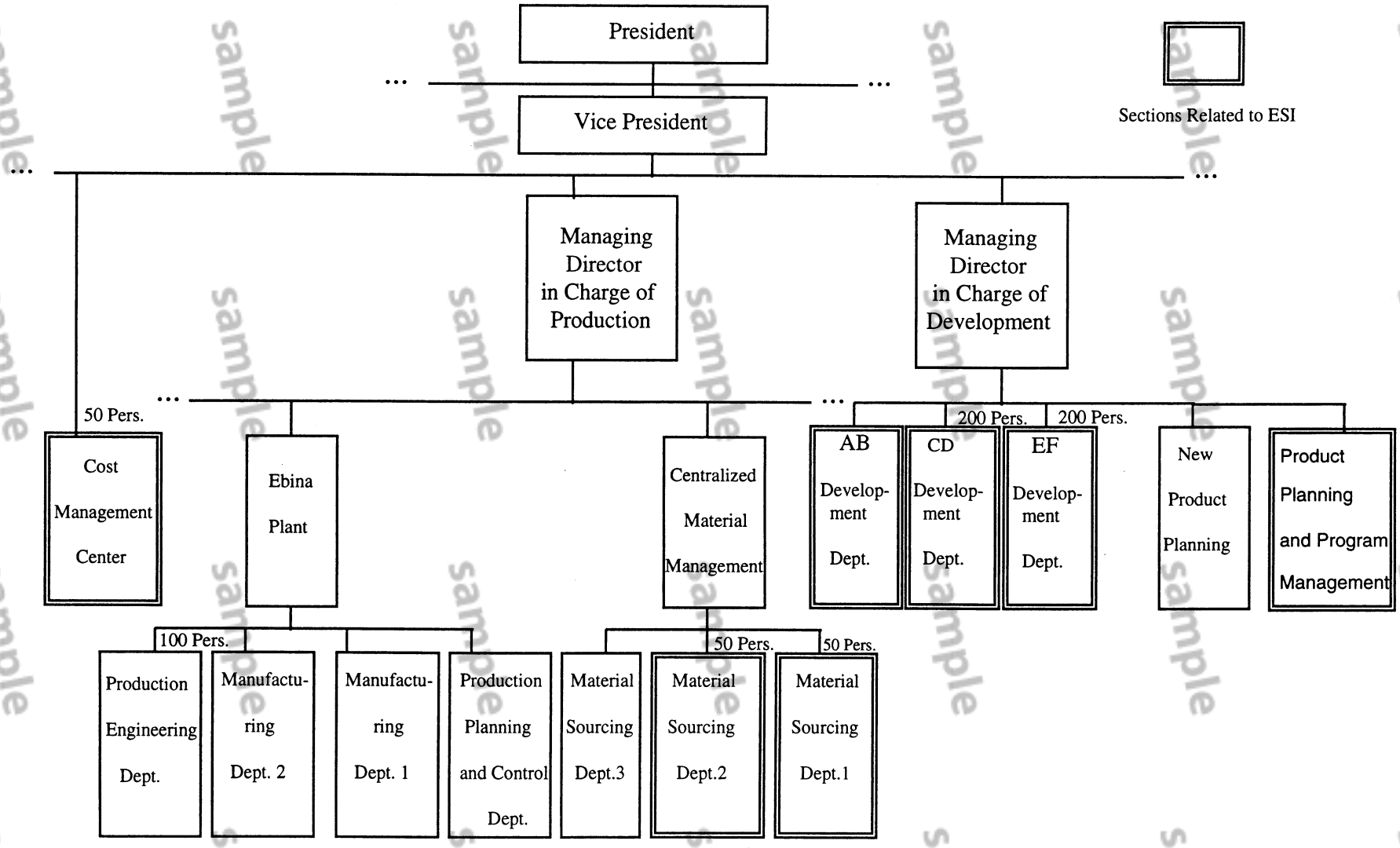
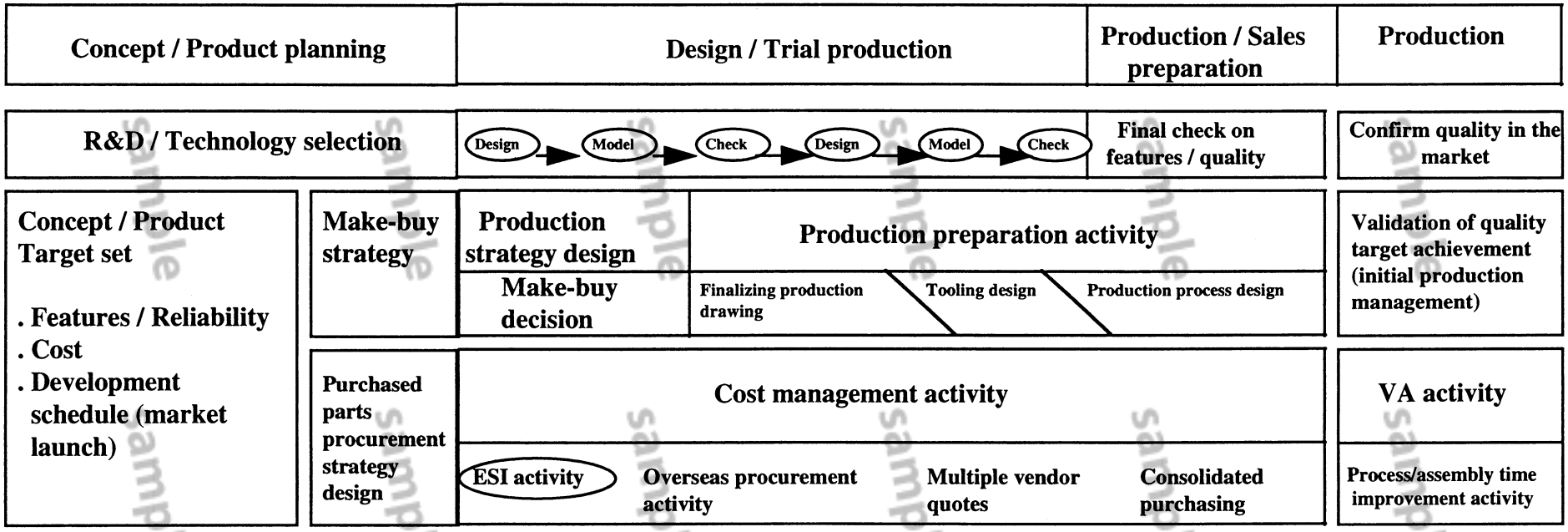
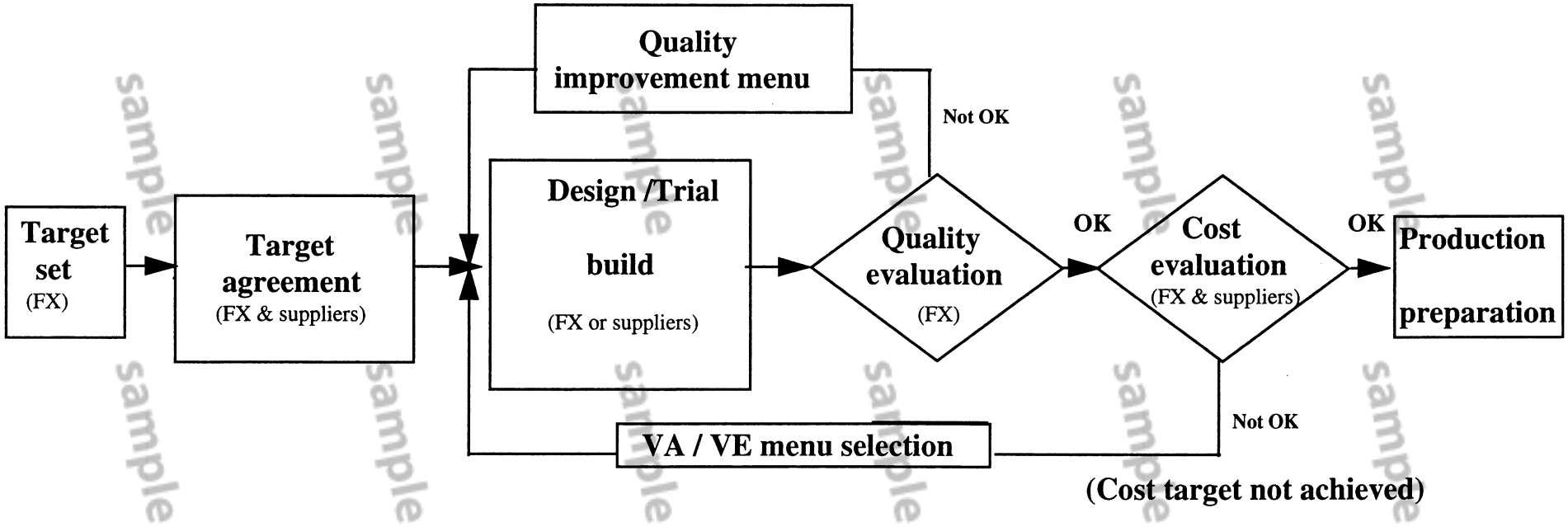


Exhibit 7: The New Product Development Process and ESI Activities



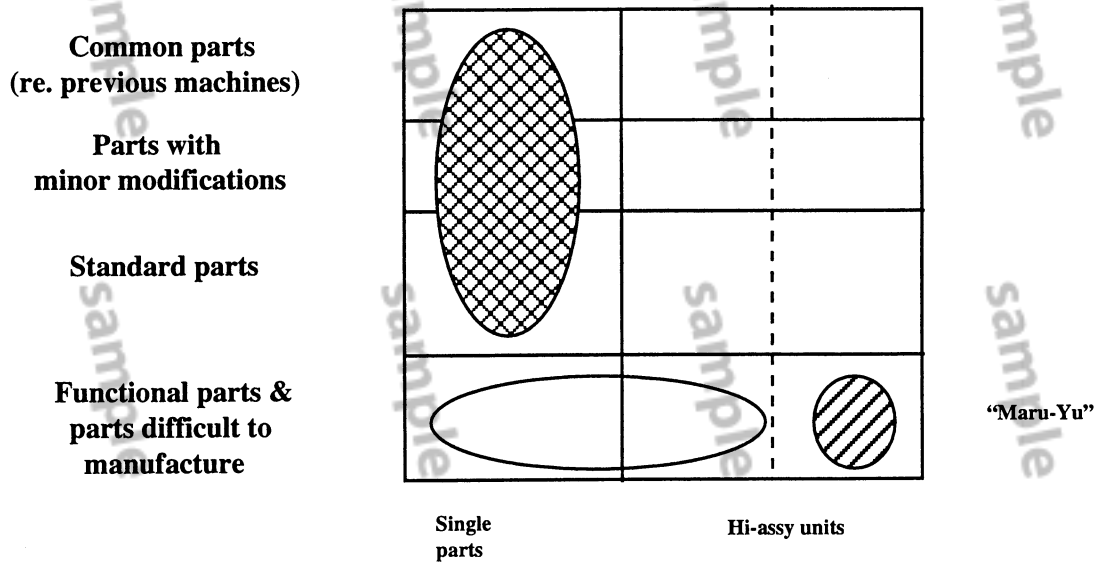
Source: Fuji Xerox Co., Ltd.

Exhibit 8: The ESI Process at Fuji Xerox, Ebina Plant



Source: Fuji Xerox Co., Ltd.

Exhibit 9: The Involvement of Suppliers for Different Types of Parts



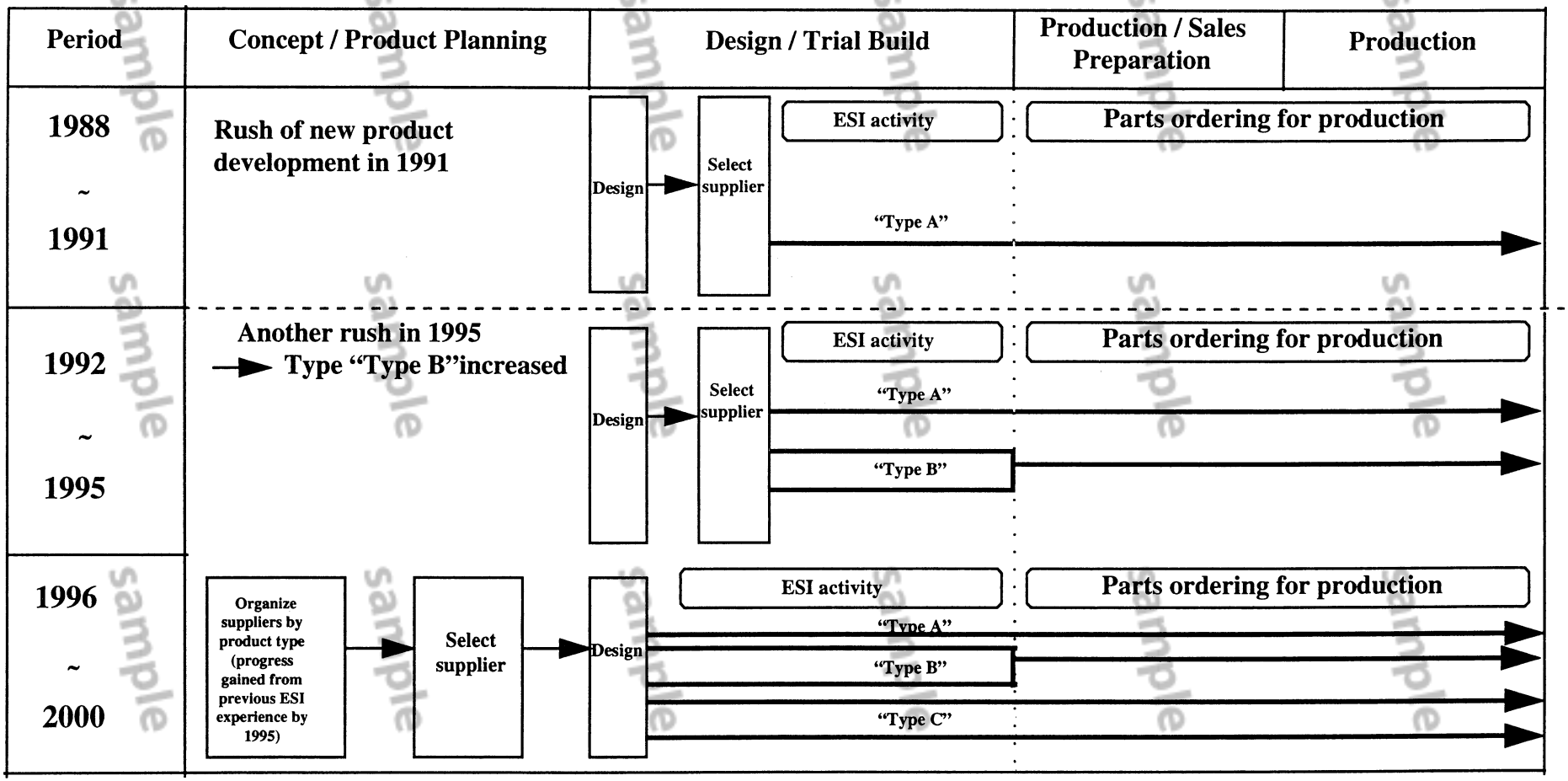
Major target for ESI. Vendors are selected early at Feasibility Model or Engineering Model phase.

Vendors are consistent across different products. Financial support is given by FX. Target units are Hi-assy units comprised of 50 to 500 parts, which require advanced process technology. FX selected eight mid-sized vendors after 1990 to apply this procurement policy and achieved 40% cost reduction in five years. This program is called the "Maru-Yu" procurement policy at FX.

Vendors are selected after the Prototype Model phase.

Source: Fuji Xerox, Co., Ltd.

Exhibit 10: The Evolution of ESI Activities at Fuji Xerox, Ebina Plant



Source: Fuji Xerox Co., Ltd

Exhibit 11: The Role of Each Department in the ESI Process

ESI Activities	Department Responsible (Support Departments)	Comments
Select ESI item	Development (Engineering, Procurement)	Discuss with Engineering and Procurement
Select ESI type (A,B or C)	Development (Engineering, Procurement)	
Select suppliers	Procurement (Development, Engineering)	Based on previous quality control records
Set targets	Quality: Engineering Cost: Procurement	Quality target/schedule Cost target/schedule
Cost management	Procurement	Compare results against targets
Quality production	Engineering	Discuss manufacturing technology process and tools with vendor
Quality evaluation	Development	Evaluate quality of part and total production

Source : Fuji Xerox Co., Ltd.

Exhibit 12: The Evaluation of Fuji Xerox by Its Suppliers

Positive Evaluation	No. of Respondents	Negative Evaluation	No. of Respondents
* Company-wide action of FX is prompt	6	* Appropriateness of cost target is unclear	8
* Response to VA proposal is prompt	5	* Too many design changes after VA activity	5
* Checkpoint on quality is clear	4	* Identification of XCN (?) point takes time and energy	4
* Rationalization / improvement of production process suggested by FX is feasible	3	* Preparation of drawing schedule is late	5
* Prior information on schedule and design change is helpful	3	* Rigid specifications inhibit cost reduction efforts	4
		* Required document action is burdensome	3

Source: Fuji Xerox Co., Ltd.

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