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David Bernstein, editor

# Executive Summary

David Bernstein

## I. Introduction

Because of the Soviet Union's heavy emphasis on military prowess and capability, the military-industrial sector in the Soviet Union (and Russia) was larger than its counterparts in other industrialized societies. In addition to military equipment, it produced almost all civilian products with technology content such as appliances, electronic equipment, and aircraft.

With the ending of the Cold War, support for the military production from this sector was radically deemphasized. The necessary adjustment of the military enterprises to this demand shock has been embedded in far more comprehensive economic reforms. As the country has moved to a market economy and privatized much of its economic potential, the managers of the enterprises have found it necessary to convert most of their output to nonmilitary products and services as well as to restructure the enterprises. In going through this major transition, the challenge for Russian defense enterprises, and for the state, has been to address several partially conflicting and interdependent goals, including:

- To redistribute ownership from the state to managers, employees, and outside investors.
- To utilize the assets of the enterprises to increase efficiency, revenue, and profits from both state and nonstate customers.
- To maintain operational control of the enterprises in hands sympathetic to the continued operation of the enterprises.
- To provide employment and social services for the employees.
- To remove the burden of support from the state and impose hard budget constraints.
- To maintain the technological and industrial base required for national security.

- To reduce the degree of industrialization and militarization of industry and thereby increase both the civilian production and service sectors of the economy.
- To liberalize prices.
- To demonopolize the supply chain.

The three major areas of restructuring are (1) the relationships of the enterprises with their owners, (2) the internal organization and operational procedures of the enterprises, and (3) the relations between the enterprises and the employees. The degree of success of the national economic reform program and the health of the economy will depend substantially on the degree of success of the defense enterprises in utilizing their residual assets (human, technological, and physical) to generate profitable economic activity.

This report deals with this economic transition, primarily at the enterprise level. We have met the directors of more than forty defense enterprises and worked with approximately ten of them in considerable detail and six in more detail, having spent between one quarter and one person year with managers from each of the six. Notwithstanding this amount of contact, there are still problems with the reliability of our data. The researchers in our group do not always agree on some aspects of the situation at a given enterprise, and of course many of the conditions are changing over time. This coupled with the absence of periodic financial reports complicates the data gathering and evaluation process. (The last data for this report were collected in early September 1994.) We have not attempted to reach consensus on all aspects of the data, and hence different views are expressed by the various contributors.

The report contains case studies of these six enterprises as well as cross-cutting chapters on four critical aspects of enterprise restructuring—privatization, organization, accounting, and social services. These have emerged as the key factors governing the strategies of the enterprises, and they will be some of the primary determinants of the success or failure of an enterprise.

In analyzing the factors that will determine the success or failure of the transition at a given enterprise, we find it impossible to isolate individual factors, such as leadership, product line, markets, and foreign investors that combine to determine success or failure; they are interdependent. Therefore we do not expect to be able to draw precise conclusions about the relative importance of these key factors, nor do we expect the relative importance to be the same for all enterprises.

By success we mean transition to a sustainable, and ultimately profitable, enterprise functioning in a market economy. The market economy does not yet exist in Russia; many of the military-oriented enterprises have not as yet been permitted to privatize; those that have privatized and converted are still undergoing many changes; and the political environment has not yet stabilized. Therefore it is not yet realistic to deem any enterprise successful. The most that one can do is note the success or failure of interim operations, restructuring steps, and strategies. The degree of success to date is not necessarily the indicator of long-term success. Although profitability will be a primary long-term indicator of success of any business, short-term financial performance is not a very good discriminant because of the inadequacy of accounting standards and records and the artificiality of costs for supplies and administrative functions supplied by the state.

In the absence of measurable outcomes, we rely on indications of progress. Not all of these indicators are easily comparable between cases. Finally, there may be very important, conceivably even dominant, influences on the success or failure of enterprises for which we

have little or no data. One such factor could be future political influence. Given all of the above, this report should be read as work in progress.

Financial sustainability is an important measure of intermediate-term performance. At the same time that the enterprises are working toward structures suitable for participation in a market environment, they are also making the necessary adjustments to survive in the transitional economy. There is frequently a tension between these two objectives.

In this report we have assumed a future of a functioning, expanding market economy. Other futures are, unfortunately, also possible. One is a reversion to a command economy, possibly including the renationalization of some property; this looks increasingly unlikely as reforms, especially privatization, continue to expand. Another is a long continuation of the current stagnation and lack of progress. A third, which appears all too possible, is an economy in which the fear and financial burden of organized crime stifle economic expansion and investment. Enterprise directors recognize the uncertainty of the future and frequently, perhaps prudently, take defensive moves to accommodate these other possible futures. This hedging may set back their preparations for the more optimistic futures. Our research has been biased by the assumption of a market-oriented future in that we have not spent much time beyond preliminary interviews with enterprise directors that prefer to depend on state subsidies and appear to be waiting for a return of the old command system. This bias seems to be more valid now (September, 1994) than it did earlier in the research, but this assumed future is by no means a certainty in our minds.

In examining the restructuring process through American eyes, one must remember that Russian and American understandings of the processes, structures, and objectives are quite different. This is most apparent in privatization since the concept of private ownership of the means of production is probably the most foreign one to the Soviet tradition but is virtually intuitive to Americans. Finally, it is important to remember that there are many substantially different meanings of markets and different approaches to ownership in the industrialized capitalist countries. The most appropriate approach for Russia may be a synthesis of several of these approaches tailored to fit the circumstances and culture in Russia.

## II. Conversion

Conversion has been both active and passive. The enterprises have actively undertaken the development, production, and marketing of nonmilitary products and services. The active conversion includes the tacitly sanctioned utilization of state enterprises' facilities and labor to establish private business ventures, so-called "spontaneous privatization." In addition passive conversion has occurred as many skilled employees have left the military enterprises for better paying jobs in the growing commercial sector. The active conversion is leading to production of civilian products, and the passive conversion is primarily building up the service and trade sectors. The enterprises have borne the major burden for conversion and restructuring without much organized assistance from the state.

The decline in industrial production has been measured and publicized, but the increased economic activity that has occurred in parallel is only partially monitored and tabulated. The active conversion portion is observable, but it is hard to quantify for lack of a quantitative baseline. The results of spontaneous privatization are largely in the gray economy, the extent of which, by definition, is not accurately known. It is also hard to quantify the portion of

buildup of the service sector that can be attributed to passive conversion. Field interviews at the enterprises in our study qualitatively confirm the extensive spontaneous privatization and the defection of skilled personnel from the enterprises to the commercial sector. The enterprise managers view the latter form of passive conversion as a detrimental brain drain.

### III. Enterprise Case Studies

Chapters II through VI of the report contain case studies of six Russian enterprises whose personnel were previously engaged primarily in military design and production activities. Four of them, Impuls, Mashinostroenie, the Saratov Aviation Plant (SAP), and the Central Aerohydrodynamic Research Institute (TsAGI), are medium to large enterprises that have existed for many years. The other two, MCST and ELVIS+, which are treated in a single case study, are small, relatively new enterprises that were formed from a small portion of older, larger enterprises. The basic characteristics of these six are presented in the summary table at the end of the executive summary.

Here again our study is biased toward those enterprises committed to reform. The managers of these enterprises, and many others that we have not followed as closely, clearly refute the assertion that managers from the Soviet era are incapable of reform and should be replaced wholesale. On the contrary, while their challenges are in my opinion far greater than those faced by their American counterparts, they have far less relevant training, and far fewer resources, they have sustained their operations against strong odds.

#### Impuls

Impuls was engaged in the research, development, and prototype production of high-technology components for advanced weapon systems. Its main fields of expertise were electronics, electro-mechanics, and electro-optics. Its output was almost exclusively military. Since it did not produce end products and produced virtually nothing for the civilian market, it seemed of all the enterprises studied to have the greatest task in conversion, as it had to develop new products, introduce production capability, and find new markets. It has had reasonable success in conversion although its primary civilian product is a relatively low-technology machine for counting currency notes. Production and sales of this product have expanded continuously since its introduction in 1993. Impuls continues to get about 30 percent of its revenue from military orders.

Impuls has recently privatized as an open joint-stock company under the GKI Option One, with the state retaining a substantial minority position. The state allows the general director to vote its shares. The general director has instituted a decentralized management structure with a matrix organization in which several division managers have responsibility for financial performance, product development, and marketing and sales. He has also instituted cost reduction policies.

Impuls has also been very active in attempting to attract foreign investment partners and penetrate foreign markets; however, this approach has not had much payoff as yet. The enterprise's current financial status seems stable; however, it is in need of additional investment capital for new product and market development.

## Mashinostroenie

Mashinostroenie is a large design, production, and systems integrator whose main business has been the development and low-volume or prototype production of space and missile systems. The military is still a major customer, accounting for about one-third of its revenue. Its primary conversion success has been in the marketing of data from satellite missions. Mashinostroenie also produces a variety of other civilian products ranging from direct outgrowths of its base business, such as television antennas for satellite reception, to totally new products, such as sailboats.

Even though Mashinostroenie has been removed from the list of enterprises not permitted to privatize, it has decided not to privatize for the time being. It has chosen instead to keep its basic space business in the core state-owned enterprise, while spinning off subsidiaries to pursue conversion activities. Mashinostroenie has also decentralized much of its management structure and placed financial and product responsibility on division managers. The enterprise has a conversion fund to which managers can apply for support of conversion projects.

## SAP

The Saratov Aviation Plant (SAP) is a medium-sized producer of aircraft designed by the Yakovlev design bureau. It started shifting from an even split of military and civilian production to entirely civilian production in 1988 and completed the shift by 1991 when the enterprise was privatized as a collective enterprise by the Soviet government. It subsequently made the transition to an employee-owned joint-stock company and had this transition approved by the Russian government. The process of conversion was comparatively straightforward since it was already manufacturing commercial aircraft.

SAP has had considerable financial difficulties, most of which were caused by attempting to do business with or through the Russian government on a commercial basis. The government, as represented by Aeroflot, was unwilling to negotiate competitive prices for airliners, but instead tried to revoke the old central control process of dictating the terms of orders. SAP was quite successful in selling jetliners to China, but the payment was delivered through the Russian government, which delayed and appropriated a portion of the payment. In addition, SAP has undertaken many new aircraft development projects using retained earnings without having obtained adequate financing. As a result the payment delays have depleted its working capital and caused the enterprise to shut down production temporarily.

## TsAGI

The Central Aerohydrodynamic Research Institute (TsAGI) was the primary Soviet facility for aerodynamic testing of all aircraft, missiles, and space systems. It is the largest such facility in the world. It suffered a decline in orders to test all categories of equipment, including civilian aircraft. TsAGI has taken a two-track approach to conversion—selling testing services to foreign aircraft manufacturers and developing new lines of business, many of which are based on the core technologies of its research and testing facilities. The marketing of testing services has had a quicker payoff, and it helps the enterprise maintain its core capability. The development of new business lines is conducted largely through more than thirty subsidiary companies. The amount of ownership of these subsidiaries available for outside investors is inversely related to how close the particular business is to TsAGI's core technologies.

TsAGI is not allowed to privatize, but the state has designated it as a state science center. This assures it of some level of funding from the Ministry of Science and the utilization of intellectual property developed during its research. It is also permitted to establish additional subsidiaries, which are permitted to privatize as joint-stock companies.

#### ELVIS+ and MCST

The two new, smaller enterprises, ELVIS+ and MCST, are both privatized high-technology companies formed primarily to pursue nonmilitary business. Both are engaged in business ventures with Sun Microsystems. ELVIS+ specializes in wireless communication technology. Its staff was involved in developing equipment for satellite communications and is now trying to market research, development, and prototype construction for commercial applications. In the meantime it is providing a high-speed fax service (faxgate), which covers a considerable portion of its operating costs. ELVIS+'s operations are within the facilities of ELAS, the enterprise of which it was formerly a division, although ELAS does not own any equity in ELVIS+. This is a contentious and unsatisfactory relationship, but it has been necessary because of the high cost and/or lack of availability of satisfactory alternative facilities. Sun has a small minority interest in ELVIS+, has funded research projects, and is helping ELVIS+ to locate a strategic partner for wireless communication applications.

MCST is a new company formed around a high-technology market opportunity, to perform research and development of computer hardware and software for Sun Microsystems, with personnel from the Institute for Precision Mechanics and Computing. The institute and the state retain a 45 percent equity interest in MCST, and they provide the facilities and some administrative services. Sun does not have an equity position. This relationship is also not satisfactory, but attractive alternatives are not available.

While the products MCST produces are very different from those its personnel produced previously, the technical skills of the enterprise's key personnel were very adaptable to these new products. The software products in particular do not require many of the functional capabilities needed to manufacture hard products. MCST-developed technology is already being introduced into Sun software products.

## IV. Privatization

The four major enterprises in this study have taken four different approaches to privatization:

- SAP was privatized much earlier, under the Soviet regime, and it has chosen to become an employee-owned, closed joint-stock company.
- Impuls has chosen to privatize by Option One to maintain control through internal ownership, friendly investors, and retention by the state of a substantial minority interest, with a voting proxy to the general director.
- Mashinostroenie has chosen not to privatize at this time, relying on state ownership to maintain control and preserve the basic nature of the business, while diversifying by spinning off subsidiaries, which may be privatized.

- In the case of TsAGI, the state has established the basic testing facilities as a state-owned science center which is forbidden to privatize. Commercial applications at Mashinostroenie and TsAGI will be conducted through privatized subsidiaries.

Ownership is the ultimate mechanism of control of a corporatized entity. Prior to privatization, in the Gorbachev era, the managers of the defense enterprises had started to gain a substantial degree of control of the operations of their enterprises. As the central control apparatus disintegrated, the control of the managers was increased and solidified. Formal ownership (by the state) became less and less of a factor of operational control. In addition, there was “spontaneous privatization” in which the managers utilized state-owned facilities for the conduct of private business. As ownership was changed through the process of privatization, the relative importance of ownership and the de facto control established by the managers has become an issue. In many cases new owners such as employees and voucher investors have not attempted to exercise active control over the managers. This is not that different from the passive attitude of many investors in the United States, except in those cases, the shareholders can place more confidence in the board of directors and government regulatory bodies to protect their interests. As the profits of some enterprises start to grow and stock markets are more broadly established, shareholders of such enterprises will begin to recognize that their shares have a monetary value. And shareholders of less successful enterprises may be stimulated to exercise their control more actively. However, shareholders’ attitudes toward their shares and toward management are difficult to predict purely on the basis of Western experience.

In most cases, including SAP and Impuls, privatization has not been accompanied by adequate capitalization so it is likely that the later introduction of investment capital will alter the de facto operational control that the managers currently exercise. In particular, large investors will frequently come in with specific ideas about the business objectives, and their investments can be expanded to exercise more active control. Outside investors are also apt to crack down on the utilization of company assets for personal business pursuits. Mashinostroenie and TsAGI are developing commercial activities through the creation of subsidiaries that are privatized, sometimes with majority outside equity.

It is too soon to tell how the issues of ownership and control will evolve. Whether owners will exercise greater control or whether the managers will further consolidate their power is difficult to predict, and the situation will vary from case to case. The approach of most general directors to consolidate their power and to discourage unsolicited outside investors can have at least two sets of motivation. It could be for the power, prestige, and financial gains. Alternatively it could be to prevent hostile takeovers that could lead to asset stripping and the demise of the enterprise. Various general directors undoubtedly have different combinations of these motivations, and it is difficult to distinguish between them on the basis of their behavior to date.

## V. Organization

The organizational structure of state-owned enterprises was not designed to function in a market economy. On the contrary, qualitative and quantitative decisions about output were dictated by the state. The state also performed many of the operational functions normally

handled within a Western corporation, such as distribution, purchasing of inputs, and finance. Thus the organization of the enterprise itself was incomplete as a functioning business.

In addition the state was in an inherent conflict in that it was both owner and sole customer of the enterprise. Many decisions were made from the customer's perspective even though these were contrary to the efficient operation of the business. Many enterprises were highly vertically integrated. They performed many functions within the enterprise that could have been provided far more efficiently by outside suppliers and subcontractors if such existed.

As the state's role has been withdrawn and competitive market forces are emerging, the boundaries and organizational structures of the enterprises are being redefined. Many of the functions previously performed by the state are being internalized. Other functions not required in the command economy, such as marketing, are being instituted. Large organizations are being decentralized for purposes of cost control and efficient operation along product lines. In some cases the decentralization is being accomplished by the creation of internal divisional cost and profit centers, in other cases by the establishment of subsidiaries. The choice depends on many factors, including availability of investment capital, concern over maintaining the control of the central enterprise, control and protection of intellectual property rights, utilization of facilities, and availability of trained managers.

In the enterprises studied herein, the main factor driving organizational decisions is the selection of which products to produce:

- SAP's production is concentrated in the production of large system products—civilian airliners—so it has restricted the freedom of operation of any subsidiaries that are necessary for the central products of SAP.
- TsAGI's main business is aerodynamic testing, and the enterprise's organizational structure is being modified to optimize the performance of this business. In addition TsAGI has created many subsidiaries, but it has kept majority control of those necessary for the core testing activities.
- Impuls has avoided the establishment of subsidiaries at this time, but it has placed considerable operational and financial responsibility on its divisions. It has created a matrix organization with production emphasis assigned to product line divisions, and new product development assigned to research divisions.
- Mashinostroenie has created commercial subsidiaries, and it has also placed operational and financial responsibilities on its internal divisions.
- MCST and ELVIS+ are still too small to have encountered many organizational issues.

## VI. Accounting

In the restructuring of internal operations to function in a market economy, many basic operations must be modified. One of the most important is accounting because it affects almost all internal and external interactions of the enterprise. It is now necessary for some financial information to be transmitted to all parties that do business with the enterprise or make decisions about the governance or operations of the enterprise. In the Soviet era, the

primary user of enterprise financial data was the state, whose main requirement was to monitor production output and employment. Soviet accounting systems were designed basically to provide data of this type. In fact, there may have been a conscious effort to suppress other data, such as the real costs of inputs.

To function in a market economy, financial data is required for external relations with shareholders, creditors, government agencies such as tax authorities and customs officials, potential investors, and other organizations doing business with the enterprise. Accounting data are also needed internally for cost control, overhead allocation, plans for financing, inventory control, pricing, personnel records and planning, evaluation of investors, and virtually all other management functions.

Assembling the necessary data in turn requires not only methods for collecting and processing financial information in a timely manner, but also requires a complete consistent method of treating this data—standard accounting procedures. These procedures obviously affect the form and content of the balance sheet and income statements, but they also affect all of the cost accounting systems within the enterprise because these must be consistent with the aggregate records of the balance sheet and income statement.

This is one of the most costly and difficult restructuring steps for many enterprises. The situation is complicated by the lack of recognized stable standards at a national level. As various aspects of the commercial legal structure evolve, they will impact and change the accounting standards. This is true in the West as well, but changes occur less often since the basic structure has been stable and in place for many years.

## VII. Social Services

Every country has its own system of providing a variety of social services to its citizens. Even in long-standing capitalist countries, the content, delivery form, and method of financing these services frequently change. In the Soviet Union all social services were ultimately provided by the state; however, the industrial enterprises were the immediate deliverers of many of these services. If the state continued to be the sole customer for industrial output, this system could probably endure, but enterprises are now competing, partly on the basis of price, with producers in other countries, so it is desirable that their prices reflect real costs. Therefore the enterprises are adopting various strategies to shed some of these social services, transfer some to local governments, and turn some into self-sustaining business ventures.

It can be argued that the fundamental problem is not one of the best form of delivery but of the lack of adequate funds, regardless of source. In addition the true costs of some of the services are no better known than were other elements in the command economy. The accounting problems cited above pertain here as well.

The issue is further complicated by the fact that the enterprises did not simply supply the funds for these services to be procured from an external provider. The enterprises actually “owned” (carried on their balance) many of the facilities, including apartment buildings, clinics, and kindergartens, and were responsible for their operation and maintenance. Many enterprises are converting some of these services to business entities in the hope of selling the services to other enterprises (or their employees) as well. Those that we have studied are

planning to charge these outside customers more than they pay internally for their own employees. Our impression is that many enterprises are trying this approach, and very few are planning to buy the services. There may, however, be a market for these services in the rapidly growing service and trade sectors of the economy.

## VIII. Conclusion

In this study we have looked at some of the most important elements of restructuring that are involved in the attempt to generate a viable civilian industrial sector from the assets of the military-industrial complex. There are many other reform activities that must be implemented at the national level to create the environment and infrastructure necessary for the functioning of the restructured industrial sector. We have not addressed these here, but they are important and equally difficult to implement. Another issue that we have not addressed is the pandemic presence of organized crime, which is a huge financial “tax” on economic activity as well as a disincentive to entrepreneurship and investment. I join those who believe that this is the largest single problem threatening the economic stability of Russia today.

Perhaps the most difficult challenge is that all of these reforms must evolve simultaneously. The industrial changes are being attempted in the presence of one of the greatest (if not the greatest) systemic economic shifts in history. And all of these reforms are interdependent. On the face of it, the task appears virtually impossible, but the results are far more encouraging than this scenario suggests. The enterprises in our study, and many others that we have observed, are not only surviving, but they are beginning to take a longer-term perspective and plan for the future. There are, of course, many enterprises that are not surviving, but this is virtually inevitable in the light of the previous overindustrialization.

The burden of enterprise conversion and restructuring will continue to have to be carried primarily by the enterprises themselves. In the long run this is probably good. While the state could assist more in providing the legal environment and infrastructure, it would probably be a disaster for the state to get involved in the enterprise restructuring per se, even of the state-owned enterprises. In addition, the enterprise managers are proving to be adaptable, and they will be far more capable once they have solved these problems themselves.

A key element of the new industrial structure should be a sector of small high-technology companies that will more easily shed the legacies of the Communist system as well as provide the innovation and jobs, as does the equivalent sector in the United States.

The achievements of the enterprises studied, the means of reaching those achievements, and the lessons learned are applicable to other enterprises in similar circumstances. However, many of these cannot be applied to enterprises with vastly different circumstances. Enterprises determined to rely on state subsidies will not find these lessons of much value. They will only succeed in a different future than the market-oriented one that we, and more importantly the enterprises studied, are assuming.

# I. Introduction

David Bernstein

A substantial portion of economic reform in Russia will not succeed without the restructuring of the Russian military-industrial complex. By the end of the 1980s, the military-industrial complex accounted for more than 25 percent of the Soviet gross national product, consuming the best human and capital resources available. While the rest of the Soviet economy approximated Third World standards, the Soviet military-industrial complex propelled the USSR to superpower status. Russia inherited 80 percent of the Soviet Union's military-industrial complex—1,100 production associations and enterprises as well as 920 research and development organizations in which more than 9 million were employed.<sup>1</sup> The military-industrial complex (VPK, Voenno-Promyshlennyi Kompleks—or MIC) comprised most of the industrial capacity of the Soviet Union and virtually all of its technological capability. Thus it is impossible to conceive of economic reform without substantial conversion.

It is not only the size of the military-industrial complex but also its structure and organization that makes restructuring of this sector of the Russian economy essential for overall economic reform. Soviet military enterprises and research organizations were large, concentrated, and vertically integrated. Small subcontracting firms, a major engine of most Western market economies, were nonexistent. Of all segments of the economy, the Soviet military-industrial complex was least exposed to market principles or hard budget constraints. On the contrary, military enterprises, especially those involved in the development and production of strategic weapons, also enjoyed almost unlimited access to financial credits, natural resources, equipment, and machinery.<sup>2</sup> Budgets for the Soviet economy were structured around the needs of the military-industrial complex, not the other way around.

Reductions in state orders have forced the Russian military production enterprises and research institutes to reduce their military output, to find ways to convert to nonmilitary products and services, and to compete in a market economy. External conditions such as

high rates of inflation and disruption of supply channels followed from the economic collapse and the macroeconomic reform process. In short, the command system was largely dismantled, but the state was still a monopsonist so a market system has been slow to evolve. The situation was exacerbated by the loss of interrepublic and COMECON trade following the breakup of the Soviet Union and the Warsaw Treaty Organization. Meanwhile the government is debating and modifying the macrostructure of the country's economy and industrial policy as well as the structure of the military-industrial complex in particular.

Under state ownership, the state had a conflict of interest (by Western standards) as it was both the owner and the customer. This conflict prevented the management of an enterprise from deciding on the business the enterprise would engage in; the business was dictated by the customer/owner, who may not have always been motivated in its decisions to act solely in the best economic interests of the enterprise. This conflict is coming to light as an increasing number of enterprise managers do not want to accept military orders because they are less profitable and less reliable than commercial orders.<sup>3</sup> The state's conflict of interest was far more complex as it also was the manager, distributor, etc.

The primary objective of this report, and the four years of research leading up to it, is to analyze the transition of the Soviet/Russian military industry. This transition involves policies of price liberalization, privatization, and marketization at the national level and conversion and restructuring at the enterprise level.<sup>4</sup> A secondary objective is to provide guidance to enterprises engaged in this transition.

The research has been undertaken as case studies at six enterprises in which the personnel were previously engaged primarily in military R&D or production. The Saratov Aviation Plant (SAP) had been producing military and civilian aircraft, stopped producing military systems, and was privatized very early (January 1991). The Central Aerohydrodynamic Research Institute (TsAGI) operated large testing facilities used for all aerodynamic systems produced in the Soviet Union and is working toward a decentralized configuration that will have state-owned and privatized components. Mashinostroenie was (and remains) a systems integrator for space systems and is diversifying into nonmilitary activities. Impuls was engaged in the research and development of high-technology components (primarily electro-optical) for military systems and is diversifying to the design and production of civilian products. The Moscow Center for SPARC Technology (MCST) is a new private company formed by staff members of the Institute for Precision Machinery and Computers. Its personnel previously developed supercomputers for military applications, and they are now working almost exclusively on commercial software and hardware development for Western companies, primarily Sun Microsystems. ELVIS+ is a small spin-off electronics company, also working with Sun Microsystems, that is trying to diversify from military (space) communications systems to wireless communications systems for civil applications. MCST and ELVIS+ are treated together in one case study. The case studies are contained in Chapters II through VI. In addition to these six, we have conducted research at several other enterprises. While this research is not yet adequate for additional case studies, we will use this data selectively to illustrate specific points.

We have met periodically with the enterprises both in Russia and the United States. The longest ongoing cooperation has been with Mashinostroenie, whose general director, Herbert A. Yefremov, we first met in February 1991. The meetings with all of the enterprises in the case studies have been carried out over at least two years. We have focused exclusively on high-technology enterprises in Moscow and other major industrial cities, such as Saratov. The six enterprises were selected for their qualitative differences (e.g., production or re-

search; degree of vertical integration; product/service line; size; stage of and approach to privatization; restructuring plan; foreign interactions; markets). Even so our case studies are concentrated in the aerospace and electronics sectors. There are major segments of the MIC that are not addressed such as shipbuilding, armor, ordnance, and nuclear weapons. A great deal of our research data comes from interviews with the general directors of the enterprises and a few of their top managers. The one exception has been TsAGI, where most of our meetings have been with a deputy director rather than the general director. The study suffers from having limited data from middle managers, and in particular from managers of small enterprises and divisions. The last data for the report were collected in early September 1994.

In this report, we deal with three major elements of restructuring: (1) the relationships of the enterprises with their owners, (2) the internal organizations and accounting procedures of the enterprises, and (3) the social services provided to the employees. We believe that these have emerged as the key factors governing the strategies of the enterprises, and that they will be some of the primary determinants of enterprise success or failure. Various aspects of government policy are discussed in the context of these three areas of restructuring; however, we have not systematically addressed all relevant aspects of government policy such as taxation, which has had a role in the drop of production.

Much of the early emphasis on enterprise restructuring in Russia has been on privatization. Since this involves a change from complete state ownership to partial or full private ownership, the state has been a major actor in this element of restructuring, and the outcome of political power struggles has had a direct bearing on the rules of privatization and their implementation.

The state's role has been to provide policies for the formation of joint-stock companies as the form of privatized industrial enterprises; the allowable distributions of ownership among insiders; the governance and relationships between the owners and the board of directors; and the accessibility of ownership to the general public. These elements of restructuring are analyzed in Chapter VII including a comparison of the four relevant cases (Impuls, Mashinostroenie, Saratov Aviation Plant, and the Central Aerohydrodynamic Research Institute). The other two enterprises studied in this project (MCST and ELVIS+) are spin-offs, but we have not studied the privatization or organization strategies and activities of their parent enterprises. Therefore we will not analyze the ownership issues of MCST and ELVIS+ comparatively with the other four enterprises.

The second element of enterprise restructuring, vital to achieving independent economic viability in a competitive market economy, is the restructuring that deals with the internal and external operations and interactions of the enterprise. This includes organizational form, product/service selection, personnel policies, marketing, finance, legal, purchasing, accounting, and other administrative functions. A great deal of the internal organizational structure is driven by the selection of products/services pursued by the enterprise. The internal organization is addressed in Chapter VIII. As an example of the complexity of reorganizing, Chapter IX describes the differences between Russian and American accounting systems.

There is not a clear demarcation between ownership and organization issues in two major respects:

(1) Ownership bears heavily on control and hence on organizational structure, and (2) product and organizational strategies can include the establishment of additional legal entities, such as subsidiaries and joint ventures, or the introduction of additional investors

and mergers, divestitures, and acquisitions, which can change the ownership distribution of the enterprise.

A third element of restructuring involves both internal and external interactions with individuals (past and present employees), other organizations, and government at various levels. This is the approach to dealing with the social assets (and liabilities) of an enterprise. Most analysts recognize this as a key factor in the potential success of a privatized enterprise. This is addressed in Chapter X, and the approaches of all six of the enterprises we have studied are considered.

We have attempted to identify and analyze the primary factors that will determine the success or failure of the transition at a given enterprise. It is impossible to isolate the key factors (such as leadership, product line, markets, and foreign investors) determining success or failure; they are interdependent. Therefore we do not expect to be able to draw precise conclusions about the relative importance of these key factors, nor do we expect the relative importance to be the same for all enterprises.

By success we mean transition to a sustainable, and ultimately profitable, enterprise functioning in a market economy. The market economy does not yet exist in Russia; many of the military-oriented enterprises have not as yet been permitted to privatize; those that have privatized and converted are still undergoing many changes; and the political environment has not yet stabilized. Therefore it is not realistic to deem any enterprise successful as yet. The most that one can do is note the success or failure of interim operations, restructuring steps, and strategies. The degree of success to date is not necessarily the indicator of long-term success. This, of course, introduces an element of speculation into the work, but this is all that is justified at this time. Although profitability is a primary long-term indicator of success, short-term financial performance is not a very good discriminant. Even though the accounting data and books were and are available, financial analysis is distorted by legacies from the past system, such as artificial administrative prices, artificial values of the current and fixed assets, depreciation rates, cost accounting concepts, and profit calculation and reporting. (Intangible assets are included from 1988; however, goodwill is not included, but it is not important, and it is excluded in some other Western countries as well.) Furthermore there is no adequate auditing system in Russia. At present auditing is a sort of tax consulting and tax inspection, which does not respond to the needs of the domestic financial market.

In the absence of measurable outcomes, we are forced to rely on measures of progress and consider the possible outcomes from there. These measures of progress are not easily comparable between cases. For example, one enterprise may be behind another in some area of progress, such as privatization, but it may be building a stronger base for benefiting from privatization later by such processes as organizational restructuring, divestitures or spin-offs, or product development. Nonetheless financial sustainability is an important measure of intermediate-term performance.

Given the poor state of the Russian economy, its excessive industrialization, and the outdated methods and equipment of many of the enterprises, the road to success will undoubtedly not be consistently upward. For example, the best strategy for some enterprises could even be to go through bankruptcy, to divest of major segments of their business, and/or to be acquired. In these cases lack of success in the near term could lead to longer-term success.

Finally, there may be very important, conceivably even dominant, influences on the success or failure of enterprises for which we have little or no data. One such factor could be future political influence. Given all of the above, this report should be read as work in

progress.

In this report we have assumed a future of a functioning, expanding market economy in Russia. Other futures are, unfortunately, also possible. One is a reversion to a command economy, possibly including the renationalization of some property; this looks increasingly unlikely as reforms, especially privatization, continue to expand. Another is a long continuation of the current stagnation and lack of progress. A third is an economy in which the fear and financial burden of organized crime stifle economic expansion and investment. Enterprise directors recognize the uncertainty of the future and frequently, perhaps prudently, take defensive moves to accommodate these other possible futures. This hedging may set back their preparations for the more optimistic futures. Our research has been biased by the assumption of a market-oriented future in that we have not spent much time beyond preliminary interviews with enterprises that prefer to depend on state subsidies and appear to be waiting for a return of the old command system. This bias seems to be more valid now (September, 1994) than it did earlier in the research, but this assumed future is by no means a certainty in our minds.

In examining the restructuring process through American eyes, one must remember that Russian and American understandings of the processes, structures, and objectives are quite different. This is most apparent in privatization since the concept of private ownership of the means of production is probably the most foreign one to the Soviet tradition but is virtually intuitive to Americans. As Americans study, assist, or invest in Russian enterprises in the transition to joint-stock companies, they generally come to realize that much more is involved than the creation of a new legal entity with distributed private ownership. The Russians, for their part, will take some time to understand the relevance of the Western form of organization and governance for doing business in a market economy, especially in the international economy. Finally, it is important to remember that there are many different meanings of markets and different approaches to ownership in the industrialized capitalist countries, and that they differ substantially from country to country. The most appropriate approach for Russia may be a synthesis of several external approaches tailored to fit the circumstances and culture in Russia.

## Notes

<sup>1</sup> Julian Cooper, *The Conversion of the Former Soviet Defence Industry* (London: Royal Institute of International Affairs, 1993), 1.

<sup>2</sup> Christopher Mark Davis, "The Exceptional Soviet Case: Defense in an Autarkic System," *Daedalus*, Fall 1991, pp. 113-134; Peter Almquist, *Red Forge: Soviet Military Industry Since 1965* (New York: Columbia University Press, 1990); interview with Major General Vladimir Tsarkov, president of the State Center of Conversion for the Aerospace Complex, in V. Khrustov, "Tsentri Konversii: Ot Pervyikh Proektov k Natsional'noi Programme," *Rossiiskie Vesti*, No. 22 (191), February 3, 1993, p. 3. This kind of resource allocation was confirmed in the authors' interviews with Nikolai Ryzhkov, former Soviet prime minister (Moscow, June-August 1992).

<sup>3</sup> Julian Cooper, "Transforming Russia's Defence Industrial Base," *Survival*, Winter 1993-94.

<sup>4</sup> In this report, conversion refers to the utilization of some of the assets (human, technological, or physical) of an enterprise rather than the wholesale conversion of the enterprise.

### III. ELVIS+ and the Moscow Center for SPARC Technology (MCST)

David Bernstein and Elaine Naugle

#### I. Introduction

The other case studies in this report describe medium to large enterprises that have existed for many years. One option for them in the transition process is movement toward a decentralized approach to organization. In this case study of two small, new private companies, decentralization is examined from below rather than from above. Both the Moscow Center for SPARC Technology (MCST) and ELVIS+ are examples of the reorganization of small portions of large enterprises into independent companies. Some analysts believe that this form of conversion and privatization will eventually play a major role in the creation of a high-technology civilian industry, as it has in the United States.<sup>1</sup> In both cases considered here, the leaders of the spin-offs were motivated primarily by the desire to keep highly qualified technical teams intact and to pursue both civilian and military orders with much more initiative than the management of their parent enterprises.

ELVIS+ originated from a much larger research and production organization, ELAS (Electronic Equipment Production). MCST came out of the Institute of Precision Mechanics and Computer Technology. It is instructive to analyze the cases in parallel, as both are small, high-technology, R&D spin-offs of larger organizations. There is no formal connection or working relationship between ELVIS+ and MCST, but the U.S. company Sun Microsystems is working with both. The most important differences between the two are the following:

- The history and distribution of ownership is different. MCST was formed specifically to be able to work with Sun, and its parent institute retained a substantial portion of ownership (45 percent), while Sun did not take an equity position. ELVIS+ was established

and privatized prior to the relationship with Sun, and its parent organization did not take any equity, but later Sun took a 10 percent equity position.

- ELAS, the parent organization of ELVIS+, has been subdivided entirely into many separate small enterprises, whereas the parent of MCST is still a large undivided institute. ELVIS+ has a variety of technical and business interactions with other former components of the old ELAS, whereas there are no analogous entities in the case of MCST.

## II. ELVIS+

### A. Description of the company and its primary activities

ELVIS+ is a private company located in Zelenograd, the electronics capital of the Former Soviet Union. The company was founded in November 1991 from the computer and communications division of a very large state-owned institute (see below) by six principals, who own most of the stock. The key areas for ELVIS+ today are in wireless technology: antenna development, radio and digital modems, systems integration, and communication services. The company employs 54 people, ten of whom are administrative/support workers, and the rest engineers who work on the design and development of wireless communication systems for both space- and ground-based applications. The group's nucleus, led by director Alexander Galitsky, has been working together for more than fifteen years.

Approximately half of the ELVIS+ employees originally were working on projects for Sun Microsystems. This work comprises complete systems, including computer design, radio software, and antenna design. Sun and ELVIS+ have been working together on a cooperative product development project, a wireless communication system for use with Sun workstations. ELVIS+ will be responsible for the development of the communication module in adherence with specifications provided by Sun. ELVIS+ has also been developing software for local area networks (LANs) and the Internet with SunSoft, a Sun Microsystems division, as well as PC software for the Internet Commerce Group in Sun Microsystems Laboratories, Inc. The market that ELVIS+ plans to serve, both globally and in the Commonwealth of Independent States (CIS), will include fax transmission, wireless, local area network, space communications, and image processing and transmission segments of the telecommunications market. Each party will have marketing rights and will earn royalty revenue from sales by the other party. Both Sun and ELVIS+ realize that they also need a third strategic partner in the radio business to help with the development, financing, marketing, and systems integration of their products. ELVIS+ managers feel that the overall communications market in Russia is huge. This is another argument for finding a substantial third partner because many others have identified this market, and it will be difficult to compete with the major firms in this area.

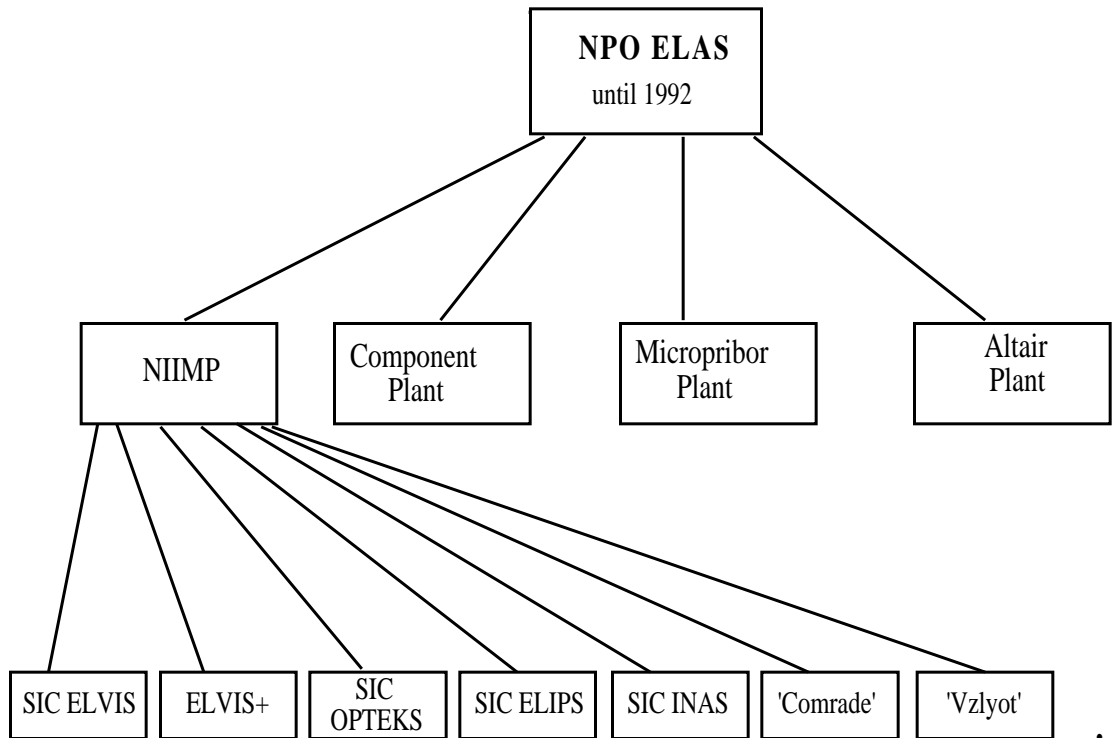
Other projects include work on commercial contracts, including in-house fax and Internet (with mobile capability) services that will allow the transfer of images and Russian text. ELVIS+ also works for government ministries. For example, Galitsky considers the enterprise's state infrastructure project<sup>2</sup> significant in order to maintain some ties to the

government. He is currently working on a proposal to create an information network in Zelenograd.

ELVIS+ has identified a potential domestic market for the creation of LANs using wireless communications. There will be a substantial need for this in Russia because most old buildings cannot be rewired easily or inexpensively. The KaMAZ truck manufacturer is a possible client for this process. It is a huge factory (60-70,000 workers, 10 x 5 km area) with eighteen different facilities. It desperately needs a good Western accounting system, which it is planning to develop, but even then the factory will not have an efficient way of getting the necessary input and output data between facilities within the factory. Currently it lacks funding for this project. Another use for this technology is the communication of operational and maintenance data related to the remote operations of the oil and gas industries. A third example is a project proposed by the GUM department store in Moscow for development of a network for its end-users. ELVIS+ is working with British and Argentinian companies to bid for this contract.

ELVIS+ has another business that is already producing significant revenue. In 1992 the company started a fax service that can transmit data, text, and images and uses imaging rather than a digital system. This faxgate service is different from the system used by Sprint in that it can transmit Russian data. Currently ELVIS+ allows other Russian enterprises to use this service at the ELVIS+ facility and is now providing mobile access as well. The profits from the service are used to cover worker salaries, and other costs such as for electricity, space, and communications. The fax service, although not the main intended field of activity for ELVIS+, and one which will become increasingly more competitive in Russia, is generating enough funds to allow the enterprise to actively pursue other areas for applying its technical expertise.

ELVIS+ does not do serial manufacturing. For prototype production (and some other jobs) the enterprise utilizes consultants who are moonlighting from other enterprises or institutes (usually state-owned).<sup>3</sup>



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## B. History

To understand the history of ELVIS+ (the name is an acronym of *Electrono-Vychislitelnye i Informatsionnye Sistemy*, or *Electronic Computer Technology Systems*), we must look at the large state-owned enterprise, ELAS, that was its progenitor, and the city of Zelenograd, where ELVIS+ is located. Zelenograd was built 50 kilometers outside Moscow in 1961 by the military-industrial complex to be the major center of electronics research and production in the Soviet Union. Highly skilled scientists from the Soviet Union were brought to work at the institutes in Zelenograd. By the end of the 1980s, Zelenograd was a city with some 3,500 enterprises and a population of 150,000, of which 37,000 worked in the electronics industry. Today it has a population of about 4,000 companies, some of which are private but use government space and materials, as does ELVIS+.

ELAS was formed in 1965 when two of the major enterprises in Zelenograd were combined. ELAS, headed by General Director Gennady Guskov, was involved in R&D and manufacturing of computer and communications systems, radio communications, radar systems, and optical electronics, and was responsible for designing and building all computing and communications equipment placed aboard Soviet spacecraft. In the late 1960s, because the bulk of its work focused on miniaturized radio systems for the Soviet space program, ELAS shifted its emphasis almost exclusively to space applications. Formally ELAS

was under the Ministry of Electronics, but also worked under the Ministry of General Machinebuilding for space applications.

Until about 1989, when the lack of state investment led to a decline in this status, ELAS was known by world standards as a leader in electronic communications. The main institute for ELAS was the Scientific Research Institute for Micro-Instruments (Nauchno-Issledovatel'skii Institut Mikro-Priborov, or NIIMP), which employed approximately 4,500 workers. ELVIS+ was originally a spin-off of NIIMP.

The history of NIIMP is important for an understanding of the evolution of ELVIS+. NIIMP was a key computer supplier for Russian space manufacturers and received orders and funding for ELAS, the majority of which came from the Ministry of General Machinebuilding. NIIMP then distributed these funds as necessary to the experimental factories in ELAS. The director of NIIMP received orders by approaching the commission of the military-industrial complex with proposals for projects, as opposed to having projects delegated to the enterprise by the ministry. Until 1991, NIIMP controlled one bank account and balance sheet for its own finances, and separately, another shared account, for all the plants associated with it. In mid-1994, NIIMP had approximately 1,200 workers. NIIMP has been given permission to privatize but, not wishing to lose its ties to the state, is proceeding reluctantly.

In the late 1980s, ELAS, which had 12,000 employees, suffered a drastic reduction of military orders, without guidance or funding for conversion. NIIMP started keeping the incoming funds for its own activities rather than distributing them to the other factories as in the past. Conflicts arose among the factories over the lack of funds and government-mandated low salaries. These factors forced ELAS to seek new business structures,<sup>4</sup> establish independent bank accounts for several of its subdivisions, and develop different working relationships among the components. ELAS split into 37 different companies, ranging in size from five employees to 400. Each of these had a collective form of ownership (a Gorbachev-era legal status), which has since been nullified by the Russian government since collective enterprises are not provided for by the December 1990 Law on Enterprises and Entrepreneurship.<sup>5</sup>

In March 1990 NIIMP reorganized its various divisions into four companies, which include the following Scientific Industrial Centers:<sup>6</sup>

(1) SIC ELVIS, "Electronic Computing and Information Systems," which employed 400 workers mainly in military applications for state orders and was formerly directed by Alexander Galitsky. (As of September 1994 SIC ELVIS had downsized to 130 workers, and halted manufacturing.)

(2) SIC OPTEKS, "Optical Electronic Devices and Systems," which employed 800 workers from the optical electronics division and worked on satellite communications technology.

(3) SIC ELIPS, "Electronic and Software Systems," which employed 50 workers from the radio and communication division.

(4) SIC INAS, "Information and Automated Systems."

The following companies were later added to this group: SIC Spurt, SIC KOMRAD, and SIC Sisvap. In June 1994, six of NIIMP's companies had also been granted independence by the GKI.<sup>7</sup>

This legal formation was intended to improve the functioning of the ELAS system and keep technical teams together.<sup>8</sup>

SIC ELVIS was formed in March 1990 as collective property of its workers. Much of the production at SIC ELVIS has both military and civilian applications, specifically work for spacecraft: design of microcircuit systems, and computers based on microschemes and software. Most work is for state orders.

In 1991 Yeltsin decreed that all small enterprises were state property,<sup>9</sup> which meant that although SIC ELVIS workers thought that they owned their company collectively, the law did not recognize this concept. SIC ELVIS could be an independent company, but it was still a state enterprise and has had to balance the desire to privatize against the concern that it might not receive further state orders if it did privatize, and would be unable to privatize physical assets.

In October 1990 SIC ELVIS managers established contacts with Sun Microsystems, which wanted to work with a non-state enterprise in creating a low earth orbit communications system. In order to do business with Sun, a new company, ELVIS+, was created with 100 percent private ownership in November 1991. ELVIS+ personnel came mainly from the computer and communications division of NIIMP.

A lack of funds and cumbersome export controls led to the abandonment of the initial project that sparked creation of ELVIS+. Despite this, Sun continued working with ELVIS+ in developing a wireless communications system. ELVIS+ differs from SIC ELVIS not only in its ownership, but also its concentration on wireless communications, while SIC ELVIS specializes in computer systems and chip design.

### C. Privatization and ownership issues

Since ELVIS+ was founded as a new private company, it does not face complicated issues of ownership and privatization. Initially, Galitsky owned 50 percent of ELVIS+, and five other principals owned the remaining 50 percent. These six make up the board of directors. A U.S. advisor was later also granted an equity share in ELVIS+. In March 1993, an agreement was reached in which Sun bought ten percent equity, and all the owners' shares were reduced proportionately.

Ownership is thus generally clear within ELVIS+ itself, which is an independent legal entity. The company still has close technical links to SIC ELVIS, however, and also has to cope with the efforts of the leaders of NIIMP to regain some control over its activities. Therefore, the fate of ELVIS+ may depend in some measure on the outcome of privatization discussions in these three entities. ELVIS+ pays either the state or NIIMP for services and some utilities; however, the enterprise has an independent source of electricity to ensure working phone lines in the event that the electricity is shut off due to lack of funds.

### Ownership of SIC ELVIS

SIC ELVIS, which is state-owned, is now proposing to privatize under Option Two. In early 1990, SIC ELVIS started moving toward privatization by paying the government one million rubles for some equipment. However, this process has slowed due to ownership issues and percentage of state funding. The enterprise has continued to pay ten percent of its income to ELAS, which is state owned. ELVIS+ is currently hiring workers from SIC ELVIS, and plans

to acquire it after it is privatized. The companies are closely linked in management as members of the board of directors of ELVIS+ are also high level members at SIC ELVIS. Galitsky is both the former director of SIC ELVIS and the president of ELVIS+. There are also contractual relations between ELVIS+ and SIC ELVIS, with Galitsky involved in the decision making in both companies, particularly on technical issues.

Some of the managers and employees of ELVIS+ have rights to purchase stock in SIC ELVIS by virtue of their former employment in SIC ELVIS. They purchased additional vouchers on the open market for this purpose. As a result the percentage of stock in hands friendly to ELVIS+ will be well in excess of 50 percent.

#### Ownership of ELAS and NIIMP

Although Guskov initially agreed to the formation of smaller groups out of ELAS, he has tried to maintain tight control over the groups without a legitimate legal basis for doing so. ELAS was divided in the late 1980s into 22 smaller units. Fifteen of the 22, which employ about 4,000 people, are in related technologies and have formed a loose alliance. They include NIIMP, the four Scientific Industrial Centers and other groups; fifteen founding organizations in all. These founders have signed an agreement to recreate a company called Stock Company NPAO ELAS, on April 1, 1993, directed by Guskov, who is currently the director of ELAS and NIIMP and was formerly in charge of other founding enterprises of ELAS Ltd.<sup>10</sup> This company has no legal relation to ELAS and most of the fifteen units are still state owned. This enables ELVIS+ to rent state-owned equipment that is under the care of one of the other companies.

The formation of the "Joint-Stock Company ELAS," which is essentially an amalgamation of NIIMP companies, has not changed the structure of the constituent groups. This 'renaming' is a formality and a mechanism for bringing the companies under one unit again, though the 15 NIIMP companies do not desire to come back into this group.

NIIMP, the current alliance, cannot exercise any legal control over the 15 organizations that make up NPAO ELAS. The intention is that the fifteen will eventually be privatized and will enter into a more formal alliance, but there are no concrete plans for this. Some of them are proceeding in privatization by Option Two.

#### D. Social services

Splitting off from the state-owned parent enterprise was easier for SIC ELVIS and ELVIS+ than it may be for many other divisions of large enterprises, because in Zelenograd all social services were managed by the local government, rather than through enterprises. This meant that employees were not sacrificing access to these services by moving from ELAS to one of its spin-offs.

Although the municipal authorities are currently hard-pressed to support the social services at an adequate level, workers at private firms are at no disadvantage compared to state employees. Their higher wages may even give them additional access, if private services begin to be available. Basic medical services, for example, are provided free of charge by the state, but patients must pay for higher quality care or special services. Aside from giving employees better wages to handle such costs, ELVIS+ is also seeking an outside insurer for the workers. The enterprise contributes to a government medicine fund as a part of worker

salaries though it does not provide medical benefits. Although they have some concern for their workers' social benefits, ELVIS+ management bars trade unions from the company.

#### E. Future plans

Charting its future course is a difficult task for ELVIS+. It requires an integration of product/marketing plans, interactions and alliances with other enterprises in the Russian electronics and communications industries, ownership distribution (of ELVIS+ and of strategic alliances), and relationships with Western interests. ELVIS+ wants to be basically a design house that would carry products through to the prototype stage but not undertake production.

In the near term, Galitsky believes there is no acceptable electronics production capability in the FSU. What capability does exist is overpriced because the state-owned enterprises are trying to support their entire operations on the minimal commercial orders that they can get. Galitsky prefers offshore production. In the longer term, ELVIS+ would welcome support to establish manufacturing capability, but this would require a substantial investment, since much of the equipment required is Western.

ELVIS+ is continuing its work with Sun. There are software projects in process, one that may involve hiring engineers from outside the company. ELVIS+ is free to enter into development contracts with other Western companies, but the company will avoid any projects that would be in competition with Sun. Sun is not able to provide some expertise that is needed for other types of projects, and therefore Galitsky is pursuing other partners that will not create conflicts of interest. Competition for wireless projects abroad is fierce, and logistically the Russian market provides many opportunities for ELVIS+. Thus Galitsky is particularly interested in pursuing LAN development and systems integration within Russia to meet this demand and provide support to domestic enterprises.

Managers recognize that their ability to find Western partners depends on demonstrating the capability of their technical team and the application of their products. The products that have been developed with Sun are waiting for patents and this process is hindering ELVIS+ in its search for partners. One near-term focus for management is to better market ELVIS+ products to Western companies that may be familiar with the capabilities of the enterprise's technology but not know the direct applications. ELVIS+ is vulnerable to exploitation by a large strategic partner, especially if its intellectual property is not adequately protected. Managers might consider being acquired if the price is right.

Overall, ELVIS+ is continuing to develop the Sun partnership while pursuing Western alliances that would relate more closely to its technical expertise and its need for network specialists. Interested companies include Motorola, Northern Telecom, Rockwell International, and some Korean companies. The faxgate and Internet service provide necessary funds to keep the ELVIS+ technical team intact as the enterprise faces the competitiveness of the Western market and the ensuing need to define its products in terms of market demand.

Another potential project would involve creating a transportation control system for a large manufacturing company. This is not particularly in line with the director's goals for the company, but will allow ELVIS+ to maintain its technical group.

Galitsky would eventually like to find a partner to work with the firms. The project with Sun would work on computers, a second joint project would work on radio technology, and a third would bring all together to collaborate on wireless technology and remote access to

the Internet. He is presently working on a World Bank proposal to design a model for the creation of satellite links between Moscow and satellite cities near Moscow, based on their existing network link between Moscow and Zelenograd.

### III. MCST

#### A. Description of the company and its primary activities

MCST is a new private company that was formed in March, 1992 by Boris Babaian, who is a leading figure in computer research and development in Russia. Babaian was motivated by his concern that the computer industry in Russia has been virtually destroyed by Western competition.<sup>11</sup> The company was founded for the purpose of entering into commercial contracts with Sun Microsystems, which has contracted for both hardware and software development work. Sun has no equity in MCST.

MCST has 124 employees, most of whom, like Babaian, came from the Institute of Precision Mechanics and Computer Technology, part of the Russian Academy of Sciences. Babaian, the president of MCST, is involved mainly in technical issues but also wears many other hats, such as project leader, marketing manager, etc. Babaian is also a division head of 250 employees in the parent Institute, which is headquartered in Moscow. One of the other principals, General Manager Alexander Kim, is in charge of all administrative functions and has also started other MCST ventures distributing and leasing Sun systems. MCST is also Sun's distributor in Russia for hardware and software.

#### B. History

Another primary motivation for founding MCST was to obtain funding to keep intact the core of a technical team, composed of employees of the Institute, in the face of drastic reductions in government funding. The 112 technical personnel (72 on the hardware and 40 on the software contract) have been working together for many years at the Institute in Moscow, St. Petersburg, and Novosibirsk. The Institute is engaged in both computer development and application simulations for weapons and space programs. In addition to its own projects for the state, it worked on many projects for other state-owned enterprises engaged in the development and manufacture of weapons systems. The Institute developed the Elbrus 1 and Elbrus 2 computers, and the Elbrus 3 computer, designed under Babaian's stewardship, was to have been the most advanced Russian supercomputer. This computer has not been completed but is currently serving to demonstrate Sun architecture. The Elbrus 2 is also underutilized because of poor reliability, energy consumption, and cooling water problems.

Babaian spent three years searching in Korea, Taiwan, Europe, and the United States for a strategic partner. He found that it was quite difficult to interest a very large company, such as IBM or Siemens. Sun, which is considerably smaller, was more receptive to his proposals, since Sun's top management is conversant with the technical issues of the company. The

many difficulties of interaction can also be handled much more easily working with a smaller company such as Sun.

SunPro, a division of Sun, has initiated several projects at MCST employing Russian software engineers. Complete teams like Babaian's, which have been working together for years, are rarely available in the United States labor market, and if they were, would be far more costly to hire. Sun has been able to retain the engineers by paying high enough salaries to compensate for the risk these workers face in the event that the contract with Sun dissolves.

SunPro visited MCST (in Moscow and Novosibirsk) in June 1992 in order to propose contracts with the Russian engineers. At this meeting, three areas—FORTRAN, compiler optimization, and Pascal—were chosen to make use of SunPro's software development on existing products.<sup>12</sup> A framework outlining the principles of the working relationship and the type of products involved was set up to deal with logistical problems in working with a Russian company.

The first projects were low risk in that they were peripheral to existing Sun products and were to be constructed with little guidance from the American side. As of summer 1994, these first projects were all either nearing the completion stage or complete. The software that MCST has developed surpasses the original specifications in ways that Sun had not even considered. This illustrates an advantage of utilizing personnel who have worked in a different technical environment.

### C. Ownership of MCST

The state owns 45 percent of the equity in MCST (25 percent by the Institute, and 20 percent by the parent ministry of the Institute). The other 55 percent is owned by five founding individuals. Notwithstanding the minority ownership by the Institute, communications between MCST and the Institute about the operations of MCST are minimal. The Institute does not even know the salaries that are paid by MCST. This would be inconceivable in a U.S. corporation; it is a logical interim step in Russia, however, in the transition from total government ownership. Currently, MCST is a partnership with limited liability and in the future Babaian hopes to transition to a joint-stock company.

MCST has no capitalization, and works on a contract basis for Sun. It is reasonable to assume that the state would be willing to sell its equity to an investor (or the employees) at such time as the residual development programs for the Institute are completed. Since MCST has essentially no tangible assets,<sup>13</sup> the price of this equity would presumably be based on some evaluation of expected future returns; this is something that is not well established in Russian accounting practices as yet.<sup>14</sup>

### D. Relations with the parent institute

MCST is in transition. It not only is still housed at the Institute, but also pays the Institute for administrative services. Some of the personnel of MCST, including Babaian, have residual responsibilities and technical interests in some of the Institute's development projects. This has led to several problems.

One is that some of the Institute employees who are not working for MCST are jealous of the salaries, projects, and prospects of those who are working for MCST. In addition to his position at MCST, Babaian had nearly 1,000 Institute employees reporting to him as of early 1994. As is currently the case in many Russian businesses, most of them are not paid every month. Babaian has a deep sense of responsibility toward these people, but this commitment to the Institute and its personnel may hinder MCST's performance and development. The number of workers of the Institute has fallen from 2,500 a few years ago to less than 1,500 in mid-1994.

Initially Babaian had investigated the option of privatizing portions of the Institute, but it proved to be easier to establish a new (private) company. However, Babaian still hopes to see the institute privatized eventually. The Institute voted 58 percent in favor of privatization; however, as it needed a two-thirds majority, privatization has not yet started. It may be better to privatize only those departments that are not engaged in military projects.

Difficulty arises in attempting to determine reasonable reimbursement rates to the Institute for administrative services. In the absence of a good cost accounting system, there is no established basis for these charges. Given the dire financial condition of the Institute in the wake of government procurement cutbacks, there is pressure to maximize the charges to MCST. Babaian believes that the Institute's charges for administrative services are excessive because the Institute has tried to retain all employees rather than striving for higher efficiency. These fees that MCST pays are no longer given directly to the director, but some of them go to the non-MCST staff at the Institute. The mechanics of such transfers are not clear. Another problem is that MCST frequently needs light administrative services quickly, but it is almost impossible to get a rapid response from the Institute. A conversion fund also exists, but as of September 1993 it was used instead to pay salaries. In 1993, the Institute received from the state only 10 percent of the budget needed to keep it running. Additional though insignificant support is given by various ministries. Babaian believes that the contract with Sun gives the Institute added credibility, which should assist it in gaining support from the Russian government.

Clearly there are strong arguments for MCST to move out of the Institute and to sever the administrative ties. Babaian feels that eventually MCST needs to have its own administrative structure, though due to the dual responsibilities and utilization of facilities, it is not a simple matter to accomplish this. MCST has resisted leaving the Institute in favor of its own facilities for several reasons: (1) The Institute provides MCST's only tie to the state, which could be crucial in the event that reform fails. (2) MCST feels it has a right to the space. (3) Some employees still have responsibilities that have nothing to do with Sun; for example, the development of Elbrus 3. Elbrus 3 has little commercial appeal due to its unreliability and large power requirements, and the project is impeded by the lack of state funding. Even so, Babaian is strongly committed to finishing it. Although Elbrus 3 is the only substantial project left at the Institute, some groups there make PC boards that may have a chance in the world market. (4) If it left, MCST would lose access to Institute equipment, which would have to be replaced. (5) Renting facilities is extremely difficult due to the scarcity of commercial space and the difficulty of getting the right to use state property. (6) Overall, MCST does not want to leave the Institute because of the commitment to its staff. The Institute hopes that MCST can eventually provide customers for the Institute and at some point be able to support the entire staff.

## E. Social services

The Institute provides MCST workers with vacation pay and vouchers. There is also a clinic for Institute employees, and access to a hospital. Sun has also paid for MCST to have a corporate membership for its employees' medical care at the American Medical Center in Moscow. Management is still working on guidelines to determine which services should be covered for employees.

At this time, there is no provision of housing by either MCST or the Institute. Many MCST workers do not live in Moscow and therefore commute into the city by train. There have been instances of MCST employees being robbed and beaten while commuting. At the same time, Moscow's apartment shortages and high rents make it impossible for them to move closer to work. MCST has therefore considered investing in some housing near the company.

In general, Babaian does not intend to invest a lot of funds and management energy in providing social services to employees. Instead, he feels that any of the workers' needs are more easily met by their relatively high salaries.

## F. Future plans

For the future, MCST has several goals: (1) To build commercial computer hardware that might eventually be customized. (2) To expand its development work in other areas that would be noncompetitive with Sun. (3) To lease Western computers for Russians, which will be possible under the new export controls regulations. (4) To expand its production into areas of packaging, printed circuit boards, and CAD. (5) To expand sales and service of SPARC stations throughout Russia and possibly other newly independent states. (6) To perform system integration involving SPARC stations. (7) To find a source in the United States for banking purposes. Such an organization would aid the flow of dollars back and forth and keep better track of transactions between MCST and Sun.

Babaian and Kim are now looking for additional contracts for MCST. This search is partially due to Sun's desire that MCST not be totally dependent on Sun. SunPro has had preliminary discussions with other U.S. companies interested in contracting with MCST or having Babaian assist in the negotiation of contracts with additional personnel or the formation of additional companies.

One American company, EnergyLine Systems, is currently planning to start a project that would initially utilize five MCST workers for software development. Babaian and his associates also have other work with the Compass Company in Florida. This work, which is to develop software for IBM machines, is more routine programming rather than innovation as in the work with Sun. In order to minimize any potential conflict, a separate company (Compass-Elbrus) was formed, with fifty employees, rather than contracting for this work through MCST. Sun and Compass both agreed to this structure.

Babaian's group, regardless of the formation of multiple companies, clearly has the structure, expertise, and access to highly skilled personnel that would enable them to expand their business in a manner similar to that of contract research organizations or software producers in the United States. Thus, an opportunity exists for MCST to work with a U.S. company in the contract research business. This could create an alliance that would market the Russian expertise and labor rates in the United States as well as in the long-term market

the U.S. company's capabilities in Russia. Some of the funds that are now being used to pay wages of additional Institute personnel could be used to develop a marketing program.

#### IV. Comparison of MCST and ELVIS+

These two companies provide insight into ways in which larger enterprises may decentralize in the future. From the standpoint of technology and potential markets, the growth potential of both MCST and ELVIS+ appears to be quite large. However, there are many barriers to translating this potential into business success.

MCST could build a substantial business doing contract research. The desire of the leaders of ELVIS+ to make the company a hardware design house requires them to form somewhat different alliances with companies that manufacture and sell the hardware.

In addition to relations with the Institute, MCST also has problems with the government tax laws. Half of the money received from Sun must be changed into rubles; as of late 1993, the bank took months to do this, however, and then made the exchange at the old rate, disregarding inflation. Sun transfers hard currency into the bank, but MCST cannot easily withdraw it.<sup>15</sup> Between the Institute charges for administration; social services; and government tax, the employees get at most 30 percent of the Sun money that was intended for them. MCST is looking at various options such as establishing a Western company or having Sun employ the staff directly, but a better alternative has not yet been found.

The transfer of funds from Sun to ELVIS+ is not subject to all of the banking problems of the MCST case, because some of these funds are equity money, which is exempt from some of the most troublesome regulations. Both enterprises have trouble using equipment on loan to them by Sun, as the Russian government charges an import duty after two years. The government assesses this duty based on original retail value rather than on the current market or depreciated value.

In order to capitalize on their potential, both companies would have to make changes in their business strategy:

(1) They should develop greater marketing capability. This could best be done by forming a strategic alliance with a Western company. While Sun could be this company, a company in the professional services business may be more appropriate for MCST, whereas a product company (or companies) would be more appropriate for ELVIS+. In addition to research and development work, both could also be marketing representatives for Western companies in Russia, as MCST now is for Sun workstations. This has advantages beyond simply expanding their business; if the products are sold for hard currency, this can be used as an offset for the contract funds from Western customers to obviate some of the bank transfers.

(2) Both enterprises should modify their ties with the parents. Further work with the parent enterprises could be done on a contractual basis from a separate location. Both MCST and ELVIS+ are hampered by being resident in their parent facilities. MCST's relationship is more complicated by the ownership tie, while ELVIS+ is affected more by the contractual and technical interactions with other elements of NIIMP and ELAS.

(3) Another major problem for both companies was CoCom (the Coordinating Committee for Multilateral Export Controls). Export control regulations, which were apparently

straightforward, were incredibly cumbersome and anachronistic. They not only related to things like multiprocessor hardware shipped from Sun, but technical advice as well—if Sun commented on the work performed by MCST, its comments were considered technical data and hence were also subject to export control. Sun was also only permitted to ship obsolete equipment to MCST, which prevented MCST from developing any new products on current Sun machines and deterred it from increasing its technical capabilities. The regulations also prevented MCST's use of any workstation connected to the Sun Wide Area Network (SWAN). Obtaining the necessary approvals from the U.S. government sometimes was possible, but this delayed the work considerably. Until September 1993, U.S. government concerns regarding national security prevailed over recognition of the importance of expediency in bringing commercial products to market. With the recent changes in export controls policy,<sup>16</sup> Sun should soon be able to send most of the necessary technology and equipment to both MCST and ELVIS+.

(3) In both cases, stock could be issued for investors or for employee incentives, but in MCST's case the priority should be placed on buying out the shares owned directly by the state, and by the Institute.

(4) Both companies will have to build more of an internal business infrastructure as they grow. They are now basically technical project teams. As discussed above, neither has adequate marketing capability, especially for marketing in the West. They also lack accounting systems that are compatible with Western standards and that could provide acceptable cost or financial accounting records. At the present time, Sun helps MCST work through many of its administrative problems; however, customers will not in general expect to do this.

Notwithstanding the difficulties of doing business in Russia, many American companies see a net advantage to utilizing skilled Russian labor, especially in fields like software development that are not capital intensive and have limited risks. The labor rate disparity is stunning, and even with inflation, it should persist for some time to come. As the disparity decreases, Russian firms should be able to compete based increasingly on their capabilities alone.

## Notes

<sup>1</sup> William J. Perry, "Soviet Defense Conversion: Problems and Opportunities" (Stanford: Center for International Security and Arms Control, 1992); Kenneth L. Adelman and Norman R. Augustine, "Defense Conversion: Bulldozing the Management," *Foreign Affairs*, 71, 2:26-27, 1992; David Bernstein, "Spin-offs and Start-ups in Russia: A Key Element of Defense Conversion," in *Privatization, Conversion, and Enterprise Reform in Russia* (Stanford: Center for International Security and Arms Control, May 1994).

<sup>2</sup> The state had proposed a project to integrate the communications network in Zelenograd with that in Moscow. ELVIS+ completed this project initiated by the government.

<sup>3</sup> This is not uncommon in Russia, whereas it would be scrutinized much more closely in the United States. If nothing else, it could raise serious questions about intellectual property rights.

<sup>4</sup> During this time, one strategy managers used to get around salary caps for state employees was to hire outside cooperatives, which in turn subcontracted back to the managers and their workers to perform the work. This took advantage of regulations that allowed cooperatives to pay higher salaries.

<sup>5</sup> See Kathryn Hendley, *Steps on the Road to Privatization: A Preliminary Report on the Saratov Aviation Plant* (Stanford: Center for International Security and Arms Control, 1992).

<sup>6</sup> Scientific Industrial Center or SIC in Russian is abbreviated "NPT" for "Nauchnyi Proizvodstvennyi Tsentr."

<sup>7</sup> These companies were:

1. SIC OPTEKS —800 employees working on satellite communications
2. SIC ELVIS
3. SIC Spurt —400 employees working on satellite design
4. SIC KOMRAD
5. SIC ELIPS
6. SIC Sisvap

<sup>8</sup> The ministries did not always recognize the legitimacy of this restructuring. In many cases the ownership was not clear because the physical assets were still state property, but utilization of those assets was made available to the new units, and they were able to realize the profits from this utilization. This is a classic example of the "spontaneous privatization" process that was quite common at that time in the USSR. See Michael McFaul, "Agency Problems in the Privatization of Large Enterprises in Russia," in Michael McFaul and Tova Perlmutter, editors, *Privatization, Conversion, and Enterprise Reform in Russia: Selected Conference Papers* (Stanford: Center for International Security and Arms Control, 1994).

<sup>9</sup> RSFSR Privatization of State and Municipal Enterprises Act, Presidential Decree of the Russian Federation, July 3, 1991, NEXIS.

<sup>10</sup> The list of these founding companies includes NIIMP, Special Design Technology Center Vzlyot, SIC ELAS Polyot, SIC OPTEKS, SIC ELVIS, SIC KOMRAD, SIC Spurt, Scientific Technological Center Micropribor, SIC Silici, SIC SINIS, SIC Sisvap, Poligrafcenter Company, Altair Plant, and SIC ELSOP. SIC ELSOP was added later than the previous thirteen.

<sup>11</sup> Babaian attributes the technical deficiencies of the Russian computer industry to the fact that too many decisions about technology development are made at high bureaucratic levels rather than by technical experts. Computer production in Russia has virtually stopped, since Russian computers cannot compete in performance, software, reliability, or price with

Western computers. As a result, some of the best computer scientists are trying to find jobs elsewhere. Software development for Russian-built computers is hampered by the small installed base of Russian hardware. There is not much of a market for applications software except for Western platforms.

<sup>12</sup> Six initial tasks were proposed for the joint projects:

- A FORTRAN 77 verification program (Novosibirsk)
- A FORTRAN 90 test suite (Novosibirsk)
- FORTRAN 77 bindings to C libraries (Novosibirsk)
- Pascal maintenance and development (St. Petersburg)
- IR—Intermediate Representation used to communicate between various compiler front-ends and the common back-end tool development (Moscow)
- SPEC Analysis and Optimization Prototyping (Moscow)

<sup>13</sup> Sun provides equipment for MCST to use in its research, but the ownership of this equipment remains with Sun. The revenue from the Sun contracts is distributed in wages or paid to the Institute for services, so there are essentially no retained earnings. This could change in the future if MCST develops its own products, obtains royalties for licensed technology, or sells substantial Sun hardware in Russia, or decides to retain some profits instead of supporting additional Institute personnel.

<sup>14</sup> See Chapter IX on accounting practices.

<sup>15</sup> These are typical examples of how the inadequacy of the banking system is killing opportunities for foreign investment and hindering the performance of existing investments. Large interenterprise debt and the lack of bank reserves cause much of the problem. See Barry W. Ickes and Randi Ryterman, "The Interenterprise Arrears Crisis in Russia," *Post-Soviet Affairs*, October-December, 1992, pp. 331-361.

<sup>16</sup> A series of reforms from September 1993 to March 1994, initiated by the Clinton administration, significantly increased the quantity and quality of computers that could be exported to civilian end-users in Russia. Because of this, U.S. companies such as Sun are able to ship computers that are not obsolete. (See the San Jose Mercury News, September 30, 1993, p. 1A and The New York Times, March 31, 1994, p.A1.)

## IV. Impuls

Tova Perlmutter, Michael McFaul, and Elaine Naugle

### I. Introduction

Since 1992, the CISAC Defense Conversion Project has been working with the Moscow-based Impuls. Impuls is a medium-sized firm with expertise in control microdevices for the military, such as control heads for guided bombs and detection equipment for various weapon systems. Currently Impuls is working aggressively to break into several commercial high-technology markets.

#### A. Brief history and general description

Impuls was founded as a research-production enterprise (NPO) in the 1970s, when, in response to the development of radio fuses in the United States, a production plant established in 1901 merged with a research institute created in 1946. The institute worked on development and experimental production of military microsystems.

The research institute and the plant are on the same property. Under the Soviet system, the institute operated entirely on funds provided out of the state budget, while the plant could use both state funds and the profits it earned from production. It was therefore advantageous for the two structures to keep their budgets separate, since the institute's state funding would be reduced by the amount of any money given it by the plant. As state regulations changed, this ceased to be an advantage, and by 1992 this separation was abandoned. Both enterprises formerly reported to the USSR Ministry of Defense Industry, where Impuls operated under the Department of Ammunition and Special Chemistry of the Department of Industry of the Russian Ministry of the Economy. As the command economy mechanisms were phased out, Impuls went through some transitional steps in which it maintained ties to various state agencies and personnel.

Impuls not only engages in research and production, but in instruction and teaching as well. Its facilities include Moscow State Technical University's research laboratory of autonomous control systems, as well as laboratories of the Moscow Physical-Technical Institute and the Moscow Energy Institute.

Impuls's main product was microsystems for use not only as components for large systems but also as complete subsystems on a very small scale, integrating complex electronic and mechanical parts. The end product for the research divisions is documentation, which then goes to Impuls's own production lines, so the two sides are tied together. There are also some cases where the enterprise sells its documentation to other companies, usually when the projects require large-scale production.

One competitive product is its satellite communication system, which was developed in a very short time. Impuls managers claim that their system can track and keep contact with a moving satellite better than comparable systems. For example, Crosna, a well-known satellite communication firm in Russia, produces only the receivers for its system and purchases all the other components from other enterprises, while Impuls produces the complete system.

Another product developed and produced by Impuls for the military is an autonomous optical guidance and control system for bombs. Bombs guided by this system hit their target from an altitude of 20 kilometers without any control by the pilot. According to Impuls managers, Western military pilots who saw the system were impressed.

Impuls also developed a system for stabilizing laser-guided ordnance missiles during flight. Whereas competing systems require that missiles be launched at less than maximum speed, Impuls's solution can be used at any speed, allowing greater launch acceleration. The internal technology is also less complex and therefore less prone to failure than competitors' systems.

## B. Organization

Alexander Grigoriev has been the general director of Impuls since February 1992. Grigoriev first tried to become director in 1988, when for the first time the director was chosen by a vote of the workers' collective. Grigoriev was at that time commercial director for the enterprise, and he lost to one of the former director's deputies, a scientist whose expertise was on the technical side of operations. This director was not very effective at coping with the new demands of the changing economy, so a few years later when the company was faced with a financial crisis, Grigoriev ran against him again and the employees elected Grigoriev. Grigoriev is respected by the employees because he is knowledgeable about both business and commercial transactions, and also has scientific/technical training.

Immediately under Grigoriev are two deputy directors for science and technology, who divide their work along scientific and technical lines; one deputy director for economic and financial affairs; one deputy for production; and the commercial director (who is also at the deputy director level). The heads of marketing, personnel, and supplies are also members of Grigoriev's primary team, which is analogous to a Western management council.

## C. Finances

By September 1993, Impuls's financial situation had stabilized as production and sales of new products reached profitable levels. The enterprise has good relations with the banks.

Although interest rates are very high, Impuls has managed to repay its liabilities, including interest payments, and does not have overdue debts. As of November 1993, the state owed Impuls about 800 million rubles, including 600 million rubles for military state orders and 200 million for knitting machine control systems. All the enterprise's debts to suppliers are short-term debts resulting from difficulties with cash flow.

Impuls was audited by the Russian Federal Tax Commission in March 1993, and by the World Bank in May 1993. Both said the enterprise had an excellent balance between salary and volume—unlike most defense enterprises, which have taken out large loans to cover salaries without having contracts to ensure their ability to repay them. In April 1993, a decree was issued giving government aid to defense enterprises because of the rise in energy prices, but Impuls did not get any because its books were balanced; Grigoriev considered it ironic and unjust that the enterprise's relative success deprived it of 30 million rubles in state support.

By June of 1993, Impuls restored its production volume to the level it was at before conversion began in 1991, and by October of the same year, the rate of production doubled. This financial success was due primarily to three products described below: electronic bill-counting machines, teletext devices, and satellite television systems. It was not obvious to the CISAC researchers in September 1993, however, whether the enterprise's profit margin was adequate.

In the beginning of 1994, the enterprise achieved a ratio of current assets to liabilities of 1.26:1; Grigoriev hoped to make this ratio 2:1 by the end of 1994. The company finished 1993 with profit. However, the first six months of 1994 have produced no profit due to large payments for utilities. In 1994, Impuls has had a 10 percent increase in sales per month. From June–September 1994 the production level increased by 40 percent.

Because of soaring energy costs, and lack of profit from the beginning of 1994, Impuls has had difficulty maintaining design work. Grigoriev is seeking funding but is not interested in loans because of past experience with paying high interest (130 percent) to banks. Despite these difficulties, salaries are being paid on time.

## II. Conversion

Over the past three years, defense contracts at Impuls have dropped sharply. In December, 1991, they accounted for 96 percent of the enterprise's production; in 1994 this figure is hovering around 30-35 percent, and Grigoriev does not think that the level of defense production will change in the next several years. The main advantage Impuls had in its quest to use its scientific and technical competence in the civilian sphere was its diversity. The enterprise's specialty is electronic control systems, which can be infrared, laser, radio, television, or ultrasonic. This technology has applications in a variety of industrial areas, such as medicine, metallurgy, coal mining, aviation, agriculture, satellite television, communications, ecology, and food processing.

Conversion requires funds, however, for reorganization, the purchase of new equipment, market analysis and marketing, and for working capital until new projects make a profit. Since Impuls's military products were components and not whole weapon systems, weapon sales are not a potential source of income over which Impuls has any control, or to which the enterprise can look to finance conversion.

Grigoriev and his team do not want to depend on state financing or state contracts, because of delays and the unreliability of state payments. In 1993, 73 percent of the institute's funds came from state budget financing, both defense and civilian, with defense contracts accounting for 70 percent of that amount. In other words, 49 percent of the total volume of the institute's work was defense (for the enterprise as a whole, including the production side, less than 30 percent of contracts were defense). This level of state financing was much lower than in 1990-91, but still too high in the opinion of top management. Many of Impuls's middle managers, however, still want to be oriented toward state financing.

Impuls has carefully worked out a competitive pricing policy. From November 1992 through March 1993, the enterprise increased its commercial product prices by only 200-250 percent although prices for energy and supplies increased by 600-700 percent. This was possible because during that period management reduced overhead by 30 percent and storage costs by several hundred percent, by moving products quickly to customers.

The main aim of the enterprise now is market expansion. A marketing department was organized in the beginning of 1993, and it is now carrying out market analysis for new products, including market segmentation by geographical area and client type.

#### A. Products

Before conversion, Impuls supplied control components for large systems. During the transition to the market, however, the enterprise's managers consider it risky to produce only components. Impuls developed a control system for planing equipment, for example, but the only factory that produced this type of machinery is no longer capable of making payments, so Impuls is stuck with 110 million rubles' worth of components. One of the enterprise's goals in conversion, therefore, has been to produce more end products, rather than just components. It is currently successfully producing a series of such final products. The enterprise will not stop producing components entirely, but the planned ratio of components to full products will be about 50-50 (the actual ratio was already coming close to that figure in early 1994).

The enterprise has started producing several new civilian products, including a fiber-optics television system, black-and-white and color camcorders, and a microprocessor control system for pile drivers and for the textile industry. Eight other Russian firms make consumer products similar to those Impuls produces, but the domestic market for complex industrial and consumer electronic products is large enough that the management team does not expect excessive competition in the near future. Its most successful product to date has been an electronic bill counter, a relatively low-technology device that does not have any discrimination capability except on the basis of optical density. Impuls's product is competitive with comparable Western machines, and there has been a great demand for these machines on the domestic market. In February 1994, Impuls began production on the third model of the bill-counter, and a fourth was planned for June or July 1994. Managers were confident that this fourth model would be equivalent to the world's best (Swedish and Japanese), but could sell at lower prices.

The enterprise has also had success with a satellite television system. In September 1993, the system was being evaluated in Jordan and Cyprus. At that time, Impuls leaders thought their system was technologically superior but too costly. They felt that they should reduce their labor costs and go abroad for components, which in Russia are quickly growing prohibitively expensive. Nevertheless, Impuls has sold 30-40 systems in Russia, and the

demand is fairly high. By the end of 1993, the enterprise expected to need additional personnel in manufacturing to meet its requirements for these products.

Another product Impuls has developed is a teletext device, which uses a technology for compressing information to transmit it by television broadcast. In five minutes of TV time, 120,000 pages of information can be transmitted. Though Impuls is a monopoly supplier of this device, it has not been able to sell this product. In September of 1993, the enterprise ceased production on the teletext device, but was still looking for viable markets. In February 1994, managers explained that when they did the initial market research, they didn't realize that there were not many business information sources to fill the Russian TV airwaves. In January 1994, however, Impuls did start negotiations with a large company for the use of the teletext device, and Grigoriev expected that production would start again in April or May.

In the beginning of 1994, the enterprise was planning several new products for the new year. One product planned for 1994 is a welding transformer, which was exhibited at trade shows in England and Australia. In February 1994, Grigoriev expected to start significant production on this project within a month. Another major product is an electronic control system for fuel injection in automobile engines. By 1995, Impuls management plans to be able to produce 250,000 such systems per year. Impuls will develop the project and start production, but for mass production the enterprise will sell the documentation to a larger enterprise. Impuls currently has an arrangement with a large company to produce large numbers of knitting machines according to an Impuls design. The production company provides warranty/servicing, while Impuls supplies spare parts as needed. Grigoriev expects a similar arrangement for the fuel injection systems.

Also in 1994, Impuls will be ready to produce radio transmission lines with an 8-millimeter wavelength. These are very useful for remote regions like mountainous territories, because they require no special cables but allow line-of-sight communication through the air up to 20 kilometers between stations.

## B. External environment

According to Grigoriev, Impuls's progress is hindered by several external factors. The first big problem was the government/legislative context. The reforms have not moved forward, and laws have not been passed to stimulate production. One bit of legislation in particular puts manufacturing enterprises at an extreme disadvantage compared to energy producers: energy enterprises are legally entitled to take money owed to them directly from their customers' bank accounts, while manufacturers have no such ability to collect from their debtors. Grigoriev also blames the government's economic policies for two other difficulties: the instability of the ruble, and the punitive tax regime, under which 90 percent of revenues goes to the government. In May 1994, President Yeltsin signed a series of decrees reducing enterprise taxes, which may help some.<sup>1</sup>

The second large external threat is the sharp rise in energy prices since the middle of 1993. Grigoriev noted that he understands that this is necessary for Russia to be integrated into the world market, but explained that the "turnover" time from investment in materials to recouping money through a finished salable product at Impuls is longer than the time from investment to profit in a purely trading non-manufacturing commercial company. Impuls therefore has trouble passing on the excess energy costs to its customers. Over eleven months in 1993, Impuls's output increased by 541 percent, but Impuls increased its use of

energy by only 146 percent in a deliberate move toward greater energy efficiency. Over the same period of time, however, energy prices went up 1,100 percent.

Perhaps Impuls's most important external tie is its ownership of one percent of a consortium called Vneshtreideinvest. The consortium's co-owners include six Russian firms (including Impuls), an Austrian company, a Panamanian company, and a company from Cyprus. Vneshtreideinvest has existed for five years. Impuls joined in March 1992; in exchange for one percent ownership, the enterprise contributed a building that was on its balance sheet. Part of the benefit for Impuls of belonging to Vneshtreideinvest is that the consortium buys Impuls's products. Vneshtreideinvest sells fertilizers, and Impuls makes control systems for the machines that produce the fertilizers. As of February 1994, Vneshtreideinvest had given Impuls 40 million rubles' worth of orders. Although this relationship is not active today, cash flow from the tie with Vneshtreideinvest was critical in helping Impuls survive the financial crisis at the beginning of Grigoriev's term as general director.

Impuls was also involved in at least two other joint ventures. One of them, Suimtech, was founded for design and production of mini-plants for foam-concrete production. Other owners of the company include the scientist who invented the design, a Russian-Yugoslav joint venture, and the Kalinin plant in St. Petersburg, which was to produce the mini-plants in mass series.

The main merit of this mini-plant was supposed to be continuity of on-location production of foam-concrete given extremely precise specification of proportions. As of June 1993, however, Impuls's commercial director Yevgeny Serebrennikov said that the Suimtech invention turned out to be inefficient. Although the venture had been working on it for four years, it was not yet near production. The first plant was completed in August 1994 and manufacturing is expected to continue. Impuls is not heavily invested in the project; however, the enterprise's main contribution is to provide space on its territory for the project at low rent.

Another potential collaboration, a commercial company called Favorit, was organized a few years ago with Impuls as owner of 35 percent, but it has also generated no profits as yet and receives very little attention from Impuls managers.

Impuls has also established a joint venture with a Russian bank. The bank will rent space in Impuls facilities in exchange for a share of ownership. Impuls is hoping that the bank will buy shares in Impuls in the future. Renting out space to outside companies appears to be favorable for Impuls although Grigoriev maintains that there are issues with this arrangement that need to be faced, such as the difficulty in renting on a short-term basis, the lack of information about prospective renters, etc.

### C. International negotiations

Impuls has had several contacts with American firms to discuss projects for automatic bill-counting machines for banks, ecological technology, civilian aircraft improvement, and others. At the end of 1992, a contract to sell satellite television systems was concluded with Jordan. In 1993 equipment was sent in accordance with the terms of the contract. In February 1994, similar contracts were close to conclusion with companies in Cyprus and Finland, and Impuls is also negotiating with companies in Malta and Argentina.

The Malta/German joint venture was completed in June 1994. Impuls provided television satellite equipment to this joint venture. Impuls also provided some of its shares and

received additional technology needed to produce the equipment. Because this company did not participate in Impuls's stock auctions, Impuls postponed its agreement with the company and is considering organizing a new agreement for future work. The total volume of all the satellite systems contracts together will allow Impuls to increase its production to 3,000-4,000 units per year.

In addition, the American company Failure Analysis Associates was considering buying a system from Impuls for monitoring dangerous cargo transport (e.g., ground transport of nuclear weapons), and Erickson Air Crane was interested in television guiding systems for hoisting and cargo placement. All of these projects have helped to stabilize the personnel and production structures, and have maintained liquidity of the accounting balance. All international contracts are negotiated by the science deputies and the commercial director, and are paid for in hard currency.

Impuls wants to increase its activity in the international market. In 1993, promotional descriptions of the enterprise and its capabilities were published in European Government, Global Management, and Global Investment Management. Impuls's commercial staff is working actively with the press, including the Western press. (For example, Impuls received some coverage in the San Francisco Examiner.) The enterprise has taken part in a number of international exhibitions/trade fairs, including some in Malta, England, and Jordan in 1993, and one in Australia in February 1994. Impuls currently holds patents for its products in the United States, Japan, France, Great Britain, Germany and other countries. Impuls has also submitted three proposals to receive Nunn-Lugar funds, and Grigoriev visited potential American partner companies in the spring of 1994 to pursue this possibility. Impuls is currently working with the Agar company in Texas and has another project with a cargo transportation company for the management of river transportation.

Through a project with Pepperdine University and the U.S. Committee To Assist Russian Reform, Impuls has made Western contacts for more than ten projects. In all, Impuls has submitted 36 projects to the U.S. Committee To Assist Russian Reform for help with finding Western partners. The enterprise has also established contacts with a Canadian company interested in satellite systems and other companies in North America and South Korea.

Impuls does not have an established foreign division since it is not very well known overseas. The civilian markets that the enterprise is trying to enter are very competitive. Grigoriev hopes that developments such as the contracts provided by Nunn-Lugar funds will help Impuls's competitiveness in the international market.

#### D. Personnel

In 1992, Impuls employed about 3,000 people, of whom 55 percent were research engineers, 25 percent production workers, 10 percent managers, and 10 percent not categorized. About 1,900 employees worked in the institute, including 80 with Ph.D.s, and the rest worked in the plant.

By the end of 1993, the workforce was reduced by 1,200 employees. Over the same period, from 1991 to the end of 1993, the enterprise's output volume increased by 20 percent. After an initial reduction in both design and manufacturing staff, the manufacturing division is growing in response to increasing orders, and the number of production workers was back up to 980 in February 1994. In September 1993, the total number of employees at Impuls was 1,600.

Impuls management has had trouble keeping its best staff, because the enterprise cannot afford to keep salaries high. Impuls cannot afford to take out loans to raise pay because the commercial interest rates are so high, despite the fact that the enterprise gets special rates from four of the five banks it deals with due to its good financial situation. It was particularly difficult for Impuls to compete for employees with private commercial enterprises, because these companies have not been regulated as strictly by state salary caps.

During 1993, Impuls kept wages in line with sales rather than inflation. While this was not a popular measure, it was a way to manage costs without actually firing people, and meant that Impuls could pay wages on time. This, in turn, has given the enterprise good relations with the banks, which is crucial if it is to secure working capital.

The enterprise managed to reduce personnel by implementing a strict budgeting policy. The wage fund of each division was determined by the volume of contracts of the division. The top managers then decided how to divide money among their employees. This led, as a rule, to growth in real wages for the most active “core” employees of each division. Less active employees, however, had only minimal salary adjustments in the face of high inflation, which worked as an incentive for them to leave the enterprise.

#### E. Restructuring

Impuls has been adjusting to the decline in state orders through the reorganization of its divisions and departments in an attempt to streamline its R&D and manufacturing areas.

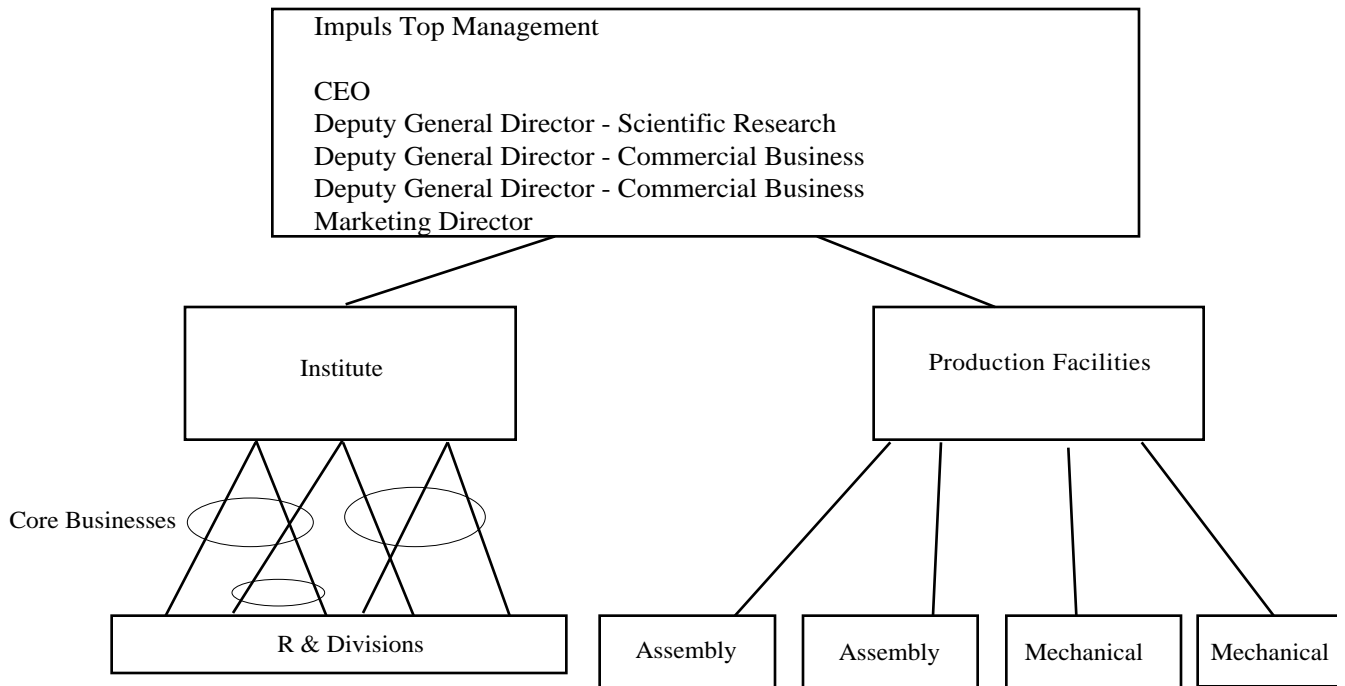
Management tried to forestall the possibility of losing divisions by setting up conditions so the enterprise could function as a diverse privatized entity in a market economy. Connections between the enterprise’s departments were established on a contract basis. The divisions are economically self-sufficient, but also integrated according to Impuls’s own management mechanisms.

A number of departments that had been productive under state budget conditions became too much of a drain for the enterprise in a freer market, and had to be disbanded. Impuls used to have some divisions, for example, in which only a small fraction of work was for Impuls, while most of the parts produced went to other enterprises. Under the state budget, Impuls could afford to house these groups and pay their overhead and administrative costs; now, however, it is to the enterprise’s advantage to contract out or buy components, so that it pays only for the work it needs.

Although top managers seem to be adjusting to operating in market conditions, many of the middle managers, especially those in research and development, were unprepared to take on the new level of responsibility. Many of these managers still believe the state should continue to support the enterprise. Grigoriev worries that Impuls will not have enough capable managers to handle the growth he hopes for, although the managers are now seeing the need for end products as well as R&D and components.

Beginning in July of 1993, Grigoriev created new units in the scientific-technical complex, organized according to core competence, such as television measurement systems and satellite communications. (See Figure 1.) These core businesses were established to utilize workers from any or all divisions. Each unit was made responsible for defining its own products and controlling its costs and wages. These division managers generally have a significant amount of decision-making autonomy and are increasingly more involved in issues of marketing and product selection. Several old units were left intact and were made responsible for generating their own business. The intended result of this restructuring was

Figure 1. Impuls Organizational Structure



to decentralize responsibility, and more specifically to reduce staff, providing work for the remaining employees and making earnings dependent upon their efficiency. At the beginning of the summer of 1993, there were seven units. On their own initiative, employees formed two more units. Grigoriev thinks that the scientific and research units may undergo some further restructuring to increase independence and profit responsibility. It is not yet clear whether this grouping will be successful, as many businesses have been dissolved.

One example of these units is the Scientific Research Division. The division is divided into eight laboratories with little decentralization of decision-making to the labs. Ninety-nine percent of marketing and business issues are the responsibility of the division head. Approximately 90 percent of the work in this division comes from external contracts that are negotiated by the division head while the remaining contracts are orders provided by Impuls. Salaries for this division are also set by the division management.

The production divisions have a different level of management and decision-making ability than the research divisions. Grigoriev's approach is not to force middle managers in manufacturing to change but to create a supportive environment for innovation. Independent units are being set up to handle repair and maintenance. The production units do not have decision-making autonomy as in the Institute and managers seldom deal with marketing issues. Their autonomy is somewhat limited to the distribution of wages. These units are also faced with losses of employees to the trade sector.

The Assembly Division produces a variety of products with its main product the bill counter. Production is carried out by mechanical engineers, design engineers, and manual laborers. 100 percent of the orders for this division comes from Impuls, though again, the division management is responsible for allocating salaries among workers. In this division no

decision-making is done regarding investment, product lines, profits, marketing, or contracting.

Since reorganization, each middle manager is in charge of a product line. According to Grigoriev, only about 10 percent of them on the design side are capable of working in market conditions. The rest are top specialists, but do not now have the experience necessary to cope with the market. There is a similar percentage on the production side, but Grigoriev feels that it is not as critical that the managers be ready for the market on the production side as it is in R&D. He explains this as follows:

Impuls's primary competency is radio electronics systems. Nevertheless, under the old system, the enterprise had to have departments to do everything: all kinds of support functions and manufacturing as well as the R&D core. Now, the management team is trying to increase Impuls's own facilities only in the core competencies; in other areas, whatever weaker managers are unable to produce that is needed to increase overall production will be purchased from outside the enterprise. Thus there are three possibilities for the weaker sectors on the production side: a manager from another Impuls division would be brought in to assist; an outside manager would be invited in to take over the division, working on Impuls territory; or such divisions would shrink or close, and the enterprise's assets invested in outside companies of similar profiles. This means that managers on the production side who cannot keep up with changing conditions are dispensable.

On the R&D side, however, any manager that can't adapt and therefore has to be let go will be lost to the enterprise as both a manager and a technical specialist. Managers who are skilled scientists/engineers cannot be replaced so easily by outsiders. This is a real problem for Impuls. It may make sense for the enterprise to consider creating parallel career ladders for scientists and managers.

As Russia's economy changes, with increased opportunities for small businesses, Impuls has faced the threat that the heads of small divisions would want to split these off into independent businesses. The high diversity of the enterprise's operations increased the risk that it would dissolve into a number of separate entities. Grigoriev and his team have opposed such a development; Grigoriev compared it to the Commonwealth of Independent States, meaning it would be ineffective and not truly unite its members.

## F. Social assets

Before the reforms began, Impuls owned many buildings and facilities for the social needs of its employees. These included more than a dozen apartment buildings, two kindergartens, a dacha and summer camp for children, family vacation facilities, and a sports complex (including a gym with fitness classes, a small swimming pool, a sauna, and ski equipment). There was also a small medical clinic on the enterprise's territory, with specialists in several fields, which was connected to local hospitals. Although the enterprise did not own or manage any agricultural property, it did provide nearby farms with technical services in exchange for low prices on food for Impuls workers.

As part of management's effort to address the administration of these social assets, a new position was created in the beginning of 1994: deputy director for social issues. Ludmila Povolotskaya, who was formerly the head representative of the trade union at Impuls, was appointed to take charge of this sphere.

Impuls turned over all its housing to the prefecture (local districts within Moscow) in the fall of 1993. It decided to do this on the principle that it should focus on its core scientific

areas, and not be responsible for every aspect of employee life. Another factor was the fact that the state does not subsidize the enterprise for housing expenses such as energy, while the prefecture does get state subsidies. The enterprise's agreement with the prefecture includes a provision that Impuls employees will get housing priority in case of "extreme situations." This agreement to help Impuls has no definite term, nor are there specifications as to what counts as "extreme," but Povolotskaya expects that since the prefecture works closely with Impuls, the officials will take the enterprise's word as sufficient evidence that a case deserves priority.

Impuls also transferred the kindergartens to the prefecture in 1993. Impuls signed over the property, the buildings, and all maintenance responsibilities, but under an agreement that Impuls employees would get priority for places for their children (no specific time limit was set for this condition). Impuls always paid for employees' children that attended other kindergartens (if they lived elsewhere in Moscow, for example), so it still pays for employees' children's fees. The enterprise's share depends on the family finances, but it pays at least half the fee for each child.

The camp facilities, including the dacha, are closed for renovation. Impuls can't afford the necessary repairs, so it is looking for a private partner to invest. Meanwhile, the enterprise is still paying to send employees' children to other camps. Impuls also still pays for about 60-70 percent of the cost of employees' vacations/recuperative trips.

The sports complex works exactly as it always has: Impuls employees use it free of charge, and the leftover time is rented out to other organizations/enterprises. Payments by outside users cover the cost of keeping the complex in operation.

The clinic's services, including consultations with ear, nose, and throat; gynecological; lung; and dental specialists, are all completely free to employees. This costs the enterprise a great deal of money, including the costs for physical maintenance of the facilities, energy costs, and salaries. Sometimes there is extra capacity; a neighboring enterprise pays Impuls for allowing its employees to use the services. Despite the expense of the medical services, Impuls management does not plan to try to transfer the clinic to the prefecture.

In addition to the on-site health care, Impuls also pays for medical insurance for its employees for major procedures, such as surgery. The enterprise pays an insurance company a fixed sum every quarter, and the insurance company is committed to covering all such major costs. In 1994, the total yearly premium will be about 5 percent of payroll.

The workers' collective votes once a year on how to allocate funds to various social programs. If there is an urgent reason to violate this budget, the deputy director has the authority to pay for whatever is necessary and simply report afterward to the council of the workers' collective.

Clearly, the enterprise is still contributing large sums for the social needs of its employees. In 1993, Impuls spent around 100 million rubles on the social sphere; because this was too much for the enterprise to keep up in the future, the housing and kindergartens were transferred. Nevertheless, although Impuls has legally shed these responsibilities, the managers (particularly Povolotskaya) still consider themselves responsible for helping employees solve problems and get service in this sphere. In general, Impuls would like to maintain the current level of social assistance (of all kinds) to employees, or to increase it.

### III. Privatization and Legal Restructuring

Initially, the 1992 State Program of Privatization divided enterprises into five groups with different requirements for privatization. Since Impuls designs and manufactures weapons systems, it fell in the group that could be privatized only by permission of the Government of the Russian Federation or governments of republics within the Russian Federation. On August 19, 1993, however, Yeltsin signed a decree allowing the privatization of certain defense enterprises that had been excluded from privatization.<sup>2</sup> Impuls acted quickly, hiring expert consultants on privatization and preparing its privatization papers.

In December 1993, a government decree was signed for the privatization of Impuls.<sup>3</sup> It gave the enterprise the right to privatize using any option, with the only constraint being that the government would retain a “golden share” (which does not allow for day-to-day interference, but would prevent the shareholders from any fundamental change of profile, the sale of the capital assets, or any other major change). Essentially the golden share has no voting voice, only veto power.

Initially, Impuls was considering privatizing under Option Two, but in the end chose Option One. Management discouraged the workers’ collective from selecting Option Two because it would give 51 percent to the workers, and managers believed workers would sell all their shares to outsiders within a few days. This risk was particularly salient because besides the 2,000 current employees, an additional 4,000 people were eligible to buy shares in the closed subscription (former employees who retired or resigned from Impuls, but who retain the right to employee privileges according to the privatization legislation). Thus, about two-thirds of the stockholders would not necessarily be committed to the survival of the enterprise. Option One posed less of a threat from this point of view, because the 25 percent given to the workers is non-voting, and thus would be less attractive to outsiders trying to gain control over management. Option One does provide for sale of an additional 10 percent of voting shares to the workers through closed subscription, but this is a small enough amount that it may not interest outsiders trying to gain control. Five percent of the shares belongs to top management, and sixty percent is distributed as follows: twenty-nine percent for private vouchers and thirty-one percent to the GKI.

Grigoriev was concerned that the second option could lead to the general director being stranded among a group of worker-owners who have no common strategy and do not consider the interests of the enterprise the way shareholders should. He felt that it would be easier for the board of directors and the general director to come to agreement with the government’s representatives concerning dividends and reinvestment than it would be for those directors to negotiate with a large group of shareholders who don’t understand the concept of property. Furthermore, Grigoriev hoped that the government would give him voting rights over the government shares.

Besides letting management keep greater control of the enterprise, Option One was also a way to compromise with the government. Specifically, Impuls will have benefits in terms of state orders and a 50 percent tax reduction. The state will retain its golden share for a period of three years and will initially appoint two of four members to the Impuls board of directors (the size of the board will increase to seven at the initial shareholders’ meeting). The board of directors consists of Grigoriev, a member of the GKI, a local government official and a representative from the trade union.

On June 6, 1994, Impuls became a privatized open joint-stock company with Grigoriev as Chairman and CEO. In addition to the 25 percent of preferred shares, employees were

allowed to purchase an additional 10 percent at a discounted price. However, because many employees had already spent their privatization vouchers, only 8.3 percent of the stock was sold. Management bought an additional 5 percent at full price.

Twenty-nine percent of the shares was sold on the voucher auction market in three offerings. First, 9.7 percent was bought in its entirety by a voucher investment fund, a real estate fund. The following offerings were purchased by small investors. The remaining 31 percent plus the 1.7 percent left unsold from the employees' subscription are scheduled to be sold at a cash auction. Grigoriev indicated that two U.S. firms had expressed serious interest in purchasing Impuls shares and was confident that he should be able to attract good potential partners for Impuls as a result of that auction.

Under Russian law, Impuls must conduct the cash auction and hold its first shareholders' meeting within one year of registering as a joint-stock company. Grigoriev expects the shareholders' meeting to take place sometime around March 1995 though legally the meeting can be held after 50 percent of the shares are sold. As of September 1994, 42.3 percent of the total shares had been sold. Grigoriev plans to work out the management structure before this meeting occurs.

For the future, Grigoriev believes privatization will help Impuls secure business. At one point, the enterprise had a large order from a South Korean company, which later cancelled the contract after learning that Impuls was still a state-owned enterprise.

#### IV. Conclusion

Impuls has achieved a considerable amount in the direction of conversion but continues to maintain a significant mix of defense and civilian work. The enterprise has shifted to production of more finished products rather than predominantly producing components. Management's focus for new products is on taking advantage of the enterprise's core technical capabilities. Another important movement has been restructuring the enterprise's organization to emphasize new functions, such as marketing, and to decentralize profit and loss and business development responsibilities.

Impuls's philosophy is still to decentralize financial responsibility of divisions without creating legal subsidiaries, and Grigoriev's team is currently working to educate staff and middle management in this area. In particular, Grigoriev and his team are trying to explain that employees need other incentives besides salary. Although the educational process is slow, members of the CISAC team have observed an increasing understanding of these issues on the part of middle managers. Employees, however, do not view cost control, positive cash flow, and meeting bank obligations as positive signs of success. Rather, they view the lower than average wages as a sign of failure. Nonetheless, senior managers believe the new ideas are making headway and are optimistic about the company's prospects for the future.

## Notes

<sup>1</sup> Steve Liesman, "Yeltsin Moves to Cut Business Taxes," The New York Times, May 26, 1993, C14.

<sup>2</sup> Presidential Decree No. 1267, August 19, 1993, On the Special Features of Privatization and Supplementary Measures of State Regulation of the Activity of Enterprises of the Defense Sectors of Industry, NEXIS.

<sup>3</sup> Private meeting with Impuls managers, January 1994.

## V. The Mashinostroenie Enterprise

Tova Perlmutter, Michael McFaul, and Jeffrey Lehrer

### I. Introduction

Starting in the winter of 1991, the project on Industrial Restructuring and the Political Economy in Russia at Stanford University's Center for International Security and Arms Control (CISAC) has provided technical assistance to Mashinostroenie, a large aerospace enterprise engaged in research, design, experimental production, and systems integration of a broad variety of space vehicles and equipment. Officially known as NPO Mashinostroenie,<sup>1</sup> the firm is one of the most prestigious enterprises in the Russian military-industrial complex, with world-class, state-of-the-art technology. The enterprise brings together many of the country's best scientists and engineers, along with management systems to execute their ideas.

Mashinostroenie managers feel that their enterprise is unique and that the products and services it provides are essential. What makes the enterprise special, they believe, is that it organizes and coordinates very large, complex projects in space, with hundreds of subcontractors and many different types of technology. This requires not only a system of coordinating these subcontracts, but also highly skilled managers with experience with this kind of project. The enterprise used to not only execute the design, development, production, and testing of all its systems but also supervise their actual use, including monitoring up to the final operation of the product.

Management would like the enterprise's space projects to remain the basis for civilian contracts; the task ahead for the enterprise is primarily not, therefore, conversion in the sense of totally new products, but rather transition, education, and adjustment to the requirements of market operations.

## II. Brief History and Description

Mashinostroenie was founded in 1955 in Reutov, a small town outside Moscow, by Vladimir Nikolaevich Chelomey, often referred to as “the Russian von Braun” for his work on rocket technology during the Second World War. Beginning on 37,000 square meters with about 215 collaborators (including many of his own pupils from the Bauman Higher Technical School of Moscow), Chelomey quickly expanded his design bureau, adding experimental installations with vacuum chambers, anechoic chambers, static and dynamic structural test benches, and metal and nonmetallic treating production facilities. By 1960, Chelomey’s bureau had designed a whole system of satellites and rockets. The enterprise employed more than a thousand engineers, most of whom were trained at well-known aircraft design bureaus.

The 1960s were a period of energetic expansion and development for Mashinostroenie. New facilities were built, industrial territory expanded, and production area increased tenfold. One of the best-known products of this period was Poliot-1, the world’s first automatic satellite to maneuver while in orbit, which was a precursor for automatic docking in orbit. Later, the enterprise developed the Proton heavy launch vehicle, which put into orbit the Proton heavy automatic space station. The Proton rocket became the principal launcher for all heavy space stations in the USSR, and is considered one of the most reliable heavy launchers in the world. Chelomey’s team also designed, developed, and constructed the three manned space stations launched in the Salyut series.

Chelomey’s successor, Herbert A. Yefremov, came to the firm as a young specialist in 1956. He was involved in all the enterprise’s major projects and is the director of Mashinostroenie today. Throughout the 1980s, Mashinostroenie continued to research, design, and develop new space systems for gathering optical and radar information and generating images of the earth from orbit, as well as a new type of space station, Almaz, which was launched in 1987. This station is considered one of the best vehicles for gathering radar information about the earth’s surface, information with a wide range of military and civilian applications.

Mashinostroenie now reports to the government through the State Committee for Defense Industry, which is headed by Victor Glukhikh. The state committee interferes very little.

Mashinostroenie has been a center for defense research both under the Soviet regime and now for the Russian state. Mashinostroenie officials would not give details on their defense work, but they confirmed that Mashinostroenie was involved in the design and development of Soviet naval ballistic and cruise missiles as well as the country’s strategic defense system.

As of September 1994 Mashinostroenie employed 6,000 workers. At the same time the center’s annual sales volume is hundreds of millions of rubles in 1991 prices, and ten to twelve billion rubles in 1992 prices. Multiplied by the appropriate exchange rates, these figures are in the range of 10-50 million dollars, but it is inaccurate to consider this the actual dollar value of production, since Mashinostroenie’s technology has been sold almost entirely on the Russian market at prices far below what it could command in the West. Until now, Mashinostroenie’s revenues have not reflected the true value of the firm’s output.

### III. Organization

Mashinostroenie has two main sections, the design bureau and the experimental production plant. The whole enterprise is led by Yefremov, a very powerful leader with both technical expertise and personal authority. Yefremov's title is General Director and General Designer, reflecting his position at the top of both administrative and scientific structures.

Yefremov is assisted by three First Vice General Directors: L. E. Makarov, Anatoliy Khromushkin, and Victor Viter. Makarov and Khromushkin are primarily responsible for administrative affairs, while Viter heads the scientific/technical hierarchy (his title is Chief Designer). All have extensive technical background, however, and maintain interest and awareness of the enterprise's overall direction and activities. In particular, although Khromushkin and Makarov divide their administrative responsibilities roughly along the lines of external and internal affairs, Khromushkin is involved in major decisions throughout the organization.

Under these top four men, the enterprise's structure continues hierarchically. The design bureau, for example, is divided into 15 sections, which are mostly distinguished by their technical subject matter. These divisions are further divided into departments, which specialize in such fields as design approaches to large general questions, theory, design-specific prototypes, and experimental laboratories. Each division may employ hundreds of people, including scientists, technicians, and "direct" workers to carry out the specialists' ideas. Departments may have from 20 to 60 or more employees, and are often broken down still further into the smallest management units, "sectors."

Aside from the technical hierarchy, there are support divisions, including one for finance and legal affairs, a commercial marketing section, and the personnel department. Other administrative units include a special "scientific-engineering center" and a center for conversion, neither of which has a clear position in the hierarchy. Finally, the enterprise has founded about 20 joint-stock companies, referred to by managers as "daughter companies," in which it retains majority ownership (see below). Still, the daughter companies are not part of the administrative system and enjoy a certain amount of autonomy.

Our team has spoken with managers at several levels, including Yefremov himself as well as Khromushkin. Another major source has been Vice General Director Vyacheslav Martynov, who is responsible for international relations and also serves as director and part owner of the Almaz Foreign Trade Company, one of the enterprise's daughter companies.

### IV. Finances

Mashinostroenie's financing has changed significantly over the past few years. Until 1989, 100 percent of the enterprise's financing came from the state for work on large, secret defense contracts. The amount of defense work has steadily declined to 95 percent in 1990, 80 percent in 1991, 65 percent in 1992, and 35 percent in 1993. By September 1994, military contracts' share of revenue had increased slightly to 45 percent.

Finance and Economics Agency Chief Valery Bunak, who heads the finance department's 100 employees, described the sources of funds for groups no longer supported by defense contracts (he called these departments "self-financing") in 1993. First, there are "external"

contracts with other enterprises, which made up about 22 percent of the enterprise's total 1993 business. Second, there are projects supported by government credits specifically designated for conversion; these funds are officially "loans," but the interest rate (13 percent in 1993) is effectively negative under current inflation. Such "conversion" projects were about 18 percent of the total 1993 budget. Finally, the enterprise allots some of its own profits to an internal "innovation fund" to encourage initiative among employees. This fund, which comprises about 10 percent of Mashinostroenie's annual budget, is allocated by a special council of high-level specialists, who review applications including business plans and oral presentations. Before coming before the committee, applicants must go to the finance department for help developing a business plan, which must include projected income figures, costs, possible sales figures, suggested prices, etc. If the finance department feels the project is unrealistic, the plan may die at this stage, without being submitted to the committee.

In July 1993, Bunak expected ten billion rubles in revenue for all of 1993, just for the enterprise's "paper" R&D projects (the overall volume of what is actually produced by Mashinostroenie and subcontractors would be about ten times more). Mashinostroenie collects the full payment and passes payments on to the subcontractors. In addition, Mashinostroenie receives a significant amount of state subsidies. In 1993 about 15-20 percent of overall revenue was profit, while the rest went to costs—materials, taxes, etc. The enterprise was taxed 32 percent on profits, plus a social insurance tax of 39 percent of payroll. These taxes, together with several other applicable taxes, added up to about 25 percent of revenues (gross).

The picture was slightly different as of September 1994. By then, 45 percent of revenues came from military orders, 15 percent from aerospace, 18 percent came from defense conversion credits, and 22 percent from commercial civilian projects. Taxes equaled 40 percent of revenue, while social service costs accounted for 30 percent of revenues. No income was being generated by social services (although the state did help subsidize the kindergartens).

Although the state is very strict about monitoring expenditures using its funds, it transfers funds very late. Delays of two to three months began in 1992. This means that Mashinostroenie is forced to delay payments, which causes problems for the roughly 400 subcontractors that depend on the enterprise's payments. As of July 1993, Mashinostroenie owed other Russian enterprises about 300 million rubles, while the government owed Mashinostroenie 800 million rubles in payments past due for contracts.

Mashinostroenie has its own internal bank, and deals with five of Russia's biggest commercial banks: Promstroibank, Unikombank, MIR, AVIA, and Agribank. Mashinostroenie is a shareholder in Unikombank, which is one of the seven largest banks in the country. These banks are used essentially to provide lines of credit for maintaining cash flow and meeting payroll. As of July 1993, the enterprise owed Unikombank 200 million rubles, and owed the state bank (Gosbank) 100 million rubles for conversion loans. Bunak and his deputies have asked the government to pay the interest on the loans Mashinostroenie was forced to take out because of the government delays, but the government has not responded. None of the enterprise's debts has been written off.

## V. Conversion—General

Before reforms began, Mashinostroenie received all its orders in the form of very large contracts from the government, through the Ministry of General Machinebuilding. The enterprise allocated each project's scientific design questions to its own divisions and specialists, and managed the execution of these designs through its own experimental production plant, as well as through subcontracts with hundreds of other enterprises. By definition, all personnel were considered to have a full workload, since staff size, recruiting, and salaries were all determined by the ministry, which was also the main customer.

With the sharp decline in government orders, however, state contracts are not sufficient to keep the enterprise alive at anywhere near its former size. Managers at the division, department, and even sector level have to find external commercial contracts to make up the difference and keep their workforces busy. Different groups have had varying degrees of success in these efforts, partly due to different levels of energy and marketing skills on the part of the scientists and managers involved, and also partly due to the fact that some types of equipment and expertise are in much greater demand than others.

Money that comes in from external contracts must be submitted to the central enterprise management, but then is redistributed to the divisions and departments that generate it, where managers use the funds for salary. Employees who work in areas with many lucrative commercial contracts, especially if they hold responsible positions and were active in pursuing the commercial business, may earn four or five times as much as employees who have less drive or work in areas less in demand.

In 1989–1990, Yefremov began to think about conversion. He announced a new policy to the entire workers' collective, both at the annual meeting and every month through official announcements. To start conversion at Mashinostroenie, he gave everyone the opportunity to come forward with proposals. Some of the upper managers today are people who started out at lower levels, but who brought conversion ideas to Yefremov and convinced him that they were worthwhile.

By 1994, Yefremov was telling his managers to work with the expectation that 20 percent of all orders would come from the state; they were to try to get commercial orders from the market to fill the remaining 80 percent of their capacity. According to Martynov, however, although Yefremov has announced this goal the general director realistically expects the best scenario to be 50 percent state, 50 percent commercial orders; the higher number is an effort to motivate managers to find orders. Managers still want to keep 30-40 percent of their business in defense orders in order to maintain their technological level; and lingering attitudes showed when one manager explained that "of course" the ideal would be to have 100 percent well-paid, guaranteed state orders. Even when he was asked, "But when government contracts are not being paid, aren't they a weak point rather than an aid to stability or a strength?" this manager still felt that government orders are better because they allow the enterprise to plan longer term. That is, even if they are "bad" government orders (i.e., orders that are not paid on time or at all), they permit management to set long-term directions.

## VI. Conversion—Space Projects

Through 1989, Mashinostroenie made a very small amount of civilian products, but most of its production was in space-related technology. Until 1991, only the military conducted space research in the Soviet Union, so all information concerning space was classified and unavailable for commercial purposes. Thus, by definition, all of Mashinostroenie's main activities were defense projects. In 1989, Mashinostroenie management got permission from the necessary military-industrial officials and the Council of Ministers for commercial distribution of data from the Almaz space station, which was then being built. Almaz-1, the satellite that generated the enterprise's first commercial projects, was launched in March 1991, and was in orbit almost two years. The data that resulted were extremely useful.

The enterprise's most developed conversion activities are connected with the sale of information from the Almaz satellite. Mashinostroenie managers believe that the successful marketing of information generated by Almaz will be the bread and butter of the company's future. Data from the satellite is useful for oceanology, geology, cartography, geophysics, agriculture, forestry, and environmental management and protection. This project has both commercial and government financing; the enterprise started work without expecting any contribution from the government, but when the government learned of the project, state funds were also forthcoming. Other commercial projects include a telecommunications satellite, and various small-scale projects.

The enterprise is now working on Almaz-1b and Almaz-2, which will use the experience of Almaz-1 to meet customers' needs better. For example, Almaz-1 used only one radar wavelength, a high-resolution wavelength of 15 meters. Not all projects require this high a resolution; indeed, some are better suited to a lower resolution, which allows more area to be visible at a time, and can require less exposure time and processing. For the next generation, therefore, Mashinostroenie specialists are developing a radar system with several different wavelengths, to serve different customers' needs.

Mashinostroenie would also like to develop, as a conversion project, the ROUSLAN geostationary communications satellite. This satellite would provide voice, data, fax, and video transmissions over 33,000 channels.<sup>2</sup> The cost of development, however, appears to be prohibitive, and Mashinostroenie is seeking a foreign partner. Mashinostroenie is also developing and producing satellite communications antennas.

## VII. Conversion—Non-Space-Related Projects

Through 1989, nearly 100 percent of Mashinostroenie's production was devoted to space technology. In 1990, non-space-related production grew slightly, to around 5 percent of total production, but it was in 1991 that the ratio of civilian to defense production began a significant shift. Even now, the enterprise's space information systems are the main focus of its attempts to find a market niche. Mashinostroenie does have other sectors, however. Like most other Soviet military enterprises, Mashinostroenie was forced to start production of consumer products in the 1980s by order of a CPSU directive. As long as the enterprise received sufficient funds from the state, its management was not very interested in the civilian goods, and they were distinctly second priority. Now, however, this sector is one of

the firm's main sources of cash, so work has increased on complex civilian products and consumer goods development, such as fiberglass sailboat construction.

As part of their strategy for initiating small commercial operations and businesses, Mashinostroenie's directors have actively encouraged lower-level managers to seek contracts with other enterprises, both at home and abroad. For instance, one partnership was concluded with the Italian firm Paletta to produce equipment for the leather industry. For many years, Mashinostroenie has been a supplier of technologies and equipment for leather treatment to factories within Russia. Paletta's interest in the venture is as a means for gaining access to the Russian leather market. After two years of negotiations, production began in 1992. In developing this project, Mashinostroenie managers sought not only to exploit new sources of hard currency, but also to obtain know-how relevant to entering the leather market. They hope eventually to serve the Russian market on their own, and if possible, to enter the foreign market as well.

Mashinostroenie has also been involved in providing equipment for food processing facilities. It has also branched out into food storage, using a nitrogen air mixture technique first used for applications in outer space. The firm has a program for developing solar energy units, wind-power stations, oil-extraction equipment, and other energy units. Other civilian products, at various stages of development, include a business-class aircraft, optical character recognition for use with computer scanners, weapons for individual self-defense, water purification equipment, yachts, furniture, telephones, and bakery machinery. In addition, Mashinostroenie has broadened its scientific research outside the aerospace arena. Current projects include work connected with medical experiments and computers.

While recognizing the utility of these non-space-related ventures, Mashinostroenie's management remains focused on preserving, maintaining, and eventually expanding high-technology products and phasing out the production of items such as saucepans. Though forced to pay attention to the market and to maximize profits, Mashinostroenie managers are still scientists by training. Decisions about diversification and product lines, therefore, are not made solely on rational economic calculations; science also plays a role. The more science, the more appealing the product, even if it may mean less profits.

## VIII. International Projects

The most lucrative contracts to distribute data from Almaz were concluded with Western customers. At first, Mashinostroenie could only make contact with foreign businesses through the government's foreign trade agency for space deals, called GlavKosmos, which had been founded in 1985. Through GlavKosmos, the enterprise began negotiations with the Texas-based Space Commerce Corporation. By 1991, however, when Mashinostroenie was launching its Almaz-1 space station, the political and economic situation in Russia had changed dramatically. Though the Soviet government lacked a comprehensive plan for conversion, individual companies were allowed greater liberty in making decisions about production and commercialization of technologies. Mashinostroenie seized this opportunity to develop civilian, private-sector uses for Almaz-1, and signed an agreement with Space Commerce Corporation. By the time the deal was finalized in 1991, Soviet legal requirements were relaxed, and prevailing business practices allowed enterprises to conclude

contracts independently of GlavKosmos. Consequently, in this case, the two main parties to the contract were Space Commerce and Mashinostroenie, with GlavKosmos as a third party.

In 1992, after Almaz-1 fell out of orbit, Mashinostroenie negotiated another deal with the Hughes Corporation to distribute Almaz information. Through Hughes, Mashinostroenie data were sold to British Petroleum and other large companies. The enterprise has also sold data to American universities and the U.S. government. Sales have not been limited to the most recent Almaz information; much of the enterprise's archival material from the past is non-classified, and these photographs have been distributed both domestically and internationally.

In early 1994, Mashinostroenie became a candidate for funds from the U.S. Department of Defense's program to assist defense diversification in the Former Soviet Union. Two such funding programs are in process so far. One is a \$20 million project to build housing for military officers in Russia. Four Russian enterprises were selected to propose projects for funding under this housing program. The second program provides a total of \$20 million for use in Russian conversion projects that involve American partners (these U.S. partners must also invest their own money); there were four Russian candidates for this program also. Mashinostroenie was the only Russian firm on both lists. As of October 1994, the housing construction program had yet to begin operation. As part of the second program, during Prime Minister Victor Chernomyrdin's visit to Washington in June 1994, the U.S. government announced an award of about \$5 million to the Double-Cola Company of Chattanooga, Tennessee to work with Mashinostroenie in building a soft drink bottling facility. Double Cola expects to employ about 200 people on the project.<sup>3</sup> The agreement between the parties is still in negotiation.

Mashinostroenie's initial moves toward the market benefited greatly from the contact with Space Commerce Corporation. Working on this project, managers at Mashinostroenie learned valuable lessons about the commercial uses of space, including advertising methods, consumer service, market research, and construction of the station itself. Martynov explained that working for a cash-paying customer is different from working to fulfill state plans. Management is starting to understand that for commercial space contracts, the whole production chain—development of equipment for the station, methods of collecting and processing information, techniques for exhibiting the products, etc.—must be planned according to the needs of the client. This contract with a foreign customer also required changes in construction of the space station, and in the equipment used to produce and service the product. Most significantly, the size of the bulky Almaz station was scaled down to cut the cost of individual launches. Space on the station was also reconfigured. Originally, the designers created large spaces to accommodate military equipment. While military projects are still conducted on the space station, more space has been allocated to commercial projects.

This kind of change at Mashinostroenie is not merely conversion of a production process or of the products themselves, but conversion to a new view of how to apply the space hardware produced to a new, market-directed philosophy for its development. Consumer-oriented tasks (e.g., how to present information for the consumer, how to expedite delivery, and how to add new options in supplying information) call for constant, up-to-the-minute communication throughout the technological chain. In the past, the commercial client was a third priority consumer, after military and science applications. Now, radical changes in development priorities must inevitably lead to significant alterations in the structure of the enterprise and of all its units.

## IX. Personnel and Productivity

As its sources of revenue have shifted, and as the need to respond to market demand has required greater flexibility, Mashinostroenie has undergone some de facto reorganization. Where there were once ten basic areas, by the summer of 1993 there were about 300 sections with separate foci. According to finance director Bunak, work is carried out using a matrix organizational structure; each project must go through five “thematic” areas: design, modeling/development, experiments and testing, technological development, and production. Bunak said there are five large sections, each employing 300-500 people, while the rest are quite small, employing as few as two or three people.

Retaining personnel is a high priority for Mashinostroenie leadership. In 1989, Mashinostroenie had 10,000 employees; by 1993, the total was only 9,000. By September 1994 employment dropped to 6,000, with 2,500 people working in research and development, 2,000 in service, 1,000 in production, and 500 as managers. The 1,000-employee drop from 1989 to 1993 was achieved through attrition and retirements. In contrast, of the 3,000 employees that left between 1993 and September 1994, 1,000 were transferred to other enterprises and 2,000 were laid off. Eight hundred of the four thousand employees who left worked in the social services.

Despite financial pressures, managers are not pleased about the departure of 40 percent of their workforce, and are anxious lest more top specialists leave. Space technology requires a large, highly educated labor force to complete even one project. However, government regulations on state contracts and payments make it difficult to raise salaries enough to keep these highly trained people. Meanwhile, the emerging private sector offers new and profitable opportunities. These talented experts can find work with small high-tech private businesses and joint ventures that pay several times their salary at the state enterprise.

Each section of the enterprise has drawn up a list of its top people, the loss of whom would significantly hurt the whole enterprise (the total number on all the lists is about 500). Salaries and other benefits are constantly adjusted to try to keep these key individuals. In fact, by September 1994, the enterprise was paying top scientists 12 times minimum salary. (See the section on the social sphere, below.) Mashinostroenie also grants “veterans’ benefits” to employees who have worked for twenty years or more.

Managers fear not only the loss of particular key people; they would like to keep all personnel at current levels. In 1993 Martynov said that staff reduction had not affected output significantly; however, he added that a reduction in personnel of 30 percent or greater (like the one that occurred in 1994) would lead to a significant drop in production.

This inconsistency reflects a more general difficulty for Mashinostroenie management in trying to run a very large operation with both R&D and experimental components, using large and expensive equipment that requires a high level of expertise yet is only in demand for very specialized use. It was very difficult for managers we interviewed to assess the workload of their divisions. When one manager was asked whether his department was working at 100 percent capacity, he answered that it couldn’t be measured in that way, since one scientist may work on a given task for two weeks, while another would solve it in two days.

One way managers compare productivity of departments is in terms of how much revenue they are generating. In June 1993, for example, the average monthly salary at the enterprise was 27,000 rubles (for comparison purposes, the mid-year average salary was

34,567 rubles<sup>4</sup> and a monthly food basket of necessities cost around 18,000 rubles). So a division was considered to be “fully used” if it earned 27,000 rubles per employee (combining revenues from both commercial and government/“internal” orders). As may be evident, however, this measure is rather arbitrary and inconsistent with accepted measures of productivity. If the enterprise as a whole loses orders, the average salary could go down (in real terms; in the inflationary environment, salaries must go up just to retain stable purchasing power) and any given department would have to earn less to be considered fully used. Such a department would in fact be less productive, but its workload would still be considered “100 percent.” At the same time, those departments that have succeeded in attracting many lucrative commercial contracts are earning quite a bit more than 27,000 rubles per staff person—as much as 50,000 rubles or more. Although no doubt their staffs are working hard to take advantage of the opportunities, it does not make sense to describe their workload as, for example, 180 percent.

At the same time, many departments may have few or, at times, no assignments that require the highly sophisticated and expensive equipment and the advanced training of their scientists; some rent out their space as warehousing to store consumer goods (in short-term contracts only, so as not to interfere with any scientific work that may come up), or they contract their people and facilities for small-scale workshops to assemble appliances. Through such contracts divisions try to use their mechanical equipment to the fullest extent possible; examples include contracts building sailboats and a venture with a German turbine manufacturer.

For the long run, however, the enterprise will have to come up with more general, reliable solutions to the problem of inconsistent demand. It does not make sense for highly educated, creative scientists to be working on telephone assembly; but unless some other system can be devised, many of the scientists will have little choice.

## X. External Relations

Another issue that will affect management’s planning for the future is the enterprise’s ties to other firms. With the collapse of the central command economy, Mashinostroenie’s relations with production facilities that can reproduce the enterprise’s designs in series are also in jeopardy. The Khrunichev plant used to produce the space stations and vehicles according to Mashinostroenie designs. For now, Mashinostroenie has no major orders pending for space station design and construction, and when another such contract comes along, Khrunichev will no longer be obligated to accept the enterprise’s order, since the state does not control their relations any more. Mashinostroenie’s managers will face the challenge of negotiating appropriate terms that will be attractive to Khrunichev or searching for a competent substitute.

The issue of intellectual property rights can also complicate relations with other enterprises. Both Khrunichev and Energiya have been using Mashinostroenie designs without paying any royalties or permission fees. Mashinostroenie also has conflicts over intellectual property rights with its own subsidiaries. Since research and creative design are two of Mashinostroenie’s major profit-making activities—the enterprise claims that 80 percent of its revenues result from these activities—Russia’s lack of a law on intellectual property rights

that recognizes these transitions severely constrains the enterprise's ability to survive and make a profit.

For a while, Mashinostroenie put some effort into "associations"—joint-stock companies founded jointly with other enterprises in the same industry to work on common projects and/or to form supply networks.<sup>5</sup> The enterprise still owns small shares (usually 3-5 percent) in several such associations, but management no longer considers them a high priority. More important to the enterprise now is its share of ownership in banks. For example, Mashinostroenie owns 33 percent of the Reutov branch of Unikombank; this is very important, as it ensures an advantageous interest rate (135 percent in June 1993). Having some influence at the bank will also help if the enterprise sets up a holding company structure.<sup>6</sup>

## XI. Resistance to Spin-offs

Like many other large enterprises with highly educated personnel, Mashinostroenie is facing the challenge of employees and lower- or mid-level managers who would like to be independent of the large administrative structure of the enterprise and to keep their division's revenues for themselves. Departments that can produce items in high commercial demand without input from the rest of the enterprise have the strongest incentive to break off from the main enterprise.

One department of Mashinostroenie that would like to be independent is the section that produces satellite antennas (dishes). The division claims to have the expertise and equipment to produce the best antennas in the country. For the internal purposes of the enterprise, however, it used to be kept busy only a small part of the year. When commercial demand grew, the antenna section started mass production for the market. The employees of this section no longer want to make the experimental antennas the enterprise needs, since they can make more money in an hour of commercial production than in a whole day of work on government contracts.

One manager pointed out that the technicians in this section could not produce the lucrative antennas if they had not been given the original documentation and design by the enterprise's design specialists. Management is willing to let this division develop its own commercial projects when there is time left over after fulfilling the enterprise's requirements, but as this source explained, "The general director has a contract with the state and he is obligated to provide these results. If this section becomes independent, they would never do what we need."

The antenna example effectively illustrates the fact that, in general, management is against splitting off parts of the enterprise. Khromushkin expressed great pride in Mashinostroenie's achievements, and emphasized that such success would not be possible if the complex were to be split up into several smaller firms. Another manager claimed that splitting off subdivisions would not make sense because a small enterprise can't maintain the large equipment. For example, the enterprise includes a very large facility for testing and experimental production. Khromushkin claimed that keeping it on-site and under the overall enterprise management ensures that designers can test their ideas with no waste of time. He also explained that the Almaz satellite, for example, involved 400 different subcontractors,

and that Mashinostroenie has developed the most efficient systems to manage all these smaller projects while keeping track of the bigger picture.

Their belief that the current system is the best possible method of coordination is not the only reason top managers give for wanting to keep all subsections within the larger enterprise. In each massive project, it was explained, some stages take longer than others, and some cost more than others; since the variables of time, effort, and cost do not necessarily correspond, the task of the enterprise leadership is to plan assignments and payments so departments whose services are in less demand don't lose out. Managers do not dispute that if departments were allowed to become independent, some would prosper—but they are “100 percent certain” that others would not even be able to support themselves. Khromushkin believes that there are tasks that have long-term value for the state that must be accomplished, whether they are profitable in and of themselves or not. He pointed out that even in the United States, test labs are supported by the government.

Khromushkin gave another reason management is against spinning off any of the departments. Some of the sections that would like to be independent are quite small, with staffs of just two or three people who are top specialists in their field. His concern was that if these specialists leave the enterprise and are in business for themselves, the enterprise will not have any employees with the expertise to monitor the quality of work that these newly independent specialists contract with the enterprise.

Although Mashinostroenie managers do not want any of the enterprise's capital assets, especially its expensive equipment, to be privatized separately, they have met some of the demand for autonomy by setting up about 20 small, private businesses on the territory of the main enterprise. Mashinostroenie owns between 45 and 100 percent of the equity in these companies, but always enough for a controlling block. Mashinostroenie also retains control by requiring a two-thirds or three-fourths vote to decide “strategic issues.”

The joint-stock company Almaz Foreign Trade Company (FTC), for example, was organized to market commercial uses of space information received from Almaz stations. Martynov was the company's director. He no longer holds this position. He had twelve permanent staff, and could bring in others, sometimes hundreds of temporary workers, from the main Mashinostroenie employee pool. The firm was founded with 85 percent Mashinostroenie ownership, 15 percent private. The starting capital was 50,000 rubles at the end of 1991. By the end of 1992, the company had a net before-tax income of \$80,000, from trade—buying and selling. In July 1993, Almaz FTC opened a wholesale outlet in Moscow for Mashinostroenie products, such as satellite dishes, medical equipment, and sailboats. Mashinostroenie provides only about 10 percent of the company's contracts, however; most customers are foreign.

The legal founders and stockholders of this profitable daughter company, besides Mashinostroenie and other state organizations, include a number of private individuals, many of whom are top managers of Mashinostroenie. Thus, senior managers have been receiving a share of Almaz's profits from the sale of images from space, but these profits do not benefit the scientists and workers who developed and produced the Almaz station. Changing this arrangement could provide an incentive for key personnel not to leave the enterprise.

The creation of small enterprises also functions as a strategy to cope with the prospective brain drain. While government contracts are scarce, scientists can earn a living through their commercial operations. Fixed capital costs, rent, overhead, and a whole range of social expenditures are de facto covered by the state enterprise. In return, the management at

Mashinostroenie aims to keep the core of the enterprise's scientists and engineers together, in case new contracts materialize for its space vehicles—whether from the Russian state or an outside customer. Above all, the management at Mashinostroenie does not want to allow the breakup of the enterprise as a whole.

Project management related to the subsidiaries is organized on a matrix system, providing flexibility depending on the type of project. Directors of special projects are also free to pursue other opportunities utilizing their own specific technology.

During the current transitional period, while the enterprise is not carrying out any major projects because of the lack of governmental support, the specialists' work on commercial projects addresses two problems at once. If scientists work in small commercial enterprises in Mashinostroenie's facilities, it will always be possible to gather them together again if a new big project is initiated. Meanwhile, any high-tech projects initiated in the small enterprises may also help Mashinostroenie diversify as the beginning of a broader process of vertical and horizontal diversification.

Nevertheless, the leaders are willing to offer some autonomy to lower levels as an incentive for hard work. Employees who work on commercial contracts are making up to ten times more than those who work on government contracts. The profits are sent back to the division that generated them as a reward, and as further incentive to motivate them to pursue commercial projects.

In July 1993, Yefremov described management's four strategies to prevent breakup. First, they have assigned work on defense orders to every division, so no division will be legally entitled to privatize separately, as they will all fall under regulation for strategic interests. Second, he said that management uses the enterprise's general funds to support weaker departments; at some point in the future, he claims they intend to give divisions separate accounts, but not yet. Even when the accounts are separated, they plan to keep all of them within their own bank or their own bank branch—and he said openly that this would enable top management to retain control over the separate divisions' accounts.

Third, the enterprise's management has a special fund to use as an incentive for groups to remain with the enterprise. This "innovation fund" is open to all divisions, and allows budding entrepreneurs to develop their scientific ideas without having to find capital and risk their own livelihood.

Finally, Yefremov pointed to the social services the enterprise provides for employees. These are not new programs, but the same benefits that existed under the old system. Nevertheless, the potential loss of these benefits serves as a constraint on employees or departments considering leaving the larger enterprise.

## XII. Social Assets

Beginning in 1992, the government has not covered the expense of social services, so the enterprise has to spend a large portion of its profits on supporting its social assets (as aforementioned, approximately 30 percent of 1994 revenues went to social services). Management therefore rethought its policy on the social sphere starting in January 1993, and turned over most of these structures to the city of Reutov. They retained some social assets because, as one manager said, "We understand that we have to help our staff."

Mashinostroenie turned over the assets in four stages. Management signed an agreement with the city to transfer the structures, but to continue paying for their maintenance for three months after the transfer. This was to cover the time needed for the city to get an administrative structure set up and to get funds from the oblast to cover costs. The transfers are significant: Mashinostroenie built approximately two-thirds of all of Reutov's housing.

In 1993, Mashinostroenie transferred about 70 buildings, eight kindergartens, a swimming pool, and a children's club. It kept a dormitory and a hotel (the enterprise rents out hotel rooms at a profit to people who come to work with it as temporary subcontractors). It also kept a stadium, a "palace of culture," a clinic, a vacation resort on the Black Sea, a sanatorium, and a children's vacation camp (with room for 500; Mashinostroenie is developing it to make it profitable).

Mashinostroenie has its own clinic, with doctors who are paid by the oblast, but Mashinostroenie pays the salaries of specialists. At this clinic, Mashinostroenie employees get free care, as well as at local hospitals according to agreements between the hospitals and Mashinostroenie. Mashinostroenie also pays 50 percent of the cost of any necessary drugs. This medical care is quite costly.

Mashinostroenie augments the mandatory government entitlements for childbirth, death, and maternity leave. For example, upon the birth of a child there is an official government one-time benefit of five times the minimum monthly salary; Mashinostroenie gives the same amount out of the enterprise's own profits. Special assistance to a family after a death is also government mandated at five times the minimum salary, and Mashinostroenie also matches this payment. In addition Mashinostroenie pays special supplements called "fellowships of the general director" to highly qualified specialists.

Other social sphere expenses include aid to the enterprise's pensioners. Mashinostroenie gives pensioners not only free medical care, but also help with phone bills and other utilities and even cash assistance when needed.

Currently, Mashinostroenie keeps 60 percent of the "places" (capacity is measured in person-spaces) at each social structure, and 40 percent are at the structure manager's disposal to make side agreements for profit. The manager gets to keep the revenues on those 40 percent to use within his group. In the future, each manager will have control over all the use of his structure (100 percent time).

Although the enterprise only just managed to get rid of the huge expense its housing represented, Yefremov is continuing current construction and intends to initiate even more. The enterprise has the area on which to build as well as all necessary governmental permissions. He explained in July 1993 that he hoped to use apartments to attract and keep top specialists; the enterprise would give employees housing in exchange for their signing a contract to stay with the enterprise for a specified number of years. At the end of the time, the apartment would be transferred to the employee for free (Yefremov mentioned as a possible agreement twenty years' service for a three-room apartment). If the employee wanted to own the flat sooner, the plan would allow her or him to privatize it immediately by paying the enterprise the market price—an almost impossible requirement given the cost of housing.

By February 1994, one apartment building was finished and people were moving in, and a second had been built and was to be ready for tenants in April or May. These buildings are owned entirely by Mashinostroenie. The issue of individual privatization of the apartments by employees is still under discussion.

Yefremov planned to build 2,000-2,500 apartments over the next six or seven years.

Mashinostroenie does not, however, have enough money to finance such a big project. It is therefore looking now for a partner to invest. According to management, their plan is to build a very large building with three or four floors of commercial space and the rest apartments. Since commercial firms cannot get access to land or the necessary building permits, they will pay enough for their space to cover the cost of the rest of the building.

In the planned holding company structure (see below), one daughter company will be created to deal with the social sphere. In the beginning, it will need to be subsidized by the rest of the enterprise (holding company), but later managers hope/expect it will be self-supporting or profitable.

### XIII. Privatization and Restructuring

Yefremov and his team have long held an ambivalent attitude toward the government's privatization program. Although at one time the enterprise seemed prepared to privatize, as of September 1994, the enterprise was planning to corporatize as a 100 percent state-owned joint-stock company, but not undergo privatization. While on the one hand, privatization was appealing as a measure to secure the enterprise from government diktat and other outside interference, to attract investors (particularly foreign finance), and to motivate the workers, ultimately Yefremov became convinced that this alternative presented risks he was unwilling to take. In explaining their decision not to privatize, Mashinostroenie managers expressed their fears that the mafia would purchase large blocks of shares, and they cited the myriad of other problems experienced by privatizing companies.

#### A. Initial plans for privatization

Mashinostroenie established a group in the beginning of 1992 to study privatization by considering the experience of other similar enterprises. The group came to the conclusion that none of the options in the government program would be appropriate for Mashinostroenie. Managers wanted to maximize their control over the enterprise, because they did not trust either the state or outside investors to have the interests of the enterprise, its employees, and its scientific aims at heart.

The privatization programs of 1992 and 1993 forbade Mashinostroenie through several articles to privatize (the enterprise could have incorporated, but only as a 100 percent government property). For the enterprise to be privatized, the government had to issue a special decree outlining the process and approving it. Management therefore worked through the League of Defense Enterprises to lobby for a special decree for Mashinostroenie. Mashinostroenie's working committee on privatization submitted a draft version of a decree to the appropriate government structures.

The government issued a decree about Mashinostroenie on December 11, 1993, just a few weeks before confirming Yeltsin's privatization decree of December 24, 1993; this latter edict established the new privatization program for 1994. Mashinostroenie had been waiting throughout 1993 for this final clarification. The new program moved Mashinostroenie from the list of enterprises forbidden to privatize to the list of enterprises that could privatize only

after receiving permission from the government's executive branch (pravitel'stvo). The December 11 decree gave much more specific guidelines for Mashinostroenie in particular, however.

This decree forbade Mashinostroenie to privatize in 1994, unless the enterprise could devise a plan that would be approved by the State Property Committee, the State Committee on the Defense Industry, and the government. Mashinostroenie management had already completed a plan by August 1993, but they revised it to meet the provisions of the new program for 1994. It turned out that much of what they had sought in their initial plan was in fact provided for among the alternatives laid out by the new program. The enterprise had hoped, for example, to keep a controlling block of shares in government ownership for a period of three years. The new program provided three ways to do this: 51 percent, 38 percent, or 25.5 percent government ownership. Revision of the Mashinostroenie plan to meet government approval therefore involved no major changes, except in the methods of implementation.

Mashinostroenie's original plan involved creating, in two stages, a holding company. The first stage was to be restructuring the enterprise. The enterprise would turn existing divisions into daughter firms and initiate separate privatization of these firms, with the controlling block in each belonging to the parent company. Mashinostroenie favored Option One of the government's privatization program for the daughter companies, but Option Two for the parent firm. The idea behind this initial plan for a two-stage process was to give the maximum number of shares to employees while minimizing the number sold at auction. This plan would have meant that 50 percent of all shares would go to the workers' collective, 38 percent to the government, and only 12 percent to auction.

Management changed the plan somewhat after the new government decrees were issued. From the beginning of 1994, the enterprise's privatization committee (which includes Khromushkin and other high-level managers) began evaluating the situation. They decided to request permission to privatize as a whole, without restructuring as a holding company. Management therefore proposed Option One to the workers' collective, with the restriction that 38 percent of the shares are to remain in government ownership for three years.

The committee's plan in February 1994 was as follows: as in Option One, 25 percent preferred shares would go free of charge to the workers' collective, 10 percent voting shares would be sold at a discount to the workers' collective, and 5 percent voting shares would be sold at face value to the managers. An additional 10 percent of the stock was to remain in the FARP (the Fond Aktsionnerovaniya Rabochikh Predpriyatiya or Stock Fund for the Enterprise Employees), where it will remain undistributed until it is issued to employees at some unspecified future date. This 10 percent to the FARP was 5 percent more than the standard plan of Option One. The larger deposit to the FARP would have allowed management to keep 5 percent more of the shares from being immediately sold to the public, while at the same time they would not be distributed to employees who might have sold them to outsiders. The plan further provided for the government to retain 38 percent ownership, with some portion of this stock, the committee hoped, to be controlled through a trust under the control of the general director.

This process of corporatization and initial allocation of shares was just the first stage of the enterprise's plan for privatization and restructuring. For Stage 2, management was still planning to set up a holding company. This model called for the enterprise to divide its assets and staff into several smaller companies, which will be organized according to type of production. This allowed the enterprise's military projects and space projects to be separated

from commercial projects and other work with no strategic implications. The experimental plant would be one company, for example, as would the design bureau. A priority was to structure the status of the experimental base so that it continues to receive state support. These “daughter” firms would be 100 percent owned by the parent firm, at least at the beginning, although later, managers of the daughter firms might have been given the opportunity to buy stock as an incentive.

When the holding company structure was first in place, government ownership would be the same (38 percent) in all the daughter firms, because no new shares would be issued. The first stage in creating the holding company would be taking five or six parts from the enterprise’s internal organization, plus some of its existing external daughter firms. Only the best of the daughter firms would be brought into the holding company; Mashinostroenie would remove its investment from the rest. At the beginning of 1994, the enterprise owned part of about forty companies, but management was evaluating all of these to determine which were worth keeping a stake in.

Thus, following privatization, Mashinostroenie would consist of a set of daughter companies joined in a closed joint-stock holding company, with the state a significant but not majority stockholder. The subsidiary joint-stock companies, however, would not necessarily have to be permanently closed, nor have the same distribution of ownership as the parent holding company.

Following this, in the more distant future, Mashinostroenie envisioned transforming the whole holding company structure into a financial-production group, by bringing in new financial partners. At this point, Stage 3, it would have used shares in the various daughter companies to attract new partners. The enterprise wanted to create the structure for the financial-production group within three years, so that when the government gave up its 38 percent ownership, Mashinostroenie would have had the resources/partners to gain control over these shares. Potential partners that managers had mentioned favorably include enterprises and institutes Mashinostroenie has worked with, commercial agents, and even foreign investors.

In 1992, Martynov said that senior managers were against majority employee ownership because they feared workers would opt for short-term dividends at the expense of long-term investment. As the privatization program took shape at enterprises around them, however, it seems that management decided that outside ownership was the greater risk. By proposing Option One to the workers’ collective in early 1994, they aimed to maintain maximum control by distributing non-voting shares to employees; by adding 5 percent more to the FARP and proposing 38 percent ownership for the government, they would have prevented any outside investor from having an opportunity to gain majority ownership.

The working committee on privatization met with workers and managers at all levels of the enterprise, as well as with representatives of the trade union; meetings to explain the plan were announced over the enterprise’s public address system. In February 1994, the committee was preparing an official proposal, formal evidence of the enterprise’s official value, and all other necessary documents to submit to the government bodies. The enterprise’s personnel department was preparing a list of those eligible to receive shares (current employees, pensioners, etc.). The details of various procedures and privileges for different groups of people were still being worked out, but management expected that the necessary documents would have been ready by the end of February.

Victor Voronin, the head of Mashinostroenie’s trade union and of the STK (Soviet Trudovogo Kollektiva or Council of the Workers’ Collective), was on the privatization

committee. He said that in general the workers do understand that changes have to be made to survive in the market. They are worried, however, because they have seen cases of failure. For example, the neighboring textile factory privatized early and collapsed. According to Voronin, in February 1994 about half of Mashinostroenie's employees were for privatization, while half were not ready or did not understand why it is necessary. Nevertheless, Voronin said he expected this to change soon, because the committee was starting a major public relations campaign to persuade the employees that management's plan was in their interests (they did not put any effort into this previously because they lacked permission to privatize). Voronin felt that the workers' suspicion was understandable; he himself only recently came to understand the necessity of privatization.

The STK also has a role in the approval of new subsidiaries. Only in rare cases, however, does it exercise this power and disagree with the general director. Moreover, the STK must approve the appointments of top managers nominated by the Ministry. Thus, management must work out agreement with the workers not only for their privatization plan, but for reorganization as a whole.

## B. Current plans for corporatization and restructuring

As of September 1994, Mashinostroenie plans to corporatize as a 100 percent state-owned joint-stock company. This will entail new autonomy vis-à-vis the state. A board of directors will be formed, consisting of three government representatives from the Ministry of Defense, the Committee on the Defense Industry, and the State Property Fund, and three management insiders. Management wants to retain full authority to oversee strategic issues. At the same time, they hope to convince the state to continue investing in the enterprise.

Management also intends to create a holding company structure on the basis of the ownership it already has in a number of subsidiaries. This holding company will include 50 "daughter" affiliates with separate bank accounts, 10 "intermediate" subcontracting divisions (in such areas as transportation and construction), and 150 small divisions.

The daughter enterprises typically combine the financial and technical resources of Mashinostroenie with outside firms on specific projects. Income and expenses are shared, with 90 percent of income going to the parent. Mashinostroenie retains 45-100 percent ownership in these daughter companies. Since daughter companies, by their charters, require a two-thirds vote for "strategic" decisions, the parent retains veto authority.

Management feels that this structure optimizes their control over the enterprise, while avoiding the risks created by privatization. By moving to a state-owned holding company structure, Mashinostroenie's leadership has indicated that they prefer to rely on profit-sharing and bonus incentives for employees rather than stock ownership and the prospect of capital accumulation and/or dividend income. Also, although remaining state-owned complicates the enterprise's ability to attract foreign investment in core facilities, joint ventures may still be formed with Mashinostroenie's joint-stock daughter companies.

## XIV. Conclusion

Mashinostroenie has many resources, in fixed assets, institutional experience, technology, and personnel. The enterprise occupies a large amount of land not far from the capital, owns sophisticated and diverse equipment, and has mastered many modern technologies. Its scientific staff is highly qualified, and its managers are forward-looking. Mashinostroenie has also managed to gain effective control over these assets and begun to corporatize, although it has chosen to forgo privatization for now.

Mashinostroenie is encouraging innovation and diversification internally. The innovation fund seems to be a well-designed program for promoting entrepreneurship within the confines of the enterprise. Some joint ventures with foreigners are providing increased revenue while diversifying the firm's activities.

Nevertheless, while Mashinostroenie has a range of prospective projects and a competent team of engineers and scientists to realize these projects, lack of financing is a serious, almost insurmountable impediment. Without state subsidies, the enterprise must try to get long-term credit from commercial banks; and current interest rates of 130 percent and higher, though barely keeping up with inflation, are extremely threatening in light of the uncertain future.

Mashinostroenie's experience and structure mean that it depends heavily, for at least the near future, on the prospect of large space projects. Competition will be fierce and opportunities limited to attract customers who can afford such contracts, whether state or private, Russian or foreign.

## Notes

<sup>1</sup> NPO is the abbreviation for Nauchno-Proizvodstvennoye Obedinenie or Scientific-Production Association; Mashinostroenie translates as machine-building.

<sup>2</sup> Information on the communications satellite provided in Defense Nuclear Agency DNA 001-94-R-0029, "Defense Transformation for the Russian Federation," Attachment No. 3, p. 17.

<sup>3</sup> "Russians Provide Fizz to Conversion Efforts," Defense News, June 27, 1994, NEXIS.

<sup>4</sup> Guy Standing, Labour Market Dynamics in Russian Industry in 1993: Results from the Third Round of the RLFS, (ILO-CEET: Budapest, February 1994), 33.

<sup>5</sup> One such association is the RONA Joint-Stock Company. RONA is described further in the case study of TsAGI.

<sup>6</sup> "In their drive to obtain scarce financial reserves, many enterprises have resorted to establishing their own commercial banks. This action provides the founder with priority access to Central Bank credit. Typically, enterprises participate in the founding of one of two types of banks. First, they may participate in the transformation of a former branch bank of Gosbank into a commercial bank. Second, they may participate in the founding of an association bank. Association banks are commercial banks that are founded collectively by a former ministry and its associated enterprises. Some of the association banks are capture banks (members of the association are forced to use them for all banking services), while others do not bind members to use bank services. Association banks appear to pursue two goals. They try to obtain credit from the Central Bank for their member enterprises and they cross-subsidize enterprises (by providing differential interest rates on deposits and differential access to loans) in the industry to facilitate its survival." Barry W. Ickes and Randi Ryterman, "The Interenterprise Arrears Crisis in Russia," *Post-Soviet Affairs* 8 (4) (Oct-Dec 1992): 347.



SAP also produces non-aviation consumer products, such as kitchenware, bicycles and tricycles, children's toys, sports training equipment, agricultural equipment, and machines for packing powder products.

In 1988 SAP employed 13,000 workers and occupied about four million square feet of production space. Operations were divided into 57 different production shops/units in fifteen separate physical plants. SAP, like many major Russian enterprises, also owned facilities to accommodate the social needs of its workers.

In 1988, SAP's general director, Alexander Yermishin, made a decision to convert production from military products to civilian aircraft and consumer goods.<sup>4</sup> Since then, production of fighter planes and cruise missiles has been phased out, and the capacity of the plant has shifted principally to the production of improved versions of the Yak-42.

SAP expanded the volume of its Yak-42 production, and in 1991, it sold Yak-42 aircraft to Cuba and China, and received strong expressions of interest from Italy, Iran, Israel, Egypt, Yugoslavia, and other countries. Technical and economic estimates by Russian research institutions suggested that a significant global market exists for the type of light and medium aircraft SAP can produce. As a result, over the next ten years SAP's plans called for an increase in the production of the Yak-42 aircraft (as well as production of some newer versions), reopening the production line for the Yak-40 aircraft, and, when financing becomes available for production equipment, production of a third aircraft, the T-401, a small, six-passenger airplane suitable for corporate use and patrols. SAP planned to expand its plant capacity to be able to produce approximately 50 Yak-42, 300 Yak-40, and 250 T-401 aircraft per year by the year 2000. SAP also planned to double its production capacity for consumer goods.

SAP developed and started to execute a comprehensive plant modernization and development plan.<sup>5</sup> Military lines were dismantled. An independent assembly complex and an additional mechanical plant were built, and a separate agro-industrial firm was formed. Over 1990-91, modern computer-controlled machinery was introduced into production shops, completely financed by hard currency generated by SAP. In addition, the State Scientific and Technical Committee developed a comprehensive plan for SAP to fully automate many aspects of aircraft production as soon as investment capital could be secured. Detailed financial plans to the year 2000 were prepared for discussion with potential investors.

SAP hired and trained marketing staffs for foreign aircraft sales. Arrangements were made with Ukrainian research institutes to develop better software for production scheduling, and to help streamline the internal management processes. SAP also developed a staffing plan to expand its workforce by 5,000 employees by the year 2000. SAP management estimated that it would take seven to ten years to complete its expansion plans and achieve fully profitable operation. SAP also began to aggressively pursue joint ventures with foreign firms worldwide, and initiated attempts to secure investment loans from international funds.

Finally, SAP management took steps to gain experience in market-based operations. In early 1991, five of the specialized production units were made independent legal entities and allowed to operate as separate small enterprises, serving SAP aircraft production needs, but also producing consumer goods for independent sales.<sup>6</sup> This step gave SAP managers experience producing and selling consumer goods at market prices for hard currency.

## II. Privatization (1988–92)

### A. Initial privatization via formation of a collective enterprise

Part of the initial SAP strategy was to privatize through employee ownership. As a first step, SAP representatives negotiated with the Soviet government for plant ownership by the workforce in the form of a collective enterprise.<sup>7</sup> Work began toward the transition from a state to a collective enterprise in 1988,<sup>8</sup> with the official authority to proceed eventually granted in 1991. Resolution 19 of the Council of Ministers of the USSR, dated 10 January 1991, granted the SAP workforce outright ownership of selected assets of the plant.<sup>9</sup> These assets included a) the collective farms, housing complexes, and health care and educational facilities that served the workers; b) those production facilities whose value had depreciated by at least 70 percent; and c) any new production facilities acquired as a result of profits generated after the plant began to operate under collective ownership. These assets were considered to account for 54 percent of the enterprise's worth. The workforce was also to be allowed to purchase the remaining assets of the plant, with payment on an installment schedule. The first payment was due in the first half of 1991; subsequent payments were not scheduled.

To determine the cost of the portion to be purchased, the plant was valued using standard formulas provided by the Ministry of Aviation Industry.<sup>10</sup> This method assessed the value of SAP assets at 250 million rubles in early 1991 prices. The Soviet government transferred 54 percent of SAP to the collective enterprise outright, and sold it the remaining 46 percent for the book value as assessed by the formulas. Thus the collective enterprise incurred a debt of 115 million rubles to the Soviet government.

SAP management<sup>11</sup> then decided to divide the ownership of the collective enterprise into shares valued at one ruble each, and distributed them as follows: 46 percent was reserved as a guarantee against the debt from the government, 30 percent (which was equal to the formula-assessed value of the housing complexes) was reserved for further economic separation of the housing assets from the main aircraft production, 6 percent was held in reserve to use as special incentives, and 18 percent was distributed directly to the SAP labor force. Each employee was given 500 shares, plus an additional number based on a formula that considered length of service, professional qualifications, and five-year salary history. Individual share certificates were not issued; instead, the number of shares received was recorded in each employee's workbook. No formal internal market for trading shares was established, but employees were free to buy and sell from each other at whatever price they could negotiate. Employees were also offered the opportunity to buy additional shares from the SAP reserve for one ruble each, and were given two additional shares for every one purchased, subject to a minimum purchase of 400 rubles and a maximum purchase of 4,000 rubles. By this method, SAP collected 1.1 million of the 1.5 million rubles due to the government on the first installment, and was able to make the first payment to the state in 1991.

## B. The transition to an employee-owned joint-stock company

In 1991, SAP management decided to move as quickly as possible from the collective ownership structure to that of an employee-owned joint-stock company, for several reasons. They believed that the joint-stock company would: (a) give employees a greater sense of ownership than the collective enterprise did, thus motivating them and increasing productivity; (b) provide a means of obtaining investment capital from the employees and possibly from other sources for plant modernization, product development, and marketing; (c) provide a recruiting incentive for new employees from the Saratov region; and, most of all, (d) provide a better financial basis for the firm and its workers to help compensate for the inadequate external economic infrastructure. These beliefs were reinforced by the success of the experiment in which five SAP production shops operated as separate small-enterprise legal entities, enabling them to receive their economic profits directly, and distribute them to their workers.

### 1. Securing Western help

CISAC sent a team of American and Russian specialists to provide technical assistance in January 1992. In April 1992, four senior SAP managers came to the United States to meet with the CISAC team to discuss progress that had been made since January.<sup>12</sup> Six draft documents were being developed for an employee meeting planned for June 1992, at which employees would be asked to formally authorize a new joint-stock company to replace the collective ownership structure, along with the implementation of revised corporate management, financial planning, and personnel methods. Three of the documents were required by Russian law: a charter, a founding contract, and bylaws (or “decree”) of the shareholders. Three others had been developed as management documents: bylaws of the board of directors, bylaws of the chairman of the board, and bylaws of the committees/officers. The “founding contract” is unique to Russian law, with no equivalent required for the establishment of a U.S. corporation. The charter does have a U.S. counterpart. The other four documents normally would be contained in the bylaws of a U.S. company.

The structure and contents of the draft legal documents demonstrated a significant evolution in the understanding of SAP managers about the concept of a Western-style corporation. In the January sessions, many SAP managers believed that charter documents must contain the details of all aspects of company structure and operations, and that those details must be voted upon by the employee-owners. The later draft documents reflected an improved understanding of the real purposes, and inherent simplicity, of charter documents, and of the differences between the responsibilities of a corporate board of directors and a corporate management council responsible for company operations.

Groups also renewed other issues including corporate management procedures, personnel management, financial and stock accounting computer systems, corporate financial and administrative staff structures, stock valuation and distribution methods, incentives, and industrial security procedures.<sup>13</sup>

### 2. Forming a joint-stock company

In May 1992, SAP retired its outstanding debt with the Russian government and received a full certificate of ownership in exchange, thus becoming the first fully privatized defense enterprise of its size in Russia. SAP had planned to complete the final transformation to an

employee-owned joint-stock company in June; however, continuing changes to Russian law delayed the changeover.

In July, as an interim step, SAP made the transition from collective ownership to a partnership with limited liabilities. This change was necessitated by a new Russian law that prohibited collective ownership. In the meantime SAP developed procedures for distributing full ownership to the employees and pensioners, created an initial board of directors,<sup>14</sup> refined the new management structure, and created procedures for stock accounting and for the operations of an internal stock market.<sup>15</sup> SAP management also initiated a program to communicate with, educate, and discuss the proposed change with SAP workers<sup>16</sup> and continued to discuss the proposed changes with the local trade unions.

SAP management focused their attention on two difficult issues. The first was distribution of ownership in the new joint-stock company, a complex issue for several reasons. First, the original share distribution to the employees in 1991 excluded the assets used to secure the outstanding note to the Soviet government. Once SAP repaid the debt, the 115 million shares corresponding to this portion of the plant had to be distributed. Second, SAP had performed a more refined valuation of the assets. Third, procedures were needed for distributing ownership equitably between long-term employees, recent hires, employees about to retire, and pensioners. Finally, Russian law required that the full ownership of the company be distributed to the employee-owners as a part of the incorporation process. As a result, the shares previously held as a management reserve for incentive programs also had to be distributed.

The second critical issue was the roles, rights, and responsibilities of the five small enterprises. These enterprises savored their independence, but were also necessary parts of the main aircraft-manufacturing production chain. SAP senior management concentrated on these two issues in order to work out compromises acceptable to all parties. In addition, there was continuing concern about whether to incorporate as a closed or an open joint-stock company. In the end, the final decision was to incorporate as a closed-stock company in order to gain some operating experience,<sup>17</sup> while reserving the option to become an open-stock company at some time in the future.

In October, a conference of SAP worker delegates approved a process for distribution of property and for the establishment of the management structure of the new joint-stock company. The final charter documents and the management and ownership structure were presented to a congress of the SAP employees on February 6, 1993.<sup>18</sup> The change in ownership structure was approved by a 95 percent vote. Alexander Yermishin, general director, was elected to the new board of directors by a 98 percent vote, and subsequently was elected Chairman of the Board. Three other new board members received the minimum 75 percent vote required by Russian law.

### III. Restructuring and Business Operations During the Process of Privatization

SAP's transformation took place concurrently with the operational transformation to function in a market-economic mode. In retrospect, it is apparent that SAP leaders' aggressive-

ness in moving into market-based business practices had a direct and favorable influence on the attitudes of the workers facing a totally unfamiliar form of ownership.

As 1992 began, SAP confronted many problems associated with the transformation to market-based operations. Principal challenges included finding reliable suppliers (taking into account time, quality, cost, and reliability); negotiating reasonable prices for aircraft sales to the Russian government; obtaining a fair economic valuation of SAP in order to make good investment decisions; establishing SAP's social welfare sector (housing, farm, education, and health facilities) on a self-supporting basis so as not to handicap the aircraft sector; understanding and complying with international aircraft quality control standards; obtaining marketing help; improving production efficiency; and training SAP managers at all levels in free market corporate operations, privatization, conversion, and employee-ownership principles.<sup>19</sup>

V. Gorbunov, vice director, identified as additional problems SAP's lack of modern production technology based on computer-aided design/computer-aided manufacturing (CAD/CAM) methods, and a parallel lack of modern information processing systems.<sup>20</sup>

SAP's director of personnel, Yu. Kovshov, pointed out such specific problem areas as the difficulty in retaining highly skilled workers, the need for adequate housing, the necessity of a wage scale consistent with those of other Saratov enterprises, and the lack of an internal labor market within SAP.<sup>21</sup>

In January 1992, SAP did not have modern financial planning and accounting software systems, nor modern production scheduling software. Also, dealings with SAP suppliers suffered from the lack of competition and incentives for the suppliers. With the market and the economy unstable, the firm needed surrogate measures of profitability and performance to guide financial planning. SAP did not have methods (such as progress payments) to manage cash flow that were suitable for operating in a market economy. The CISAC advisors also saw a need to review employee fringe benefits versus individual employee responsibilities, and a need for education and training in Western cost-accounting methods. Finally, they advocated retaining independent financial and legal advisory firms familiar with Western methods and practices and with the current state of Russian law.

By October 1992, SAP had made substantial progress in most of its major problem areas. It now had more than 1,600 reliable suppliers who understood and responded well to incentive payment arrangements. SAP also had continued to modernize plant facilities including increased usage of computers.

SAP also made some needed initial management and restructuring changes by appointing an executive director, analogous to the chief operating officer of a Western corporation, to run the company on a day-to-day basis,<sup>22</sup> and by establishing the new position of deputy director for sales to handle both domestic and international sales. Other progress involved steps toward the separation of the ownership and operations of some of the social welfare facilities.<sup>23</sup>

During 1992, SAP also substantially improved its economic situation. During that year, overall production in Russia declined by 20 percent, but SAP production increased by 30 percent, and profits increased by 50 percent.<sup>24</sup> SAP also established good marketing relations with China, India, Cuba, and Israel. The general aircraft development plan prepared two years earlier proceeded according to schedule.<sup>25</sup> Foreign investment in general modernization had not yet materialized, but investors in Europe had agreed to finance the development of specific new aircraft projects.<sup>26</sup> One SAP-developed idea for a new aircraft design—a “flying plate” based on screening and hovering effects—received serious attention abroad as

a major new development project. The plant did well enough to add a second shift of 2,000 workers. The one negative component to the SAP economic picture was reflected in the sale of consumer goods: kitchen products continued to sell, but sales of toys and other consumer goods had decreased.

SAP salaries were tied to an inflation index based on prices of goods in the local Saratov market.<sup>27</sup> A basic automated personnel management system was also developed. Furthermore, SAP began to focus on other important issues, such as environmental problems.<sup>28</sup> The aggressive move to privatize via employee ownership appeared to have a direct effect on its growth.

#### IV. Restructuring and Business Operations of the Joint-Stock Company (1993 to mid-1994)

SAP's activity in 1993 was driven by the first year of operation as a new joint-stock company and external events that included the deteriorating economic and political situation in Russia.<sup>29</sup> The most significant characteristic was the dramatic reversal in SAP's short-term economic situation compared with 1992.

At the start of 1993, SAP was in a good financial position. Early in 1994, however, SAP decreased production, withheld wages for periods of time, and in March initiated a three-day workweek in order to keep production lines open as long as possible. In late May, the board of directors issued a directive, printed on the front page of the factory newspaper,<sup>30</sup> declaring June to be a month of vacation for all workers, and announcing that production would be virtually stopped for the months of July and August. The basic problem was the lack of adequate operating funds, which resulted from the following circumstances:

##### A. SAP Sales and Products<sup>31</sup>

###### 1. Domestic sales

In 1992 SAP secured orders for eleven Yak-42 aircraft from Aeroflot. These orders were completed and delivered. However, payments were not forthcoming in 1993. It is not exactly clear who was responsible for payment for the aircraft, since SAP entered into a contract with the Department of Aviation, which itself is subordinate to the Russian Ministry of Transportation, with a responsibility to act as a broker between SAP and customers within Russia. As of January 1994, SAP received only partial payment for four aircraft. In 1994 SAP is concentrating on foreign customers until the internal payment issues can be satisfactorily resolved. SAP did expand its sales to the other former Soviet republics in 1993, selling two aircraft to Ukraine and four to Kazakhstan. In these countries, SAP has contracts with non-government aviation companies, but in fact these companies must also apply to their own governments for funds.<sup>32</sup>

## 2. International sales

SAP's principal international customer in the last three years has been the People's Republic of China. In late 1992 a Yak-42 aircraft crashed on takeoff in China. In 1993 the Chinese government held up payments for aircraft already delivered and the placement of new orders pending the outcome of the crash investigation. It took many months for this situation to be resolved. Yermishin tried to be as responsive as possible to the Chinese, while patiently waiting.<sup>33</sup> He did not stress to the Chinese government that the crash was actually the result of pilot error, and he did not demand a statement of absolution from the government. There have been no claims against SAP as a result of the crash, and in late 1993 China finally placed orders for five new Yak-42s, with delivery scheduled for 1994. However, SAP cannot complete the sale until the Russian state signs an intergovernmental agreement with China, which as of June 1994 was not yet signed. Once the agreement is signed, SAP expects to receive goods, rather than cash, from the Chinese for the sale of these airplanes.

In 1993 SAP sold eight aircraft to private commercial companies abroad, and is currently in the process of negotiating to lease two aircraft to private companies for use in the Middle East. This leasing arrangement will also provide a new base of operations for SAP in the Middle East. One of the companies is a Russian company, Dakono, and the other is a Middle Eastern company, Pesh Air. SAP has no financial interests in these companies. SAP has also initiated marketing in Singapore and South Korea, searching for financial and technological partners for new developmental projects.

SAP is considering several proposals to enter the European market, but is proceeding cautiously, as it views Europe as a solidly Western market. SAP believes that it must be well prepared to enter that market by first developing close contacts with European firms. SAP is making gradual progress, with definite interest from European firms in the development of several new aircraft types as well as the new flying plate project. Also, one Yak-42 has been leased in the former Yugoslavia. An accident involving a Yak-42 belonging to the Saratov Civil Aircraft Company occurred in Macedonia in November 1993, but there were no equipment problems, and no claims against SAP have been made.

SAP also continues to try to develop business initiatives with the United States. SAP is also currently negotiating to produce in 1995 its first aircraft for the United States. In addition to Yermishin's general initiatives with the U.S. aviation industry, SAP has several agricultural initiatives. There have also been several visitors from the United States expressing interest in the industrial development of the Saratov region, including industrial companies, banks, insurance companies, and housing projects. SAP is currently somewhat frustrated with the difficulties in establishing partnerships and securing investments from U.S. partners, feeling that Americans are taking a far too cautious approach. There is also frustration with the delays in U.S. technical assistance pilot projects for the Saratov region that SAP had hoped would be forthcoming as a result of an earlier series of visits by American representatives.

## 3. New developmental aircraft initiatives

SAP continues to develop new aircraft programs on a broader scale than initially envisioned in 1991.<sup>34</sup> In the original conversion plan, SAP commercial aviation products were concentrated in three lines: the Yak-42 and its modifications, the Yak-40, and the T-401. Now, in addition to the Yak-42 follow-on and successors (e.g. the Yak-142, which is the same kind of aircraft as the Yak-42, but has new avionics, new cockpit display, and new passenger conveniences), there are several other new programs under development. These include the

Yak-48 (an eight-seat passenger plane), the Yak-54 (a small trainer), the Yak-130 (a larger trainer), the Yak-77 (a midsize passenger plane), the Yak-242 (a larger passenger plane), and the EKIP flying plate. The EKIP is an all-surface saucer-shaped vehicle that will be about the size of a Boeing 767 jet and capable of carrying up to 400 people, or equivalent cargo, at speeds up to 400 mph.<sup>35</sup> SAP has stopped development on the T-401, after 60 percent completion, due to lack of financing.

SAP currently has two production lines, one for the Yak-42 and its modifications, and a new one for the Yak-54. The Yak-42 line has a maximum production capacity of 40 airplanes per year (currently underutilized). The company also is continuing its aggressive program to use computers in production. SAP already has computer production control systems; now the company is working to install computer-aided design and simulation systems. Many new kinds of systems for production are needed to support the developmental projects. For example, SAP currently has three-axis production tooling machinery, but will need five-axis machinery for the planned new projects. SAP's goals are to invest in preparation for production for the new systems and to have flexible production capability to allow switching products easily. The company hopes to be able to sell not only the main aircraft products, but also technology and instrumentation. SAP eventually wants to secure customers for both the aircraft and the design.

#### 4. Consumer goods

SAP continues to produce consumer goods (kitchenware and toys), and is attempting to expand the types and quantities produced for these goods.<sup>36</sup> SAP now also produces candles, and plans on making 100,000 bicycles in 1994.

#### 5. SAP economic strategy

SAP is attempting to hedge its plans in order to be prepared for whatever economic situation actually develops. There are several strategy variants:

1. If SAP can sell the Yak-142, it will generate funds to proceed with the other developmental projects. It will take a bit longer to complete the developmental projects, and SAP also has direct competition from Boeing in China, and from European companies in the Middle East and in Europe.
2. If SAP cannot sell the Yak-142, it will stress its other projects. It hopes to sell the Yak-54 and Yak-130 trainers in Italy, and the Yak-48 in Israel.<sup>37</sup> It also hopes to interest U.S. companies in both projects.
3. If the economic situation in Russia becomes so bad that aircraft production is canceled because SAP can't replace its 1,600 suppliers with foreign ones, SAP will try to produce even more consumer goods. For example, SAP is now trying to contract with the Chinese for the manufacture of consumer goods.

SAP also intends to increase aircraft leasing as a part of its overall economic development strategy. The leasing arrangement is an effective way to introduce the Yak-42 aircraft to new regions. There are several possible leasing variants. One variant is the sale of SAP planes to a charter leasing company in Saratov. SAP has already used this method for several years. However, this approach may cause problems for future aircraft sales if the charter company prices the use of the aircraft too low. Or, SAP could lease the airplanes itself, and in fact has already leased two aircraft to Iran and three to the Philippines by this method. This variant injects risks due to product liability. A third leasing variant involves the use of a private

charter company in Moscow to gradually build a market for the future sale of Yak-42s. Yermishin currently favors this approach.

## B. Internal SAP operations

### 1. SAP workforce

In 1993 SAP lost about 1,500 employees (about the same number as it hired in 1992)<sup>38</sup> and another 1,500 during the first half of 1994. Inflation was a principal cause. About 1,400 workers left for higher paying jobs; 170 were released. In order to keep especially qualified workers, SAP raised their wages. The highest salaries in Saratov are being paid to police forces, energy enterprises, the commercial structures, and the city administrators. The energy sector receives first payments.<sup>39</sup>

### 2. Stock company operations

During 1993, the board of directors<sup>40</sup> began to learn how to operate, and started to differentiate board responsibilities from those of a management council. Yermishin is now Chairman of the Board and SAP General Director. During the first year, the board of directors met seventeen times, dealing mostly with organizational and management issues.<sup>41</sup> Within the board, SAP has tried to create a structure parallel to that of Western companies. SAP has appointed a secretary of the joint-stock company (Irina Klimova) who prepares the agenda for the stockholders' meetings, prepares the documents, and sends out the information to shareholders. The Board also has three committees: Stock Company Affairs (headed by Yu. Kovshov), Shares Policy (M. Mordvinkin), and Ethics (A. Popov). Kovshov's committee organizes the work of the other committees, and is now actually running the company. Kovshov's committee also plans the work of the board of directors.<sup>42</sup> SAP plans on reorganizing the board of directors in a year or so, when the enterprise expects to seek outside board members in certain areas (e.g., financial).

The management council has not yet become a fully operational entity. Yermishin's deputy, Executive Director Dubrovin, is in charge of the management council. There are also functional and branch directors on the management council, but the exact roles and responsibilities of the council have not yet been worked out. The management council has no committees, and in 1993 they met only once per quarter. The council decided to meet twice a week during 1994.

SAP held its first annual shareholder's conference on March 25. During preparation, several procedural issues arose, some of which were referred to the CISAC advisory team for discussion. Typical questions were: When should stock trading stop relative to the date of the stockholders' meeting so that there is stable information to send to the shareholders? Is information released on who has control of how many shares? What are the procedures for running for the board of directors? (Russian law says that board members should be shareholders with some minimum number of shares, to be determined by the shareholders.)

As a part of the preparations, the board of directors also met frequently to discuss proposed changes in the bylaws, charter, and annual report. The board tried to make the documents more exact, to simplify them, and to expand them in certain areas as necessary. Some of the current general bylaws were to be dropped as they were no longer applicable.

The proposed changes were published for shareholder review about a month prior to the meeting.

Preconference meetings and local plant radio shows were scheduled for management to discuss important issues with stockholders. SAP hoped this would reduce the tensions at the annual meeting. Senior SAP managers felt that the workers, in spite of the difficulties, were very patient. They seemed to realize that SAP cannot develop separately from Russia, and they understand the basis for the conditions in Russia. The workers also could see that other factories around them have been shut down while SAP was still operating.

SAP also was concerned that criminal elements may try to gain a controlling interest in the corporation. Even though SAP is a closed-stock company, the wage issue has become so critical that it is possible that criminal elements could give money to employees to buy shares on their behalf.

As in 1993, the shareholders' meeting itself was accompanied by an extensive program of written and graphic information about SAP, its operations over the previous year, and the questions that had been voted on by the shareholders before the meeting. During the meeting, questions were asked about social benefits, about back pay for February and March, and about layoffs. Yermishin's responses acknowledged the possibility of future layoffs, and heavily emphasized the lack of current operating funds.

### 3. Internal stock trading

As a closed-stock company, SAP initiated an internal trading market.<sup>43</sup> The market is managed and operated by a SAP manager, Nadia Akhmanova, who two years ago was a relatively junior financial specialist. She also will have management responsibility for the operation of the new SAP pension fund. SAP may also have to create a new company to operate the internal market. A new Russian law requires a separate company to conduct all trades and maintain the shareholders' database. This law may soon also be applied to closed-stock companies. The SAP trading department may soon be incorporated as a bank to meet this requirement, or perhaps as a financial investment company.

Initially, SAP issued and fully distributed 30,000,000 shares of stock valued nominally at 100 rubles/share. During 1993, SAP shareholders traded 727,000 shares at an average trade price of 65 rubles. About 1,000 shareholders were involved in these trades. SAP also traded 1,550,000 shares at the nominal price of 100 rubles from shareholders who were leaving or joining SAP. By Russian law, the "free shares" must be sold back to shareholders within a year. Shareholders leaving SAP could sell their shares back to SAP for the nominal price of 100 rubles at the next designated quarterly trade, or sell at market price immediately. Considering the rate of inflation, selling at 65 rubles was generally considered to be of greater value than selling three months later at 100 rubles.

According to the bylaws, the nominal price of a share is established by the board of directors with the help of financial and outside market specialist advisors. The nominal price was also held constant in order to be consistent with the financial situation at the plant. Also according to Russian law, property re-evaluation was required to take place as of 1 January 1994, effective as of the shareholders' meeting on March 25. After that time, a new nominal price could be established.

Procedurally, SAP has created a computer database that records the shareholders and how many shares of stock each owns. If a shareholder wants to trade, he lists on a form the amount and the price he wants. He can also fill out a second part of the form with an alternative price if he wants to sell quickly. Stockholders cannot trade directly with one

another. They have to go through SAP as an intermediary. Each trade application is assigned a number. The application is then posted on a bulletin board. Potential buyers look at the offers, and decide if they want to buy. It is a blind trade. The application, once offered, must remain open for three days. After the transaction, the shareholders involved are given new certificates, and the transaction is recorded in the computer database. SAP used to have 15,000 shareholders; it now has 13,000. The average number of shares per shareholder is increasing, with twelve persons now up to the limit of shares allowed by the Charter. (The percentage limits of stock ownership specified in the Charter are: Chairman of the Board, 0.2 percent; other board of directors members, 0.15 percent; and ordinary stockholders, 0.01 percent.)<sup>44</sup>

At present SAP's greatest technical problem is the determination of the price of shares in the market. The current market stock price is published in the SAP newspaper, along with information as to how many shares are on sale.

SAP managers felt that, during 1993, about 50 percent of the sales were made by employees to supplement current income, and about 50 percent of the purchases were made for longer-term gains. The managers were very encouraged by this fraction, feeling that if there were people who would buy shares under current conditions, there will be even more buyers when the plant is in a better financial position. SAP is considering initiating a program by which its employees can sell their shares directly to SAP when they want to buy housing or educate their children.

SAP also decided to offer a selected number of outsiders who have worked closely with SAP the opportunity to become the first outside shareholders of SAP. That decision, and the specific individuals (including some foreigners) who received the invitation, were approved by the stockholders at the annual meeting in March 1994. This was based on a provision in the SAP charter that allows outside ownership for individuals with a close personal relationship with SAP.

#### 4. New pension fund

A new challenge confronting SAP is the establishment and operation of a non-government pension fund.<sup>45</sup> The pension fund is being created for people who retired before the creation of the joint-stock company in 1991. The shareholders voted to authorize the establishment of the fund with 150 million rubles from SAP's 1993 profits. SAP employees who become pensioners after 1991 can either retain their stock or join the pension fund. They can do both if they make contributions to the fund. If they join the fund, their shares will be sold back to SAP and the proceeds from the sales will be placed in their individual accounts in the fund.

The process for actually setting up the fund has required SAP to break new ground. There is currently no law on pension funds in Russia, and there is only one relevant governmental decree, dated September 1992. There are several recommendations from the government, but unfortunately the government has not yet made any decisions. Only one prior experimental pension fund has been created in Moscow, with SAP being the second enterprise allowed by the government to create such a fund. SAP has studied 50-60 regional and enterprise funds that are currently being formed elsewhere. According to Russian law, a pension fund cannot be established as a commercial organization such as a bank, but there also must be a specialized company to run the pension fund. SAP may have to create a new company specifically for this purpose.

The SAP fund is in the process of being organized. It has been registered, a fund director has been chosen, and the methods of allocating the funds among pensioners have been set.

The procedure for initially allocating the fund will be the same as that used in 1991 to distribute SAP shares. An account will be set up for each pensioner, and SAP will place the appropriate amount of money directly from the profits into the account as working capital for the pensioner. The pensioner can either keep the funds in the account in cash, purchase stock with the funds, or designate that the funds be put in the bank in the pensioner's name. Interest will be paid to the pensioner's account, and can be distributed to the pensioner once per quarter or not at all, depending on the pensioner's wishes. There will be several options to choose from. The pension fund will also be opened to others as well, with both outsiders and insiders able to contribute and participate.

SAP is investigating several alternative options for investing the fund's resources (e.g. bank deposits, commercial structures). Since the current pensioners cannot wait for long-term payments, the fund needs to invest for immediate cash returns. When people who are 40 years old or under decide to invest, then the fund will begin to provide investments with longer-term returns. SAP plans on protecting the fund assets from inflation by the rate of interest charged for the use of the funds.

### C. Corporate restructuring

SAP continues to develop restructuring initiatives. One area of restructuring focused on the small enterprises. These have now been drawn back into the main corporate structure as independent branches, without financial independence. As the separate profit center structure becomes established, the small enterprises will have that status. SAP is continuing to try to work out an appropriate compromise that balances the interests of the plant with the interests of the small enterprises. If the overall SAP economic situation develops in a way that places even greater emphasis on non-aircraft consumer goods, the independence of the enterprises will increase. If this happens, SAP plans to allow enterprises that split off to receive help only when they need it, with the enterprises themselves deciding how much assistance they need. Consumer goods production has already received some separation from the other work of the factory. In 1991, consumer goods were produced by shops that also supported aircraft production; however, these goods are now being made by a separate production unit concentrating only on consumer goods.

A second area of restructuring focused on improving SAP's overall technical and marketing capabilities. SAP is now a partner in a new closed joint-stock company, the Yak Aircraft Corporation, formed by the Saratov Aviation Plant, the Yakovlev Design Bureau, and the Smolensk Aviation Plant (one-third ownership by each). Yermishin is president of the company, and Alexander Dondukov, general designer of the Yakovlev Design Bureau, is chairman of the board. This company will produce the Yak-142. The company will gradually incorporate financial and marketing departments. The operating concept is to allow the company to draw on the three owners to carry out production, with centralized financial operations, marketing, and distribution of profits. There are certain procedural issues that have not yet been worked out, since SAP is an employee-owned company, while the other two enterprises are only 49 percent owned by the employees and are still in the process of privatization. The full scope of the new company, once in operation, may go beyond the Yak-142 and include other new developmental projects.

SAP has also created an international marketing organization, AviaImpex, as an internal subdivision. AviaImpex currently employs 42 people, organized into four departments: a department of protocol, a department of negotiations, a sales department handling advertis-

ing, and an export department. The head of this company is now the lead SAP representative to China. Yermishin has authorized him to sign contracts, even though Yermishin himself still conducts many of the negotiations. AviaImpex is also trying to sell consumer goods to the Chinese.

Another restructuring initiative focuses on the mechanism for financing further spin-off companies. Yermishin is creating a financial-industrial group (BusAvia Financial-Industrial Group) to create a cheaper way to secure loans for SAP and for its spin-offs or other daughter companies. The government currently lends money at 300 percent interest. A new bank to be created as a part of the financial-industrial group will be able to make loans at 10 percent. The financial-industrial group will help with the loan, and protect the company from criminal structures.<sup>46</sup> The overall strategy calls for the growth of smaller companies up to the size at which they can decide for themselves if they want to become totally independent or integrated into the overall SAP structure.<sup>47</sup> The financial-industrial group as envisioned will also have an international component to facilitate signing contracts with foreign partners and handling international funds transfers. This capability will facilitate aircraft development and production as well as the development of new commercial ventures.

SAP also has a number of restructuring activities focused on the social sphere assets. SAP is in the process of establishing a wholly owned housing joint-stock company, AO Zhil'e. The full set of procedures has not yet been completed, but the legal entity has been created. The entire housing apparatus (houses, materiel base, maintenance, security) will be turned over to Zhil'e, but SAP will also give it a subsidy for energy, gas, oil, and water. Some of the buildings also contain some stores that will eventually start to make money. It will be a long time before this new company will be profitable, since SAP still has to train the company management about ownership and operations. With this step SAP will be able to show investors that new funds will be invested only in production, and not in the social sphere. Additionally, some of the housing burden is gradually being removed from SAP since people are starting to buy their own housing now that it is being privatized.

The collective farms are also continuing the restructuring process initiated in 1992. Two are still wholly owned, and three have been converted to joint-stock companies with SAP retaining 30, 5, and 2 percent ownership. Employees (and others) buy products from the farms at market prices. SAP is planning to invest even more money in these stock companies. These investments are not grants. SAP will gain land from the investment, and the price of land is rising. SAP also is continuing to invest in agricultural development. In 1993 SAP constructed two granaries for agricultural storage (and protection against theft). SAP is also creating private agricultural enterprises with foreign partners. For example, one separate private enterprise was created for corn production; SAP gave the enterprise corn in exchange for shares of stock. Similarly, SAP has given corn to a pig breeding company in exchange for stock. Once the BusAvia Financial-Industrial Group is created, it will buy these stock companies, and invest in new technology for them. SAP has concluded that new technology is required to attract foreign investment in these agricultural enterprises. English and American companies visiting the pig breeding farm, for example, did not feel it was worth their investment due to the difficulty of implementing modern pig farming methods with the existing technology. Agricultural restructuring continues to be an area of high priority.

The restructuring initiatives for educational facilities have been mostly successful. SAP currently pays only for the maintenance of the schools. Kindergartens are now self-sufficient. However, SAP still gives grants directly to employees who have children: a family in which

one parent is a SAP employee receives 50 percent of the school costs; if both parents are SAP employees, SAP pays two-thirds.

Finally, SAP has also undertaken restructuring initiatives to improve the security of its commerce. Three stock companies have been established to provide physical security and to insure transportation of products and money to and from Saratov. The companies are staffed by former members of elite military units (Alpha Units, Spetsnaz), KGB, and former athletes. SAP believes that it can provide the most effective security for Western partners and customers if SAP assumes responsibility for security of goods and shipments within Russia.

#### D. Major problems and issues (1993–94)

The greatest problem facing SAP in 1994 is the restoration of adequate operating funds. Over the past year and a half, however, SAP has encountered a number of external situations beyond its direct control that are slowing the pace of change.<sup>48</sup> The principal external problems cited by SAP leadership are:

Lack of payment for completed orders. As 1994 began, SAP was owed 60 billion rubles for orders delivered to or through the state.

Government taxation structure. The taxation structure makes it difficult for an enterprise to simultaneously provide realistic costing of products as the basis for pricing, and the maintenance of a competitive price structure. The tax structure also precludes adequate capital formation for investment.

Inflation. The 1993 rate of inflation, coupled with SAP's overall revenue situation, makes it impossible for SAP to maintain competitive wages. The rate of inflation in Russia also leads to an excessively high bank interest rate, currently on the order of 400 percent.

Supplier reliability. The lack of payments to SAP has threatened the supplier reliability that SAP established in 1992. Suppliers demand to be paid in advance for their products to avoid their own financial problems.

Interrepublic costs. Current high customs tariffs between the former Soviet republics are making it difficult to profitably sell products to those countries. An additional complexity is the recent switch to different currencies in many of the former republics, which removes a certain amount of financial flexibility.

Crime. SAP now has to explicitly consider security precautions in the conduct of its business. SAP now guarantees safety and provides guards as a part of its business, drawing on its new subsidiaries established for security purposes. SAP also fears that criminal elements may become proxy-like owners by financing the purchase of SAP shares by existing employees.

The dichotomy between SAP's steps to set the stage for longer-term success and SAP's current circumstances is but one indication of the complexities of economic transformation in Russia today.

In addition to the restoration of its operating funds, and relief from externally-generated problems, SAP also has a number of other internal problems and priorities. These include modernizing production; making the management system more efficient and profitable; improving engineering efficiency through greater automation; and developing investment funding for new projects. In earlier years, these kinds of issues would have been among the

most pressing, but, given the turn of events in 1994, they are now subordinate to the restoration of financial stability in the short term.

## V. Issues and Obstacles: An Assessment

Since 1988, SAP has assumed a leading role in Russia as it works through the practical problems associated with defense conversion, privatization, and restructuring. SAP's experiences to date provide some insight into the issues and obstacles that will eventually be faced by the other defense enterprises undergoing similar transformations. This section summarizes what appear to be some of the main issues that will confront all enterprises, and that will have to be dealt with on the path to successful industrial demobilization and transition to a market-economic mode of operation. Issues relating to defense conversion, privatization, and restructuring are discussed separately, followed by discussion of some overall cross-cutting issues.

### A. Defense conversion issues and obstacles

In this discussion, "defense conversion" is used in the narrow sense of the term. It refers to product shift and directly related topics as opposed to the entire transformation of the defense enterprise. Specific issues, generalizable from the SAP experience, include initial product selection, pricing versus taxation structures, international certification and quality control, and residual armament production for short-term benefits.

#### 1. Initial product selection and market adaptivity

The principal initial product lines selected by SAP for conversion all were in the civilian aviation area as a direct continuation of SAP's previous work. Even though SAP began to produce consumer goods, these were always considered to be secondary products, although hopefully profitable ones and sources of both management experience and revenue. SAP has a distinct advantage in being able to apply its core defense competencies to the civilian market. By starting with a market analysis developed by the Aviation Ministry in 1991, SAP chose three main aviation product lines, to be developed over a seven-year period, as its main conversion effort. However, SAP has also shown a high degree of adaptivity to market conditions over the last three years. SAP's current production lines include one aircraft, the Yak-54, that was not even in the original development plan. The current developmental projects also mostly consist of promising new programs that have been identified from continuous market analysis and responses to market-generated opportunities. An adaptive strategy like this will probably be required for many defense enterprises undergoing conversion during the initial several years or more of their efforts, until such time as their new product lines and markets start to stabilize. It will thus be important for the enterprises to stay engaged with their prospective markets, and to remain as flexible as possible in their ability to shift products within their areas of technical competence. This approach is a new requirement for enterprises used to following long-range plans in specific, relatively narrow product areas, but one that must be learned for survival.

#### 2. Pricing versus taxation structures

To develop a consistent and profitable combination of products, prices, and markets has been a major challenge. As with other enterprises, SAP initially did not have a complete picture of costs in accordance with Western accounting standards. SAP now prices its airplanes to cover costs, and to be highly competitive against Western companies in its intended markets for the level of technology involved. However, SAP has found that it must pay on the order of 80 percent of its profit to the state in taxes. This fraction is far too high to meet the needs of a market-based stock company. When coupled with the rate of inflation, the tax structure is a critical problem for the enterprises. Even without excessive inflation, the Russian tax structure places Russian enterprises at a competitive disadvantage internationally, makes it very difficult to operate on a true market basis (even domestically), and makes it difficult for the new Russian shareholders to see real benefits. SAP is one of many former defense enterprises that are now lobbying heavily within Russia for tax reform.

### 3. International certification and quality control

SAP's conversion products are focused heavily on the international market, where its aircraft will have to meet international quality control and certification standards. Standards focus on both aircraft functions not essential for flight and on passenger convenience. Additionally, testing standards in some areas are more rigorous. A special problem has to do with the environmental pollution characteristics of SAP production machinery and processes. International certification requires production plant certification, which in turn requires production technology that meets international environmental standards. Each of these areas places new expensive demands on SAP that add to the product price. This demonstrates one of the hidden costs of defense conversion that will probably be experienced by many enterprises producing products for international markets.

### 4. Defense production to generate short-term revenues

Although SAP is committed to defense conversion, it has also recognized potential opportunities to produce military equipment on a limited scale to help generate short-term revenue. During 1993, SAP produced unspecified defense products for foreign sales through the Russian arms company Oboronexport, hoping to receive \$26 million in hard currency revenues, which, as of the beginning of 1994, had not yet been paid to SAP. Additionally, SAP is supporting the Yakovlev Design Bureau through the Yak Aircraft Corporation in the development of new products, including the new Yak-141 VSTOL fighter in which a number of countries have displayed interest.<sup>49</sup> Because of SAP's financial situation, SAP managers feel that any real business opportunities must be pursued, even though they result in the temporary production of military equipment. This situation could arise with other former defense enterprises in Russia because of the current economic situation and the other external barriers they are facing.

## B. Privatization issues and obstacles

During SAP's privatization, important issues arose in five main areas.

### 1. Conceptual understanding

Discussions of transition to a joint-stock company revealed a lack of understanding among managers and employees of many of the basic concepts behind a market-based stock corporation.<sup>50</sup> These included the very concept of a corporation, stock, stock valuation, the

relationship of stock value to profitability and growth, stock issuance, stock dilution, and stock liquidity. A second set of conceptual issues focused on governance, and included the role and responsibilities of a corporate board of directors (versus the management council responsible for day-to-day operations), the purpose of shareholders' meetings, shareholders' voting rights and responsibilities, and the basic idea of "one share, one vote" (as opposed to "one shareholder, one vote"). A third set of conceptual issues concerned corporate legal documents (charter and bylaws) and the difference between those documents and documents that describe day-to-day corporate operations and production development plans.<sup>51</sup>

## 2. Trust

SAP managers expressed concern that transition to an employee-owned joint-stock company may not actually result in the distribution of the profits to the employees and managers. They also were anxious about insuring that employee-owners would have sufficient say in company operations, and that they would have the power to replace the board of directors. These concerns illustrate a cultural issue that SAP managers had to confront as a part of the transition to employee-ownership: they had learned their jobs under the Soviet system, which eroded trust in authority. Workers and managers did not trust the government, the legal system, or enterprise management.

SAP managers found, however, that trust is an essential requirement of a Western-style joint-stock company. The stockholders must trust that the elected board of directors will act in their best interests. They must be comfortable delegating their authority to others to vote on their behalf as they see fit, but with the overarching good of the stockholders as the guiding principle. The stockholders must also trust that the legal system will provide them with a means of resolving disagreements fairly. Employee ownership makes this basic issue more immediate because the employee-owners are also subject to the day-to-day problems of running a company. The employees must trust that company management will successfully deal with such problems and create a long-term strategy. Finally, the employee-owners must trust that profits and rewards will be distributed to them fairly.

## 3. Employee expectations

In several instances, employees expected that employee ownership would mean maximum control and immediate personal profit, which led them to advocate short-sighted policies. Many SAP employees wanted to keep ownership solely in the hands of employees because they feared outsiders. SAP managers, however, saw the need for selective foreign investors. There was also conflict over the shares that were withheld from the workforce as a corporate reserve for future incentives. Many SAP managers and employees felt that these shares should be distributed immediately. Some SAP employees and managers also pushed to dispose of shares withheld for revenue in order to meet current economic problems associated with inflation, rather than retaining them for their long-term growth potential.

The managers of the five small enterprises that had previously been granted legal independence demonstrated another clash of interests resulting from inappropriate expectations of the new structure. They wanted to retain financial independence so that they could distribute their profits directly to their workers, but SAP management called for the return of their profits to SAP; their reward for financially sound management would be additional ownership shares in SAP, or simply an increase in the value of stock already owned.

## 4. Procedures and operations

There were several issues SAP encountered concerning the mechanics of transition to and operation of an employee-owned joint-stock company. These included creating procedures for the initial distribution of ownership; establishing stock programs and ownership plans to provide different classes of incentives; creating and operating an internal market for trading stock; electing an initial board of directors; defining and carrying out operational duties of the board; learning and executing the mechanics of stockholder meetings and votes; creating a bonus, incentive, and profit-sharing system for rewarding employees for increased productivity; and drafting a full disclosure statement for stockholders explaining the risks and potential rewards associated with stock ownership. SAP had many procedural questions, and many issues associated with the adaptation of traditional Western practices to the specifics of its situation.

## 5. Law

Several issues surfaced with regard to Russian law.<sup>52</sup> At the beginning of 1992, extant laws raised a number of problems for SAP. The most basic of these was the issue of SAP's legal status as a collective enterprise, which was not a long-standing form of property in the Soviet Union. It was introduced in the USSR Law on Property (March 1990) as a halfway step toward the creation of real private property, which was completed by the Russian Law on Property of December 1990. Neither this law nor the Russian Law on Enterprises and Entrepreneurship, also passed in December 1990, mentioned collective property. The legal status of a "collective enterprise" was therefore ambiguous.

By 1992, there were also legal difficulties in implementing SAP's plan to become an employee-owned joint-stock company. The Russian government's draft privatization plans limited the fraction of employee ownership permitted for an enterprise.<sup>53</sup> The draft laws applied only to state and municipal enterprises about to be privatized; however, SAP was already fully privatized by May 1992, and thus did not fit into either category. Also, there were legal ambiguities concerning the procedural requirements for transfer of ownership from a privatized collective enterprise to a joint-stock company. Finally, the legal structure was incomplete and did not regulate security exchanges, enforce the corporate right of first refusal of stock repurchase,<sup>54</sup> define procedures for establishing an employee-owned closed joint-stock company with foreign investment, or determine legal forms for a corporate charter and bylaws.<sup>55</sup>

As 1992 progressed, some of these legal ambiguities were clarified, but new ones appeared. In July, SAP moved from collective ownership to the form of a "partnership with limited liabilities" as the result of an imminent Russian law that threatened to outlaw the collective form of ownership. At the same time, new regulations affected the process of transition to a joint-stock company and created new requirements for stock company formation and asset valuation. The net impact of these regulations was to delay the process by several months. Perhaps most importantly, the Russian legal requirement for transferring all ownership to employees upon incorporation as a joint-stock company prevented SAP from immediately establishing stock-based worker incentive programs, which are a principal advantage of employee ownership.

Another issue of Russian law concerned the distribution of the initial shares of stock associated with the formation of the joint-stock company. SAP, as an employee-owned company, would have liked to hold back some of the initial shares as treasury stock. This pool of authorized but not allocated stock could be drawn on by SAP managers for such purposes as rewarding employees for superior performance, creating a formal employee

stock ownership program, or enticing key new recruits to join the SAP workforce. Unfortunately, Russian law currently requires the complete distribution of initial shares of stock, and SAP interpreted this to mean that all shares must be allocated to the new individual shareholders. Creating a special stock pool for other purposes now must await a subsequent authorization of new shares of stock by the SAP board of directors. Legal provisions that would allow enterprises to allocate initial stock to a company-held pool, and legal assistance in creating and developing appropriate procedures for operating such a pool, would help provide a mechanism for motivating the workforce.

As 1994 began, SAP established a pension fund, with no real guidance from Russian law. As they worked through the options and issues, SAP managers found that many outside managers were coming to them for advice on how to proceed in their own circumstances.

### C. Restructuring Issues and Obstacles

Restructuring involves such activities as changes in internal management structure for efficiency, motivation, and profitability; a change in the overall corporate structure from a single to multiple legal entities; divestiture of assets; acquisition of assets; and mergers with other enterprises. Specific issues encountered by SAP that will also be faced by other defense enterprises involve the financial planning and monitoring infrastructures, the newly formed small enterprises, the social sphere assets, marketing organizations and consortia, and product line subsidiaries.

#### 1. Financial planning and monitoring infrastructures

SAP is undergoing a progressively more complex sequence of internal changes designed to improve financial planning, monitoring, and accountability. SAP intends to move as rapidly as possible toward the formation of decentralized profit centers, each with its own revenue base and profit goals. This structure will be supported by functional directors whose responsibility will span the corporation, and who will also have their own budgets. The pace at which SAP could enact this change has been limited by the availability of appropriate computer hardware and software to allow the rapid generation of appropriate financial management information.

#### 2. The small enterprises

Like many other former defense enterprises in Russia, one of SAP's initial restructuring steps was the formation of five small enterprises from existing production shops. These were formed to provide alternative sources of income during stagnant periods of aircraft production, to give managers experience with market operations, and to motivate the workers by allowing them to directly manage and distribute their profits. In the SAP case, the units that formed the small enterprises were also essential aircraft production units, so there was the possibility that as new aircraft orders were obtained, scheduling and priority issues would arise. An even greater issue arose from the success of the small enterprises as semi-independent operations. The managers and workers liked their independence, and the ability to directly receive the profits from their work. As restructuring has taken place, SAP senior management has spent much time working on the best way to allow the small enterprises the

kind of independence that they have learned to enjoy while retaining them as an essential part of the aircraft production chain.<sup>56</sup>

### 3. The social sphere assets

A major part of SAP's restructuring efforts has focused on the disposition of the social sphere assets via divestiture. SAP is trying to create a process by which the social sphere assets will eventually become completely separate companies, perhaps owned to varying degrees by SAP. During the transition process, SAP is creating a de facto holding company structure, creating privatized subsidiaries, and gradually allowing these subsidiaries to become completely independent companies as they gain experience and solidify their financial positions. In some cases (e.g., agriculture), foreign partners are involved in the creation of new subsidiaries. This approach, if successful, ultimately will result in complete divestiture.<sup>57</sup> Even during the transition process, the approach allows investors to concentrate their capital in specific portions of SAP.

### 4. Marketing organizations and consortia

SAP has gone through several steps to improve its marketing capabilities. During the initial period of change, SAP depended heavily on the state Aviation Ministry for international marketing, because of the time required to hire and train marketing staff. In 1991, SAP began to hire a few people to concentrate on foreign marketing, and by 1993 had hired a new senior marketing manager. During 1993, SAP also created an international marketing subdivision, AviaImpex, and cofounded the Yak Aircraft Company to provide a more integrated approach to marketing new aircraft.

Additionally, the managers of the small enterprises and the consumer units had to market their side products. As SAP creates separate profit centers, each will be confronted with the need, to varying degrees, to market by either drawing on centralized marketing resources, or by creating separate capabilities focused on specific product lines. SAP's multiple-axis approach to the development of improved marketing capabilities has focused simultaneously on (a) understanding new potential markets as the basis for product definition; (b) the sales of these products; and (c) the procedures of domestic, Commonwealth of Independent States, and Western business. SAP has aggressively sought strategic alliances with both foreign and domestic partners to improve its marketing capabilities. SAP understands the need to create a good reputation in the West, and also realizes that it is somewhat at a marketing disadvantage with respect to Western aviation companies since it does not yet have Western certification for its airplanes and it does not assume responsibility for airplane maintenance.

### 5. Product line subsidiaries

One other important aspect of SAP's approach to restructuring has been a willingness to rapidly create new subsidiaries focused on the development of a specific project or product line as a basis for attracting foreign investment. SAP hopes that this approach will be attractive because it will make it possible for investors to concentrate their capital, to limit their risk, and to exert specific control over those assets of primary interest, without getting involved in other aspects of the corporation.

#### D. Overall progress: issues and obstacles

In addition to the issues associated specifically with defense conversion, privatization, and restructuring, there are also several cross-cutting issues that bear on the progress of SAP and other Russian defense enterprises in transition.

##### 1. Psychology of the workforce

One major issue is the attitude of the workforce toward change. At the beginning of the SAP privatization initiatives, many workers and managers were uncomfortable with the transition to a market- and profit-based mode of operation. SAP senior managers made a great effort to convince the workers that the change was both necessary and appropriate. As business improved the workers gained confidence in the reform process.

However, when business declined this confidence waned even though the causes of the decline were apparently external.

##### 2. Senior management initiative

SAP's senior managers have worked to find solutions to problems at the enterprise level without waiting for the overall economic, legal, and political situation to stabilize, and they were willing to proceed incrementally into unfamiliar areas in order to gain the necessary experience.

Yermishin has demonstrated leadership, initiative, and enthusiastic optimism throughout the entire period since 1988, and he continues to try to instill confidence in SAP among the workers and managers. He believes that the current situation is a short-term one. Perhaps the single most important reason for the success at SAP to date has been Yermishin's leadership and his ability to solve unexpected problems. Even in 1994, in the midst of problems caused by circumstances beyond his control, Yermishin's view was that "the only pressing issue remaining is how to pay wages,"<sup>58</sup> a problem he was sure he would be able to solve.

##### 3. Education

Substantial education and training is essential for both enterprise managers and workers on the principles and structure of market-based corporations, on stock concepts and mechanics, and on the relationship of financial standing to stock values. Workers should be encouraged to view stock in terms of its long-range benefits, a view that will be easier to encourage as the Russian economy stabilizes.

Education should also address the social welfare sector, evaluating state/enterprise responsibility versus individual responsibility for these benefits, and illustrating how such policy choices affect wage structure and enterprise profits. Education can also be useful to describe a legal system of checks and balances that protects individuals' rights, promotes trust of institutions, and provides established procedures for resolving disagreements. Finally, employees should be taught how to balance employee-ownership rights and responsibilities in order to ensure that the employee-ownership structure remains viable. Such awareness will depend largely on experience, as well as education.

##### 4. Russian legal structure

Current Russian law does not allow privatization via complete employee ownership. Employee stock ownership programs, pension funds, and other incentive stock programs do not have legal status as part of the initial creation of the joint-stock company. If these alterna-

tives were available from the outset, employee ownership would be an option for management to provide additional incentives to profitable operation. Also, Russian laws with regard to product liability and taxation are currently a hindrance for those enterprises trying to participate in international markets or capitalization.

#### 5. Improved valuation methods

Russian accounting practices differ significantly from Western practices. When this is combined with the instability of the Russian economy, it becomes very difficult to get a fair market assessment of an enterprise's assets. Some buyouts have been negotiated based on depreciation schedules for equipment and formula values of assets, but there is no established means for assessing intangible values such as good will, market position, and technological capital.

#### 6. Adapting Western economic thought

SAP, like other Russian enterprises, has been confronted with the issue of how best to adapt appropriate elements of Western economic thought and business methods to its own circumstances. Yermishin has focused less on being the beneficiary of technical assistance funds than on the formation of legitimate partnerships based on complementary capabilities.<sup>59</sup> SAP has experienced frustration as it learns Western business investment criteria and processes, but has still eagerly sought interaction with Western companies.

## VI. Conclusion

The SAP experience to date suggests that it takes a long time for Russian defense enterprises to convert, restructure, privatize, and become viable in a market economy. Over the last five years, the Saratov Aviation Plant has made the transition from a Soviet state-owned defense enterprise to a Russian privatized employee-owned joint-stock company producing commercial aviation and consumer products almost exclusively. The progress made in 1992 has resulted in an enterprise whose position is looked upon favorably by its employees, its suppliers, and its customers. As of February 1993, more than 8,000 employees purchased shares in the new joint-stock company, the plant's economic activity increased by 15 percent over the previous year, and 1992 was the first year since 1976 that there had been an increase in the size of the workforce. The quality of products also improved. The enterprise has initiated programs aimed at improving the housing conditions of its workers while preparing to divest the social assets. In addition, the enterprise began the production of two new aircraft types, modernized some of its production shops, and purchased a substantial number of new computers to support both technical and management requirements.

The period of 1993-94 marked the first full year of operation of the joint-stock company, and the development of new operating mechanisms and procedures. The period also marked the development of several new product initiatives, and continued economic restructuring efforts. At the same time, although deliveries were high, the period saw a financial crisis in operating funds due to a variety of circumstances, which led to a reduction in the workforce and in work stoppages that will continue until adequate cash balances can be restored.

SAP's current priorities as of mid-1994 are to continue the program of long-term change, while at the same time concentrating maximum efforts on the restoration of operating capital. The Russian economic situation complicates the task. SAP's leaders believe that the cash flow problem will be short-lived. If SAP can continue to work its way through difficult situations as it has in the past, it could consolidate its progress and grow. On the other hand, if SAP becomes entrapped in Russia-wide conditions, then substantial further reductions of the workforce may be required before short-term financial stability is restored.

## Notes

<sup>1</sup> A. Yevreinov, "Saratov: Moving Toward the Future," *Soviet Life* (September 1991): p. 20.

<sup>2</sup> This paper is a continuation of a series of papers by the author on the Saratov Aviation Plant produced under the Defense Conversion Project of the Center for International Security and Arms Control, Stanford University. This sequence documents the progress of the Saratov Aviation Plant. Each paper builds on the material and analysis documented in previous papers. See Michael McFaul and Tova Perlmutter, eds., *Privatization, Conversion, and Enterprise Reform in Russia: Selected Conference Papers* (Stanford, CA: Center for International Security and Arms Control, May 1994) and M. McFaul, ed., *Can the Russian Military-Industrial Complex Be Privatized? Evaluating the Experiment in Employee Ownership at the Saratov Aviation Plant* (Stanford, CA: Center for International Security and Arms Control, May, 1993). See also Kathryn Hendley, *Steps on the Road to Privatization: A Preliminary Report on the Saratov Aviation Plant* (Stanford, CA: Stanford University, August 1992).

<sup>3</sup> Details on SAP history and product lines are from *Collective Enterprise "Saratov Aviation Plant"* (Saratov, 1991), pp. 1-2; and the brochure *Collective Enterprise, Saratov Aviation Plant* (Saratov, 1991), pp. 1-4.

<sup>4</sup> Alexander Yermishin, author's interview, Saratov, January 1992.

<sup>5</sup> *Aviation Production Development of Collective Enterprise "Saratov Aviation Plant" Under Conditions of Economic Reform* (Saratov, 1991).

<sup>6</sup> At the time this step was taken, aircraft prices were state-regulated, and separate enterprises had to be formed to sell products at market prices. Since then, this requirement has been relaxed.

<sup>7</sup> A "collective enterprise" is not state-owned, but neither is it fully employee-owned in the Western sense. The term denotes collective ownership by the labor force. The Western concept of an employee-owned company involves a corporate legal entity, with shares of stock that account for the current value of all corporate assets, and are issued to the employees as stockholders, who are thus the owners. This type of structure is known as a "stock company" under Russian law, and is sharply distinct from a collective enterprise.

<sup>8</sup> Yevreinov, p. 20.

<sup>9</sup> "Council of Ministers of the USSR Resolution on Conversion of Saratov Aviation Plant and Saratov Electro-Aggregate Production Association into Collective Enterprises," in *Aviation Production ... Under Conditions of Economic Reform*.

<sup>10</sup> The formulas used did not attempt to reflect current world market value of SAP assets. Nevertheless, the formula valuation did give SAP management some basis for further distribution of ownership to the individual employees.

<sup>11</sup> Corporate governance at that time was based on an annual company conference of delegates selected as representatives by work units (some as small as five employees). A total of 576 delegates was chosen for the first conference, and these delegates then voted for a nine-person board of directors, who in turn elected Alexander Yermishin as President and Chairman of the Board.

<sup>12</sup> The visitors were V. Gorbunov, Vice Director and Chief Operation Officer; M. Mordvinkin, Chief Financial Officer; Yu. Kovshov, Director of Personnel; and S. Sotov, Head of Industrial Security.

<sup>13</sup> Many new industrial security problems confront SAP. These include not only the physical security of SAP commercial products and facilities, but also a range of intellectual security

issues: intellectual property rights, airplane design rights, nondisclosure issues in subcontracts, team projects and joint ventures with other commercial enterprises, SAP-proprietary information, and patent rights.

<sup>14</sup> Procedures had to be developed to nominate and present an initial slate of candidates to the workers. Since Russian law required approval by three-quarters of the stockholders, the enterprise set up a procedure for a large slate of candidates to be narrowed down progressively until the required number were elected with the necessary majority.

<sup>15</sup> SAP's initial approach was to create a true internal market by which shares would be traded on a monthly basis, with supply and demand determining the price of the stock each month. This approach allowed the internal market to proceed, but made stock prices susceptible to the inordinate impact of trading a small number of shares in a given month. (The relative insensitivity to this kind of anomaly is one of the advantages of the formula approach to establishing the stock price. This is the approach used in some closed employee-owned stock companies in the West. SAP plans to refine its internal market rules once it has some experience.)

<sup>16</sup> The communications program with SAP workers was intensive and took several forms. Managers at all levels received special training and discussed the issues with their subordinates. Extensive use was made of the factory newspaper to explain the impending change and its rationale. Finally, Yermishin started a weekly radio program in which workers could call in and ask questions and he would discuss the answers over the radio. As a result of these efforts, worker support for the change grew rapidly. For example, by October, about 90 percent of SAP employees had written in their workbooks that they intended to transfer the ownership of their shares in the collective to the new joint-stock company. Additionally, there was a noticeable change in the employees: they were becoming very interested in the change, and no one was trying to sell shares.

<sup>17</sup> There was concern that inexperience could put SAP and its employees at a disadvantage if the company became partially owned by outside investors. Hence, in spite of the need for investment capital, SAP made the decision to stay closed so as to be able to better control its own destiny.

<sup>18</sup> Representatives from the CISAC team visited SAP in both October and February, participated in both conferences as observers, and provided consultations and training. In October, the principal issues of concern to SAP management focused on the mechanics of employee-ownership: the election of a board of directors, the distribution of property, the operations of an internal market. In February, SAP management asked for help on various aspects of corporate operations, and many of the issues discussed in earlier training sessions were revisited.

<sup>19</sup> Yermishin, author's interview, Saratov, January 1992.

<sup>20</sup> V. Gorbunov, author's interview, Saratov, April 1992.

<sup>21</sup> Yu. Kovshov, author's interviews, Saratov, January 1992, and McLean, Virginia, April 1992.

<sup>22</sup> Decentralized financial operations, one of SAP's objectives, have not yet been adopted, because the necessary financial accounting, budgeting, and monitoring computer systems have not yet been developed. SAP's annual budgeting process is also a holdover from the command-economic mode of operations. It must be adapted to meet the requirements of budgeting with market-driven demand.

<sup>23</sup> Three of the SAP collective farms were formed into a joint enterprise with U.S. agricultural companies. SAP will own a controlling interest in this joint enterprise, but the board of

directors includes representatives of the Western partners. SAP is also working on a program to sell the housing complexes to individuals, and transfer ownership to the individual workers. The firm is promoting single family dwellings, and has programs underway to finance their construction. At this time, SAP is one of the few enterprises in Saratov continuing to build houses.

<sup>24</sup> L. Hayes, "Russian Plant Weans Itself from the Military," Wall Street Journal, 5 January, 1993, p. A10.

<sup>25</sup> The development of a new Yak-40 airplane, supported by Western European investment, is now a priority for SAP. In 1993, SAP is working on the smaller T-401 aircraft, beginning flight tests of the Yak-42A, enlarging the passenger capacity of the Yak-42, and starting production of an entirely new aircraft design for the Yak-42M using a different engine, different fuselage dimensions, and new avionics. SAP is also continuing to develop the flying plate, an economical flying machine capable of lifting very heavy loads.

<sup>26</sup> Yermishin attributed this distinction to general uncertainty about the future political and economic stability of Russia, and not to specific conditions at the firm. Author's interview, Saratov, October, 1992.

<sup>27</sup> The salary structure within SAP is still based on old standards established by the Soviet Ministry of Aviation. SAP intends to revise the salary structure soon to meet contemporary requirements.

<sup>28</sup> The Saratov Aviation Plant is in the Southern Saratov Industrial Zone, which suffers from air, water, and solid waste pollution. The Saratov region itself, including the Volga river, is a region of major environmental concern. The development of economically feasible methods to reduce SAP's environmental pollution is important for several reasons. First, pollution directly affects the health of SAP workers, most of whom live very near the plant. Second, environmentally clean operations will be cheaper than paying to clean up pollution, which SAP would be required to do under a new Russian law soon to take effect. Finally, in order to receive international certification for aircraft production, SAP production technology must meet strict environmental standards. Hence, solution of SAP's environmental problems is directly related to SAP's future economic viability. E.I. Pyrozhenko, author's interview, Saratov, October 1992.

<sup>29</sup> The year 1993 ended with the October 1993 assault on the Russian White House and the December 1993 elections in which the popular vote expressed widespread discontent with the Russian government. Many areas of popular discontent focused on general problems that also are specific issues for the Saratov Aviation Plant.

<sup>30</sup> Aviastroitel', Newspaper of the Saratov Aviation Plant, Saratov, 25 May 1994, p. 1.

<sup>31</sup> Where not otherwise specifically noted, factual information in this section is based on author's interviews with several senior SAP managers in Saratov, February 1994.

<sup>32</sup> A. Zakharov, author's interview, Saratov, February 1994.

<sup>33</sup> A. Yermishin, author's interview, Saratov, February 1994.

<sup>34</sup> A. Yermishin and A. Zakharov, author's interview, Saratov, February 1994.

<sup>35</sup> Reuters News Service, London, 24 April 1994.

<sup>36</sup> In February 1994, the author visited the same consumer goods facility that he had visited on earlier trips. SAP had made a major effort to eliminate the earlier clutter, dirt, and materiel piles associated with heavy-duty machine shop production. The unit is now a much tidier, cleaner facility.

<sup>37</sup> As a result of contacts established at the Israel-94 Exhibition in Moscow, Russia and Israel signed an agreement to co-develop and sell the Yak-48. The first aircraft is planned to be

ready in 1995, with mass production and sale on the world market beginning in 1997. See Sergei Staroselsky article (untitled), ITAR-TASS, Moscow, June 17 1994. Yermishin visited Israel shortly thereafter to coordinate production, but was not satisfied with the results.

<sup>38</sup> Yu. Kovshov, author's interview, Saratov, February 1994.

<sup>39</sup> Yu. Kovshov, author's interview, Saratov, February 1994.

<sup>40</sup> After the founding conference, SAP only had four initial board members who received the necessary 75 percent majority vote required by Russian law. Since the bylaws require a board of nine members, five were approved after the conference. SAP picked those who had received at least 60 percent of the vote. The nine members for 1993 were Yermishin, Mordvinkin, Dubrovin, Popov, Sugak, Zakharov (Technical Director), Larioff, Voronoff, and Zakharov (Capital Construction). In subsequent years, a new board member can be elected with a 50 percent vote of the shareholders.

<sup>41</sup> By contrast, in a Western company the board of directors may typically meet quarterly. The board of directors currently has to approve all purchases, down to even the smallest level.

<sup>42</sup> A. Yermishin, Yu. Kovshov, and I. Klimova, author's interviews, Saratov, February 1994.

<sup>43</sup> N. Akhmanova, author's interview, Saratov, February 1994.

<sup>44</sup> I. Klimova, author's interview, Saratov, February 1994.

<sup>45</sup> N. Akhmanova, author's interview, Saratov, February 1994.

<sup>46</sup> Yermishin's current thinking on the types of companies that may be financed to support the initiatives of current SAP employees is very broad. One example he cited is the case in which 10-15 people may want to establish a brewery or a chain of beer places as a daughter company of SAP.

<sup>47</sup> If successful, this approach would probably eventually transform the Saratov Aviation Plant into a holding company structure, with the aviation component as a major subsidiary.

<sup>48</sup> At the beginning of 1992, internal problems and issues were identified as the top concerns of SAP managers. That was not true at the beginning of 1994. External problems had come to the forefront.

<sup>49</sup> See P. Romanov, "Supersonic Fighter Takes Off Vertically," *Military Parade*, January/February 1994, pp. 72-74.

<sup>50</sup> In January 1992, a survey was taken of the workers to determine if they preferred to remain a collective enterprise or to transition to a joint-stock company. Of those sampled, 46 percent asked for more information about the differences.

<sup>51</sup> There are also underlying psychological issues that may need to be addressed. For example, one SAP manager argued that some workers are not prepared for transition to a joint-stock company because it is a major step toward the capitalism they were taught to despise.

<sup>52</sup> For a detailed discussion of legal issues relating to SAP, see Kathryn Hendley, "Steps on the Road to Privatization: A Preliminary Report on the Saratov Aviation Plant," June 1992 Project Status Report of the Center for International Security and Arms Control (Stanford, CA: Stanford University, 1992).

<sup>53</sup> During 1992, several versions of draft Russian privatization laws appeared, each of which treated employee ownership somewhat differently. For example, one draft Russian privatization law provided for a maximum of 51 percent employee ownership.

<sup>54</sup> This right means that if an employee-owner receives an offer to sell stock to someone outside the corporation, or if the employee leaves the corporation and decides to sell his or

her stock, the corporation has the first right to repurchase the stock. This right is acknowledged by the employee as one of the conditions of employment or of stock ownership.

<sup>55</sup> During the first six months of 1992, there was also the question of the legal status of the debt that SAP incurred from the former Soviet government. SAP resolved this question by paying the Russian government in June 1992.

<sup>56</sup> Almost all defense enterprises have created small enterprises. Some of these were formed from essential main production assets, and others were formed from support assets or ancillary assets. Once formed, there are only a limited number of choices for reintegration: the small enterprises can be dissolved once sufficient main product orders are flowing; they can be reintegrated as branches with varying degrees of independence; they can be made separate subsidiaries, or they can be spun off as independent companies. Depending on the specifics, defense enterprises are choosing all of these options. However in each case there are personnel and morale issues involved in the execution of the choices.

<sup>57</sup> Not all defense enterprises have been taking this approach. They all realize the need to separate the social sphere assets from the main economic activity, but some are still planning on retaining them within a new corporate structure that will allow the enterprises more positive control (and guarantees to their employees) than would be obtainable by complete divestiture.

<sup>58</sup> A. Yermishin, author's interview, Saratov, February 1994.

<sup>59</sup> At the same time, Yermishin has experienced frustration and disappointment with the pace at which Western technical assistance programs have been forthcoming for the Saratov region.