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# Soviet Reform and the High-Technology Imperative

DONALD M. SNOW

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The furtive, headlong impetus of Mikhail S. Gorbachev's reform program has been with us for nearly five years, producing enormous changes in Soviet political and economic life. Although some question the permanence of change and speculate that failure could eventuate in a possible Stalinist reversal, the movement toward limited political democratization through *glasnost* (openness) and *perestroika* (economic restructuring) are well entrenched. The question is not the sincerity of Gorbachev's commitment to change; it is whether he can or will be able to change the system enough to succeed.<sup>1</sup>

Gorbachev's problem is that he presides over a system truly resting on the horns of dilemma, the root cause of which is a creaky, uncompetitive economy mired in the First Industrial Revolution, while the Western capitalist democracies careen into the Third Industrial Revolution of high technology. To remain a superpower demands an economic transformation which—if possible at all—will result in a Soviet economy that is not recognizably socialist, if the shape of the high technology in the West is a guide. Thus Gorbachev faces an agonizing choice: he can remain true to Marxist economics and watch Soviet superpower status fade; or he can choose to try to make the Soviet economic system—and, given the impact of high technology on military matters, the military system as well—competitive and watch Soviet socialism dissipate. From his perspective, it is a devil's choice.

The heart of the problem, and much of its solution, lies in high technology. Recent analyses have made passing reference to this factor, but have failed to acknowledge its centrality. My thesis is that the role of high technology is crucial, that the Soviets know it, and that the Gorbachev program makes sense specifically in terms of a Soviet attempt to join high-tech society. To do so, they must do two things. First, they must restructure

Soviet society to create the seedbeds for the growth of high technology. Principally, this means creating incentive and reward systems for high technology entrepreneurship and an open flow of ideas and information; these are the goals of *glasnost* and *perestroika*. Second, they must knock down the barriers to Soviet participation in the international high-technology community. This requires removing self-imposed economic barriers and anti-technology-transfer barriers erected by the West; this is the goal of the new political thinking.

Gorbachev and his advisors recognize the problem and the need to attack it. They view an economic and political system in continuing crisis. The problem arose during what Gorbachev and his followers call the period of stagnation during the Brezhnev era, when the continued application of Stalinist command economy methods brought economic growth to a grinding halt while the world economy expanded around them. As Gorbachev puts it, "A country that was once quickly closing on the world's advanced nations began to lose one position after another."<sup>2</sup> Making matters worse, he argues, a number of domestic problems had accumulated over time and began to surface as reform unfolded.<sup>3</sup>

The Soviets, revealing motives that are doubtless partly political (discrediting Brezhnev to enhance Gorbachev) and partly economic, have no trouble assigning blame. Even conservative Yegor Ligachov, writing before his recent retirement from the Politburo, acknowledged that scientific and technical progress had largely ceased under the Stalinist system as continued by Brezhnev, thus leading to the need for basic reform of the economy.<sup>4</sup> Tying general economic progress to scientific and technological proficiency suggests the direction of reform as well. For instance, Soviet economist Abel Aganbegyan, who has emerged as one of Gorbachev's closest advisors, has argued for movement from a command, centrally controlled economy toward a more democratic, independent, self-managing economy, recognizing full well the fundamental changes this will entail.<sup>5</sup>

Most Westerners agree with this economic assessment and with the consequent notions that radical transformation is necessary and that the problems have reached crisis proportions beyond solution through traditional Soviet methods.<sup>6</sup> Disagreement in the West exists over the adequacy or

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possibility of adequate remedy—whether the Soviets will move to something akin to full-scale market economics, a prospect that economic autonomy in the Baltic states raises—or whether it is possible to retrieve a situation that already is beyond saving. Moreover, as the Baltic states and the introduction of the information revolution into a heretofore closed society suggest, the crisis also has clear political implications.

The desperation of present conditions and prospects explains the tempo of change, particularly in the fields of domestic political liberalization and foreign policy initiative. Individual arms control and international political normalization proposals can be written off by skeptics as either public relations ploys to maximize “Gorby fever” or as conscious deceit to cause Western governments unilaterally to engage in defense cuts. Similarly, domestic political actions can be interpreted as stopgap efforts to stimulate worker productivity or as little more than highly visible but ephemeral and reversible phenomena. But such arguments beg the more fundamental point: the Soviets must change in the ways they *are* changing if they are to have any chance to compete technologically.

For present purposes, high technology refers to the revolutionary growth in knowledge development and generation (largely the product of computer and computer-related discoveries), information processing and dissemination (the telecommunication revolution), and a highly diverse set of associated and derivative technologies that cumulatively define technological preeminence. This phenomenon has so far been largely limited to the Western industrial democracies. Seweryn Bialer has been among the leading academic observers of this transformation, arguing that the Third Industrial Revolution, as it is often called, has produced a revolution of communications, information, and services of unprecedented magnitude.<sup>7</sup> This change is so fundamental that those who understand and master it will be tomorrow’s winners, and those who ignore it will be tomorrow’s losers.<sup>8</sup>

Soviet absence from the third industrial or high-technology revolution is partly imposed by a West worried that the Soviets will turn dual-use high technologies to military ends and partly self-imposed by traditional Soviet isolationist economic policies. The result, however, is progressive Soviet non-competitiveness, because the momentum of technological competition has a cumulative effect marked by fierce inter-company and international competition and the constant movements of innovators and ideas.<sup>9</sup>

This dynamic captures much of the problem identified at the outset. First, it reflects the two primary characteristics of high technology that are simultaneously traditional Soviet disadvantages: the highly innovative nature of high-technology environments and the increasingly international nature of high-technology production and competition. Moreover, the historical timing could not have been worse for the Soviets: the Third Industrial Revolution of

the capitalist world coincided with the downturn in the Soviet economy. The simultaneity of these two developments, according to Bialer, was "calamitous for the domestic and international aspirations of the Soviet rulers."<sup>10</sup>

The Soviet dilemma is more than a general economic problem of competitive disadvantage, although it is that too. More fundamentally, years of devoting the best scientific manpower in the Soviet Union to defense projects or sandwiching them into the stifling, bureaucratic environment of huge research institutes has left the Soviet technological base, as well as the general economic base, perilously behind the West. In addition, the political dimension continues to intrude: political authoritarianism and the information revolution do not coexist easily.

The problem is cumulative and circular, and it is getting worse. It is cumulative in that now-missing technological applications (e.g. robotics, computer-aided design and manufacturing) could be used to improve the quality and quantity of basic Soviet goods and services, as well as providing the basis for more sophisticated production down the road. It is circular because Soviet innovators who might make the efforts to advance technology see no material incentives to do so because any resulting improved potential would not be manifested in the civil sector. It is getting worse, because a number of the emerging high technologies are dual-use, with both civilian commercial and military applications, and these new technologies are the basis for yet newer technologies. Moreover, efforts are hampered by a lack of hard-currency capital for investment.

Most Western observers acknowledge these Soviet difficulties, although they rarely recognize their centrality in explaining the Soviet dilemma. A recent *Business Week* study, for instance, argues simply that advanced technology is crucial to Gorbachev's plan to restructure the economy and that his policy of *perestroika* is essentially geared toward pushing the Soviet Union into the late 20th century.<sup>11</sup> Bialer maintains that part of Gorbachev's motivation has to do with power and status because Soviet leaders understand that their country's destiny of international greatness has been called into question, creating a sense of urgency in countering the economic and technological challenge.<sup>12</sup>

Such observations amount to no more than the commonplace notion that an economically weak Soviet Union's claim to superpower status is compromised unless high technology, combined with modernization of other parts of the economy—such as management and distribution systems—energizes the economic and military production systems. Bialer, again, notes that the close relationship between a country's economic strength and its military power and international influence has been elevated by the Soviet leadership to be the central premise of their economic policy.<sup>13</sup> RAND analyst Sergei Zamascikov maintains that this theme has consistently been reflected in the

Soviet literature, which stresses the linkages among the nation's economy, its scientific and technical posture, and its international status and reputation.<sup>14</sup> The Central Intelligence Agency has reached the similar conclusion that the Gorbachev leadership has made its scientific and technological policy the linchpin of its overall economic strategy.<sup>15</sup>

But such analysis does not go far enough. If one accepts that the Soviets understand their disadvantages and find the consequences of those disadvantages unacceptable, then the entire Gorbachev program of acceleration, restructuring, openness, and new political thinking clearly becomes an attempt to reassert Soviet competitiveness. More specifically, I submit that the Soviets are motivated by a belief in three fundamental propositions concerning high technology and their position in the high-technology competition:

- *High technology is important for national preeminence, and its importance is increasing.* This is the point already made and recognized in the literature. To reiterate, high technology forms both the research base for today's and tomorrow's weaponry and the tools and processes essential to propel the Soviet economy into the 21st century. The Soviets' well-known fear of technological surprise on the battlefield makes the competition important.

- *The Soviets are behind, and unless current trends are reversed, they will fall further behind.* Ed Hewett, in a Brookings Institution study, observes that the Soviet "economy seems unable to produce a cheap, reliable, automatic washing machine, radio, or phonograph; and cheap, powerful hand calculators and personal computers are no more than a distant hope . . . . It would appear that the population's considerable patience with the chronic low quality of Soviet goods and services is eroding."<sup>16</sup> The erosion of Soviet patience, possibly induced by the impact of the information revolution and the consequent inability to suppress access to knowledge about the outside world, may in the long run be the most serious problem the regime faces.

- *The Soviets understand the prospects of a continuing comparative decline and find the consequences absolutely unacceptable.* Gorbachev, in a speech on 25 August 1988, himself has acknowledged the Soviet technological disadvantage: "We are going slowly, we are losing time, and we are losing the game."<sup>17</sup> Losing the game in turn creates problems of its own. First, nuclear weapon capability decreasingly defines the ability to exert power because of the fear of the consequences of nuclear war (what I have referred to elsewhere as "necessary peace"<sup>18</sup>), thereby eroding the USSR's chief claim to superpower status. As the importance of the nuclear factor diminishes, the inequality between the two prevailing state systems increases because the West is increasingly superior in the technological, economic, and conventional military dimensions of national power potential.<sup>19</sup> Second, technology increasingly drives both economic and military capability, so that failure to

compete successfully in the high-technology field can leave the Soviets both economically *and* militarily disadvantaged. As a result, a dramatic improvement in Soviet economic performance is not only good domestic politics, but an important component of Soviet national security strategy.<sup>20</sup> High-tech proficiency, in brief, will come to define international economic and military superpower status. It is noteworthy in this regard that a recent book on high technology mentions the Soviet Union only once, and then regarding espionage activities in California's Silicon Valley.<sup>21</sup>

The horns of the Soviet dilemma thus sharpen. The Stalinist command economic system and its accompanying repressive, authoritarian political regime may have been effective in moving the Soviet Union rapidly through the heavy industrialization phase of the first industrial revolution.<sup>22</sup> That same Stalinist system, however, is not sensitive to nor adequate for the dictates of a more sophisticated, advanced economy. The system has become a millstone around the neck of Soviet national aspirations. Thomas Naylor has well chronicled that system's impressive list of problems: a stagnant economy, inefficient agriculture, an inadequate supply of consumer goods and services, a substantial technological gap vis-à-vis the West, a rigid political and governmental structure, a police-state mentality, a high death rate, and an increasingly alienated population.<sup>23</sup> Some apparent progress has been made in mitigating the political dimension of this litany of woes, but it is no understatement to assert that Soviet economic, scientific, and technological prospects remain bleak.<sup>24</sup>

Soviet leaders from Gorbachev down acknowledge these difficulties. Aganbegyan argues that the economic development path and system of management created under Stalin and retained by Brezhnev are the heart of the problem, having become obsolete and incapable of dealing with "the real and growing needs of socio-economic development."<sup>25</sup> The result was stagnation in the economy which, predictably enough, Gorbachev blames on the Brezhnev regime. He argues that structural problems, management inefficiencies, and the like were becoming evident in the early 1970s but that these problems were not addressed adequately at the time. Among the most damaging effects was a slowdown in the area of scientific and technological progress, which he describes as having proceeded at a "sluggish pace." In his construction, acceleration of scientific and technological endeavor is the key to rectifying

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the situation: "There should be revolutionary changes, a transfer to fundamentally new technical systems, to technologies of the latest generation, which ensure the highest efficiency."<sup>26</sup> If one is prone to question whether the high-technology race is at the heart of Soviet reformist motivations, he has only to listen to the Soviets themselves.

**T**he remaining question is the most central, especially in a policy environment where the US President has announced an American stake in Gorbachev's success: what must the Soviets do if they are to have any reasonable prospect of closing the technology gap? An answer requires looking at the environment in which high technology has developed and prospered in the West and which the Soviets must emulate if they wish to become technologically competitive. The assessment is grim: the conditions required are virtually the opposite of conditions present in the historical Soviet system; hence, emulation becomes a process of reform aimed at overcoming barriers to progress.

The first set of barriers is domestic, possessing both physical and social elements. The physical elements refer basically to the kinds and qualities of equipment available to potential Soviet technological innovators. The more serious domestic problem is societal: high technology appears to prosper in a peculiarly open, information-sharing, entrepreneurial, high-risk and potentially high-benefit, informal, non-hierarchical societal structure. That structure is the virtual opposite of the traditional Soviet system. According to Richard Judy,

The Soviet economy and society in its present, modified Stalinist form is a behemoth programmed to move predictably and ponderously in an ordained direction. But the informatics age demands agility and the ability to change direction quickly. The Soviet leadership appears to recognize its dilemma: either make the behemoth more agile or lose the game. But can a behemoth lose weight, become agile, and remain a behemoth?<sup>27</sup>

The other set of barriers is international. Increasingly, both the scientific collaboration that produces the knowledge on which technology is based and the commercial application of that technology are international, with a triangular flow between the United States, Japan, and the countries of the Western European community. The Soviet Union is excluded from that flow on grounds of national security; to gain access to that flow, the Soviets must break down the technology-transfer barrier. At the same time, the Soviets must reverse their own isolationist economic policies (e.g. currency nonconvertibility) that have kept them economically aloof.

These are difficult, possibly insurmountable, problems. The first domestic problem, equipment access and quality, would seem the most tractable, but it is difficult nonetheless. The key physical elements in technology generation are the computer and the equipment allowing effective computer

interface (communication between computers), both of which are Soviet weaknesses. As Ed Hewett observes concerning computer hardware, "Soviet enterprises find it difficult to obtain the few fourth and fifth generation computers produced in the Soviet Union, but far less difficult to obtain second and third generation machines, even though they embody twenty-year-old technology."<sup>28</sup> Moreover, the computers available are degraded by what the CIA describes as an underdeveloped network of software, service, and component support.<sup>29</sup> Computer interface in the West is accomplished through modems using commercial telephone lines (especially those incorporating fiber-optics technology), but the Soviet Union's limited, primitive telephone system lacks the quality of transmission needed to send computer data on it.<sup>30</sup> Moreover, the virtual absence of paper copiers and printers in computer facilities further impedes the flow of information.

The solution to this problem includes great increases in the production of high-quality, state-of-the-art machines, software, and communications equipment. However, these qualitative and quantitative improvements require fundamental change in Soviet production systems. John Battle describes it as a "Catch 22" situation. A radical increase in labor productivity is necessary to resolve the economic crisis threatening to undermine not only the power of the party, but the whole system. Unfortunately, the Soviet worker has little incentive to improve his performance until he can see some positive benefit, such as the consumer goods a reformed system is supposed to make available.<sup>31</sup> The problem is all the more intractable because improvements in other sectors of the economy, such as management and distribution, are also needed.

The second domestic barrier—societal maladaptation—is even more complex, and successful resolution requires attacking basic values and institutions. The basic problem is that Soviet society is not structured to produce an entrepreneurial class of innovators who will take the lead in discovering and applying new technologies. Gorbachev himself has identified providing active support for "the work of inventors and innovators" as a priority.<sup>32</sup> The first, difficult step in that process is to create a cadre of such individuals, because the system lacks the Western-style technical entrepreneurs who energize the Silicon Valleys in the United States, Japan, and Western Europe.<sup>33</sup>

These technologists are a special breed, and they require special conditions to flourish. Physicist Dimitry Mikheyev summarizes those conditions as a high degree of motivation, open access to information and colleagues, a flexible workplace, and a generally high quality of life.<sup>34</sup> Included in this quality of life is the ability to prosper materially, if the US experience is any guide.

These conditions resemble the requisites of political democracy (freedom of inquiry) and market economics, hardly the hallmarks of the traditional Stalinist state. Soviet spokesmen appear to accept at least the first

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part as necessary for progress. Aganbegyan, for instance, has argued that the command system of economic management “represses democracy, initiative, and the creativity of workers.”<sup>35</sup> Even the conservative Ligachov has maintained that greater democratization of the entire social fabric is the lever making it possible to activate *perestroika*.<sup>36</sup>

Creating material incentives to work hard and excel with the promise of great reward for success attacks such basic Soviet values as social and economic equality and, by allowing for the possibility of failure, the failure-proofing mechanisms like guaranteed jobs. Attacking these values runs real risks. Effective decentralizing reforms will result in wider income differentials, possible class conflict, and change in the political status quo.<sup>37</sup> Creating an environment that replaces equal-pay-for-unequal-effort with one that recognizes exceptional effort with exceptional reward will not be easy. The incentive system must simultaneously overcome the lethargy and unproductiveness associated with the guaranteed job system and produce change that is viewed as fair. Since some will benefit and others will not, this is a delicate problem.<sup>38</sup> The Soviets have walked gingerly around this aspect of *perestroika*, because it strikes close to the heart of basic socialist values.

The final set of barriers the Soviets must overcome is their virtual exclusion from the process of international cross-fertilization so essential to the full realization of modern high technology. Historically, of course, Soviet aloofness from the international economic order was a conscious national choice enforced by mechanisms such as a nonconvertible ruble. In a world of largely independent and autonomous but competing national economies, that policy made sense for a struggling, developing economy seeking shelter from the buffeting of international economic forces. In an increasingly internationalized economic order where high technology provides the cutting edge of economic competitiveness and is itself an international phenomenon, those who remain on the outside run the risk of being left behind.

The Soviet problem here is twofold: they must remove the barriers raised by others against their participation in the world economy as well as those

they have raised themselves. The Soviets are gradually inviting the world in through devices such as joint ventures with Western corporations. Unfortunately for them, the dual-use nature of most high technology has meant that an external barrier has been placed between the Soviets and the cutting edge of Western technological endeavor. Western states are understandably unwilling to share technologies having national security implications.

Technology transfer is the key to global economic growth, and the acceleration in modern technology transfer across borders has largely passed by the Soviet Union.<sup>39</sup> Tapping into Western technology and becoming part of the international economic and technological system would thus clearly benefit the Soviets. It would provide a boost for the Soviet economy, especially in the consumer and service sectors that are largely nonexistent today. One dramatic but not atypical example of the current gap is in personal computers: "The Soviets now make a microcomputer called the *Agat*. A bright red machine, it is compatible with the aging Apple II but 30 percent slower; it sells for the equivalent of \$17,000."<sup>40</sup> Economic integration with the West would accompany a relaxation of tensions with the United States, which is necessary to lower the technology-transfer blockade anyway. Indeed some argue that substantial relaxation of competition with the United States in the international arena is *necessary* for the Soviets to solve their internal problems.<sup>41</sup>

A lowered threat perception on both sides is critical to Gorbachev's program. On the one hand, it can serve to lower international tensions, thereby allowing greater concentration of resources on domestic economic reform. To the extent that outside nations can aid in this effort, a receding threat is a political precondition.<sup>42</sup> On the other hand, a reduced Soviet military threat would provide access to technologies undergirding the technological battlefield of the 21st century and hence allow the Soviets to remain a first-class power and compete militarily, especially in high-technology weapons.<sup>43</sup>

The Gorbachev reform program gains a tone of nearly desperate sincerity if one assumes that the Soviets realize they are badly losing the race for technology, which promises to be the defining characteristic of international prosperity and status in the 21st century. Not only are the Soviets badly and possibly irretrievably behind, but their situation, if left unattended, will get worse.<sup>44</sup> With the superpower deadlock in nuclear and nonnuclear military forces now settling in, a nation whose sole claim to influence lies in military power is potentially in trouble. By that yardstick, the Soviets are indeed in trouble, and they appear to understand this.

It is commonplace to note that by any economically important measure, the Soviet Union is hardly a superpower—it is more akin to a Third World country. The only way the Soviets can even attempt to rectify that situation is through a crash program of total and systematic modernization of their entire economic system. A high-technology proficiency currently absent in the

Soviet Union is the key if such reform is to have any chance of succeeding. If one assumes that the Soviets realize this, then Gorbachev's reform package as the instrument to stimulate technological growth makes great sense. Acceleration of effort can aid consumption, making material rewards available for which citizens can work and strive. A primary goal of *glasnost* and *perestroika* can be seen as an attempt to create a seedbed from which an entrepreneurial class of inventors and innovators will sprout, thus leading to Soviet Silicon Valleys that are something more than Potemkin villages. Finally, the new political thinking which has been the basis for the Gorbachev peace offensive (e.g. arms reduction proposals, Afghanistan withdrawal, renunciation of the Brezhnev doctrine) makes sense if it is motivated by Soviet realization that they must allay Western fears about their motives and behavior to gain access to Western technology.

Given the nature and extent of the Soviet technological problem, it is difficult to conclude that they will be able to join the technology race successfully. Closing the gap may be both conceptually and physically beyond the Soviets, but certainly Gorbachev is pursuing the effort with dogged determination. Although our ability to influence the outcome is marginal at best, US policy enters here: Should it be US policy to try to assist Gorbachev's quest toward high-tech competitiveness? Or should we be content to watch the Soviets slide into the technological backwater of the 21st century? The answer, of course, depends on the way we prefer to see the power map of the 21st century: with a vibrant, prosperous Soviet Union as a full-time member of the community of nations, or with an increasingly backward, brooding, and isolated giant.

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